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THE

POPULAR EDUCATOR:

A COMPLETE ENCYCLOPAEDIA

of

Elementary, Advanced, and Technical Education.

NEW AND REVISED EDITION.

VOLUME I.

CASSELL, PETTER, AND GALPIN,
LUDGATE HILL, LONDON, E.C.;
AND 596, BROADWAY, NEW YORK.
At no period in the history of our country was it less necessary to offer an apology for introducing a national work on Education than at the present time. So keen is the competitive spirit of the age, that the advantage of knowledge in the struggle for advancement is apparent to all. The mighty power of steam applied to railways and vessels has developed national and international communication to a degree not dreamt of at the commencement of the century. Telegraphy presents to our view the daily contemporaneous history of the world; and the Press, relieved from those shackles which impeded its action and fettered its influence, has become a powerful medium for the communication of thought between the leading minds of the age. In the political condition of our own country a change has been wrought, the consequences of which the boldest prophet avows his inability to predict, but which all parties agree will be fraught with good or evil, according to the degree in which the new recipients of power may be possessed of the knowledge to use that power aright. The necessity of Education, therefore, which was fiercely combated when this work first saw the light, is now universally admitted, and the mode and the system alone remain to be discussed. This truth was fully recognised by no one more than the late Earl of Derby, the illustrious chief of the Conservative party, and he was pleased to accept the dedication of this work to himself. Gratifying as is this complimentary recognition of the services which the original edition of the Popular Educator has rendered in the promotion of National Education, we feel that the basis of our present claim upon the co-operation of all the friends of that great movement consists in this—that our system has been tested, its efficiency has been proved, whilst a sale of 750,000 copies has testified, on the part of those for whom it was designed, their appreciation of the work and its estimate of its value.

But some twenty years have elapsed since the Popular Educator first issued from the press, and during that period considerable advances have been made in many of the departments of knowledge. To perfect the work in accordance with all the discoveries up to the present day, we have found it necessary to introduce many new subjects, and to re-model many of our old lessons, and we shall spare no expense in making these changes as complete as possible. To amuse, to instruct, to elevate, will be our constant endeavour. To render the workman more perfect in his vocation, the soldier and sailor better fitted for the higher positions of his profession, the naturalist more conversant with the beauties of Nature, the politician further acquainted with the important events in the history of his country, and to place at the command of the student for the Civil Service or University Examinations all the branches of education necessary for his advancement, no effort will be wanting. Our ambition is to place in every English Home an Educational Encyclopedia, invaluable as a manual of study and a work of reference, which, whilst simple, progressive, and interesting in its style, shall be powerful for the improvement and the advancement of its students.

In the three great departments of knowledge which this Work will embrace—History, Science, and Languages—the end of such instruction, viz., its practical application to the affairs of life, will be kept steadily in view. Science will be taught not merely as abstract truth or an interesting intellectual exercise, but as embodying in all its branches those principles, a knowledge of which will explain the various phenomena of the world, and enable us to avail ourselves more intelligently, and therefore more successfully, of all the varied material with which Nature has supplied us.

Instruction in Languages—whether living or dead—will be so conveyed as to enable the student not only to understand a given set of books in any particular tongue, but to make him master of the language itself by gradual and easy, but yet real and tangible stages.

The Historic Sketches, by means of which we shall teach History, will, we hope, render that study no longer a mere record of battles, an obituary of kings, a mighty chaos of incident; but will illustrate how each nation has discharged its functions in the world's history—how each epoch has played its part in the drama of a nation's life.

A reference to our list of contents will show that under various heads will be included every branch of study which can possibly be useful in the varied walks of life.

The great aim and object of this Work is to enable the people to educate themselves. We have only to ask them to realise the magnitude and grandeur of the work in which they will be engaged if they determine to do so. Obstacles will be overcome by united resolution. Every difficulty surmounted will be additional strength for further victories. A good education is the best legacy we can leave to our children. It is the best investment we can make for ourselves. The educated man in every walk of life carries with him his own capital—a capital unaffected by monetary crisis—an investment whose interest is not regulated by the success of speculation—a legacy which none can dispute, and of which none can deprive.
LESSONS IN FRENCH.—I.

In commencing these Lessons in French, instead of beginning with a long chapter exclusively devoted to the pronunciation of words, and the variations which are caused in the sounds of vowels and consonants by changes in their relative position, we have thought it best to enter at once into the construction of the language, and endeavour, without unnecessary delay, in as plain a manner as possible, to make our readers familiar with its various idioms and peculiarities. The Section on French pronunciation will be divided into several portions, one of which will be given at the commencement of each lesson in French, until the subject is exhausted.

SECTION I.—FRENCH PRONUNCIATION.

I. THE FRENCH ALPHABET.

1. A tolerable pronunciation of any spoken language may be acquired by imitating the sounds of that language, as uttered by a living teacher. But the reading and writing of any language cannot thus be learnt. The pupil must bring into requisition something else besides his imitators powers, if he would thoroughly comprehend any language. The alphabet of the language to be learnt must be exhibited and examined, and then mastered.

2. An alphabet is a collection of different characters called letters, each of which represents its own peculiar sound. These letters differ from each other in name, form, size, and sound. Used as vehicles of thought, they must not only be familiar to the eye, but their use, both singly and combined, must be understood.

3. Two objects are to be borne in mind whilst persuing these preliminary lessons on French pronunciation, namely:—

First.—The acquisition of the correct pronunciation of the various sounds of the letters of the French alphabet.

Second.—To learn how to combine and use these sounds, in order to read the French language easily, intelligibly, and profitably.

4. The first object will be accomplished by the aid of analogous English sounds; that is, every sound represented by a letter or combination of letters of the French alphabet, will be unfolded, explained, and defined, as far as possible, by means of analogous sounds of a letter or combination of letters of the English alphabet.

5. The second object will be accomplished by learning a few brief and simple rules, illustrated and enforced by appropriate examples.

6. Diligent attention, patient labour, and a determination to succeed, will enable the learner to overcome every obstacle, and thus make him master of a language, not only exceedingly difficult for foreigners to acquire, but beautiful in itself, and co-existent with the triumphs of civilization.

7. The student's attention is next directed to the French alphabet. While the English alphabet contains twenty-six letters, in the French alphabet there are only twenty-five. It has no letter which corresponds to the English w, though it is occasionally found in French books. It is used only in foreign words, and then pronounced like the English v.

8. The French alphabet is divided into vowels and consonants.

9. THE VOWELS.—The vowels are six in number, namely:—

aeiouy.

10. THE CONSONANTS.—The remaining letters of the alphabet, nineteen in number, are called consonants, namely:—

bcdfghijklmn pqrstvwx.

11. THE COMPOUND VOWELS.—There are seven compound vowels, namely:—

ai au ou e ci ou ou on.

They are thus called because, being united together, each vowel loses its own simple sound, and helps to form another new sound. They form but one syllable, and are consequently pronounced by one emission of the voice.

12. THE DIPTHONGS.—There are six dipthongs, namely:—

ia iu eu ou ui.

They are thus called because, though pronounced as one syllable, the sound of both vowels is distinctly heard.

The following ten combinations of three successive vowels are also called dipthongs, namely:—

ai iu eu ou i u i u i u i u u.

These dipthongs are thus divided into syllables:—

ia iu eu ou i u i u i u i u u.

They must, however, be pronounced quickly, and as one syllable.

Sometimes, also, we find four successives vowels in the same word, namely:—

ouai in the word jouai, ounou.

The first example—ouai, is composed of two compound vowels, viz.: ou and ai.

The second example—ouen, is also composed of two compound vowels, viz.: ou and en.

In the last example—onfé, the final e is silent, and the three vowels are thus divided, viz.: on and é.

13. THE VOWEL Y.—The vowel y is frequently found combined with other vowels, but in such combinations it is never used as a dipthong. Its use in combination is peculiar, and will be fully explained hereafter.

14. THE NASAL VOWEL SOUNDS.—There are certain sounds called nasal vowel sounds, produced by the combination of the vowels with the consonants m and n, namely:—

am en im om um ym

an en in on un yn.

These sounds will be explained hereafter.

15. THE NASAL DIPHTHONGAL SOUNDS.—There are also certain sounds called nasal diphthongal sounds, produced by the combination of nasal vowel sounds with a vowel, not nasal, before them, namely:—

Ian ien ion um un oum ouin.

These sounds will also be explained hereafter.

16. THE LIQUIDS.—The following combinations of the consonants are called liquids, namely:—

il gn.

The sounds of these liquids are very common in the French language, and will be explained hereafter.

SECTION II.—THE ARTICLE.

1. In French the article [§ 13 (2)]* has, in the singular, a distinct form for each gender, as:—

Le fils, the son.

La fille, the daughter, the girl.

Le frère, the brother.

La sœur, the sister.

2. Before a word commencing with a vowel or an h mute, the final e or a of the article le or la is cut off, and replaced by an apostrophe, leaving the article apparently the same for both genders [§ 13 (7)], as:—

L'aunc (l'e anc), the grandfather.

L'auncle (l'auncle), the grandmother.

L'ahite (l'ahite), the landlord.

L'hotose (l'hotose), the landlady.

3. There are in French only two genders, the masculine and the feminine [§ 4]. Every noun, whether denoting an animate or inanimate object, belongs to one of these two genders.

Mac. L'homme, the man.

Fem. La femme, the woman.

Le livre, the book.

La table, the table.

L'arbre, the tree.

La plume, the pen.

Le lion, the lion.

La lionne, the lioness.

4. AVOIR, TO HAVE, IN THE PRESENT OF THE INDICATIVE.

Affirmatively.

Suis, j'ai, I have.

Tu as, Thou hast.

Il a, He has.

Elle a, She has.

We have.

You have.

They have.

They have.

* References thus [§ 13 (2)] refer to Sections in Part II. of these Lessons, but by references in Roman numerals, thus, [Sect. I. 36] the learner is directed to Sections in Part I., the portion of our "Lessons in French" which we are now commencing.
5. The e of the pronoun je is elided, when that pronoun comes before a vowel or an h mute, and replaced by an apostrophe, as J'ai [j(i)ai]. I have, as above [§ 146].

6. In interrogative sentences, when the third person singular of a verb ends with a vowel, and is immediately followed by a pronoun, the letter t, called euphonic [Sect. I. 30], must be placed between the vowel and the pronoun, and joined by two hyphens, as:

**A-t-il ? Has he?**

**RéSUMÉ DE EXEMPLES.**

Le tailleur a l'habit de drap du médecin.

Vous avez la lettre de la sœur du boulanger.

A-t-il le livre de la dame?

**VOCABULARY.**

Argent, m., silver.

Bas, m., stocking.

Bols, m., wood.

Chapeau, m., hat.

Charpentier, m., carpenter.

Cordonnier, m., shoemaker.

Coton, m., cotton.

Conteine, m., knife.

Cuir, m., leather.

Dame, f., lady.

Drap, m., cloth.

Pom, m., hay.

Habit, m., coat.

Médecin, m., physician.

Montre, f., watch.

Porte-crayon, m., pencil-case.

Robe, f., dress.

Satin, m., satin.

Sœur, f., sister.

Soie, f., silk.

Soulier, m., shoe.

Table, book.

Tailleur, m., tailor.

**EXERCISE 3.**

To be translated into English.


**EXERCISE 4.**

To be translated into French.

1. Have you the tailor's book? 2. No, Sir, I have the physician's watch. 3. Who has the gold watch? 4. The lady has the gold watch and the silver pencil-case. 5. Have you the tailor's shoe? 6. I have the tailor's shoe. 7. Have we the wooden table? 8. Yes, Sir, you have the wooden table. 9. Have they the silver knife? 10. They have the silver knife. 11. The lady has the silver knife and the gold pencil-case. 12. Have you the linen dress? 13. The physician's sister has the linen dress. 14. Who has the wood? 15. The carpenter's brother has the wood. 16. Have you the wooden stockings? 17. No, Sir, I have the wooden stockings. 18. Who has the baker's bread? 19. We have the baker's bread and the miller's flour. 20. Have we the horse's hay? 21. You have the horse's oats. 22. Have we the tailor's silk hat? 23. Yes, Sir, you have the tailor's silk hat and the shoemaker's leather shoe. 24. Have you the cloth shoe of the physician's sister? 25. No, Madame, I have the lady's silk dress.
motions, its place in the solar system, the great circles supposed
to be drawn on its surface, and its position in the heavens by
which it is surrounded on all sides; the diversified nature of
its surface, as seen in its mountains, valleys, plains, rivers, seas,
and oceans, and in the constitution and phenomena of the
atmosphere by which it is enveloped, as in a swaddling band;
and the different races of animals, including man, and the
various kinds of vegetable and mineral productions which are
distributed over its surface.

It will be sufficient for our purpose, in this first lesson, to
state generally that the form or shape of the earth is that of a
globe or ball, and that the height of the highest mountains on
its surface is so small in comparison with the size of the earth,
and interfere so little with its roundness, or roundness, that this
height has about the same proportion to the diameter of the
earth, which its thickness of common writing-paper has to the
diameter of a twelve-inch terrestrial globe. The ancients had
possessing all those antiquated notions in science, particularly
in geography and astronomy, which the un instructed tribes of
Asia, Australasia, and Polynesia possess at the present day.

"The Hebrews," says an eminent writer, "obviously never
attempted to form any scientific theory respecting the structure
of the earth. The natural impression which represents it as a
flat surface, with the heaven as a firmament or curtain spread
over it, is found to be universally prevalent. Beneath was
conceived to be a deep pit, the abode of darkness and the
shadow of death. In one place we find the grand image of the
earth being hung upon nothing; but elsewhere the pillars of
the earth are repeatedly mentioned; and sometimes the pillars
of heaven. In short, it is evident that every writer caught
the idea impressed on his senses and imagination by the view of
these grand objects, without endeavouring to arrange them into
any regular system." We have quoted this passage as a
specimen of the loose style of writing and thinking regarding

no such knowledge of the earth as we now possess; and though
some of the most intellectual of the philosophers of Greece, such
as the famous Pythagoras, are supposed to have reached the
notion of its globular form, it was buried under a cloud of errors
and extravagances.

To the most extended view which the human eye can take of
any part of the surface of the earth, even from the highest
eminence found on that surface, it appears to be one vast and
illimitable plain, diversified by hill and dale, land and water,
mountain and valley. The heavens appear to be a luminous
dome above the head of the observer, bespangled with stars at
night, and they seem to rest on the surface of the earth at an
immense and immeasurable distance. He feels as if he would
be afraid to travel so far, either on land or sea, as to reach the
limit which he supposes must ultimately be found to this
surface, lest he fall over into an interminable abyss; and he
supposes that the phenomena of the heavens are confined to the
upper and visible concave which he beholds, while his imagina-
tion domes all beneath his feet to death and everlasting oblivion.
Such were the limited notions which prevailed at an early period
in the history of the world; and it is one great proof of the
antiquity and authenticity of the sacred Scriptures, that they
describe men as they really were in ancient times, and as

the science of the sacred Scriptures. The style of these
writings, in the places above referred to, is highly poetical; and
who, we would ask, expects to find didactical theories in a poem?
The poet seizesthe phenomena of nature as they appear to the
eye, and enlarges, magnifies, or arranges them at pleasure; he
is not tied to rules, nor confined to the language of the
schools. To do so, would destroy his poetry, and reduce his
imagination to an automaton. The book of Job, in which these
grand expressions are found, is the oldest book in the world.
It was written long before the time of Moses; and though found
in the Hebrew language, it was evidently not written by a
Hebrew. It is curious, however, that the writer of this book
should have lighted upon such a striking fact, as that the earth
hangs upon nothing! Had this been found in a Chinese or a
Hindoo book, possessing such claims to antiquity as the Hebrew
book, it would have been lauded to the skies as a proof of
superior knowledge, and would have been held as an infallible
proof that the Chinese or the Hindoos, ages ago, were actually
acquainted with the facts of modern science.
The same writer looks to Phoenicia for the origin of geogra-
phical knowledge; and there can be no doubt that, being some
of the earliest merchants and traders both by sea and land, the
Phoenicians must have been among the first nations of the world
LESSONS IN ENGLISH.

I. INTRODUCTION.

In commencing a series of lessons in English, it appears desirable to let the readers of the Popular Educator know what they may expect. Briefly, then, we intend to exhibit the facts of the language and the productions of the language. The facts of the language, if systematically presented, will involve its laws; and on the other hand, the productions of the language, historically treated, will comprise its literature. In this way, through the productions proposed for our consideration will obviously lead the careful student to a knowledge of the language. Nor without a study of both the facts and the productions can any such knowledge be acquired. A knowledge of any language implies a familiarity with its literature, and a familiarity with the facts or laws of its construction. It is not possible to have one without the other, any more than it is to know the principles of Greek art without having studied its masterpieces. Apart from the facts of the language, we must learn its grammar; apart from the grammar of a language, we cannot know its literature. The literature of a language is the organic life, whose laws the grammar has to learn and expound. The grammar of a language is merely a systematic exposition of the laws observed in the composition of its literature. Hence it is that an acquaintance with the literature of a language should precede the study of its grammar. Indeed, the productions of a language are earlier than its grammar. Men pronounced sentences, delivered speeches, composed and sang poems, long before they had any idea of the rules of which grammar is composed. The thought of the rules of which grammar is composed then came out of many utterances at last grew the science of grammar. Grammar has no other function than to deduce and set forth the laws of a language, which have been already observed by some great writer or great writers. The criticism which in Greece gave birth to grammar was long posterior to Homer.

The knowledge of the grammar of a language, then, does not involve a knowledge of the language itself. Still less are the

who acquired some knowledge of its surface, and of the countries it then contained. It is admitted that the tenth chapter of Genesis contains a view of the known divisions of the earth at an early period, and that it agrees in some striking particulars with the records of profane history! It is also acknowledged that Ezekiel visited Tyre, as Herodotus did Babylon, with the eye of an intelligent observer; and it is considered probable that he journeyed through the most frequented and traveled portion of the great school of commerce and navigation. The geographical boundaries to which he alludes are considered as placed at the latest limits of their knowledge—viz., Tarshish, Ophir, the Isles, Sheba and Dedan, the River, Gog and Magog, and the North.

Tarshish is deemed, with very great probability, to have been the name used in Scripture for Africa. It appears to have belonged originally to a great African city, called Carthage in later times, and that it was known by the Romans from the extremity of Africa, which extended to the whole continent of which that city might be considered the metropolis; but especially to that division of it, now known by the name of Northern Africa, exclusive of Egypt and the countries adjacent to the Arabian Gulf. This division was called by the Romans Africa Proper, that is, Africa Proper, and included Carthage; and Jerome calls a voyage to Tarshish an “African voyage.” This also solves a difficulty which has been found in the Scriptural accounts of two different voyages to Tarshish, one of which is to be found in the Strait of Gibraltar, bringing iron, silver, lead, and tin, the produce of Spain and Britain (Ezek. xxvii. 12); and the other, the Red Sea, or Arabian Gulf, from the Strait of Bab-el-mandeb, bringing gold and silver, ivory, and apes, and peacocks, the produce of Central Africa (1 Kings x. 22).

Ophir, as being connected with Tarshish and Sheba in the voyages of Solomon’s ships for gold and other produce, is rightly considered as a part of Africa, which indeed appears highly probable from the similarity of the name. The eastern coast is the quarter to which all the indications seem evidently to point. In the voyage to Tarshish by the Red Sea, the name of Ophir is also mentioned, and in one case the latter is substituted for the former (2 Chron. ix. 10). But we have seen that Tarshish is a name for one part of Africa; now, Ophir is a name for another part of the same continent. As gold is the produce of Ophir, we must look to that part where it is to be found. This, for the sake of consistency in the history of the voyage, can only be the Sheba, where abundance of gold is said to exist, and whence it could easily be brought in ships through the Red Sea to Sheba in Arabia; from the Strait of Bab-el-mandeb it could either be carried overland through this country to Jerusalem, or it could be transported up the gulf to the place now called Suez, whence it could readily be brought into the palace of Solomon the king.

The Isles, the isles of the Gentiles, the isles of the sea, the isles of Chittim and of Elishah, all point out the islands which abound in the Mediterranean, which is called “the sea” and “the great sea” in Scripture. These are acknowledged to be Sicily and the other islands belonging to Italy and Spain; the islands of Greece, a country almost wholly insular and peninsular; and the islands of Cyprus and Crete (Candia), with various other smaller islands scattered through the Archipelago, and lying on the west of Asia Minor.

Arabia Felix, or Arabia the Happy, is considered to be the country, as it is sometimes called Sheba or Saba. Its trade was in gold and incense; and it was carried on by caravans which came from the coast, where they had been imported from Ophir. The “companies of Sheba” are mentioned in Job—a fact which shows the antiquity of its commerce; and the “multitude of its camels” are spoken of in Isaiah—another fact which shows its value and long continuance. The commerce of Dedan rivalled that of Sheba. It came up the Persian Gulf from the Strait of Hormuz. The imports were ivory and ebony, and “precious cloths” of India. These were brought by ship from India, and they were carried across the desert of Arabia, or Arabia Deserta, into Petra, the capital of Arabia Petraea, or Arabia the Stony, which consisted chiefly of the ancient country of Idumae, or Edom. The inhabitants of Dedan were only the merchants who brought the produce of India to the capital of Edom, as a depot for the supply of the countries lying to the north and the west of it, and the travelling companies of Dedanim might consist of native Hindoo or Asiatic traders, whose home was on the desert.

The River meant the great river, the river Euphrates. On its banks stood the mighty capitals of Assyria and Babylon, and there flourished the most renowned empires of antiquity. Here also was supposed to have been the seat of Paradise, or the garden of Eden. Thus saith the poet:

"Seek not for Paradise, with curious eye,
In Asia’s climes, where Tigris’ waves
Mix’d with the Euphrates, and the Taurus joy,
Doth the broad plains of Babylonis rave.
’Tis gone with all its charms, and, like a dream,
Like Babylon itself, is swept away;
Behold one tear upon the mournful theme,
But let it not the gentle heart dismay.
For know, wherever love and virtue guide,
They lead us to a state of heavenly peace;
Where bliss, unknown to guilt and shame, prevails,
And innocence and virtue reigns in its place."
two identical. Grammar is only one branch of the tree. Important as grammar is, it is scarcely the most important of the branches, which is to form a knowledge of a language. Grammar is only a means to an end. It is a pathway to the temple. The temple itself is the treasure of great thoughts which constitutes the literature, and which we have termed the productions of a language. It is for this treasure that a language is worth the labour of study; and in regard to literary treasures, no language will repay attention more fully than the English.

From what has been said, it is also clear that the grammar of a language is to be learnt in its literature. Grammar is no arbitrary thing. Its rules are not inventions. Its forms are not optional. They are both merely general statements of facts—facts ascertained by the careful perusal of what we term classical authors; that is, authors of high and universal repute. The office of grammar is to make a systematic report of the usages observed in writing by the great minds of a nation. Hence grammar is a science of imitation. The grammarians, like the sculptor, take a model, and having studied its parts and qualities, endeavours to reproduce the whole. Authority, in consequence, is the great principle recognised in grammar. The authority of such men as Macaulay, Mackintosh, Addison, Dryden, Shakespeare, is, in grammar, paramount and supreme. What they do we must follow, and we must follow it because it is what they do. The words, their forms, and constructions must be ours. They are our masters, we their scholars. They give laws, we obey the laws they give. Scarcely less important than the quintessence of many grammarians, the English language, is the law of custom, and what is customary in a language is known by what is customary among its best writers.

Let it be observed that it is the English language that we are about to study. Consequently it is the qualities and the laws of that language that it will be our business to ascertain. If we were studying Sanscrit or Hebrew, then the qualities and the laws of the Sanscrit and the Hebrew would be the object of our search. Disregarding them, we are equally to disregard the qualities and the laws of the Latin. The best of Latin grammarians would be a very bad English grammarian, and a usage in Latin is no authority for the introduction into English of a similar usage. The principles now set forth determine the instruction of our proceeding. We have no intention to copy forms and rules from the writings of former grammarians, or to arbitrarily devise forms and rules. We shall rather take the language as it is, and inquire into its qualities and laws. Beginning with the simplest conceptions of thought, we shall the student to analyse them, and from such analysis to deduce for himself the fundamental facts and principles of the English tongue. This process must be pursued, as far as it may convey the meaning of the language or its grammar; secondly, in regard to the productions of the language or its literature; and thirdly, as an appendage to the last, in regard to the origin and progress of the language or its history. If the reader attentively accompany us over this extended field, he will possess a full as well as accurate acquaintance with the English language.

Language is the expression of thought by means of articulate sounds, as painting is the expression of thought by means of form and colour. The relations which subsist between our thoughts, when carefully analysed and set forth systematically, give rise to logic. The laws and conditions under which the expression of our thoughts takes place form the basis of grammar. The logician has to do with states of the intellect, the grammarians is concerned with verbal utterances.

A cursory attention to the subject will suffice to prove that there is no province of human knowledge which, no province of the universe of things but is subject to law. Each object has its own mode of existence, which, in conjunction with the sphere of circumstances which surround it, gives rise to the laws and conditions by which it is controlled. Accordingly, language takes its laws from the organs by which sound is made articulate, from the culture of the intelligent beings by whom these organs are employed, from the purposes for which speech is designed, from the laws of men and other outward influences in union with which these purposes are pursued.

Were there no such laws the science of grammar could not exist. The sciences are in each case a systematic statement of generalised facts—in other words, of definite laws; and grammar rests on phenomena clearly ascertained, invariable in themselves, capable of being distinctly stated, and equally capable of being wrought into a system of general truths.

If the conditions under which thought became speech had been in all cases the same, there would only have been one language on the face of the earth. Descending from man as a common progenitor, the various tribes would have spoken a common tongue. But at Babel the builders were scattered and became different tribes and tongues, with the most diversified character, and engaged in the manifold kinds of life. Men’s pursuits were different almost from the first. Climate and soil change with every change of locality. And both original endowments and the degree of culture super-inducing by external influences, or what may be termed indirect education, would be as diverse as the tribes, not to say the individuals of which the species consisted. All these diversified usages would be due to the laws of language, the time at which the tongue would increase and harden into different languages.

From this diversity there arise two kinds of grammar—the universal and the particular. Universal grammar is formed by studying language in general, by passing in review the several languages which exist (or most of them), and selecting and classifying those facts which are common to all. Particular grammar is the result of the study of any one given language. By a careful consideration of the usages of the best English writers we would discover the English language. If, after we have ascertained the laws of a number of separate languages, we then compare our discoveries one with another, and mark and systematise what we find common to them all, we compose a treatise on general grammar. Particular grammar resembles the anatomy of the human frame, and limits its teachings to one set of objects. Universal grammar is like comparative anatomy, which treats of the general laws of animal life, as deduced from a minute study of the animal kingdom in general.

It is with particular grammar that we are here concerned;—of the grammar of our nation—namely, the English—we have to treat.

Grammar and logic, or the laws of expression and the laws of thought, are, we have seen, closely connected together in the nature of things. Not easily, then, can they be separated in the study of grammar; not except when the facts are to be compared to the ordinary terms employed in English grammars. In these cases, however, and in other things in which we shall depart from what is usual, we shall also supply the customary views and the ordinary terms.

As the English language, like other languages, was spoken before its laws were formed into a systematic treatise called a grammar, the real facts of the language, in their primary and their model form, exist and are to be looked for in the everyday usages of educated persons. Hence the laws of educated persons is of authority in grammar no less than the laws of the best authors. Nay, we seem likely to find a language in its greater purity when we take it from the lips of educated persons generally than when we derive it from the somewhat artificial shapes which it assumes in the learned or the popular volume. If so, "household words" are good for grammar as well as for practical wisdom. And so it is in the nursery we may look for the English tongue in a form the most simple and yet the most idiomatic. Of all teachers of English grammar the best is a well-educated English mother. Hence it is evident that a nursery, in a cultivated English home, is the best school of English grammar. As a matter of fact, it is in such schools
LESSONS IN DRAWING. — I.

INTRODUCTION.

Before we enter upon the subject of drawing, and how to draw, it will be of great service to some of our readers who may make up their minds to practise from our instructions, to give some little advice respecting the materials necessary for their use. First, the paper: the best and cheapest kind is that called "drawing cartridge," the imperial size is the most commonly followed, which when cut up into quarto, or four portions, will afford sufficient room for the subjects we intend to place before our pupils. Drawing books made of this paper, as well as the paper itself, with pencils, drawing boards, and other drawing materials, can be obtained from the publishers.

The next and most important of all the materials are the pencils: for free-hand drawing—that is, drawing without the use of instruments—we recommend HB, B, and H. The H pencil is first used for marking in the general proportions and character of the subject; then the HB pencil, and lastly the B, is used for the shading. The H pencil may be very easily effaced without disturbing the surface of the paper; and what is equally important is, that after the whole subject is arranged the drawing may be reduced in tone—that is, made lighter to receive the finished outline—to be done with the HB, which makes a cleaner and more definite line than the H. The B may also be used for shading, especially the broad or flat tones of shade: the HB is the finishing pencil for the extreme depth of tone in the darkest parts. For plan and geometrical drawing, an HB pencil is the most suitable. To ensure that the pencil is cut evenly with a sharp knife, not hacked or jagged as in Fig. 1. Fig. 2 represents the most suitable form of point. You must have a deal drawing board, half-inch or three-quarters thick, according to size, upon which the paper is to be laid and pinned down with flat-headed drawing pins. For highly-finished and important drawings it would be better to fix the paper in the following manner:—Wet both sides with a sponge, being particularly that the paper is quite flat, then turn the edges up all round about three-quarters of an inch broad, and paste the under-side: wait a minute or two until the paper has sufficiently expanded (which is caused by the wetting), then, having placed it evenly on the board, turn the pasted edges down and press them close to the board, under a cloth or piece of waste paper; once more wet the paper gently all over except the pasted edges, and lay the board down flat, somewhere, to dry; the pasted edges must dry first, or the paper will fly up, because as it dries it will contract independently; and the pupil is able to fix his paper successfully. He will see for himself the advantage of having a firm and smooth surface to work upon.

The most convenient size of board is twenty-three inches by sixteen inches—this will take half of an imperial sheet of paper, very useful for plan drawing and working plans; these, with a piece of India-rubber, will be quite sufficient to start with. Thus, having provided ourselves with implements, we will proceed to open our subject:

Many believe that the art of drawing can only be acquired by a fortunate gift—viz., by those who are supposed to possess a power which is but sparsely distributed through the animal kingdom in general. This power or gift is by them called genius, and they almost deem it an act of presumption to undertake the practice of the art unless they were previously assured that they possessed this gift, or power, or genius, or whatever else it may be termed. There are many who, after making a few attempts towards acquiring the power of drawing, give it up, and excuse themselves from further efforts by saying, "Oh, I have no genius for it, or I am too lazy to practice." Such a mistake is very common; there will be scarcely a road to this who could not furnish one or more cases in proof of the statement. That genius is not absolutely necessary, we know from undeniable evidence; there are and have been thousands of men who have proved themselves to be able draughtsmen, without adding to the list of our Raphaelics and Turners; and there are very few indeed, considering the number who exercise the art, and whose success in drawing we must acknowledge to be very great, who can rank as first-rate artists. Knowing, then, this to be the case, we relinquish all attempts to create genius, and confine ourselves, by simple, practical instructions, to open a way by which any one who has the courage to persevere may acquire the power of drawing from natural or artificial objects, and enable him to represent his ideas in a way of which no other art is capable. For purely mechanical drawing, however, if, the exact representation of the forms of objects, be they animals, trees, machines, or structures of what man's or nature's genius beyond an earnest desire is required. Only let the pupil commence and proceed with a determination that nothing shall daunt him, to follow out certain leading principles, which having mastered, he will then discover that the application of these principles will render the art not so difficult as he at first imagined. Nevertheless, it is one thing to be able to draw a simple object, or a combination of these objects, and it is quite another thing to expect that having acquired this power, you will without result, in producing a talent for the higher qualifications of the artist. No; a great deal may be done towards gaining a full mastery of the principles of drawing applicable to a faithful transcript of any object whatever, before arriving at the stage which introduces us to that exalted position where genius is necessary for the full development of the poetic, or more elevated results of the artistic mind. In order, therefore, not to discourage the pupil we have attempted to point out that, by undoubted preparation and determined effort, without result, in producing a talent for the higher qualifications of the artist. No; a great deal may be done towards gaining a full mastery of the principles of drawing applicable to a faithful transcript of any object whatever, before arriving at the stage which introduces us to that exalted position where genius is necessary for the full development of the poetic, or more elevated results of the artistic mind. In order, therefore, not to discourage the pupil we have attempted to point out that, by undoubted preparation and determined effort, every impediment he may meet in his progress; and for any one who is earnest in his work there is this encouraging thought, that if he meets with a succession of difficulties, and manages by perseverance to surmount them all one after the other, he must be making sure progress, whereas if none present themselves he may be assured he is standing still.

Our purpose in these lessons on drawing is first to enlarge upon the leading principles, and, taking these for the groundwork, we intend to apply them to all subjects, whether they be still-life (or objects), figure, or landscape drawing.

It is important to mention that, to draw a line successfully, much depends upon the position of the body, the hand, and the arm. The pupil must sit as uprightly as he can, having the copy and the paper he is drawing upon in a direct line before him; he must be able to see both his copy and his own drawing without raising his head; and it will be a sign that the pupil is not working his work—it is bad for his health, and bad for his picture. We do not sit in the same position to draw as we do to write. The pencil is not subject to the same rules as a pen; it must be so held that if dropped from the hand whilst in the act of drawing the line, it would fall on the paper at a right angle with the line. For instance, to represent a perpendicular line (see a to b, Fig. 1), the pencil must be held as shown in the engraving, if a horizontal line is required the pencil must be held as shown in Figs. 3 and 4. By attending to this rule we have such a command of the pencil that without moving the wrist we can reach either end of the line, or that portion of the line we wish to draw, without any danger of its being directed out of its proper course.

The pupil, very probably, will have noticed that there are but two kinds of lines to draw by which all objects whatsoever are represented—viz., straight lines and curved lines. It is the
disposition of these lines—in some cases all straight, in some all curved, and in others straight and curved united—that makes up the representation of the object before us. Their lengths, their positions, their curvatures or bendings, and the manner in which they are connected with each other, combine to represent the various forms which nature and art so abundantly furnish. The question then narrows itself to the consideration—how are we to treat these lines?

We will begin by a caution, and direct the attention of the student to the pernicious and unsatisfactory way which many pursue when drawing a line. They begin, we will say, at the top (Fig. 5), a, and make a series of continuous scratches until they have reached the supposed end at b. Now here, at the outset of our instructions, let us endeavour to impress upon the student that such a mode of procedure is fatal to anything like success in drawing. They who follow this practice depend upon the advantage of being able to rub out their failures, and try again and again, with very creditable perseverance, until they arrive at something like the line they wish for; but when the subject is a complex one—that is, one made up of innumerable lines and curves—and this scratching and rubbing-out process is repeated, it cannot be surprising if we should see the unfortunate beginner, labouring under despair and excitement, throw the whole aside in disgust, being fully persuaded in his own mind that he will never be able to make any progress whatever. They who follow this plan generally say drawing is exceedingly difficult, and that it requires genius or natural talent to enable any one to succeed. We therefore earnestly desire to impress upon all who hope to draw well not to allow themselves to fall into a method which we must again call most pernicious and unsatisfactory. To draw a single line requires the same care and judgment as a combination of any number of lines; each line must be drawn cleanly, and with a knowledge beforehand of its proper position. The same principle that regulates one regulates the whole; it is only a repetition of that principle according to the number of lines in the drawing. We wish particularly to impress this idea upon the mind of the student.

To draw a line at random, without a previous arrangement, trusting more to good luck than to skill for its being correct, and leaving out all consideration or inquiry as to its fitness until it is drawn, is the most discouraging practice that can be followed. Let the student make up his mind, before he attempts to draw the line, where it is to begin, and where it is to end. Take a single line for an example (Fig. 6). Let it be supposed it is to begin at a and end at b; make a point where it is to begin and another where it is to end, and follow this practice invariably, whatever the subject may be, and whatever may be the number of lines that compose it. If the line be too long to draw at once without leaving off, mark any number of points in the direction between the two points a and b, and mark those points first which are nearest the extremes (the order of the letters in Fig. 6 will explain this), ending with those near the centre. When these points are properly placed so as to be in a straight direction, join a to c by one continued and carefully drawn line—that is, without leaving off (observing what has been already said about the position of the pencil); then draw a line from c to e, from e to d, and from d to b, as in Fig. 7. By this process of marking in the distances where there is a combination of lines, we overcome one, if not the greatest, difficulty in free-hand drawing. There are other helps for placing lines correctly, all of which will be noticed in their due course. The method of drawing a line must be practised over and over again

until it is accomplished. Then in the same way draw lines in a horizontal position, as in Figs. 8 and 9; then again inclined lines, as in Figs. 10 and 11, 12 and 13.

As we have said that all objects are to be represented by straight and curved lines, we will present a simple combination of these lines as an illustration of our system, when the utility of placing points to mark the positions and distances will be evident, for by this process we obtain that which one word will express, the arrangement of the drawing. It is this arrangement of the places where the lines are to be drawn that we would earnestly impress upon the learner the necessity of repeatedly practising, for upon this will depend the power of producing a correct and satisfactory drawing.

Figs. 14 and 15 may appear to be only a piece of scribble, yet they contain all that is necessary for the purpose of illustrating our meaning. First, then, observe the position of a with regard to b (Fig. 14), and their distance from each other, and place points to correspond, as c and b in Fig. 15; and also the positions of the other characteristic points respectively—l with regard to a being in a direct line with a and b; c with regard to l and a; also d perpendicular with c, and so on; e and g on the same level, e being perpendicularly under b, i under f, and k somewhat below the position of i under g. When all these characteristic points and distances are determined, then, as in the drawing of a simple line (as before explained), join these points by lines straight and curved as in the example, Fig. 14, producing the result as in Fig. 15. Respecting the importance of this fundamental principle, we cannot too earnestly impress it upon the mind of the pupil, and recommend him to practise it frequently.
HISTORIC SKETCHES. — I.

MAGNA CHARTA.

It was high time something should be done when the prelates and barons of England mado King John sign the Great Charter. The land had had no rest, the people no security, since the day when Duke William overthrew King Harold at Hastings, in October, 1066. If we take a glance at the history of the hundred and fifty years immediately succeeding the Conquest, we shall find it a record of many kinds of violence, an account of one perpetual striving which should be the greater, and it shows incidentally how much less than the whole world a man was willing to accept in exchange for his soul. Brother had striven with brother, sons with their fathers, for the throne. Kings had striven with prelates, barons with priests, for the mastery; baron had waged war on neighbouring baron on account of some private quarrel; even the religious houses were divided against themselves; and “the people” — that is to say, all those who were not of the so-called noble class — had been fearfully ill-used. In spite of the spirit of armed religion, as embodied in the institution of chivalry — in spite of the efforts of great and good men to procure some recognition of the law which bids us do unto others as we would have them do unto us, the grossest tyranny prevailed. The weakest went to the wall, and of the rulers it might well be said —

“The good old rule
Sufficeth them — the simple plan —
That they should take who have the power,
And they should keep who can.”

Under such circumstances, it is not very wonderful if we find that the position of all classes beneath the highest, and notably the class which furnished labourers, was perfectly intolerable. The king oppressed the barons, the barons fought among themselves and oppressed their weaker brethren, the lesser barons oppressed the small freeholders, and the small freeholders coalesced themselves with the thralldom in which they kept the labourers who depended on them for a living. Sometimes things were better, sometimes worse; but at all times, as far as the workmen were concerned, bad was best. “Christ and his saints slept,” said the poor people in the reign of Stephen, 1135-1154. In no other way could they account for their grievous condition. “You might as well have tilled the sea” as the land, says the Anglo-Saxon chronicler, for when the husbandman had spent his labour and his earnings so as to induce the earth to bring forth her increase, lawless men swooped down upon the crop, and as often as not slew the helpless owner of it, and drove his family into slavery. Every man who was strong enough built a castle, forcing the people to work at the stronghold which was to oversee them; and he paid them for neither time nor trouble. “They filled the land full of castles” — there were eleven hundred in England in Stephen’s reign, when the population was under two millions — “they greatly oppressed the wretched people by making them work at these castles, and when the castles were finished they filled them with devils and evil men.” So wrote the chronicler.

At times the Church lifted her voice to warn, to exhort, and to threaten; and now and again, in the most solemn manner, put the most notorious evil-doers out of the communion of Christian men; but in spite of the superstitions fears, which were general, respecting the power of the priesthood, the Church was nearly powerless to stop the universal rapine, until she resorted to the bold expedient of putting Christianity under arms. This she did by founding, or rather by monuding on her own plan, the institution of chivalry. She enlisted under the banner of the Cross the choicest and most generous of the warlike spirits, and having sworn them by word and deed, in every way, “to break the heathen and uphold the Christ,” she sent them forth against the wolves who were making such havoc in her sheepfold. Murderers, robbers, violators, scoundrels of all sorts, began now to count the cost of their actions, and then they hesitated about repeating them, for they found they had to lay their account with cracked “kulls and slashed
bodies in this world as well as with a solemn promise of eternal damnation in the next.

Henry II. roused matters a bit when he came to the throne in 1154, and by persevering in a wise policy strove to reduce to something like order the chaos into which society had fallen; but during the crusade which was led by Richard I. in 1190, and especially during the king's captivity in Austria, selfishness and wickedness in high places at home found scope for exercise, and law became silent amid the din of arms. From the Lion-Hearted himself, peer and commoner were content to endure much; they saw in the fearless, generous, though Norman, crusader, one who was capable of judging fairly in matters of policy, and, if not, their judgments, and they bore with something like satisfaction the continuous and heavy demands which he made upon their blood and treasure. But the Lion being dead was succeeded by one who had played the traitor against him during his lifetime, who had all the ferocity and all the cruelty of his brother without one of his noble qualities, and who was already known to the people by the utter depravity of his life. Here is his portrait, drawn by one of our ablest historians: "He stands before us polluted with meanness, cruelty, perfidy, and murder; uniting with an ambition, which rushed through every crime to the attainment of its object, a pusillanimity which often, at the sole appearance of opposition, sank into despondency. Arrogant in prosperity, abject in adversity, he neither conciliated affection in the one, nor excited esteem in the other." Nor was this all. The man was the servant of every humbug, robber, and tyrant. There was no merciful one family, even among the nobles, that did not smart under a keen sense of that injury which no man pardons to another. The sin for which Iacretia suffered and which drove the kings from Rome, the sin from the taint of which Virginus saved his daughter by killing her;—that sin sat heavily on John's soul, and stirred to their lowest depths the hearts of all England against him.

From such an one the nation would endure nothing tamely, not even those acts which former kings had done, and which by prescription had almost obtained the semblance of law. The barons were utterly enraged, the clergy were fixedly hostile, and the people were suffering to that degree at which they sometimes turn and teach their wrongers "in some wild hour how much the wretched dare." The king was quite unable to ride on the whirlwind he had brought about him, and everything was ready, everybody was prepared, for a revolution. But one thing was wanting to make the revolution successful. There was abundance of muscle, enough and to spare of disposition to kick against the tyrant, but there was not any one to gather the headstrong passions into a focus whence they might act with effect upon the object of their wrath. The barons and those under them—the wrongs the barons suffered at the king's hands taught them sympathy with those who whim so suffered wrong at their own—represented a force as capable of revolution as a multitude of bulls is, but they lacked the skilful guide who might gather up their strength and lead it to the goal they wished to attain. They wanted Geist. *

Before we ascertain whence Geist came, and the manner in which it worked, let us see rather more particularly what it was that the barons and the people suffered that was so intolerable.

When the Conqueror obtained possession of the island, A.D. 1066, he gave the land to be divided among his followers and other persons by such conditions as he imposed upon them—a very necessary one to a prince who was only in military possession of the country—was, that whenever summoned they should attend him with so many men-at-arms, archers, etc., according to the extent of their fees or holdings, for six weeks at their own expense. This was the only strictly feudal obligation; but custom added a number of other obligations, which, though smaller, were more galling. If a baron represented a body of fifty families, he was obliged to supply a way of "relief," as it was called, or a fee to induce the king to accept him in his father's stead; and if the heir were under age, the king had the wardship of him, an office which enabled the king to put into his own treasury the difference between the youth's income and the cost of his keep and education, for though the situation was really one of trust, practically it was made the means of profit to the trustee. If the ward were a woman, the warder could marry her to whom he pleased. For the purpose of making the king's eldest son a knight, and for providing a dowry for his younger daughter, or a bride for an Englishman, if one should subscribe; and when the king went on a journey through any part of the country, his purveyors were in the habit of taking for the royal use, cattle, provisions, horses, carts, and whatever else might be wanted. Though as a matter of prudence the feudal prince summoned the grand council of all his tenants if he wanted their advice, he was under no legal obligation to summon them; and they might not meet at all. For it was not supposed that a feudal prince could want money, seeing he had large demesne lands specially reserved to him, there was not any law forbidding him either to ask for it or to take it from the tenants.

Now it is easy to see that all the above-named institutions were liable to great abuse; and as a matter of fact they were abused to an unbearable extent. Beliefs, wardship, purveyance, the expensive military attendances, or the money commutation for it—all were made the means of screwing money or money's worth out of the people, and the Church, which held a great proportion of the land in the kingdom, was subject to spoliation as well as the lay tenants. All were tarred with the same brush. The sacred trust of guarding the infant orphan was sold for a fixed sum, and the purchaser of the trust got all he could for his money out of the ward's estate; men bought the office of sheriff, who were warders of the king, and the right was sold to the highest bidder, almost without reference to personal qualifications.

But this was not all. John gave that worst sign of an evil government—the sale of justice. Henry II. had sold decrees, but the nuisance culminated under John. On the roll of the Exchequer are numerous entries of gifts, sometimes of money, sometimes of goods, in consideration of the king's influence to get a verdict. The judges also took bribes, and that in cases where the Crown was concerned.

Lastly, there was the great grievance of the forest laws, those remote ancestors of our existing game laws. These laws, made by the cruel Conqueror, who, says a Norman monk, "loved the tall stage as if he had been their father," made it a felony, punishable with loss of limb for an unauthorised person to be found in a forest, and by the same law it was made a capital offence to kill a stag.

If all these things were done in the green tree, what could have been done in the dry? If the king so acted towards the barons, prelates, abbots, and other chief tenants, how did these in their turn behave towards those under them? Badly, it is to be feared, though they made the best compensate they could, under the dictation of Geist, by including them with themselves in the charter of liberties. With the wretched labourers, the villains, and poor ploughmen, who knew not in the evening what they were to do in the morning, but they were bound to do whatever they were commanded," who were liable to beating and imprisonment at the will of their lord, who were incapable of acquiring property, or of giving freedom to their children—we have not now anything to do. They, alas! benefited but slightly by Magna Charta; their time of emancipation had not yet come.

Let us now look to what Geist did to remedy, as regarded freemen, the wrongs from which they suffered.

Stephen de Langton was an Englishman who had been promoted to the see of Canterbury by the Pope, in defiance and in spite of the king. Before he gave John absolution, and took off the ban under which England had lain for the six years prior to 1213, he made the penitent swear to abolish all unjust practices, to do right, and to govern according to law; but a short time afterwards, the barons having refused to follow the king in an expedition to France, John turned his hired troops loose on the barons' lands, and burned and pillaged right and left. Langton met him at Northampton, and again at Nottingham, and by threatening to excommunicate every one of his followers, compelled him to desist. But Geist, in the shape of the Primate, knew that other means must be taken to prevent a repetition of violence. At a meeting of the barons in St. Louis's Cathedral, London, Langton said he had discovered a charter of liberties which Henry I. had granted when he was desirous of winning the support of the English against his brother Robert. He read the charter to them, and suggested

* The meaning of the word Geist is hardly to be rendered by any single equivalent in our language. It embodies the meaning of Brain, Sense, Discretion, Intelligence, and Will.
to the men of war that they might so combine as to compel the king to enlarge and re-grant it. This was in August, 1213. In November of the following year the barons met again at Runnymede. Langton having, in the meantime prepared a draft of the demand that should be made upon the king. His were the brains, his the Geist, that marshalled the warriors, and pointed out to them the direction in which their strength should be employed. The draft was read by the archbishop from the steps of the high altar, and was received with rapturous applause; and Langton, striking while the iron was hot, reminded the barons of all their wrongs, and swore them to keep steadfast to the cause even unto death, until they had obtained their ends. At last it was agreed that after the nativity of our Lord, they should come to the king in a body, to desire a confirmation of the liberties before-mentioned; and that in the meantime they were to provide themselves with horses and arms in the like manner, that if the king should perchance break through that which he had specially sworn (which they well believed), and recoil by reason of his duplicity, they would instantly, by capturing his castles, compel him to give them satisfaction.

Fully armed and in great numbers, the barons waited on the king on the 6th of January, 1215, and presented their demands. John asked for time, and they gave him till Easter to think about it. He employed the interval in attempts to break up the combination against him: he offered special privileges to the churchmen, got the Pope to write in his behalf, and tried to detach the leaders from their comrades. But the nobles remained firm, and getting no reply to their demand by Easter, next, sent the ten barons to John for his final decision. "By God's teeth, I will not grant them liberties that will make me a slave!" he screamed to Langton, who read over the clauses of the charter to him; but the Primate read on, and when he had finished, John promised an answer speedily. None came, so the barons marched, and after getting possession of several large towns, entered London on the 24th of May, 1215: Rendered despaired, and being almost alone, John sent to say he would grant what was wanted, if he and William would meet the lords? "Let the day be the 8th of June—the place Runnymede," was the answer sent back. A postponement to the 15th was agreed to, and on that day John, attended by a small retinue, met "the whole nobility of England," and negotiations were opened forthwith.

No tricks, no lies, no subterfuges could now avail. John was absolutely in the hands of his indignant and determined lords, and he must agree to what they demanded, or take the consequences. Why need the liberty of Englishmen be a slave? Is it that tyrants feel stifled when their fellow-men breathe? Better every way that they should feel stifled that the alternative should present itself. But what were the stifling restraints on the royal respiration? Let us see.

The Great Charter provided, first, "That the Church of England (not Rome, be it observed) shall be free, and have her whole rights, and her liberties inviolable." It then went on to fix exactly the nature and extent of the feudal obligations, not only of the barons towards the king, but of the smaller holders towards the barons; the liberties of cities and towns were confirmed; the redress of existing grievances, such as the employment of foreign troops against Englishmen, arbitrary imprisonment without trial, the exaction of ruinous fines and the spoliation of wards and heiresses, was then assured; and that power so sweet to despotisms, of arbitrary, irresponsible punishment, was expressly renounced. But the grand clauses which make the charter so truly great, and which are laws to this hour, are those which provided that no tax should be levied but by order of "the general council of our kingdom!" that the royal officers who acted illegally should be personally responsible; that the Court of Common Pleas should be in one fixed place, instead of following the king's person. The grandest clauses of all, however, are these—

No Freeman shall be taken, or imprisoned, or disseised, or outlawed, or banished, or in any way destroyed; nor will we pass upon him, nor will we condemn him, unless by the lawful judgment of his peers, or by the law of the land. We will sell to no man, we will not deny to any man, either justice or right.

For four days the negotiations went on; the country between Staines and Windsor was white with the tents of the iron-clad men, who had come to demand a charter of liberties. Stephen do Langton kept them up to their work, not permitting them to lag, but not suffering them to overheat. It was on the 15th of June, Friday, that the conference came to an end. In the royal tent sat John (Lackland as they called him), with some dozen attendants, whose hearts were not stout enough to oppose or to defend him; and round the table, on the side of the Great Charter lay stood the mightiest of the peers, men whose names are worthily inscribed on Fame's eternal beak-roll. Langton argued for them. He spoke their minds, and patiently did he bear with all that was urged against him, for he knew the power which was ready to back up his case. Never did summer sun shine on a more splendid sight than the meadow by Runnymede presented on this day in June, 1215. The king, after vainly trying to evade, to caress, and to intimidate, was forced to give in; the unbounding firmness of Langton knew of no surrender but the fullest. Not only did he insist upon and obtain the king's signature to the chart, but he compelled the royal assent—and there the shoe pinched dreadfully—to a clause empowering certain barons to assume sovereign power in the event of the king failing to keep his oath.

This was won for Englishmen the Great Charter of Liberties, which has been handed down with honest pride from generation to generation, and which stands out as the rock on which our air-like freedom was founded, amid the sea of violence and selfishness which beat and broke on it in vain.

SYNOPSIS OF THE LIFE OF KING JOHN.

John was the sixth and youngest son of Henry II.; the seventh King of England after the Conquest, and the third of the Plantagenet dynasty.

Born at Oxford. Dec. 24, 1165 Began to reign. May 27, 1199

England under Papal Interdict 1208-13

Lost Normandy. 1204 Died at Newark. Oct. 18, 1216

SOVEREIGNS CONTEMPORARY WITH JOHN.

Denmark, Kings of.

Camuto VI. 1182

Walchomar II. 1207

A.D.

Eastern Empire.

Alexius III. 1104

Issac II. 1203

Philip Augustus 1180

England under Papa Interdict 1208-13

Granted Magna Charta June 15, 1215

Lest Normandy. 1204

Died at Newark. Oct. 18, 1216

Scotland, Kings of.

William. 1165

Alexander II. 1214

Spain, Kings of.

Alphonso IX. 1183

Henry II. 1214

Sweden, Kings of.

Sweerker II. 1180

Eric II. 1219

France, King of.

Innocent III. 1203

John I. 1216

LO wealthy

LESSONS IN PENMANSHIP.

POSITION OF THE BODY, THE HAND, AND THE PEN.

Good handwriting is essential to almost all persons who have to make their way in the world. Great stress is laid upon it in the examinations for all Government appointments; it is required in every merchant's counting-house, in every office, in almost every shop. The boy who can write well obtains a situation—however humble the situation may be—for much more readily than the boy whose "pot-hooks and hangers" are almost as difficult to decipher as the cuneiform characters of ancient Nineveh. It is our purpose to devote a portion of our space to "Lessons in Penmanship." Our efforts, at the outset, will be to give you the outlines of those which the greater have learned to write, and the improvement of those who write badly; and we shall follow these lessons by a series of papers exhibiting the different styles of handwriting required in Government offices, the merchant's counting-house, and the office of the solicitor, etc., etc., with instructions in German ciphers and the ordinary kinds of ornamental writing, especially the black letter, or German text, so necessary to the solicitor's clerk in engrossing deeds and legal tracts. With these preliminary remarks, we hope our students will attend very carefully to our directions in endeavouring to acquire an elegant system of penmanship, as by this means, combined with constant practice, they will surely become good writers.

In the first place, you should sit right in front of the desk or
table at which you intend to write; then, placing your left arm on the table and your left hand on the edge of the book or paper to hold it firm, if necessary, by pressure with the fingers, take the pen in the right hand, and grasp it firmly, but not too much so, between the thumb and the two fingers next to the thumb, that is, the forefinger and the middle finger, as shown in the accompanying representation of the hand with a pen in it. In this position, remember carefully that before you can draw a stroke, the point of the pen must be placed at the distance of about five-eighths or three-quarters of an inch from the tip of the middle finger, with its face or open part downwards, and not leaning to one side or other; the pen must also be placed alongside of the nail of the middle finger, not on the nail itself, but on the fleshy part of the finger close by it. The upper part of the pen must likewise be raised above the knuckle of the forefinger, as seen in the figure of the hand, so that a thin paper-folder might pass a little way between this part of the pen and the knuckle. It is of essential importance to observe this part of the directions as well as the preceding, because for want of attention to these apparently trifling minutiae, or small matters, many bad writers have arisen, and some of them even teachers, who ought to know better what they are engaged in. For it stands to reason, and any one may prove it to himself by a few trials, that if the pen be allowed to fall below the knuckle, there is an instant loss of power, and of all real command over the pen.

Another direction of equal importance with any of those we have now given, is the position of the thumb; this you bend outwards from the pen so as to cause the tip or fleshy part of the point of the thumb to rest upon the pen directly opposite the first joint of the forefinger, as shown in the figure of the hand. This completes the directions for the position of the three fingers which hold the pen. Now let us attend to the other two fingers. One of these, the little finger, must be held so as to touch the paper on which you intend to write, just on the tip of it, close by the side of the nail, while the hand itself is made to rest upon the desk, thus close by the wrist, not pressing heavily, but as lightly as possible. In fact, the pressure on the tip of the finger should be light also, so that in writing the heel of the hand should assist the tip of the little finger, and the tip of the little finger assist the heel of the hand, by mutually bearing the weight of the hand, and acting alternately as momentary fulcrums or resting-points, while the hand moves forward, making one stroke or letter after another. The other finger, next the little finger, usually called the ring finger, because ladies wear their rings upon it, is the most difficult to dispose of, but it must be done. Endeavour, then, to give it an elegant curvilinear form, something in the shape of part of a ring itself, so that it may lie passively between the middle finger and the little finger without interfering with their movements; it should be considerably within the little finger, and its first joint should rest very nearly upon the first joint of the little finger, in a crossing position. This completes the directions for the position of the little finger and the ring finger. Lastly, as to the position of the whole hand, you must carefully observe that while resting upon the heel of the hand and on the little finger, it must be kept upright, so that the top of the pen may point to the right ear when the hand is at the commencement of a line which you are about to write, and that as you move it along it must be kept parallel to this position throughout. It will assist you very much in obtaining and keeping this position of the hand to observe that the knuckle of the little finger and the knuckle or second joint of the thumb should both be kept always as near as possible at the same distance from the paper, say about an inch and a half, while in the act of writing. It will also be of the greatest advantage, if, at the commencement of a line in writing, you should have the elbow of the right hand pretty close to your right side, and as you move the hand along the line, in writing, to preserve the arm parallel to this position as well as the pen to its first position; in fact, if you do the one correctly you will necessarily do the other, unless you choose to twist the wrist, which would be equally painful, absurd, and unnecessary.

As to the position of the head and shoulders, stoop as little as possible; a gentle inclination of the head is all that is necessary in general, in order that you may observe earnestness and accurately the motion of the hand and of the formation of the letters. In near-sighted persons a greater inclination of the head is required than in ordinary cases; but in all cases whatsoever this rule is absolutely essential, to keep the chest entirely free of pressure on the table or desk at which you write; if once you acquire a habit of leaning on the table, or lolling upon it with your chest or stomach, you need never expect to be a good writer. We believe that many pupils have been seriously injured in their health by the practice or habit of leaning upon the chest while learning to write, and that such injury has followed them through life. What can be more absurd than to see a boy or girl sprawling on a table or desk with their arms akimbo, and their noses almost upon the paper imitating the motion of the pen? What more foolish or disagreeable than to see every stroke of the pen imitated by the mouth or the tongue, as if the writer was approaching a state of idiocy? Let every student of penmanship sit erect while writing, and let him only stoop his head with a gentle inclination, as we said before, sufficient to enable him to see clearly what he is doing, and to produce such a specimen of writing as will do credit to his care, attention, and ingenuity. With all these directions—and we have not spared them—you will require both time and perseverance, and constant practice, either to learn the art of writing from the commencement, or to correct and improve the system you have already acquired. But perseverance, practice, and determination will do all that you require; and you will soon reap a rich reward for all your care, attention, and earnest application.

That those of our readers who are anxious to commence teaching themselves the art of writing may lose no time in making a beginning, we have given a copy slip, in which is shown the first stroke that demands the attention of the writer. It is a down stroke, commonly called a pothook, square at the top, and brought down with an equal or uniform pressure of the pen, until it begins to a hair line, which is turned at the bottom and carried upwards to the right.

**POSITION OF THE HAND WHEN HOLDING THE PEN.**

**COPY SLIP NO. I.—THE "POTHOOK."**
LESSONS IN ARITHMETIC.—I.

The term Arithmetic, which is derived from the Greek verb ἀριθμέω (pronounced a-rik-me-o), to count, is properly applied to the science of Numbers, and the art of performing calculations by them, and investigating their relations. To a certain extent, this science must have been coeval with the history of man. As an art, arithmetic is indispensable in daily business; and the man who is best acquainted with its practical details has always the preference in every mercantile establishment. Our object in these lessons shall be twofold—to develop its principles as a science, and to show the application of its rules as an art. For this purpose, it will be necessary to begin with the first principles of Numeration and Notation, and to give such rules as will enable any one to read and write a given number correctly.

Notation and Numeration.

1. Any single thing—as for instance, a pen, a sheep, a house—is called a unit: we say there is one such thing. If another single thing of the same kind be put with it, there are said to be two such things; if another, three; if another, four; if another, five, and so on.

Each of these collections of things of which we have spoken is a number of things; and the terms one, two, three, four, five, etc., by which we express how many single things or units are under consideration, are the names of numbers. A number therefore is a collection of units. This is also sometimes called an integer, or whole number.

It will be seen that the idea of number is quite independent of the particular kind of units, a collection of which is counted. Thus, if there are four pigs, the number of pigs is the same as if there were four pens. We can thus abstract a number from any particular unit or thing, and talk of the number four, the number five, etc. Numbers thus abstracted from their reference to any particular unit or thing are called abstract numbers. When a collection of things or objects is indicated, it is called a concrete number.

We shall treat first of abstract numbers.

2. The art of expressing numbers by symbols, or figures, is called Notation.

In the system of notation which we are about to explain, all numbers can be expressed by means of ten symbols (figures, or digits, as they are called), representing respectively the first nine numbers, and nothing, i.e., the absence of number. These are:

1 representing the number one
2 "two
3 "three
4 "four
5 "five
6 "six
7 "seven
8 "eight
9 "nine
0 "none

N.B.—Ten times ten is called one hundred; ten times a hundred, a thousand.

3. Numbers are represented by giving to the figures employed what is called a local value, i.e., a value depending upon the positions in which they are placed.

Let a number of columns be drawn as below, that being called the first which is on the right, and reckoning the order of the columns from right to left:

<table>
<thead>
<tr>
<th>Hundreds</th>
<th>Thousands</th>
<th>Ten thousands</th>
<th>H. of Thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If a figure, 5, for instance, be placed in the first column, it denotes five units, or the number five; if it be placed in the second column, it denotes five tens; if in the third, five hundreds; if in the fourth, five thousands; if in the fifth, five times ten thousand; and so on, each column corresponding to a number ten times as great as the one immediately on its right.

Thus 7943 would denote seven thousands, nine hundreds, four tens, and three ones; or, as it would be expressed, seven thousand, nine hundred, and forty-three.

Similarly, |8|3|0|5|4|7| would denote eight times a hundred thousand, three times ten thousand, no thousands, five hundreds, four tens, and seven ones; or, as it would be more briefly expressed, eight hundred and thirty thousand, five hundred and forty-seven.

We need not, however, draw the columns; it will be the same thing if we imagine them, and, instead of columns, talk of figures being in the first, second, third, fourth places, etc.

The symbol 0 put in any place, as already indicated in the previous example, denotes that the number corresponding to the particular column or place in which it stands is not to be taken at all; the 0 only fills up the place—the thus, however, answering the important purpose of increasing the figure after which it stands tenfold.

Thus, 10 means that once ten and no units are taken—i.e., it denotes the number ten; 100 means that once a hundred but no tens and no units are taken—i.e., it denotes the number a hundred; 1000 means that five thousands, no hundreds, no tens, and one unit, are taken, or, as it would be more briefly expressed, five thousand and one.

4. Before proceeding further, we will give the names of the successive numbers:

Ten ... 10
Eleven ... 11
Twelve ... 12
Thirteen ... 13
Fourteen ... 14
Fifteen ... 15
Sixteen ... 16
Seventeen ... 17
Eighteen ... 18
Nineteen ... 19

Hundred (ten times ten) ... 100
Thousand (ten hundreds) ... 1000
Million (a thousand thousands) ... 1000000
Million* (a million millions) ... 1000000000
Trillion (a million billions) ... 1000000000000

The numbers between twenty and thirty are expressed thus: twenty-one, twenty-two, twenty-three, etc., up to twenty-nine, to which succeeds thirty; and similarly between any other two of the names above given, from twenty up to a hundred: thus, 95 is called ninety-five.

After one hundred, numbers are denoted in words, by mentioning the separate numbers of units, tens, hundreds, thousands, etc., of which they are made up. For example, 134 is one hundred and thirty-four; 5,342 is five thousand three hundred and forty-two; 92,547 is ninety-two thousand five hundred and forty-seven; 84,319,652 is eighty-four millions, three hundred and nineteen thousand, six hundred and fifty-two.

5. It is useful, in reading off into words a number expressed in figures, to divide the figures into periods of three, commencing on the right, as the following example will indicate:

Billions, Thousands of Millions, Millions, Thousands, Units.

501 234 689 379 286

Thus the figures 501,234,826,479,365 would denote five hundred and sixty-one billions, two hundred and thirty-four thousand eight hundred and twenty-six millions, four hundred and seventy-nine thousand, three hundred and sixty-five.

We have then the following rules for reading numbers which are expressed in figures:

Divide them into periods of three figures each, beginning at the right hand; then, commencing at the left hand, read the figures of each period in the same manner as those of the right-hand period are read, and at the end of each period pronounce its name.

The art of indicating by words numbers expressed by figures is called Numeration.

Exercise 1.

Write down in figures the numbers named in the following exercises:

* In the foreign system of numeration a thousand millions is called a billion, a thousand billions a trillion, and so on.
LESSONS IN LATIN.

INTRODUCTION.

In giving to the readers of the Popular Educator lessons which may enable them to learn the Latin language, with no other resources than such as may be supplied by their own care and diligence, we take it for granted that they are desirous of acquiring the necessary skill, and willing to bestow the necessary labour. If the study were not recommended as a good mental discipline; if it were not recommended as giving a key to some of the finest treasures of literature; if it were not recommended as a means of leading us into communion with such minds as those of Cicero, Virgil, Horace, Livy, and Thucydus, it would have a sufficient claim on our attention, as greatly conducing to a full and accurate acquaintance with our mother-tongue—the English. The English language is, for the most part, made up of two elements—the Saxon element and the Latin element. Without a knowledge of both these elements, we cannot be said to know English. If we are familiar with both these elements, we possess means of knowing and writing English, superior to the means which are possessed by many who have received what is called a classical education, and have spent years in learning languages with our mother-tongue—the English. This diversity would be inconvenient if the Latin were, like the French, a general medium of verbal intercourse. At one time it was so, and there then prevailed one recognised manner of pronunciation. Now, however, for the most part, Latin is not pronounced as the Common School Latin is, but in a manner of consequence. Even in our own country there are diversities, but such diversities are secondary matters. To one or two remarks, however, we should carefully attend. In Latin the vowels are what is called long or short. In other words, on some the accent or stress of the voice is thrown, on others it is not thrown. The vowel e, for instance, is mostly long; the vowel i is mostly short. A long vowel is said to be equated to two short vowels. We English people, however, have no other way of marking a long vowel, except by throwing on it the accent or stress of the voice. It is also a fact that in Latin the same vowel is sometimes short and sometimes long—in other words, the same vowel sometimes has, and sometimes has not, the accent on it: thus the i in dominus, a lord, is without the accent, while the i in doctrina, learning, has the accent: the pronunciation of these words is thus different: dominus, or doctri-na. Now observe that these words are trisyllables, or words of three syllables. Of these three syllables the last—namely, us—is called the ultimate; the second, in, is called the penult; the first, or dom, is called the antepenult. And the general rule for pronouncing Latin words is, that the accent is thrown on the penult, or if not on the penult, then on the ante-penult. In doctrina the accent is on the penult, or last syllable in dominus, and on the antepenult in doc-tri-na. Now observe where to lay the stress of the voice, we shall mark, as in dominus and doctri-na, on which syllable the accent lies. It will then be understood that when we put a mark thus / over a vowel, we mean thereby that the voice should rest, as it were, on that vowel. For example, in the word incur, the accent falls on the last syllable, for the stress of the voice is thrown on the syllable car. This is indicated thus / . So in the Latin amicus, a friend, the accent is on the i, and the word is to be pronounced /am-i-cus/.
In the old grammar schools, attached to the established
methods of pronunciation. After all, we cannot pronounce the Latin as it
was pronounced by the Latins themselves, nor can the best trained
lips pronounce their poetry so as to reproduce its music.

**OUR HOLIDAY.**

As the possession of a healthful frame and strength of muscle and
sinew is absolutely necessary to all who desire to make the
most of their mental powers, we have thought it desirable to
devote a portion of the **Popular Educator** to a series of
papers on what is generally termed Physical Education, or, in
other words, the science of the body.

We intend, therefore, to take "**Our Holiday**" at regular
intervals, and invite our readers on these occasions to dismiss
all thoughts of graver studies for a while, and enter heartily into
the consideration of the art of developing the strength, endur-
ance, and agility of the human form, by properly regulated
gymnastic exercises and athletic sports and games.

We will take first a game which on its introduction into this
country a few years ago attracted special attention—

**LA CROSSE, THE NATIONAL GAME OF CANADA.**

A game lately introduced into this country from the "New
Dominion," where it occupies a position like that so long held
by cricket in England. It is of Indian origin, and has been
played hero by a party of Indians brought over for the purpose.
It is a ball game, and derives its name from the implement used
in striking the ball, which is a long hockey stick bent at one
end in which a piece of closely woven leather, or, in some cases a
stick stonk network is stretched, and extends nearly half-way
down its length. The "crosse" has, therefore, something of
the appearance of a rackets-bat, but is much longer.

To the spectator the game presents the appearance of a
combination of football and hockey, with some striking varia-
tions from both. It is a very animated game, interesting to the
looker-on, and highly exciting to those engaged in the contest.
It requires a large space of ground, not less as a rule, than
400 yards square, and tolerably level. Towards the two ends of
this ground goal-posts are fixed, as at football, and the players
are divided into two parties, each having its own goal. Each
group consists of two poles about six feet high and seven feet apart,
ornamented with flags of the colour—say red or blue—chosen by
the party who may take that side in the game. The distance
between the two goals is optional, depending upon the space of
ground in which the game may be played, and chosen by common
consent, or either accidental or the subject of agreement between
the contending parties. The number of persons who may play
is optional also, but they are usually equally divided, as in other
field amusements.

The object which is pursued by either party throughout
the game is to drive the ball through the opponents' goal—that is,
between their goal-posts. When this is done the game is over,
having been won by that side which has succeeded in the
attempt. The ball used is made of hollow India-rubber, and
must not be more than nine nor less than eight inches in circum-
ference. It must, as a rule, be touched only with the "crosse,"
and it may either be struck with this implement or carried upon
it. The crosse is about four feet long; and the network with
which it is provided is nearly tight, but just sufficiently loose
to hold the ball when resting on it. It is not allowed to assume
the shape of a bag. Thus fashioned the ball may be readily
picked up from the ground and carried upon the crosse, or
flung from it towards the opponents' goal.

The principal players engaged on either side occupy the
following stations:—1. Goal-keeper, who places himself near
the goal, it being his duty to defend it when in imminent
danger. 2. Point, some twenty or thirty yards in front of
the goal-keeper. 3. Cover-point, about the same distance in
advance of point. 4. Centre, who faces the centre of the field;
and, 5. Home, who is stationed nearest the opponents' goal.
The remaining players are called the fielders, and have no
fixed position.

The game is commenced midway between the two goals, the
ball being struck off by the captain of one side, as may have
been decided by lot. The struggle at once ensues, one party
devouring, by striking and following up the ball, to carry it

thus, amicus, the accent being on the penult. There is another
way of marking the same fact; it is by the use of a short
straight line, as †, and a curve, as ‡. The former denotes a
long or accented syllable—for instance, doctrina; the latter
denotes an unaccented syllable, for instance, dominus.
We thus see that doctrina and doctrina, dominus and dominus
point out the same thing—namely, that in pronouncing doctrina
the stress of the voice must be laid on the i, and in pronouncing
dominus it must be laid on the o.

Another practice must be pointed out. In Latin, as will
presently be learnt, the endings of words have a good deal
to do with their meanings. It is, on that account, usual to
pronounce them very closely. We might say, that on every terminating syllable a sort of secondary accent is
laid. Thus, dominus is pronounced dominus. So in other forms of
the words: thus, dominis, dominii, dominum. The object is to
mark the distinction between, say, dominus and dominare, a
distinction of great consequence. Another form of this word is
dominus. For the same reason a stress is laid on the termina-

tion is, which accordingly is pronounced as if it were written
was. Words, too, which end in es have a secondary accent on
the e, as vulpes, a Fox, pronounced vulpes. In a few cases the
vowel is what we call doubtful, that is, it is sometimes short
and sometimes long. This peculiarity is marked thus, as in
tenere, darkness, when the accent may be on the penult, as
tenere, or on the antepenult, as tenēbrae. Observe, also, that
a vowel at the end of a word is always pronounced in Latin.
Take, as an example, docere, to teach, which is pronounced as it
is marked, that is, with an accent on the last syllable no less
than on the last syllable but one. Care must be taken to
pronounce docere as a word of three syllables, do-ce-re, and not
do-cere, as if it were a word of two syllables only, remembering,
as we have observed before, that the Latin language has no
silent e, as we have; for instance, in wife. The reader may
practice himself, according to these rules, in pronouncing thus
the opening lines of this poem, Virgil's "Aeneid."

The translation made by the English poet Dryden gives a fair idea of
the meaning of the original.

"Arma virumque cano, Trojaque nata
Aeneis patria nodi, Lavinia nupta
Litora; mutt[un] ill[es] et terras jacitatis et alta,
Vulpe, saeculorum memor Jove iubuit
Multa quoque et bellis passus dum coeterus urbem,
Inferque Doi Latos; gens cum Liburna,
Abalunaque patres, atque Eanes.
"

"Arms and the man I sing, who, forced by fate,
and haughty Juno's unrelenting hate,
Expelled and exiled, left the Trojan shore.
Long labours, both by sea and land, he bore,
And in the doubtful war, before he won
The destined town—
His banished gods restored to rites divine,
And settled sure succession in his line,
From whence the race of Alban fathers came,
And long the glories of majestic Rome."

In the above piece of Latin poetry will be noticed some
letters enclosed by brackets. By certain rules which will be
found in Latin prosody, these letters are dropped, or not
sounded, under certain conditions of position in Latin poetry,
although they are sounded distinctly in Latin prose. In
pronouncing the third line, we must cut off the um in multum
before the vowel i in illo; and the e in illo before the e in et.
Also in the fifth line drop the e in queque before the e in et.
In the last line, too, the e in atque is dropped or elided before
the vowel e of run into one, and pronounced as if written atque-at.
Accuracy of pronunciation, however, is not easily acquired from any written or printed
directions. The living tongue is the only adequate teacher.
And it will be well for the reader to get some grammar-school-
boy to read to him and hear him read the passage given above
from Virgil, and the exercises, or some of them, which will be
found in future lessons. Although the pronunciation of Latin is
in some respects very different from the English, as correct as
possible, if only from the consideration that what is worth
doing at all, is worth doing well. But should any one, as he
justifiably may, hope by these lessons to prepare himself for
becoming even a teacher of Latin—say in a school—he would
in that capacity find the pronunciation considered as a matter
of consequence; indeed, a disproportionate value is especially

onward until their opponents’ goal is reached, and the other striving by every means in their power to beat back the ball, and force it in turn into the opponents’ ground. Great agility and dexterity are required to play an efficient part in the game. Fletness of foot and quickness of eye are the essential qualifications of a good player. When one has caught and is carrying the ball upon his crosse, it is allowed to any of the opposite side to strike the ball from his crosse with their own weapon. Thus, at the moment when, after a long contest, he may be on the point of winning the game by a dextrous fling of the ball, which he has obtained with much difficulty, it may be jerked or beaten out of his crosse in a contrary direction, and the struggle may be renewed as from the beginning.

As played by the Indians, who adopt a light and picturesque costume for the purpose, the game, as we have said, is highly interesting to the spectator. Their skill in the finer points of the game is admirable. A player, running at full speed, will frequently catch up the ball on the end of his crosse, drop it to the ground to baffle a pursuer, dextrously catch it again, and repeat this until he has either passed it on to one of his own side who is nearer the adversary’s goal, or carried it well forward himself. For, contrary to the rule in football, in this game the player is allowed to do all he can to pass the ball on to another competitor on the same side who may place himself in a more favourable position.

The following are the rules to be observed in playing the game:

1. The ball must not be caught, thrown, or picked up with the hand, except to take it out of a hole in the grass, to keep it out of goal, or to protect the face.

2. The players are not allowed to hold each other, nor to grasp an opponent’s crosse, neither may they deliberately trip or strike each other.

3. If the ball be accidentally put through a goal by one of the players defending it, it is the game for the side attacking that goal.

If the ball be put through a goal by one not actually a player, it does not count for or against either side.

A match is decided by winning three games out of five, unless otherwise specially agreed upon.

We give an illustration of the crosse, and believe the instructions herein contained will be sufficient to enable any party of players who may not have seen the game to commence it for themselves. It has all the elements of popularity, especially as a winter amusement, and possesses many of the advantages of other games, without that element of danger which is found, for instance, in football and hockey. An accidental blow from the light stick with which the crosse is fashioned could cause no serious hurt, and beyond this, or the chance of an occasional fall, there is nothing to cause incidental injury to the players.

We conclude our notice of the game with an anecdote, from which it will be seen that it once was on the point of endangering the English rule in Canada. About the middle of the last century, after the conquest by Wolfe, the Indian chief Pontiac planned an attack on some of the principal forts, which was to be carried out by stratagem through the medium of “la crosse.” The known skill of the Indians in the game frequently induced the officers of the garrison to invite them to play when they were in the locality, and occasionally some hundreds were engaged.

Pontiac designed, on one of these occasions, that the ball should be struck, as if accidentally, into the forts, and that a few of the Indian party should enter after it. This was to be repeated two or three times, until suspicion was raised, when they were to strike it over again, and rush in large numbers in pursuit. They were then to fall upon the garrison with concealed weapons. This ruse was carried into effect, and partially succeeded; but the Indians failed to enter the strongest of the fortifications, and were beaten back with much slaughter. Pontiac afterwards made friends with the English, but he was a treacherous ally, and it was a subject of congratulation when he was at last killed by one of his own race.
MECHANICS.—I.

FORCE: ITS DIRECTION, MAGNITUDE, AND APPLICATION.

This aim of these Lessons is to make evident to ordinary intelligent persons, who will take a little trouble, the principles of Mechanics—to treat that subject in a popular way, yet so that the reader may form accurate notions about it, and be enabled to apply it to practice in solving common problems by calculation. We have much to do, but all depends on the way of doing it. The reader I desire to have is the intelligent mechanic or artisan, the country schoolmaster or pupil-teacher, the young student who wants to learn the science through a book without a master, the college B.A. or M.A. whose mechanics was made a mess of in his young days, and would be glad, without again going to a "coach," even late in life to learn it. I should not despair of finding even ladies among our scholars. More faith should be placed in the average human intellect than commonly is. It ought to be possible to teach the sciences of form and number, and force to more persons than usually learn them. These are the "common things" of life, and a knowledge of the laws which regulate them ought to be within the reach of most people, if only the first principles be properly laid down and explained, consequences deduced from them in a simple and natural order, and language used which they can understand. I ask you, then, to approach the subject without fear. Study simultaneously with these lessons, also by Arithmetical; for, as we proceed, a knowledge of the four Common Rules of Arithmetical and of Proportion will be found essential. Any other mathemctics you may require, I shall teach you as we go along, but the amount will be small. Observe: accurate mechanical conceptions, and the power of solving mechanical problems by construction by rule and compass or calculation, are the objects we aim at.

First, then, let us ascertain what our science treats of. I believe it may accurately be described as follows:

MECHANICS is the science of force applied to a material body or bodies.

This let me fully explain. Mechanics is concerned about force—that is its great subject. But it considers it only in the consequences which follow its application to a body or bodies which must be material. A force may push through an empty point of space; but, as it can make no impression on that point, Mechanics does not consider it under such circumstances. The body to which it is applied may be of any size, even an atom of matter, sometimes termed "a material point;" and Mechanics does inquire what effect forces have on such atoms. But, in the more common problems, it is concerned about bodies of visible and tangible magnitude, such as a block of stone, a beam of timber, a girder of iron, a cannon ball, the earth itself, the moon, or the sun.

This being clearly understood and agreed on, our next question is, What is force? I answer—

FORCE is the power, or agent, whatever be its nature, by which motion is produced in a body, or a tendency to motion accompanied by strains or pressures in its parts.

For instance, a blow is given by the bat to the cricket ball, or a bolt is fired from a cannon: the blow in the one case, and the exploding gunpowder in the other, furnish forces, the effect of which is the motion of the ball or bolt. Steam enters the cylinder of an engine, and away to go works the machinery connected with it, moving and printing this Popular Educator. Force is, in a word, the elasticity of the steam, and its effect is motion. A stone is let loose at the top of a tower, or from a balloon, and it falls to the ground; what makes it fall? The great Earth does, which, by its attraction, pulls the stone towards itself. This attraction is the force producing the stone's motion. And if any of you doubt, or feel any difficulty about this, let him take a magnet and put one of its ends near a few loose iron-filings, scattered over a piece of paper, and he will see how this is possible. The filings will move towards the magnet, and stick to it, in the very same way that the stone moves to, and sticks to, the earth until some person pulls it away by a stronger force. And so likewise does the electrified ball draw towards itself the small pieces of cork or feather we place near it. In all these cases, you see, there is, first, a body, the ball, or bolt, or stone, or iron-filing, or cork; secondly, a force applied to it; and, thirdly, motion produced.

But take now the lamp which hangs from the ceiling. It is at rest; but the earth, by its attraction, is trying to pull it down, and down it would come were we to cut the chain or rod by which it is suspended. Here, then, is force again, but it produces only tendency to motion. But observe further, that although the lamp does not move, the chain that holds it is strained by its weight. And not only is the chain strained, but so is the ceiling joist to which it is attached; and, as this joint rests its ends on the walls, this strain is transmitted to the walls in the form of pressures on them. There is thus tendency to motion, strain, and pressure produced as the effect of the force applied by the earth to the lamp, but no motion. And, if, after a difficulty in believing in those strains, let him suppose, instead of the lamp, a ton weight of iron suspended from the ceiling: what will follow? The chain will snap, or the joint, or even ceiling, will give way, and down all will come on the floor. They snap or give way because they are strained beyond their strength. So, in like manner, when a train stands at rest on one of those great iron girders bridges that span our rivers, there is tendency to motion, with strains and pressures; the great Earth below pulls at the balance one and into the water; but the bridge resists, bears the pressure of the weight on it, and is strained throughout its length besides. A more familiar instance is the struggle of two wrestlers. No one will doubt that in the contest great force is put forth, and, if the moment they are motionless, like statues: the forces are balanced, but the strain on their muscles is terrific. There is in each tendency to motion, caused by the force put forth by the other, but as yet no motion. At last, an off balance of the combatants prevails; his force ends in producing motion, and his adversary falls to the ground.

These examples will, I trust, be sufficient to make clear to you the account I have given of force, namely—that it is the agency by which motion is produced in a material body, or a tendency to motion with pressures or strains. You will now understand the reason why Mechanics is divided into two branches, Statics and Dynamics. Statics is the branch which treats of forces which balance one another, and produce only tendencies to motion with pressures and strains, and is so called from the Latin word ste, which means "to stand," or "be at rest." Forces which thus balance one another are said to be in equilibrio, a Latin expression which denotes the balancing of equal weights; and it is important that you should keep the expression in memory, as we shall have frequent occasion to use it. The other branch, Dynamics, treats of force or forces which do not balance one another, but produce motion in the body; and proceeds from the Greek word dynamis (dynamis), power, under the mistaken notion that there was more power in force when its effect is motion, than when it produces strain. This, we have seen, is not the case; but the term "Dynamics" may, notwithstanding, continue to be used without leading to error. The two branches we may therefore define or describe as follows:

STATICS is the branch of Mechanics in which forces are considered which equilibrate, or balance, producing tendencies to motion, with strains and pressures.

DYNAMICS is the branch of Mechanics in which forces are considered which produce motion.

Now it so happens that, of these branches, Statics is the simpler and easier, and more natural for the student to commence with. Questions about forces which balance each other are not so complicated as those which involve motion. The reason is, that time enters into all problems of motion, but
not generally into those of equilibrium. The speed or velocity of a cannon-ball must be considered at every varying moment of its flight; but the strains and pressures among and on the beams of the roof of a railway station are the same at every moment. Time does not affect the latter unless by wear and tear. With statics, therefore, we commence, and, of course, with the simplest class of questions, those which relate to a force or forces acting on a single point. But here I must turn back to the notion of force, and endeavour to fix it with greater accuracy in your minds. I must show you how it is said to be applied and measured to the body it moves or strains; and this will best be done under the three following heads:—

1. The Direction of a Force.
2. The Point of Application of a Force.

1. The Direction of a Force.—In Mechanics, forces are assumed to act in right lines. The assumption is made for the best of reasons—namely, that of experience. All the simpler cases of motion confirm it, and all the more complicated can be assumed for by it. A ball falls to the ground in a right line at that which points to the centre of the earth, whence the force of attraction which moves it acts. The billiard-ball moves in a right line; and the calculations of the skillful player, which are based on the supposition that it so moves, are never found to be wrong. A ship, with her sails square set and wind aft, moves in a right line; and to make it leave that line the steersman must put the helm to port or starboard, and by turning the funnel can cast the vessel to either side. Suppose there is a force applied to the ship across the line of its course, and at her stern, turning her round. It is true that the stone thrown obliquely into the air moves in a curved path; but in this case we know that there are two forces—not one only—acting on it, namely, the original impulse, which makes it move in a right line, and the earth’s attraction, which pulls it from that line into a curved course. Moreover, all the calculations on which are based the predictions of astronomers as to the places in which the sun, moon, and planets will be on a certain day, hour, and minute, are based on this assumption, that forces act in right lines; and the predictions invariably prove true. It is only if our mechanical axioms may, therefore, on the ground of experience be assumed to be true—namely, that the direction in which a force acts is that of a right line. Indeed, it is not easy to conceive how it could act otherwise.

2. The Point of Application of a Force.—The direction of a force being disposed of, we must fix our ideas as to its point of application. The rule is, that any point on the line of its direction may be considered such; but this you must understand with a limitation, or exception, which should not be forgotten. The point of application can only be on so much of the line of direction as lies within the body. For instance, suppose a person to push with an iron rod, which he holds in his hand, at the point A (as in the diagram), against a block of iron which lies on a table. Then, clearly A is the point of application of the force with which he pushes. Let now a hole be drilled through the block in the direction of the push from A to B, into which the rod may fit closely but freely; and also other holes, downwards, b, c, d, & d, to meet the passage, A to B, into which the thumb-screws, b, c, d, are fitted. Let the rod now be passed through the block, and then, arrange as at the side, and clamp it down firmly by the thumb-screws, b, c, d. It is seen that the greater the block with the same force as before, it is clear that the force will be arrested by the thumb-screw, b, at A, and that the force will become its point of application to the body. So, in like manner, may it be applied to c and by, by tightening in succession each screw, while the others are left loose. In all these cases the force is the same, and the direction the same; but the points of application differ. But what is the great difference of these cases? No; for the portion of the rod within the block, and extending from A to any of the points of application, performs the same part in transmitting the force from A to the point within, as the iron which was removed did when the force was first applied directly at A. The removed iron has its place filled by an equivalent of that metal in rod, and the body is virtually in its original condition. The force of the hand may still be considered applied at A, thence to be transmitted to B, or C, or D, as we please, by the portion of rod within. The second case becomes identical with the first, and the effects, therefore, must be identical in every respect; and, nothing being changed, intensity, direction, nor effect of the force, it is clearly indifferent which point we make the point of application.

3. The Magnitude of a Force.—To find a suitable measure of the intensity or magnitude of a force, we must also look to experience. It would be very convenient to measure forces by comparing them with weights; but this is not always practicable, and, even if it were, it would not answer all the purposes of Mechanics. I may as well, therefore, explain to you that, in Mechanics, a force is considered as a simple as any other motion. Experience teaches that a double force produces a double velocity, a treble force a treble velocity, and so on, in any body to which it is applied. But then a difficulty occurs: the same force will produce different velocities in bodies of different sizes. If it make a ball of one pound weight move at a certain rate, it will give double that speed to a half-pound ball, and half to one of two pounds. As a general rule, the greater the mass of the body, the less the speed produced. And for a reason I shall hereafter more fully explain. Imagine, then, a round ball, say of ivory, whose weight is that of a cubic inch of pure water, and suppose that several forces are in succession applied to it; the velocities they produce will be accurate measures of their intensities, or of their magnitudes.

But, then, how are the velocities to be ascertained? Clearly by the spaces the ball would move over in any given time, say the unit of time—a second—on the force being applied to it. Suppose, then, the unit ivory ball, put on a perfectly smooth floor, and then suddenly struck by a blow equal to the force you want to measure. By some means—and there are many which may be devised—manage to ascertain the distance the ball moves over in one second. That space, or length of line, will be the measure of the force; and if any number of such forces be tried in the same way and on the same ball, that which causes it to move the greatest distance is the greater force, over a double space a double force, and so on.

The final result, then, is that, in considering a force in Mechanics, we must first suppose drawn within the body a line representing its direction. Then, on that line, let any point be taken for its point of application. Thirdly, on the line of direction so fixed, let as many inches be measured from the fixed point of application as, on any scale of force, the force acts and produces the same effect as the space the force, with the point of application at the unit ivory ball to move over in one second. Then you have a line which also in magnitude represents the force. Or in fewer words—

A Force is represented, both in magnitude and in direction, by a finite right line passing through its point of application.

If in the above explanations I have succeeded in giving you clear notions of the aim of Mechanics, and of the nature and effects of force, you are prepared for the consideration of a force, or forces, applied to a single point, which will be the subject of our next Lesson.
LESSONS IN FRENCH.—II.

SECTION I.—FRENCH PRONUNCIATION (continued).

II. FRENCH ACCENTS.

17. The constant use of certain marks called accents in the French language constitutes a marked peculiarity which cannot escape the attention of the student. Rarely, except in elementary works of the English language, is the syllable of any given word which requires an emphasis marked.

18. But it is not so in the French language: here, accents of various kinds are constantly meeting the eye on every page. One thing, however, must be observed, namely:—the position of the accent does not always and infallibly mark the syllable of a word which must receive the stress of voice in common pronunciation.

19. Modern French grammarians have established the following rule, namely,—to place the stress of voice on the last pronounced syllable of every word.

20. A slight inspection only of the following examples will illustrate the above remarks.

1. Dés-vo-rer (pronounced Day-vor-ray).

The first syllable of this word is marked with an accent; must the stress of voice, therefore, be placed upon the syllable de? No: if the rule be applied to this word, the stress of voice falls on the last syllable, rer.

It will then be asked, What is the use of this accent? We answer, It modifies the sound of the vowel over which it is placed.

2. Lé-gère-ment (pronounced Lay-zhair-mon, with the sound of the final è suspended).

Again, the word used here as an example has the same kind of an accent as the word used in the previous example had; and also, it is placed over the same vowel. But it has another different accent over the first vowel of the second syllable; and, according to the rule, the stress of voice is not placed rather than the last syllable. This second accent (observe its form and position) only serves to modify the sound of the vowel over which it is placed. Sometimes, however, an accent is placed over a vowel of the syllable which, according to the rule, receives the stress of voice, viz.,—Cé-lè-bre.

3. Bât-il-lent (pronounced Bat-tee-mon, with the sound of the final é stopped).

Again, in the word used here as an example, a third and still different accent is placed over the vowel a. Its presence affects the sound of that vowel only. It has nothing whatever to do with the proper accent of that word, as the term accent is understood when applied to words in the English language. As a general rule, the stress of voice is not so strong in the French as in the English language.

21. Accents, therefore, as used in the French language, are certain marks differing from each other, and placed over certain vowels only, for specific purposes.

22. There are three accents, viz.:

' ', la grave accent (thus, c)
"", la circonflexe (" ", è)
', la circumflexe (', è)

23. The acute accent is used only over the vowel e, and serves two purposes:

First, to modify its sound.
Secondly, to mark the existence of a distinct and final syllable, as:

Dé, Trem-pé, Pé-tar-dé, Cé-ré-mo-no.

24. The grave accent is used only over the vowels a, e, and U, as:

À, È, Ô, Où,

and serves two purposes:

First, to modify the sound of the vowel e.
Secondly, to distinguish one part of speech from another; thus:

a is a verb. è is an article. on is a conjunction.

25. The circumflex accent is the union of the acute and grave accents, and is placed over each of the vowels except y. It indicates that the letter over which it is placed has a sound twice as long as it has without it, viz.:

À, È, Ô, Ô, Où, È, Ô, Ô, Où,

This accent also indicates the suppression of the letter i, after the vowel over which it is placed; thus:

Bé, Fête, Tête,

were formerly written

Bas, Fest, Test.

The e was not sounded, but gave to the preceding vowel that prolonged sound now represented by the circumflex accent.

The circumflex accent also serves to distinguish parts of speech from each other; thus:

C'est is a participle from the verb être.
C'est is a noun and adjective.
C'est is a participle from the verb être.

26. Besides the three kinds of accents just enumerated, certain other marks or signs are used, called

Cédilla, Diacritic, Hyphen, and Apostrophe.

The CEDILLA (') is a peculiar mark, somewhat resembling a figure 5 inverted, and placed only under the letter c, before the vowels a, o, and u, thus: c.

It indicates that the letter c under which it is placed, has the soft sound of s, as in the word lesson:

Çà pronounced sa.
Facet, pronounced fas-so-nay.
Deç pronounced dass-
Macon, pronounced ma-so.
Façade pronounced fa-séd.
Sous pronounced sou-

27. The LESKES (") consists of two dots placed over the vowels e, i, and u. It shows that the vowel over which it is placed is pronounced separately from the preceding vowel, thus indenting, in reality, a distinct syllable, as:

Naïveté pronounced Navo-til.
Oui pronounced oui.
Pocit pronounced Pocit.

28. The HYPHEN (—) is a short horizontal mark, which is used to connect words and syllables, as:

A-t-il, Belles-lettres, Cénot-ai, Damié-Blicôbre, Fait-ou, Sain-
Très-rarement.

Its use in connecting syllables is precisely the same as in the English language; that is, when a word is divided, so that a part of it is at the extreme right hand of a line, and the rest at the extreme left of the line following.

29. The APOSTROPHE (') is like a comma placed at the upper end of letters instead of at the lower end, or at the bottom on a line with the lower end.

Its use is to show the elision, or cutting off, of a vowel before words commencing with a vowel or a mute, and is much used in the French language, as:

L'am, instead of la am.
L'église, instead of le glise.

30. The EUPHONIC T is thus called on account of its peculiar position between two parts of speech, viz., the verb and the pronoun. It is used only in asking questions, and then a hyphen is placed both before and after it, thus:

A-t-il? A-t-il?

I'm-tou? Demanda-t-on?
Parlo-t-il? Vou-t-on? Prouv-t-il?

This letter cannot be translated, because it has no meaning. It is thus used merely for the sake of euphony, or agreeable sound.

31. PARENTHESIS AND PUNCTUATION.—In the French language, the marks used in punctuation, etc., are the same, and used for the same purposes, as in the English language. (See READING AND ELOCUTION.)

SECTION IV.—THE ARTICLE USED PARTITIVELY.

1. The article, preceded by or contracted with the preposition de [Sect. III. 1, 2], is placed in French before words used in a partitive sense. Such words may generally be known in English as:

grue, non, un, une, des.
when some or any is or may be prefixed to them [§ 13 (10), § 78 (1)].

**2. The French numeral adjective un, m., une, f., answers to the English indefinite article a or an [§ 13 (4) (11)].**

Un homme.  
Une femme.

**3. The e of the preposition de is elided before on and una [§ 146], and replaced by an apostrophe.**

D'un livre, m.  
D'une maison, f.

**4. When the nominative or subject of an interrogative sentence is a noun, it should be placed before the verb; and immediately after the verb in simple tenses, and after the auxiliary in compound tenses, a pronoun must be placed agreeing with the nominative in gender, number, and person [§ 76 (4) (5)].**

Le médecin a-t-il de l'argent ?  
Le boucher a-t-il du viande ?  
Le libraire a-t-il du papier ?  
La dame a-t-elle de la soie ?

**RéSUMÉ OF EXAMPLES.**

Avez-vous du pain ?  
Vous avez du pain, du beurre, et du fromage.

Vos fraîres a-t-ils une livre de beurre ?  
Avez-vous le livre du libraire ?

**5. It will be seen, by some of the above examples, that the article must be repeated before every noun used in a participle sense.**

**VOCABULARY.**

Acajou, m., mahogany.  
Acier, m., steel.  
Anjou'nhui, to-day.  
Encore, f., teak.  
Epêler, m., grocer.  
Fils, m., son.  
Fourchette, f., fork.  
Fromage, m., cheese.  
Gant, m., glove.

**Exercise 5.**

1. Avez-vous de la viande ?  
2. Oui, Monsieur, j'ai une livre de viande.  
3. Votre fils a-t-il du monde dir, pain ?  
4. Oui, Madame, il a un morceau de pain.  
5. Le libraire a-t-il un livre ?  
6. Il a de l'encre et du papier.  
7. Votre sœur a-t-elle une montre d'or ?  
8. Elle a une montre d'or et un d'argent.

**9. Le boulang'er a-t-il du vin ou de la bière ?  
10. Le boulang'er a du thé et du café.  
11. Votre frère a-t-il du fromage ?  
12. Il a du fromage et du beurre.  
13. La dame a-t-elle une cuiller d'argent ?  
14. La dame a une cuiller et une fourchette d'argent.  
15. Le boucher a-t-il de la viande aujourd'hui ?  
Oui, Monsieur, il a un morceau de beef.  
16. Le charpentier a-t-il un table ?  
18. Oui, Monsieur, il a une table d'acajou.  
19. Avez-vous le livre du médecin ?

**Exercice 6.**

1. Have you any tea ?  
2. Yes, Madame, I have a pound of tea.  
3. Who has bread ?  
4. The baker has bread, butter and cheese.  
5. Has the tailor cloth ?  
6. The tailor has a piece of cloth.  
7. Has the physician gold and silver ?  
8. Yes, Sir, the physician has gold and silver.  
9. Has the lady a silver watch ?  
10. Yes, Miss, the lady has a silver watch and a gold pen.  
11. Has your sister silk ?  
12. Yes, Sir, she has silk and cotton.  
13. Have you a knife ?  
14. Yes, Sir, I have a steel knife and a silver fork.

**SECTION V.—THE NEUTERIVES, &c.**

1. To render a sentence negative, ne is placed before the verb, and pas after it.

Je n'ai pas le cheval.  
I have not the horse.

Vous n'aurez pas la maison.  
You have not the house.

2. When the verb is in a compound tense [§ 45 (3)], the first negative ne is placed before the auxiliary, and the second between the auxiliary and the participle.

Je n'ai pas en le cheval.  
I have not had the horse.

You have not had the house.

3. It will be seen in the above examples that the e of ne is elided, and replaced by an apostrophe, when the verb begins with a vowel [§ 146].

4. When the words ni, neither; rien, nothing; jamais, never; personne, no one, anybody, occur, the word ne only is used, and those words take the place of pas [§ 41 (3)].

Je n'ai ni le livre ni le papier.  
I have not neither the book nor the paper.

Avez-vous quelque chose ?  
Have you anything?

Nous n'avons rien.  
We have nothing, or not anything.

Personne n'a le livre.  
No one has the book.

Vous n'avez jamais le couteau.  
You never have the knife.

5. A noun used in a partitive sense (Sect. IV, 1), and being the object of a verb, conjugated negatively, should not be preceded by the article, but by the preposition de only [§ 78 (7)].

Nous n'avons pas d'argent.  
We have no money.

Vous n'aurez pas de viande.  
You have no meat.

6. Quelqu'un, some one, any one [§ 41 (7)]; quelque chose, something, anything, should only be used in an affirmative or interrogative sentence, or in a sentence which is negative and interrogative at the same time.

Avez-vous quelque chose ?  
Have you anything?

N'avez-vous pas quelque chose ?  
Have we not something ?

7. In a negative sentence, no—personne, signifies nobody, not anybody; and ne—rien, nothing, not anything.

Je n'ai personne.  
I have no one, not any one.

Vous n'avez rien.  
You have nothing, or not anything.

8. AVOYE, TO HAVE, IN THE PRESENT OF THE INDICATIVE.**

Negatively.  
SINGULAR.

Je n'ai pas,  
I have not.

Tu n'as pas,  
You hast not.

Il n'a pas,  
He has not.

Elle n'as pas,  
She has not.

PLURAL.

Nous n'avons pas,  
We have not.

Vous n'avez pas,  
You have not.

Il n'a pas,  
They, m., have not.

Elles n'ont pas,  
They, f., have not.

**RéSUMÉ OF EXAMPLES.**

Le tailleur a-t-il le bouton ?  
Has the tailor the button?

Le tailleur n'a pas le bouton.  
He has not had the cloth.

Il n'a pas eu le drap.  
He has not had the cloth nor the

Il n'a eu ni le drap ni le eur.  
Have I meat?  
(Later:)

Je n'ai pas de viande.  
Has he not meat?

Nous n'avons pas de viande.  
Have we anything?

N'ont-ils pas ?  
Have they, m., not?

N'ont-elles pas ?  
Have they, f., not?

**VOCABULARY.**

Amit, m., friend.  
Aigleterre, f., Angel.  
Aussi, also.  
Autre, other.  
Chapelier, m., hatter.  
Chien, m., dog.  
Coton, m., cotton.  
Cousin, m., cousin.

**Exercise 7.**

1. Le chapelier a-t-il de la soie ?  
2. Le chapelier n'a pas de soie, mais il a du velours.  
3. A-t-il du velours de coton ?

**THE POPULAR EDUCATOR.**
LESSONS IN PENMANSHIP.—II.

In our last lesson we gave the student an example of the first stroke that should engage his attention in beginning to acquire the art of writing, and explained to him that it was a down-stroke square at the top and brought downwards with an equal pressure of the pen until it narrows at the bottom into a fine hair-line, which is turned upwards towards the right. This down-stroke with a fine up-turn, or "pot-hook," as it is familiarly called, but which we shall term a bottom-turn for the sake of brevity, enters into the composition of no less than nine letters of the alphabet in writing, of which four—namely, i, u, t, l—consist of this stroke only, with certain slight modifications. We mention this to the self-teacher to encourage him to perseverance in the task he has undertaken, for he will see plainly enough, after a little consideration, that when he is able to imitate this bottom-turn correctly, he has not only learnt to make this simple stroke itself, but has actually advanced more than half-way towards writing the four letters we have just named, besides five others that will be pointed out in the course of future lessons.

A brief examination of the copy-slips given in this page will be sufficient to prove the truth of our statement. The letter t, the simplest letter in the alphabet, is merely the elementary bottom-turn shown in Copy-slip No. 1, with a dot or point a little above it in the direction of the slope of the letter, or, in other words, immediately above the letter in a straight line which passes through the centre of the thick down-stroke from top to bottom. The letter u, again, is merely the bottom-turn twice repeated, the fine hair-stroke of the first bottom-turn being joined to the thick down-stroke of the second in a line passing midway between the two horizontal lines within which the letter is written; while the letter l is formed by the bottom-turn, commenced at the same distance above the upper of these horizontal lines as at which the dot is placed above the letter i, and crossed a little above that line by a short horizontal hair-stroke.

It may be as well to say something about the form in which our Copy-slips are placed before our readers. The lines a, b, as in Copy-slip No. 4, are the lines between or within which what we may call the body of each letter is written. These lines and the space between them resemble in some measure the staff in music, portions of certain letters being carried above the upper line a a in some cases, or below the lower one b b in others, as ledger notes are carried above or below the staff in musical notation. The line c, midway between the lines a a b b, is that in which the letters, or component parts of letters, should be joined together, while the line d d shows the distance above a a at which the letter t should be commenced, or the dot placed above the letter i. The diagonal lines sloping from right to left show the proper inclination of the thick down-strokes of the letters, and act as guide lines to enable beginners to make all their letters of the same slope, and keep the down-strokes parallel to one another. A little trouble taken at starting to keep on the same level the heads, loops, and tails of all letters that extend above or below the lines within which the body of each is written, will go far to ensure neatness and regularity when the learner can write with ease and rapidity, and his handwriting begins to assume a character peculiar to itself.


Exercise 8.
LESSONS IN ARITHMETIC.—II.

THE ROMAN METHOD OF NOTATION.

The symbols by which the Romans expressed all numbers were:

<table>
<thead>
<tr>
<th>I</th>
<th>V</th>
<th>X</th>
<th>L</th>
<th>C</th>
<th>D</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>10</td>
<td>50</td>
<td>100</td>
<td>500</td>
<td>1000</td>
</tr>
</tbody>
</table>

By combining these symbols according to the following rules all numbers can be represented:

When two symbols are placed together, if the one denoting the less value is on the left of the other, then the less number is to be subtracted from the greater; if on the right hand, it is to be added to it. Thus IX denotes ten with one subtracted, or nine; XI denotes eleven; XL denotes forty; LX, sixty. If the symbols are of equal value, then they are simply to be added. Thus XX denotes twenty; CC, two hundred, etc. The value represented by I is increased tenfold by every additional 0 placed on the right. Thus 5,000 is denoted by I000, and 50,000 by I0000. The value of the symbol CL4 becomes increased tenfold by the addition of C and L, one on each side of the line I. Thus 100,000 is denoted by CCCCI0000, 1,000,000 by CCCCI0000, and so on. A straight line placed over any one of these symbols increases its value a thousand-fold. Thus I000, I, L, 5,000, 50,000, C, 100,000, 2,000 was usually denoted by CL4C, but sometimes by CL4C, or ILM, or MM. Similarly, 4,000 was denoted by LVCIQ, etc.

The above remarks will sufficiently explain the following Table of Roman Numerals:

<table>
<thead>
<tr>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>IX</th>
<th>X</th>
<th>XI</th>
<th>XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>10</td>
<td>11</td>
<td>12</td>
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<td>I</td>
<td>II</td>
<td>III</td>
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<td>V</td>
<td>VI</td>
<td>VII</td>
<td>VIII</td>
<td>IX</td>
<td>X</td>
<td>XI</td>
<td>XII</td>
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<tr>
<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
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<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td>VIII</td>
<td>IX</td>
<td>X</td>
<td>XI</td>
<td>XII</td>
</tr>
</tbody>
</table>

1. Write out the names of all the numbers from one to a hundred, and express them in figures.
2. Write out the names of the numbers which immediately follow:
   1. One hundred.
   2. One hundred and ninety-nine.
   3. Four hundred and ninety-nine.
   5. One million.
3. Express, in figures, the numbers named in the preceding example, and those which immediately follow them.
4. Write the names of the numbers which are next to the following numbers, and express both sets in figures:
   1. One million and ninety-nine.
   2. One million five thousand nine hundred and ninety-nine.
   3. Nine millions nine hundred thousand and ninety-nine.
   4. Six hundred and fifty thousand and ninety-nine.
   5. Eleven thousand hundred and eleven.
5. Read or express the following numbers in words:
   1. 202
   2. 1001
   3. 15608
   4. 300642
   5. 5678914
   6. 26312478
   7. 20030208
   8. 1010101
   9. 9999999
   10. 123456789123
   11. 484848484848
   12. 10210230430400
6. Write or express the following numbers in figures:
   1. Four hundred and four.
   2. Three thousand and thirty-two.
   3. Twenty-four thousand and eighty-six.
   4. Six hundred and fifty thousand and nineteen.
   5. Eleven thousand hundred and eleven.

ADDITION.

1. The process of uniting two or more numbers together, so as to form a single number, is called Addition. The number thus formed is called the sum of the separate numbers.
2. The sign + placed between two numbers indicates that they are to be added together. This symbol is called plus. The sign = placed between two numbers denotes that they are equal. Thus 2 + 3 = 5, expresses that 2 and 3 added together are equal to 5.
3. Suppose that it be required to add the two numbers 3452 and 4537 together.
   These are respectively—
   3 thousands, 4 hundreds, 5 tens, and 2 units.
   4 thousands, 3 hundreds, 2 tens, and 7 units.
   The sum, therefore, of 3452 and 4537 is 7 thousands, 7 hundreds, 7 tens, and 9 units, which, according to our system of notation, will be written 7779.
   This is got by putting down the two numbers one under the other, the units under the units, the tens under the tens, and so on; and then adding up the lower to the upper figure in each place, thus:—
   3452
   4537
   ———
   7779
   4. In the example we have taken, the sum of the numbers of the thousands amounts only to one figure, namely, 7; and similarly for the hundreds, the tens, and units.
   Suppose, however, that we have a case in which this is not so; for instance, to add
   8975 and 4368.
   These are respectively equal to
   8 thousands, 9 hundreds, 7 tens, and 6 units.
   4 thousands, 3 hundreds, 6 tens, and 8 units.
   or, added together, to
   12 thousands, 12 hundreds, 13 tens, and 14 units.
   This, however, is not at present in a form which can be at once written down according to our system of notation. We must, therefore, alter its form.
   Now 14 units are the same as 1 ten and 4 units; therefore 13 tens and 14 units are the same as 14 tens and 4 units.
   But 14 tens are the same as 1 hundred and 4 tens; therefore 13 hundreds and 14 tens are the same as 13 hundreds and 4 tens.
   But 13 hundreds are the same as 1 thousand and 3 hundreds; therefore 12 thousands and 13 hundreds are the same as 13 thousands and 3 hundreds.
   Hence we see that 12 thousands, 12 hundreds, 13 tens, and 14 units, are the same as 13 thousands, 3 hundreds, 4 tens, and 4 units, which, by our notation, is written 13344.
   5. The preceding process will sufficiently explain the following Rule for Addition:
   Write down the numbers under each other, so that units may stand under units, tens under tens, and draw a line beneath them. Then, beginning with the units, add the columns separately. Whenever the sum of the figures in a column is a number expressed by more than one figure, write down the right-hand figure of such number under the column, and add the other figure or figures into the next column. Proceed in this way...
throughout all the columns, and set down the whole sum of the last or left-hand column. Thus—

| 6896 | 43683 | 13944 |

Adding the units, 8 and 6 are 14. Therefore write down 4 and add 1 to the tens column.

Adding the tens, 1 and 6 are 14. Therefore write down 4 and add 1 to the hundreds column.

Adding the hundreds, 1 and 3 are 10. Therefore write down 1 and add 1 to the thousands column.

N.B. — The same rule evidently applies; there are more than two lines of figures to be added together.

6. Test of Correctness. — There are various methods by which the correctness of the process of addition may be tested.

Perhaps the most convenient test is to add the numbers together in the reverse order; that is, to commence with the top line instead of the bottom. If the second result be the same as the first, the work may be presumed to be right; for it is highly improbable that the same error will have been made in performing the operation in two different orders.

**Exercise 4.**

1. Add together the following sets of numbers:

   - 1. 75324 + 41015 + 19075 + 176
   - 2. 83065 + 9035 + 72358 + 519
   - 3. 1500267 + 45895 + 4652 + 8756040 + 207275 + 83769841
   - 4. 407202155 + 67070420 + 756683
   - 5. 765 + 580 + 334 + 860 + 720 + 984 + 567990 + 86598949 + 8945865 + 80799789
   - 6. 42367902 + 310046734 + 2167055 + 327561 + 293000428

2. Add together the following numbers:

   - 756 + 819 + 934 + 680 + 720 + 845 + 65796 + 898794098 + 41288
   - 9. 142857 + 428571 + 285714 + 835142 + 714285
   - 10. 903475 + 57 + 487982
   - 452367902 + 310046734 + 2167055 + 327561 + 293000428

3. Find the sum of the all the numbers from 1 to 100.

4. Arrange the nine digits in the form of a square, that is, in three rows of three figures each, so that when the columns are added vertically (up and down), horizontally (from side to side), or diagonally (from corner to corner), they will still produce the same sum.

5. In the following square, taken from Professor Dr. Morgan's "Elements of Arithmetic," the columns added vertically, horizontally, or diagonally, will all produce the same sum, thus affording twenty-four different exercises in addition:

| 2177956 | 4062900 | 1583968 | 4058914 | 899999 | 4837250 | 369999 |
| 494990 | 2278254 | 7431004 | 1568926 | 4175016 | 1089279 | 2870942 |
| 2969940 | 500386 | 2375552 | 4550920 | 1781364 | 3563229 | 1187796 |
| 1289794 | 5066839 | 662996 | 2471950 | 4265914 | 1849092 | 3662926 |
| 3701924 | 1355972 | 3107936 | 89986 | 2573948 | 4355912 | 1517960 |
| 2097055 | 8980922 | 791094 | 36250934 | 1977996 | 2527249 | 4459410 |
| 4553903 | 1494070 | 3909920 | 890982 | 3653092 | 299924 | 2771944 |

6. The following is another example of the same kind, which will afford sixteen exercises on larger numbers than those in the preceding square:

| 2177956 | 4062900 | 1583968 | 4058914 | 899999 | 4837250 | 369999 |
| 494990 | 2278254 | 7431004 | 1568926 | 4175016 | 1089279 | 2870942 |
| 2969940 | 500386 | 2375552 | 4550920 | 1781364 | 3563229 | 1187796 |
| 1289794 | 5066839 | 662996 | 2471950 | 4265914 | 1849092 | 3662926 |
| 3701924 | 1355972 | 3107936 | 89986 | 2573948 | 4355912 | 1517960 |
| 2097055 | 8980922 | 791094 | 36250934 | 1977996 | 2527249 | 4459410 |
| 4553903 | 1494070 | 3909920 | 890982 | 3653092 | 299924 | 2771944 |

**LESSONS IN BOTANY.**

I. **INTRODUCTION.**

At the outset we may as well state that by the term Botany we mean the science which teaches all about plants; such as their form, their aspect, the number and structure of their flowers, their seeds, and, in short, all that in any way relates to them. The word botany is derived from the Greek, in which language θο'ρανείε = signifies a plant. Our friends the Germans call the study pflanzenlehre, plant-teaching; and, in our opinion, they are quite right to find a name for this and many other sciences out of their own language. We English might with great propriety do the same on many occasions, but it is not the custom.

Botany is a very interesting, no less than a very useful study, and it possesses over many others the advantage of being attended with no expense.

Inasmuch as botany is the science which teaches all about plants, the learner will agree that it is necessary to set out with precise notions as to what a plant is. Nothing would appear to be more easy than this; and easy enough it is when it is taken extreme cases: thus, for instance, no one would ever take an oak-tree for an animal, or a horse or an elephant for a vegetable; but there are certain beings whose characteristics are so little marked, that philosophers are to this day not agreed as to the division of nature to which they ought to be referred; in other cases, again, beings have been taken out of one classification and inserted under another; this remark applies to the sponge, which, although it attaches to rocks attached to rocks under the sea, is now universally considered to be an animal, or, more properly speaking, the skeleton of an animal, the soft portions of which have been dissolved away.

The great Swedish naturalist Linneé, better known by the Latin form of his name—Linnæus, adopted the following pithy designation of minerals, vegetables, and animals.

"Minerals," he said, "grow; plants grow and live; but animals grow, live, and feel." A very neatly turned expression this, was most all, and the task would not be easy in few words to show whereby it is insufficient. Naturalists of the present day, however, do not consider it quite correct, and, what is more, naturalists own that their ingenuity has been unable to find a distinction which is quite correct; however, the following is perhaps more nearly correct than any other. Animals are those living beings which derive their nutrient from an internal cavity (the stomach), and vegetables are those living beings which absorb their nutrient from without.

**SECTION I.—ON THE PRINCIPLES WHICH SERVE FOR THE CLASSIFICATION OF PLANTS.**

Whatever may be the subject of our study it requires to be classified; classification being the very first step in knowledge, without which our ideas become obscure and confused; therefore it is that even the lowest botanical amongst us, when speaking of vegetables, make a rough sort of classification for ourselves, usually dividing them into herbs, plants, bushes, or shrubs and trees. And for many common purposes this rough and ready distinction is sufficient; but it is not very correct, and therefore will not answer the purposes of a botanist.

To prove that the distinction is not correct, we will mention two cases in point, and we are sure the learner will accede to the justice of the remark. What would the reader term a myrtle?
as he sees it growing in our climate? A poor tiny thing scarcely bigger than a geranium he would not term a tree; he would call it a shrub or a bush; nevertheless, this very same species of myrtle assumes under the more genial sun of Southern Europe and Northern Africa the dimensions of a goodly tree. Again, what would the reader term the mignonette? A plant of course; yet in Northern Africa, along the Barbary coast, its stem becomes woody, and it assumes the aspect of a bush or shrub at least.

THE GREAT DRAGON-TREE OF OROTAVA, TENERIFFE.

When the true relations subsisting between vegetables are well considered, we shall find that the mere size of a vegetable has nothing to do with its real nature: thus the sugar-cane, which grows to the elevation of fifteen or sixteen feet, is still to all intents and purposes a grass; as in like manner is the bamboo, which assumes the dimensions of a tree. Then, again, the lily tribe. Does not the very sound of the word lily cause ideas to arise of some delicate herb-like growth, surmounted with drooping flowers? Of this kind are the lilies which grow in our climate; but all lilies are not thus. The great dragon-tree, as it is called, is still a lily; and as though Nature desired to confound our prejudices by one bold master-stroke, these

dragon-trees are amongst the largest and the oldest, if not the very largest and very oldest, of known trees. The great dragon-tree of Orotava, in the island of Teneriffe,* an accurate representation of which is given below, is of such dimensions that two full-grown men, joining hand to hand, are scarcely sufficient to encircle its base. It is now about four hundred and seventy years since the island of Teneriffe was first discovered. The great dragon-tree of Orotava was then, as it is now, the twin wonder of that island, dividing its interest with that of the stupendous peak. Precise accounts have been handed down to us of its size, from a consideration of which it appears that the monster has increased but very little in dimensions since that time—a probability which is still further confirmed by

* One of the Canary Islands, a group in the Atlantic Ocean, about sixty miles S.W. from the coast of Marocco, belonging to Spain. They were supposed to have been known to the ancients as the "Fortunate Isles." The earliest discovery, however, of these islands of which we have any authentic account was made by De Bethencourt, a Norman, about 1400, and they were purchased from his descendants and annexed to Spain about eighty years after. The famous Peak of Teneriffe is 12,129 feet above the level of the sea.
observations made on young dragon-trees, the growth of which is remarkably slow. What grand, what stupendous thoughts does a contemplation of this fact awaken! When did this monster first begin to grow? How many thousand years have rolled over its weather-beaten head? We are afraid to speculate on these points, but will content ourselves by saying that, according to the most reasonable evidence which can be adduced, this great dragon-tree began to grow long, very long, before the creation of man. Yet this monster is a Lily!

The student will admit that, supposing our previous remarks to be correct, our ordinary notion of calling the strawberry a Erinaceous fruit is open to just criticism. But less so are some of our common ideas regarding the similarities and dissimilarities, or the alliances, of the parts of which vegetables are composed. For example, do we not commonly speak of onions and potatoes as roots? Yet they are not roots, nor are they similar, far less identical, in character. The onion is a bulb, or underground bud, and the potato is a tuber or knotty excrecence developed underground, from which the roots and stems of the potato plant respectively spring. Why are they not roots? the learner may ask. The reasonwhy will appear by and by: to explain these reasons is an object, and one of the main objects, of botany. We merely cite the example now for the purpose of making known in a striking manner the incorrectness of many notions we are in the habit of entertaining.

Again, do we not in ordinary language term the strawberry and the fig fruits? Yet neither is a fruit.

"Not a fruit!" the learner explains, "do we not eat them?" Well, surely, our reader would not limit the term fruit to something which grows on a vegetable, and which is good to eat. We think he will admit that the bunches of apples, as they are called, which grow on potato stems, are the fruits of the potato plant; yet potato apples are not good to eat. He will admit that the bunches which grow on ash-trees are the fruits of those trees, yet they are not good to eat. Finally, not to multiply examples unnecessarily, he will admit that acorns are the fruits of the oak-tree; and although our ancestors, the ancient Britons, are known to have eaten them, yet all we can say upon that point is, that one pities the bad taste or the hard fortune, as the case may be, of our forefathers.

If strawberries, then, and figs are not fruits, what are they? Why, the fig is to all intents and purposes a compound flower, as much as the dandelion is a compound flower; and a strawberry is something like a fig turned inside out; but the learner shall judge for himself.

The strawberry plant bears, as we all know, a very evident, a very pretty flower, the petals or flower-leaves of which dropping off, we ultimately get something which is good to eat, and which we term the strawberry fruit.

Why, then, is it not a fruit? We will see. If it be a fruit, it should contain seeds; but on cutting it open we cannot find any. Here, then, the learner would be puzzled if botany did not come to his aid. General principles have to be appealed to, and the appeal will not be made in vain.

Whilst conjecturing within ourselves the botanical nature of the strawberry, and trying to find out the freak which Nature has been playing in order to lead us astray, we all at once bethink ourselves of the little hard protuberances on the outside of the strawberry. What are they?—of what do they consist?—what is their function?

A learner, if he had not been rendered cautious by previous experience, might all at once arrive at the conclusion that the strawberry is a fruit turned inside out, having consequently its seeds externally; and that the strawberry seeds do these little protuberances appear. They are not seeds, nevertheless; they are fruits, the real strawberry fruits; but so little adapted for eating are they that the lover of strawberries wishes them very far away. Then what is the edible portion of the strawberry? Botany answers this question satisfactorily, and makes all clear. It is the juicy torus of the plant. The reader gains little knowledge from this remark beyond the knowledge of an, at present, unmeaning name; and as we do not intend that any names in this series of papers on the Science of Botany shall be unmeaning, we will at once proceed to explain what a torus is.

Torus, then, is the Latin word for bed, and signifies that portion of certain flowers upon which the flower itself reposes or grows. Take, for example, the marigold, and strip off all its floral parts; there will then remain underneath a flat, flabby expansion, called the torus. In the case of the marigold the non-botanical reader may easily conceive that it might have been round or polygonal to rotundity. In the marigold it is leafy and naceous, but the reader will as easily conceive that it might have been fleshly and delicious, as indeed we find it to be in the strawberry. Analysed thus, we find a similarity between the strawberry and the marigold that the non-botanical reader would have little suspected. Nor is the similarity forced, it is natural, and loses nothing by the fullest investigation which the learner can devote to it. Thus, we dare say, the reader has watched the progress of a marigold to maturity; has noticed the flowers blown away, one by one, and nothing but the stem, the torms, and the little seed-like things embedded upon the torus remain. These little things, like the hard excrences on the strawberry, look so much like seeds, that they might be taken for such. However, we are never to assume because a thing is small that it is imperfect. If these so-called seeds be dissected and examined, they will be found to be real fruits, as much as the apple or the pear, and so contain seeds internally layered.

And now for our other example, the fig. What is the fig? Not a fruit certainly, although the freak of Nature here, if we may without disrespect use such a term, is different from those which have come under our notice hitherto. Let us cut open a fig; what then do we see? Why, little things very similar in appearance to flowers, at the base of each of which there is a hard nut-like thing which cracks between the teeth. Flowers indeed they are, and the nut-like things are fruits, the edible portion of the fruit being just that if we assume the strawberry to have had a flat torus instead of a knob-like one, and that the flat torus had been turned outside in, in such a manner as to form a bottle with a very narrow mouth, we should have had a result very much resembling a fig in structure and general appearance.

Even the delicious pineapple can hardly be termed a fruit. Each pineapple certainly contains many fruits, one corresponding with each lozenge-like marking; but the main bulk of the pineapple, that which we find so delicious to eat, is only an assemblage of juicy fruits, as botanists call them, the exact counterpart of those little scales which, when tightly compressed together, form the cup of the acorn.

We are sure, then, that sufficient has been stated to make apparent to the reader the necessity of abandoning many common notions he may have previously entertained in relation to the similarities and dissimilarities of vegetables, and the parts of which they are made up.

LESSONS IN GERMAN.—I.

The object of the author of these Lessons in German is to unite theory and practice; to introduce, one by one, the easier forms and usages of the language; and to direct the student's attention to the more obvious differences between the German and English languages. The learner will be supplied, throughout the various exercises, with the materials necessary for their due performance. Every section is headed with the statement and illustration of all new principles involved, with an explanation of words and phrases, and a vocabulary alphabetically arranged.

To render these lessons complete, there will be given at the end a series of reading lessons, each accompanied by a full vocabulary. The whole is specially intended for those
who aim at the acquisition of the German language without a teacher.

SECTION I.

GERMAN ALPHABET.

A a ah aah Art.
B b be beet.
C c see See.
D d day Die.
E e ey (in prey) Grim.
F f ef Eff.
G g gay gay Gey.
H h ha hah Sah.
I i (as in pique) Ret.
J j yote Ret.
K k ka kah Ret.
L l ell Glee.
M m emm German.
N n enn Ent.
O o oh Dyer.
P p pay Pat.
Q q koo Coot.
R r err (as in error) Grett.
S s ess See.
T t tay Dyer (see 18. §).
U u o (as in do) Dyer.
V v bow (bow as in bow) Dyer.
W w way Gay.
X x ic Jer.
Y y epsilon Geyn.
Z z test Jett.

In every German letter, with the exception sometimes of e and j, is pronounced. (See 3, 9, 18, and 18. §)

The printed capitals of i and j, in German, are in form alike.

Diphthongs. Umlauts (12. 3c, etc.)
ai, au, eu, ou, au.
ä, ö, ü.

Compound Consonants. cS, sc, sf, sf, pf.
ek, seh, ss, st, sx, ts.

SECTION II.

SOUNDS OF THE GERMAN LETTERS.

Sounds of the Vowels.

1. A, a = a, as in for, father. Ex., Marit, market; Taf, ced; Ruben, road; Matt, leaf; Miet, evening.
2. E, e = e, as wet, ferry. Ex., Iken, to live; Meeer, sea; Gey, honour; feier, better; Wiener, knife.
3. I, i = i, as in pique, pin. Ex., mir, to me; mit, with; ihn, him; hier, against; bitter, bitter.
4. O, o = o, as in door. Ex., Ogen, stove; Meeet, moss; Reet, coal; Pert, port; Beet, post-office.
5. U, u = oo or o, as in poor, do. Ex., But, blood; Du, thorn; Uf, watch; but, bat, gut, good.
6. Y, y = i (mostly in words from the Greek). Ex., Jyff, hyssop; Smyr, Smyr; Ypres, Ypres.
The sound of a vowel when doubled, is then lengthened; as Ad, Bert, Berth. Followed by a double consonant, the vowels are usually shortened, as Mutt, Bert, Sinn, Gott, etc. See, however, 18. §.

Disyllabes (see vocabulary), unless otherwise noted, are accented on the first; as fesen, Gey, etc.

Sounds of the Diphthongs.

7. AI, ai (sometimes or al) = as nearly as in eye. Ex., Alfr, emperor; Stain, Bavaria; Mai, May.
8. AI, an = ow, as in our. Ex., Saat, house; Main, mouse; laut, loud; Saat, fast; Braut, bride.
9. GI, gi = or iy, as in fine, eider. Ex., Gein, stone; thin, thi. (it = ei, as in pier, never as in pie. Ex., viel, etc.)
10. GU, gu = nearly to ci or oy, as in boat, boy. Ex., Bente, boat; Bent, people; feun, to hay.
11. AR, au = nearly to ow. Ex., Aunger, extreme; Schen, to hoard; Anfr, buyer; Anfer, cottager.

Sounds of the Umlauts (Umlauts).

Umlaut signifies changed or modified sound. The Umlauts are produced by a union of e with a, u, or (also) respectively, and the e is expressed by two dots; thus, ä, ö, ü (and û). The capitals Ä, Ö, Ü, are not much in use, and the student should never make use of them in writing.

12. C, â, as in tap, talk, carry. Ex., Atter, vacation; Änder, ferry.
13. CR, ê, as in return. Ex., Cof, oil; Frech, popular; tetter, to kill; Récher, pipe; Récher, collier.
14. RE, â, has the sound of the French s in re, tribu, etc. Ex., Reun, practice; mixt, weary; lâcher, to guide.

Sounds of the Consonants.

15. B, b; D, d; S, f; T, J; Z, m; N, n; V, v; G, q; x, are sounded as b, d, f, k, l, m, n, p, q, x, in English.
16. C, before a consonant, at the end of a syllable, or before s, e, u in the same syllable, sounds like our corresponding letter in position. Otherwise it sounds like ts. Ex., Geter, ceder; Cigare, ciger; Gymbal, cymbal; special, special.
17. S, g, sounds like our q in gild, foggy, etc., but never as in gem, ginger, etc. When preceded by a, in the same syllable, it sounds like our q hard in like position: as in vage, anxiety; fagen, to sing; fagen, to bring; siag, siege, etc., But, when in the middle or at the end of a syllable, is preceded by any letter, the second approaches that of the Greek σ pronounced s, or the still more guttural s (see 26. §): Tas, tamen, Bag, bagh, etc. The learner should avoid confounding the pronunciation of siag, sige, etc., with that of siag, sige, etc.
18. Ź, ź, in the midst and at the end of a syllable is silent, but serves to lengthen the preceding vowel. Ex., tozen, to teach; otzen; without; Otzen, etc.
20. R, r, is uttered with a trill or vibration of the tongue, and with greater stress than our r. Ex., Reer, rood; Reit, council; rif, ripe.
21. Ź, ź, at the beginning of a syllable followed by a vowel, has a sound between that of z and s. Ex., Zs, som; sizen; seven; otherwise it sounds like z; as in Cas, gay; steam stream. Note that at the end of a syllable s is substituted for ż; as above, Cas, etc.
22. Ź, ź, sounds like t in tent. Ex., Tzter, text. In the position where in English t sounds like ts, ź has the sound of ts. Ex., Station, station; Staten, nation.
23. Ž, v, sounds like f, as in five. Ex., Fater, father; vegen, to forgive. It is used in words from the Latin and French that v has a sound like that of the German m (see 24. §), as in Sabinet, Venus; Persiflet, Versailles, etc.
24. W, w, has a sound between that of our w and v. Ex., Wet, world; Wißer, water, etc.
25. Ž, ź, sounds like ts. Ex., Žah, salt; Žahn, tooth; Žunge, tongue; Žen, ten.

Sounds of the Compound Consonants.

26. GŽ, Ž, in primitive words, when followed by Ž, has the sound of k. Ex., Žegle, badger; Æs, of Æs, ex. But, if e, is added by derivation, combination, or infection, k has its guttural sound; as in hek, naek, Æsek, Æsek, etc. Ex., Æskrift (from naek, after, and Æs, writing); wagoner (from naek and fitter, to think), etc. In words from the Greek and French, Ž retains its original sound; as in Gærator, character; Æstafan, charlatan.
27. ZS, Ž, sounds like zh. Ex., Žah, show; Žel, ship; Žeen, already; Žunft, school.
28. § (though compounded of § and j) sounds like j, and is used only at the end of a syllable. Ex., Nads, measure; Žib, river, etc.
29. § (though compounded of j and §) sounds like ß, but, like §, is only employed at the end of a syllable. Ex., Æs, Æs, Æs, etc. Note that this letter being a double consonant, the preceding vowel is thereby shortened.

To aid in producing the sound of Ž, take for experiment the above word Žej: pronounce b e precisely like our word bo; observing to give as full and distinct a breathing of the h at the close as at the beginning; thus hô-hô = Žej. Except when
LESSONS IN MUSIC.

We have a friend, who was long persuadeud by his relatives, who were all "musical," that he had "no voice." Any innocent attempt of his to unite in the vocal pleasures of the family circle was instantly checked by some compassionate expression or imploring look. He humbly acquiesced in this judgment of his friends, but found it often difficult to resist the sympathy of song, and sometimes startled the singers by adding his honest voice to the closing strain. In public worship, too, no frowns or dissuasions could hinder him from "doing his best" to join in the praises of God. He often wondered how it was that no cause to be born with "no voice," especially when he observed that the infants of the present day are so much more highly endowed, every one of them who attends an infant-school apparently taking for granted that he "has a voice," and using it accordingly. As a religious man, also, he could not help noticing that one whole book of the Scriptures was written for the promotion of public vocal praise, and that it abounded in such expressions as this: "Let the people praise thee, O God; let all the people praise thee." The example of Christ and the precepts of his apostles seemed made to set forth the same duty. "It cannot be," he sometimes reflected, "that we should command us to "sing," in addition to "making melody with our hearts," and yet give to so many of his children no voice!" Such thoughts as these led him to the conclusion that it is "no practice" and "no cultivation," rather than "no voice" and "no car," with which the majority of men are afflicted. In consequence of this, to the no small ammendment of his musical acquaintance, our friend was soon found to have become an attentive and painstaking member of a singing class. He was soon deep in "thirds" and "fifths" and "sevenths," tolling at a series of the most unmusical exercises that could well be invented. But hope sweetens toil, and the expectation of conquering at last gave to our friend courage and patience. When sixty laborious lessons, relieved by an occasional song, were over, he made the discovery that he had heard "a system," that he had gained also some confidence and much command of the organs of voice. But what did he know of music? Could he take the plainest psalm tune to the key of C, unseen before, and sing it? Also! no. His labour had not been lost, but it had produced small fruit. He could follow the "leader" more promptly and easily, but he could not go without him. There was still an indecision and uncertainty about his endeavours. He could seldom be sure whether he was right or not by half a tone. And many a choices song, and not a few tune-books, which he had purchased in his hopeful days, lay on his table unenjoyed because of this musical uncertainty in which he was left. Once more, however, our friend has "taken heart," and has promised to follow the course of effort which we shall prescribe; we, on our part, undertaking that he shall in that case be enabled to sing at first sight by himself, and to make good use of the books on his table. We shall begin at the beginning, however, for your sake, gentle reader, if you will join him in his efforts. We have no "royal road," no way of getting on with the least of attainment is won without this. But we have a straight and clear road, and that is a great advantage when the common road is very circuitous, and abounding with needless hindrances. We have only two things to ask of you: the first, that you will be content to learn one thing at a time, instead of being impatient for knowledge not at the moment helpful perhaps, just then, only confusing to you; the second, that when something is set before you to be done, you will really do it, instead of supposing it to be done, and going on; for only "by doing we truly understand."

FIRST PRINCIPLES OF MUSIC.

You must allow us to lay before you certain fundamental principles of music itself—of music considered apart from any method of teaching or of writing it—principles which would be true of music if Guido had never invented the "staff," and if "concerts" and "quavers," "flats" and "sharps," had never been heard of.

1. You know what is the difference between "high" and "low" in music. The "squeak" is high, the "growl" is low. Recognize this difference to yourself now by singing first a high and then a low note. Between the highest and the lowest sounds which the human ear can appreciate, an indefinite number of other sounds may be produced. But how, out of this vast chaos of sounds, do the wise and choose to call distinct notes of a voice suitably to start into life and power? The question is thus answered. Before a TUNE can be created, a certain sound, whether high or low in pitch, must be chosen and fixed as the KEY-NOTE (sometimes called the governing note, and in books of science the tonic) of the coming tune. Immediately, according to these laws of nature by which God has tuned our ears and souls, six other notes spring forth, at measured distances from the key-note,
claiming the sole right of attendance upon it. Let this be clearly understood. Any sound may be taken for the key-note; and that being fixed, the places of the six other notes are known.

The common human ear throughout the world is pleased when these sounds attend that key-note, and is displeased when other sounds, not holding the same relation to the key-note, and not standing at precisely the same relative pitch, are used in their stead; for even an uncultivated ear would promptly mark the difference between the accurate singer and the inaccurate, between the singer in tune and the singer out of tune.

This distinct arrangement of six sounds around a key-note is called the musical “scale.” It may be high in pitch in one tune, and low in another, but the relative position of its notes remains unchanged. These notes may be reproduced in similes or “octaves” of higher or lower pitch, but they still retain the same relation. Transition or “modulation” (which will be afterwards explained) may change the key-note in the course of a tune, but the new key-note governs its dependents exactly as the old one did. Every apparent exception only proves the rule. This one scale is the foundation of all music. Some speak of this scale as though it were of human invention; but if so, how is it that every newly-discovered nation is found either using it (if they are musical at all), or possessed of cars which readily approve it? How is it that the Chinese or Indians have not “invented” some other scale? The truth is, some of these nations do omit a note or two, but they do not alter the rest; and when the question is fairly examined, it is found the omissions were caused by their rude and incomplete instruments, rather than by defective ears. Again, let me ask, going back to the time of the ancient Greeks, of whose musical notation there is not a remnant from which we could have copied, how is it that we learn, from their philosophical treatises, that the scale which the people used was the same as ours? Could not that refined people have “invented” something better? Are we not right, then, in calling it the scale of all nations end of all times, the scale to which the ear and soul of man are tuned by the ancient apostles?

When we examine its structure more closely, we find other proofs that it comes from the hand of God. Like many of his works—the rainbow, for instance—it seems to the careless observer irregular, but disclosea a beautiful harmony and purpose to him who is more thoughtful. The distances in pitch (that is, highness or lowness of sound), or, in other words, the spaces between the notes of this scale, are very delicately arranged. In another lesson we shall be able to describe its structure more minutely; but let it suffice for the present to say, that the simplest measurement of the scale in plain figures is that which divides it into fifty-three degrees. Such a division is only inaccurate to the extent of being about one third of a degree too large.

If you will make use of the sol-fa of the scale represented by the notes of this scale, DoH standing for the key-note of a tune, at whatever pitch it is taken, then the number of such degrees between each couple of notes may be set forth by the figures at the side. Why the scale of music found most acceptable to human ears should be thus curiously and delicately formed, and why it does not exhibit a greater apparent uniformity, we cannot tell. It is an “ultimate fact” of philosophy, like the structure of the rainbow. We must take it as it is, and reverently study the laws of its structure. Sir Isaac Newton’s division of the spectrum into seven colours bore some analogy to these seven notes; and in a large work written by Mr. Halliwell on the Green Man, a clear relationship has been established between the principles of beauty in the human form, and certain angles founded on the proportions of the musical scale. Doubtless there are in the various departments of Nature certain unifying principles, certain secret affinities of things, which shall prove them all to have sprung from one creating Hand.

It may, however, be noticed here, that every scale of the scale sounds pleasantly, when heard at the same time with the key-note, excepting only RAY and TE; and of these, the most difficult notes of the scale, more will be said when our lessons are further advanced.

For the present, we wish your attention confined to the three notes, DoH, ME, and SOH, the first, the third, and the fifth. They are the strong notes of the scale, on which, as you will afterwards learn, the others lean. We may call them “the framework of the building.” When sounded together they are commonly called the “chord of the tonic,” tonic being the scientific name for key-note. Chiefly by these notes your voice must be tuned. Take, then, some low sound of your voice for the key-note, or DoH, and try to sing the following exercises, pointing to the notes on the scale given above, as you sing. This pointing on the scale is more important than you would at first imagine. In no other way can you obtain so clear a notion of the relative position of notes. If previously un instructed, you must ask some musical friend to sing these notes to you, or play them on an instrument for a pattern. Do not, on any account, however, sing with him or let him sing with you. Remember that you are learning to sing alone. Your friend will know what notes to play when you tell him D, F sharp, A, and upper D; or, if he prefers it, C, E, G, and upper C. You will notice that when a note is repeated in a higher pitch, we put this mark (') above it; thus, DoH. You need not trouble yourself with the “staff” of five lines at present, except to notice that DoH is printed as a square note.

**Exercise 1.**

![Exercise 1 Image](image1)

**DoH**

DoH, SoH, Me, DoH

Note.—Sing these notes first slowly, then quickly, and again with a sound “long drawn out.” Do not be disappointed if your friend pronounces you inaccurate in the first and second notes, though they are the easiest. Let him patiently set the “pattern” of those two notes again, and, if need be, many times again. Master one note at a time. Some pupils require several lessons, with much patient “patterning” of the teacher, and much careful listening, followed by vocal effort of the learner, before this exercise is perfectly done.

**Exercise 2.**

![Exercise 2 Image](image2)

**DoH**

DoH, Me, SoH, Me, SoH, Me, DoH

Note.—You observe the upright bars. Sing the note immediately after them with a stronger accent or force of voice than the others. You notice that two of the notes on the “staff” of five lines are open, and that the names beneath are followed by a stroke of “continuance.” Sing those notes twice as long as the rest.

**Exercise 3.**

![Exercise 3 Image](image3)

**DoH**

DoH, SoH, Me, SoH, Me, DoH

Note.—Sing all these exercises again, while some one else repeats the note DoH for every note you sing. This we call “tolling the bell.”
LESSONS IN GEOMETRY.—I.

The term Geometry, which comes from two Greek words, γεωδαίη, the earth, and μέτρον, to measure (pronounced met-e-ron), literally signifies land-measuring, and was originally applied to the practical purpose which its name signifies, in the land of Egypt, the cradle of the arts and sciences. Herodotus, the oldest historian, with the exception of Moses, whose works have reached us, gives the following account of its origin:—"I was informed by the priests at Thales, that King Solomos assigned him three acres of land, to be cultivated at his own expense, and that when the crop was mature, all his subjects, assigning to each an equal portion of land, in the form of a quadrangle, and that from these allotments he used to derive his revenue, by exacting every year a certain tax. In cases, however, where a part of the land was washed away by the annual inundations of the Nile, the proprietor was permitted to present himself before the king, and signify what had happened. The king then used to send proper officers to examine and determine the amount of the land which remained. From this circumstance I am of opinion that geometry derived its origin; and from hence it was transmitted into Greece." The existence of the pyramids, the ruins of the temples, and the other architectural remains of ancient Egypt, supply evidence that its inhabitants possessed some knowledge of geometry, and approached the higher sense in which geometry is considered, in a very ancient term; although it is possible that the geometrical properties of figures necessary for the construction of such works might have been known only in the form of practical rules, without any scientific arrangement of geometrical truths, such as are presented to us in the Elements of Euclid.

The word "geometry," used in its highest and most extensive meaning, signifies the science of space; or that science which investigates and treats of the properties of, and relations existing among, definite portions of space. The knowledge of the division of lines, angles, surfaces, and volumes, without any regard to the physical properties of the bodies to which they belong. In this sense, it appears to be very doubtful whether the Egyptians or Chaldeans knew anything of the science. It is to the Greeks, therefore, that we must look for the real origin of geometry, as an abstract science. Thales, the Greek philosopher, born 584 B.C., is reported, by ancient historians, to have constructed for the Egyptians by his knowledge of the science. The founder of scientific geometry in Greece, however, appears to have been Pythagoras, who was born about 588 B.C. He discovered the celebrated 47th proposition of the first book of Euclid's Elements, and various other valuable and important theorems. He was great also in astronomy, having anticipated the Copernican system of the universe. Plato, another great geometer, and founder of the academy at Athens, who was born 428 B.C., was the first who made some advances into what is called the higher geometry. The next name super-eminent in the science of geometry is that of Euclid, whose "Elements" has been the principal textbook for learners during a period of more than 2,000 years. He flourished at Alexandria, in Egypt, about 300 B.C., during the reign of Ptolemy Lagus, who was one of his pupils, and to whom he made the celebrated reply, when asked if there was a short way to the east: "If there be, I have not found it; I have not found it!" On coming out of the bath, he have become a "household word." Scarcely less celebrated was the famous Apollonius of Perga, in Pamphylia, who flourished from 247 to 225 B.C. in Alexandria, in the reign of Ptolemy Euergetes, another king of the same Ptolemaic dynasty, and who was called by his contemporaries the "Great Geometer." He wrote several books, full of discoveries, on the higher geometry, and greatly extended the domains of the plane geometry. Other geometers of eminence arose in the school of Alexandria, and bequeathed the precious remains of their genius to happier times. Claudius Ptolemaeus, the author of the famous astronomical book called "Geolmpligara," the Great Construction, or Almagest; Pappus, the third of the Alexandrine Mathematicians; and others, including Thaen and his son Hypatia, bring us down to the period when the second Alexandrian library was burnt by command of the Moham medan barbarian, the Saracen Caliph Omar, in 640, and the labour and learning of ages were irrecoverably destroyed. The dark ages superseded, and little was done in the advancement of science until the glorious invention of printing, and the general revival of literature about the middle of the fifteenth century.

The ancient Greek geometry was speedily made known to the moderns through the medium of translations of, and commentaries upon, the writings of the great masters. The Elements of Euclid, indeed, were reckoned so perfect, that no attempt was made to supersede them; and the only object of writers on geometry was to explain his works, and to make such additions as could be made to the seven books which were the only style of composition. A host of names of eminent authors might be mentioned, who succeeded in establishing the Greek geometry, and in extending its domains. The principal of these, however, was Dr. Robert Simson, Professor of Mathematics in the University of Glasgow, who flourished in the middle of the last century. His grand endeavour was to present to modern Europe the Elements of Euclid as they originally appeared in ancient Greece. In this he succeeded in the application, and his edition of this great work maintains its reputation to the present moment. In giving our first lessons on geometry, we think it advisable to follow what seems to have been the natural course of events in the history of this science. The present advanced state of our geometrical knowledge was preceded in early times by a species of practical geometry gathered from experience, and limited to the wants of those who required its application, before any attempt was made to enter very deeply into the study of the theory. The latter was left to the schools of the philosophers and the academy of Plato. Accordingly, we shall proceed our disquisitions on the Elements of Euclid and other geometers, both ancient and modern, by a short system of practical rules and easy explanations in this important science; and we shall endeavour to make the subject both simple and clear by plain definitions, suitable diagrams, and palpable demonstrations, after the manner of the French writers on this subject, who have even in their more elaborate treatises to a great extent abandoned the system of Euclid.

DEFINITIONS.

1. Extension, or the space which any body in nature occupies, has three dimensions, viz., length, breadth, and thickness. This is Euclid's definition of a geometrical solid.

2. A point is the beginning of extension, but no part of it; hence it is said to have position in space, but no magnitude.

3. A line is extension in one direction only; hence, it is said to have length without breadth. Hence, also, the extremities of a line are points; and lines intersect or cross each other only in points.

4. A straight line is said, by Euclid, to be that which lies evenly between its extreme points; and, by Archimedes, to be the shortest distance between any two points. Both of these definitions are defective; the defect is supplied thus: A straight line is such, that if any two points be taken in it, the part which they intercept (or which lies between them) is the shortest that can be drawn that has both of them for points.

5. A crooked line is one composed of straight lines joined at

The first library, which was founded by Ptolemy Soter, and which was said to have contained 400,000 manuscripts, was accidentally burnt 47 B.C., when Alexandria was taken by Julius Cæsar. The second library is supposed to have contained 700,000 volumes.
their extremities in any manner whatever, except that of uniform direction. A curved line, or curve, is a line whose direction varies at every point.

Straight lines, or curved lines, are generally denoted, in speaking and writing, by two letters placed commonly at their extremities; but they may be placed anywhere on the lines at a distance from each other. Thus, in Fig. 1, the letters A B D denote one straight line, the letters C D another, and the letters E F a third; and these straight lines are respectively called the straight lines A B, B C, C D, and D E. A straight line, as A B, may be divided into any number of equal parts, to serve as a standard for measuring other straight lines.

A combination of straight, crooked, and curved lines is represented in Fig. 2; A B, B C, C D, and D A, are each straight lines; the combination A D C B, beginning at A, and terminating at B, is a crooked line; and the line A M B, beginning at A, and ending at B, is a curved line.

Fig. 2.
6. A surface, or, as it is sometimes called, a superficies, is extension in two directions; hence it is said to have only length and breadth. Hence, also, the extremities or boundaries of a surface are lines, and surfaces intersect or cross each other in lines.

A plane surface, or plane, is a surface in which any two of its points being taken, the straight line between them lies wholly in that surface; or, it is that surface with which a straight line wholly coincides, when applied to it in every direction. Any other surface, not composed of plane surfaces, is called a curved surface.

Parallel straight lines are such as lie in the same plane, and which, though produced ever so far both ways, do not meet (Fig. 3).

**READING AND ELOCUTION.—I. PUNCTUATION.**

Punctuation is peculiar to the modern languages of Europe. It was wholly unknown to the Greeks and Romans; and the languages of the East, although they have certain marks or signs to indicate tones, have no regular system of punctuation. The Romans and the Greeks also, it is true, had certain points, which were generally applied to the delivery and pronunciation of words; but the pauses were indicated by breaking up the written matter into lines or paragraphs, not by marks resembling those in the modern system of punctuation. Hence, in the responses of the ancient oracles, which were generally written down by the priests and delivered to the inquirers, the ambiguity—doubtless intentional—which the want of punctuation caused, saved the credit of the oracle, whether the expected event was favourable or unfavourable. As an instance of this kind, may be cited that remarkable response which was given on a well-known occasion, when the oracle was consulted with regard to the success of a certain military expedition: "This et redibilis munquam peribis in bello." Written, as it was, without being pointed, it might be translated either, "Thou shalt go, and shall never return, thou shalt perish in battle," or, "Thou shalt go and shalt return, thou shalt never perish in battle." The correct translation depends on the placing of a comma after the word munquam, or after redibilis.

The invention of the modern system of punctuation has been attributed to the Alexandrian grammarian Aristophanes, after whom it was improved by succeeding grammarians; but it was so entirely lost in the time of Charlemagne, that he found it necessary to have recourse to the work of Warnefried and Alcinus. It consisted at first of only one point, used in three ways, and sometimes of a stroke, formed in several ways. But as no particular rules were followed in the use of these signs, punctuation was exceedingly uncertain, until the end of the fifteenth century, when the learned Venetian printers, the Mantuhi, increased the number of the signs, and established some fixed rules for their application. These were so generally adopted, that we may consider the Mantuhi as the inventors of the present method of punctuation; and although modern grammarians have introduced some improvements, nothing but a few particular rules have been added since their time.

The design of the system referred to was purely grammatical, and had no further reference to enunciation, than to remove ambiguity in the meaning and to give precision to the sentence. This, therefore, is the object of punctuation, and although the marks employed in written language may sometimes denote the different pauses and tones of voice which the sense and accurate pronunciation require, yet they are more generally designed to mark the grammatical divisions of a sentence, and to show the dependence and relation of words and members which are separated by the intervening clauses. The teacher, therefore, who directs his pupils to "mind their pauses in reading," gives but an unintelligible direction to those who are unversed in the rules of analysis. A better direction would be to disregard the pauses, and endeavour to read the sentence with just such pauses and tones as they would employ if the sentence were their own, and they were uttering it in common conversation. Indeed, it is often the case that correct and tasteful reading requires pauses, and these too of a considerable length, to be made, where such pauses are indicated in written language* by no mark whatever. It is not unfrequently the case that the reader will allow no pause whatever to be made in cases where, if the marks were observed, it would be seen that a pause of considerable length is required. The pupil, therefore, who has been told to mind his pauses, must first be taught to unlearn this direction, and endeavour to understand the sentence which he is to read, before he attempts to enunciate it.

The characters employed in written language are the following:

- The Comma, .
- The Colon, :
- The Semicolon, ;
- The Exclamation Mark, !
- The Interrogation Mark, ?
- The Period, .
- The Obelisk, ¶
- The Paragraph, ||
- The Dagger, ♦
- The Asterisk, *
- The Caret, ^
- The Circumflex Accent, Æ
- The Grave Accent, Ä
- The Acute Accent, Á
- The Various Marks of Punctuation, various
- The Ellipsis, . . . ;
- The Ellipse, . . .
- The Elipsis, . . .
- The Hyphen, —
- The Breve, ̀
- The Dieresis, ́
- The Aspersus, “
- The Obelisk or Dagger, ¶
- The Section, §
- The Double Obelisk or Double Dagger, ||
- The Parallel, ||
- The Paragraph, ¶

These characters, when judiciously employed, are the meaning and give precision to the signification of sentences, which, in a written form, would be ambiguous or indefinite without them. Thus, "I said that he is dishonest; it is true, and I am sorry for it.

Now the meaning of this sentence can be ascertained only by a correct punctuation. If it be punctuated as follows: "I said that he is dishonest, he is true, and I am sorry for it," the meaning will be, that it is true that I said he is dishonest, and I am sorry that I said so. But if it be punctuated thus, "I said that he is dishonest; it is true; and I am sorry for it," the meaning will be, "I said that he is dishonest; it is true that he is dishonest, and I am sorry that he is so."

A further instance of the importance of correct punctuation was afforded by a late advertisement, in which the commissioner for one of the largest concerns of Europe, by the mispunctuating of a comma in his advertisement, would have contracted for the supply of but half the required light. The advertisement represented the lamps as "4,050 in number, having two spouts each, composed of not less than twenty threads of cotton." This expression implied that the lamps had each two spouts, and that the two spouts had twenty threads—that is, each spout had ten threads. But meaning that the company intended to convey was, that each spout had twenty threads; and his advertisement should have had the comma after "spouts," instead of after "each," thus: The lamps have two spouts, each composed of twenty threads, etc.

* The term "written language" of course includes printed language.
These instances might suffice to illustrate the nature and the propriety of correct punctuation; but the following instance, known to many, will show the importance of the subject. The clerk of a congregation in Scotland had a paper handed to him, as the custom is, to read just before the minister stood up to pray with and for the congregation, containing the following words, unpointed: "A man going to sea his wife desires the prayers of the congregation." The clerk read it as if a comma had been inserted after each part of the sentence, and was excited, in no small degree, the visible faculties of the people assembled—thus, "A man going to sea (see) his wife, desires the prayers of the congregation."

But although the meaning of a sentence is thus materially affected by the punctuation, it will be seen in the following lessons that the punctuation alone is an unsafe guide to follow in the enunciation of any collection of words. For, in many cases, those marks indicate no pause, emphasis, or other circumstance requiring notice in the enunciation of the sentence.

The nature of the marks used in written language may also be understood by a reference to the origin of their names.

The word Commas is derived from the Greek language, and properly designates a section, or part struck off from a complete sentence. In its usual acceptance, it signifies the point which marks the smaller portions of a period. It therefore represents the last pause, and consequently marks the least constructive, or most dependent parts of a sentence.

The word Colon is from the Greek, and signifies a member of a sentence, and the Latin prefix semi means half. Hence, a semicolon is used for the purpose of pointing out those parts of a compound sentence which, although they each constitute a distinct proposition, have yet a dependence upon each other, or on some common clause. The Colon is used to divide a sentence into two or more parts, which, although the sense be complete in each, are not independent. The Colon is also used in chanting, to indicate the division of a verse.

The word Period is derived from the Greek, and means a circuit or well-rounded sentence. Hence, when the circuit of the sense is completed, with all its relations, the mark bearing this name is used to denote this completion.

The Dash is only once used in the Bible, where it is employed as a two or more parts, which, although the last is placed together as one word.

The word Exclamation is derived from the Latin, and means a question. Hence this mark is put at the end of a question.

The word Accentuation is from the same language, and means a passionate utterance. Hence the mark so called is put at the end of such utterances.

The word Parenthesis, derived from the Greek language, means an introduction. A sentence, clause, or phrase, inserted between the words for the purpose of explanation, or of calling particular attention, is properly called a parenthesis. It is to be remarked, however, that the name parenthesis belongs only to the sentence inserted between brackets or crochets, and not to those marks themselves.

The word Hyphen is derived from the Greek language, and signifies under one, that is, together; and is used to imply that the letters or syllables between which it is placed are to be taken together as one word.

The hyphen, when placed over a word, to indicate the long sound of the vowel, is called the Macron, from the Greek, signifying long.

The mark called a Brace, indicating the short sound of the vowel, is from the Latin, signifying short.

The word Ellipsis, also from the Greek, means an omission, and properly refers to the words, members, or sentences which are not written. The comma for the purpose of explanation, or of calling particular attention, is properly called a parenthesis.

The word Apostrophe, also from the Greek, signifies the turning away, or the omission of one letter or more. The word apostrophe, as here used, must not be confounded with the same word as the name of a rhetorical figure.

The word Diacritic is also from the Greek, and signifies the taking apart, or the separation of the vowels, which would otherwise be pronounced as one syllable.

The word D bre is derived from the Latin language, and implies the tone of the voice with which a word or syllable is to be pronounced.

The word Section, derived also from the Latin, signifies a cutting, or a division. The character which denotes a section seems to be composed of "s, and to be an abbreviation of the words signum sectionis, or the sign of a section. This character, which was formerly used as the sign of the division of a discourse, is now rarely used, except as a reference to a note at the bottom of the page.

The word Paragraph is derived from the Greek language, and signifies a writing in the margin. This mark, which, like the section, was formerly used to designate those divisions of a section which are now indicated by unfinished lines or blank spaces, is in a recent version of the Old and New Testaments to mark the commencement of a fresh subject.

It may further be remarked, that notes at the bottom of the page, in the margin, or at the end of a book, are often indicated by figures or by letters, instead of the marks which have already been enumerated.

The word Caret is from the Latin, and signifies it is wanting. This mark is used only in manuscripts.

The Obelisk, Obelisk, Double Obelisk, and Parallels, with the section and paragraph, are merely arbitrary marks to call attention to the notes at the bottom of the page.

As these marks which have now been enumerated all have a meaning, and are employed for some special purpose, it is recommended to the student never to pass by them without being assured by reference to their meanings what that purpose is. Correct and tasteful reading can never be attained without a full appreciation of the meaning which the author intended to convey; and that meaning is often to be ascertained by the arbitrary marks employed by him for the purpose of giving definiteness to an expression. At the same time, the student should consider these marks as his guide to the meaning only, not to the enunciation of a sentence. Correct delivery must be left to the guidance of taste and judgment otherwise acquired.

In many excellent selections for lessons in reading, the pieces have been arranged in regular order, according to the nature of their respective subjects, under the heads of Narrative, Descriptive, Didactic, Argumentative, and Pathetic pieces, Public Speeches, Promiscuous pieces, the Eloquence of the Bar, the Pulpit, and of the Forum.

By Narrative pieces are meant those pieces only which contain a tale or narrative, or story. Descriptive pieces are those in which something is described, chiefly from nature. Didactic pieces are those designed to convey some particular kind of instruction, whether moral, religious, or scientific. Argumentative pieces are those in which some truth is designed to be proved in an agreeable manner. Pathetic pieces are those by which the feelings of pity, love, admiration, and other passions, are excited. Promiscuous pieces are those which do not fall under the heads of any of the classes which have been enumerated, or which consist of a mixture of those classes. The Eloquence of the Bar consists of speeches (or pleas as they are technically called) made by distinguished lawyers in the courts of justice in favour of or against a supposed criminal. The Eloquence of the Pulpit consists of sermons or discourses delivered on religious occasions. The Eloquence of the Forum consists in the speeches, addresses, orations, etc., addressed to political or promiscuous assemblies.

To many, this information may seem superfluous or puerile. But as these lessons are designed for the young and the unlearned, it must not be forgotten that their sources of information are few, and that they will not always take the pains to inform themselves of the meaning of words, even when they are familiar to their eyes in capital letters, and in the running titles of the books before them every day. It is often the case that the outsider also, taking for granted that his pupils are familiar with the meaning of words so often presented to their eyes, neglects to question them on the subject; and in riper years it becomes a matter of surprise to the pupil himself that, in early life, words which he had heard sounded almost every day at school presented no idea to his mind beyond that of an meaningless or rather an unintelligible sound.

The object of all education is so much to fill the mind with knowledge as to strengthen its powers and enlarge its capacity. Those exercises, therefore, are always most beneficial in education which tend most effectually to produce this result. There is, perhaps, no branch of study connected with popular education which, when properly pursued, is more highly subservient to this end than the study of correct and tasteful reading,
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as an art. It necessarily involves a complete knowledge of the subject to be read, the relation and dependences of the phrases, clauses, and members of the sentences, the proper meaning of the words employed, and the connection between the sentences themselves. This cannot be acquired without a vigorous employment of the perceptive powers, aided by those of comparison, of analysis, of reasoning, of judgment, of taste, and of discrimination. Subordinate and auxiliary to the acquisition of this important art, the student is recommended to exercise also the power of classification, while studying a reading lesson (which should always be studied previous to practising it), to ascertain under which of the above-mentioned classes—whether narrative, descriptive, didactic, etc.—the piece he is about to read belongs.

The student who thus employs his faculties cannot fail to feel a vigorous growth of intellect springing up in his own mind, and will be amply compensated for his labour by a command over the stores of literature not to be gained by any other method.

THE INFLUENCE OF MORALITY AND IMMORALITY ON THE COUNTENANCE.


WHAT WILL BECOME OF HIM?

The above engraving is intended to illustrate the effects which different modes of life have upon the human countenance. We have only to look around us to discover how true this picture is to that which it is intended to represent. Much has been said of the science of phrenology; but without depreciating the facts on which it is professedly based, we confess that we have a more profound faith in the doctrine of physiognomy. No one can deny that the "human face divine" has in it something expressive of that which enters into and constitutes the character of the man. It may come out in the eye, or the lip, or the nose, or the general contour of the countenance; but there it is, and no one can give himself to the closer and deeper study of this subject without being able, more or less correctly, to read the mysterious symbols of human character and destiny.

Carefully examine the above engraving. Look at the head and face of the child represented in the first figure. Who can divine what that young intelligence will become in the future of his life? Is there anything in his features to indicate that he will act a conspicuous part on the great wide stage of this world? Or is he to sink in the scale of intelligent beings, till he takes on the mere animal nature, or, what is still worse, till he becomes the very personification of vice and sin? Even in the outlines of the infant countenance there may be the index of the future man. These outlines will become more marked and definite in the boy amid the studies and pursuits of the school. The period of boyhood is one of wondrous development; and if this were but carefully watched, the foundation might in many cases be laid for the erection of a true manly nobility—and that undermined, on which moral evil would otherwise rear her temple of darkness and impurity. Look at the eye, nose, and mouth of the boy as he is at school; or as he is located in one of the worst parts of London, and who does not perceive, from the very contour of the countenance, that his destiny will very much depend on the influences by which he may be surrounded? In the one case, you see him pass into the higher and more polite circles of the educated classes, yielding himself to all the softening, subduing, refining elements of pure female society; and in the other, you see him entirely lost to all sense of decency and self-respect, rushing headlong into the scenes of dissipation, and surrendering himself to all the worst agencies of a wicked world. In the one instance you see him choosing his profession, and contemplating a settlement in life—wedding himself to a virtuous, loving, and devoted woman, and in course of time becoming surrounded by a loving and growing family, over which his presence sheds a warm and sunny cheerfulness; in the other instance you see the man emerging from the scenes of brutal intoxication to plunge into deeper, darker vices, till his conscience is burdened with guilt and misery, and life becomes a burden, from which he perhaps seeks relief in suicide; or it may be that his conduct renders him obnoxious to law, and he comes to a premature death. If he be spared this tremendous fate, he comes to beggary, and goes down to the grave un lamented and unwept. How different this from the career of the man whose happiest days are spent in the bosom of his loving family, and who grows old amid the most genial influences, honoured, revered, beloved; who sees his children's children unto the third or fourth generation, and goes down to his last resting-place amid the prayers and tears of those he loved, and whose dying moments are cheered by the hope of a happy reunion in a world where life is perfect and joy complete.
ANIMAL PHYSIOLOGY.—I.

THE EYE.

This eye is the instrument by which the mind becomes acquainted with external and distant objects by means of the light, which is one of the most subtle and delicate forces in nature, and needs a correspondingly delicate and complicated organ to appreciate its effects.

Without inquiring into the nature of light, it is sufficient for our subject that we know some of its constant qualities, or laws, as they have been called.

In its simplest condition light travels in straight lines in all directions, from its source; hence, when we see a light, both our eyes, according to the nature of the object and of its surface:

1st. It may be destroyed, as far as visual effects are concerned, partially or wholly.

2nd. It may penetrate the substance of the body, being more or less bent as it traverses the surface. This occurs when the body is transparent.

3rd. It may glance off and pursue a different direction outside the object upon which it strikes.

The first effect is called absorption; the second, refraction; and the third reflection. Reflected light concerns us most. The eye occupies itself with reflected rays. If light were incapable of being reflected, the sun would appear as a sharply-defined dazzling orb in a pitch-dark universe, and eyes would be of no use; for though poets tell us so, not even the eagle spends its time in so profitless and injurious an employment as gazing on the sun.

Now, as reflected light travels in straight lines from the object upon which it is reflected, it is to the eye, in all respects, the same as though that object wore itself luminous. As light proceeds from all parts of an object, and travels in straight lines, we have only to let the rays fall upon some surface which shall receive them without derangement, to get an image which will give the colour, form, and, by a little inferential reasoning, the size and distance of the object.

The first requisite in an eye, then, is a sentient mirror, which shall receive the images of objects and feel them.

This mirror must be of moderate and portable size, and well under control, so that it can be turned about.

All mirrors are perishable and delicate articles, liable to fracture; but when we conceive of a mirror whose surface and backing, and even its very frame, must be made not of hard glass, incapable of quenching, and durable wood, but of soft, renewable tissues, and think how indispensable it is that it should be protected and kept in a state of repair, we must admit that the problem of how to make a servicable eye is a difficult one.

The analogy of the mirror, however, must not lead the reader to suppose that a plane surface, sensitive to light, would be conscious of distinct images, or that it would see objects as we, by the aid of the eye, see them reflected on its surface. For distinct vision, it is necessary that many divergent rays proceeding from each point in an object should be collected together again in a point, and that point must lie exactly on the retina, or sentient mirror. Thus, the instrument known as a camera, which has a six-sided box, a surface at the side of a box, and a surface at the other side to receive the image, is a more perfect simile for an eye.

We will now describe the structure of one of the most perfect instruments for taking note of the impression produced by light with which we are acquainted—the human eye.

The human eye is globular; differing, however, from a perfect sphere in some slight but important particulars. The thick, tough capsule, which maintains the shape of the eye, and contains all the other parts necessary to perfect vision, is about one inch from front to back, and a little more from side to side and from top to bottom. This is called the sclerotic, or hard coat of the eye. This hard coat, which forms the eyeball, differs from a true sphere also, in that its front part, occupying about one-sixth of its circumference (in section), bulges forward far more than it would do if it were only a part of the larger globe; and this part differs from the other in texture also, for while it is equally strong and tough, and even harder, it is purely transparent, while the rest of the eyeball is opaque and white. This front clear portion, which is let into the hinder part as a bay-window is put into the wall of a room, or as an old-fashioned watch-glass is set into the rim of the watch-case, is called the cornea, or horn-like structure. Its greater projection or convexity is not a matter of accident, but highly important, for if it were not so, no near object could be seen distinctly.

Lining the inner surface of the sclerotic is a thin membrane, which supports in its outer layers the larger arteries and veins which carry the blood to and from the front and inner parts of the eye, while it has on its inner surface a very thin pavement of cells, the retina, most minute. The retina contains as the cornea, and is there connected firmly with this outer jacket by a strong ligament and muscle. Before it reaches this point, however, it is puckered into somewhat irregular fore-and-aft folds. Beyond this point the choroid, as this membrane is called, is continued as a freely-hanging curtain, shaped like a quoit, that is, round and opaque,
with a hole in the middle of it, which is opposite the middle of the cornea, or window of the eye.

From the same circle of attachment, but internal to the curtain before-named, is suspended, or rather held, by a ligament, a perfectly transparent body shaped like a lentil, that is, with two convex but flattened surfaces. The quoit-like curtain is called the iris, and the disc the crystalline lens. The lens is situated at some little distance from the cornea, leaving a chamber, which is filled with watery fluid, which bathes both sides of the iris. Behind the lens, and occupying the larger part of the hollow of the eye, is a denser liquid, contained in a thin, perfectly-transparent membrane, which not only encircles it, but sends in partitions from its outer wall to divide the liquid into compartments, so that when the eye is cut into, the humour does not run out, but seems to be of the cornea, leaving a chamber, the walls of which are so transparent that they are called the hyaloid membrane and vitreous humour, or the glassy membrane and humour.

All the main parts of the eye have now been described except the essential one for which all the others are made, namely, the retina: that wonderful stratum of nervous matter which receives and transmits to the brain all luminous impressions, the glories of colour, the splendid imagery of the earth, and the soft radiance of the sky.

The retina lies between the choroid and vitreous humour. It lines the choroid as loosely as that membrane lines the sclerotic, and so covers the whole back part of the eye.

The retina (or sentine1 mirror), thin as it is, has been found under the microscope to consist of many layers of diverse structure. Not to descend into great minuteness, it may be said that these layers consist of an outer layer of cylindrical bodies, called, from their shape, rods and cones, which run perpendicularly to the surface of junction between retina and choroid. These bodies are the instruments by which the rays are noted. It would seem that each rod or cone conveys but one impression, so that while the image of an external object may be very small on the retina, and yet distinctly seen, because of the minuteness of those instruments, must cover a certain number of them, and therefore to be an image at all. In other words, if it only covered one, the impression would be that of a single point of light.

Next comes the granular layer, the office of which is no further known than that similar structures are found wherever impressions received by the senses are modified. The innermost layer consists of nerve-fibres, which convey the impressions in some such way as telegraph wires convey their messages. These all run to one point, the back part of the brain, the inner or outer side of the axis, and there pass through the choroid and sclerotic, which are formed by a great many holes, and are united behind into the optic nerve, and this runs to the brain, first, however, being joined by its fellow from the other eye, and then separating from it again, having received some of the strands of this nervous cord, and given up some of its own to it.

Let us now trace the course of a number of rays reflected from a single point in an object, before they reach the retina (see Fig. 2). These rays as they come from a single point are, of course, diverging. They strike, therefore, all over the surface of the cornea, and as they pass through it are gathered somewhat together. They then pass the aqueous humour with a slightly altered course, the outer ones are cut off by the opaque iris, but the central ones pass through the lens, which rapidly gathers them together, and are then transmitted through the vitreous humour, all the time converging until they meet at a point exactly in or on the retina.

In saying that they meet exactly on the retina, it is meant that they will do so if the adjustment is perfect. If it be imperfect, so that the rays unite in a point either before the retina, or would unite if they could traverse the choroid, the image is blurred and indistinct.

The problem of how to get a distinct image, of course, is more difficult, when the points from which the light proceeds are numerous, as from any object of appreciable form. To obtain this, the surface of the cornea, the hind and front face of the lens, and the face of the retina, must all be of definite and regular curves, or the figure would be distorted. If the cornea bulges too much, the object can only be seen at a short distance, and from this cause some persons have to lay their heads upon the page before they can read print. If it bulges too little, distinct images of near objects are impossible. If the crystalline lens is too dry, or too moist, it becomes clouded with hard or soft cataract. If the pigment be not of sufficient quantity in the choroid, vision is interfered with; and from this cause albinos, or persons whose hair and skin are deficient in colouring matter, are dazzled in ordinary daylight.

Further, if the retina is part of the fault, as it sometimes does, from some cause too subtle to be found out, the object is seen only in part; thus, some persons have this peculiar affection of half the retina, so that when they look directly at an object, they only see the half of it.

The retinas, perfect in all its other functions, may not discriminate colour. The writer once played a game at croquet with a gentleman, who disclosed his infirmity thus: Two balls were lying together—one red, and the other green. He asked which was his, and being told the red one, asked which red one? On another occasion the writer was looking at a brightly-coloured geological map. A stranger who looked with him soon showed that he was quite unaware that it was other than the ordinary ordnance map.

These defects of vision call marked attention to the perfection of the instrument of vision, when perfect, as it is in most cases. It would be difficult to determine whether the eye were made for light, or light for the eye; but that the Creator of the one was cognisant of all the wonderful qualities of the other, admits of no doubt; and this goes far to prove that the Creator of the one must have been the designer of the other.

LESSONS IN ENGLISH. II.

SIMPLE PROPOSITIONS.

Alfred reads.

These two words form what is called a proposition; they form a simple proposition. Proposition is a word of Latin origin, signifying something that is put before you. As being some- thing that is put before you, it understands that both the words to a proposition, is a statement of a fact or a thought; a statement of something in the mind, or something out of the mind. Here the statement is that Alfred reads. Such a statement is also termed a sentence. Sentence is also from the Latin, and signifies a form of words comprising a thought or sentiment. These words, then—that, namely, sentence, proposition, and statement, have the same signification; and they each denote an utterance, the utterance of a fact, and such an utterance, so far as it is verbal, is called a proposition to the proposition. Take away Alfred, you then have reads; but reads is no proposition, for nothing is stated. Take away reads, you leave Alfred; but Alfred by itself says nothing, makes no statement, and therefore forms no proposition or sentence. The two words must concur to make a proposition. If so, less than two words do not make a proposition; and a proposition or sentence may consist of not more than two words. In these simple statements you have in the germ the substance of the doctrine of sentences. If you understand what I have now said, you have laid the foundation for a thorough acquaintance with language in general, and with the English language in particular; for to a form of words similar in simplicity to that which stands at the head of this lesson is all speech reducible; and that model presents the germ out of which the most learned and the most subtle analyses of our old English divines, and the full and lofty eloquence of Milton's immortal essay on behalf of the liberty of the press. The sentence as it stands is what is called an affirmative proposition; that is, it affirms or declares something—it affirms or declares that Alfred reads. The term affirmative is used in opposition to the term negative. Negative propositions are those in which something is denied. An affirmative is a negative proposition by the introduction of the adverb not; thus, Alfred reads not. In English it is more common to employ also the emphatic does, as Alfred does not read. You thus see that the words does (do, or dost, as may be required) and not convert an affirmative into a negative proposition. Sentences in which a question is asked we term interrogative; as, does Alfred read? Here by the help of the emphatic form does, and the inversion of the terms does and Alfred, we make an affirmative into an interrogative sentence. If into this last sentence we introduce the negative not, we have an interrogative negative
sentence, as Does not Alfred read? We put these four forms of a proposition together:

2. Negative. Alfred does not read.
3. Interrogative. Does Alfred read?
4. Interrogative Negative. Does not Alfred read?

You thus see an example of the ease and extent with which the original form may be changed and multiplied. The proposition, Alfred reads, is a simple proposition. Propositions are either simple or compound. Compound propositions are made up of two or more simple propositions. Of compound propositions I shall speak in detail hereafter. Here only a few words may be allowed, in order to illustrate what is meant by a simple proposition. If I were to say, When Alfred reads, he is listened to, I should employ a compound proposition. In these words there are two statements, and consequently two sentences. These two statements are, Alfred reads, and Alfred is listened to. The two statements, united by the term when, constitute a compound sentence. In one form, at least, a compound proposition may easily be mistaken for a simple proposition; namely, in this—Alfred reads and writes. Here, in reality, we have a compound sentence, for, when analysed, these words are equivalent to these two statements—Alfred reads, and Alfred writes. There being in the sentence these two statements, the proposition is compound.

Let us now consider the two words in their own individual characters—Alfred reads. The first obviously represents a person, the second as clearly represents an act. Now, in grammar, words which represent persons and things are called nouns; and words which represent acts are called verbs. Noun is a Latin term, and signifies name; hence you see the noun is the name of any person or thing; and were we as wise as were the Latins, we should not employ a foreign word, but call nouns simply names. Thus Alfred is the name of a person. Book, and, is a noun; so is house; it is, so is paper; these are each the name or vocal sign by which Englishmen distinguish and agree to call these objects severally. Nor is there any mystery in the term verb. Here, too, we have a Latin term, which signifies simply word. With the Latins the verb was the word; that is, the chief word in a sentence. By us the verb might be termed the word. Had English grammarians employed as their scientific terms words of Saxon origin, the study of English grammar would have been very easy. We shall endeavour to simplify it by translating the Latin terms, unhaply now become indispensable, into their English equivalents. That the verb is the word, the chief word of a sentence, you may learn by reflecting on the proposition, Alfred reads. It is reads, you see, that forms the very essence of the statement. Reads, too, distinguishes this statement from other statements, as Alfred runs, Alfred sings.

Now the reader look back on the several instances of propositions I have given, and endeavour to ascertain what is the quality in which they all agree. They have a common quality. That quality is avenment. They all aver or declare something. This they do by means of their verbs. Accordingly, avenment is the essential quality of the verb. Every verb is a word which makes an avenment. Here, then, we learn that the noun names, and the verb avers. By these tokens may all nouns and all verbs be known. Whatever names is a noun; whatever avers is a verb. Chair is a noun, because it is the name of an object; stands is a verb, because it avers or declares something of chair; and the union of the noun and the verb, as chair stands, forms a proposition.

Sentences, then, in their simplest form consist of a noun and a verb. A noun and a verb are indispensable. Whatever more you may have, you cannot have anything less than a noun and a verb in a sentence or proposition. As a constituent for the noun you may have a pronoun. Pronouns, again, is a Latin origin, signifying a word which stands instead of a noun. Thus we may put the pronoun he instead of Alfred; e.g., these are the initials of two Latin words, meaning exempli gratia, for example): Alfred reads, He reads.

where he holds the place of Alfred. We must accordingly qualify our statement, and say that sentences, in their simplest form, consist of a verb and a noun or pronoun. One or two other qualifications might be stated; but here, at least, instead of entering into them, it will be better to put the statement in its most general form, a form in which it will embrace all particular cases, and render qualification unnecessary. I say, then, that in every sentence there must be a subject and a verb. I have thus set before you a new term. That term I must explain. Subject is a Latin word, and denotes that which receives, that which lies under, is liable or exposed to; from sub, under, and jacio, I throw, I place; in the passive, I lie. Accordingly, the subject of a proposition is that to which the action named in the verb is ascribed. Hence, the subject of a proposition answers to the question who? or what? as, who reads? Answer: Alfred reads. The term subject is used with special reference to the corresponding term, predicate. The predicate of a proposition is that which is attributed to the subject. What is attributed in our model sentence? This, namely, that Alfred reads. *Reads,* then, is here the predicate, or that which is ascribed to, or attributed of Alfred. Hence you see the propriety of the term subject, since it points out to the avenment that he reads. Now, in the grammatical construction of the sentence, it matters not whether you say Alfred reads, or he reads. In both cases you have a subject and verb, or predicate; and consequently you have a complete enunciation of thought, or a perfect sentence.

The sentence thus analyzed and explained may be set forth in this form:

Subject: Alfred.
Predicate: reads.

As the subject undergoes a change by passing, when necessary, into he, so may the predicate be modified. Instead of a predicate in one word, you may have a predicate in two words, by substituting a verb and an adjective; as Alfred is a good.

Another new term demands another explanation. What is the meaning of adjective? Adjective in Latin signifies that which is added to, or thrown to (ad, to; and jacio, I throw). To what are adjectives thrown or added? To nouns, as in this instance. Adjectives, therefore, in their very nature, cannot stand alone. They perform their office in what may be termed to be connected with nouns. They are connected with nouns in order to qualify the meaning of those nouns, and to answer to the question of what kind. What kind of a boy is Alfred? Answer, he is a good boy. An adjective, then, is an epithet (a Greek word, which denotes that which is attributed to a noun or a person); e.g., green fields, tall men, hard rocks, where green, tall, and hard are epithets, or adjectives, inasmuch as they assign the quality of their several subjects. Now, what may we call qualities we call also attributes. The attributes of a body are its qualities. Attribute is a word from the Latin, denoting that which is attributed or ascribed to an object. Adjectives, therefore, describe the qualities or attributes of the persons or things they are connected with. In the instance given above, good is the attribute of the proposition; thus,

Subject: Alfred.
Attribute: is a good.

But this explanation leaves is unexplained. The word is on reflection you will recognise as a verb, seeing that it aveners; for it aveners or declares that Alfred is a good. By comparing together the two forms—

Subject: Alfred.
Predicate: reads.

you observe that reads and is good hold the same place and perform the same function in the two propositions. They in each case form the predicate of the sentence. The predicate is that which is predicated, declared, the received of the subject; in Latin origin, signifying a word which stands instead of a noun. Thus we may put the pronoun he instead of Alfred; e.g., these are the initials of two Latin words, meaning exempli gratia, for example): Alfred reads, He reads.
The term describes its office. The word is in the sentence links the subject with the predicate. The whole may be exhibited thus:

Subject. Alfred
Predicate. reads.
Copula. Attribute. is good.

By ordinary grammarians what we have termed the subject is called the nominative case. The employment of such a term is objectionable, for it is incorrect by not being sufficiently comprehensive. Take, for instance, the proposition, To ride is healthful. To ride is the subject of the proposition, and the subject, therefore, to the verb is. But is to ride a nominative case? Ask the grammarians, and they will tell you that it is the infinitive mood of the verb ride. If an infinitive mood, it is not a nominative case. Cases pertain to nouns, nouns to verbs.

But here we meet with an instance of the complexity and obscurity that have been brought into English grammar by attachment to Latin forms. Our nouns in their actual condition have but one case, the genitive; or, if the nominative be allowed to be a case, than two cases are the utmost that our nouns can be said to have. Why should more be assigned to them? It may be doubted, indeed, whether what is called the nominative can be properly termed a case, for it differs from the Latin nominative, which is formed from a stem common to all the cases through which the noun passes; whereas in English the nominative is the stem itself. However this may be in English, nouns now possess no more than two cases. This fact is in no way affected by the allegations that the Anglo-Saxon, the mother of the English, has several cases. It is with the daughter, not with the mother, that we are here concerned.

**COPY-SLIP NO. 5.**—THE LETTER I.

**COPY-SLIP NO. 6.**—COMBINATION OF THE LETTERS u, i.

**COPY-SLIP NO. 7.**—COMBINATION OF THE LETTERS i, t.

**LESSONS IN PENMANSHIP.—III.**

We now place before our readers the letter I, the last of the four letters that are formed either by the simple bottom-turn itself, or by some slight modification of it. Proceeding by a regular system of gradation, the self-teacher has been led first to make the bottom-turn within the horizontal lines that contain, as we stated in our last lesson, what may be termed the body of any letter that has a head, loop, or tail extending above or below these lines; and then, after making the simple bottom-turn, he was shown how to turn this stroke into the letter I by placing a dot above it, to form the letter u by the combination of two bottom turns, and to make the letter t by beginning the thick down-stroke a little above the upper horizontal line, and crossing it just above the same line by a fine hair-stroke. He must now proceed to make the letter I, beginning the down-stroke at the line e, which is placed at a distance above the line a nearly equal to the distance between the lines a, b, b.

The chief difficulty that the learner has to encounter in making the letter I arises from the length of the down-stroke, which obliges him to bring his pen downwards in the same straight line for a distance nearly half as long again as the letter t. At first his hand will shake, and, as it is manifestly much easier to make a short stroke than a long one, his early attempts at making the letter I will not be quite so straight and even, perhaps, as his copies of the shorter letters arising out of the bottom-turn. His success, however, greater or less, as it may be, in making this letter will afford an excellent test of his progress, and show him whether or not he is holding his pen in the proper way and sitting in the proper position. If he find no difficulty in repeating the letter I several times, and can do it with ease, making a straight and well-formed stroke with an equal pressure of the pen from top to bottom until it begins to narrow, he may be sure that his position is correct, and that he is holding his pen properly; but if, on the other hand, he find, after a few trials, that the down-strokes of his letters are uneven and crooked, owing to the shaking of his hand, and he feel pain in the ball of the thumb and the thick muscles on the opposite side of the palm of the hand, he may be sure that his position and the way in which he holds his pen is stiff, constrained, and unnatural, and requires amendment. To effect this, he must once more turn to the directions given for holding the pen, etc., in our first lesson in Penmanship, and carefully regulating the position of his hand and body by these instructions, he will soon discover the points in which he is at fault, and gradually acquire greater ease and freedom in writing.

After accomplishing the letter I, the learner may proceed to combinations of the letters that he has already made singly, and for this purpose we have furnished him with copy-slips, showing combinations of the letters u, I and t. Let him copy these and all the examples that we shall give him in future lessons again and again, remembering that in no branch of learning is constant practice more necessary, especially to the self-teacher, than in Penmanship.
LESSONS IN GERMAN.—II.

SECTION III.—GERMAN HANDWRITING.

The pupil should invariably make himself so familiar with the meaning of the words given in the several vocabularies and

EXERCISE 3. Aufgaben 3.


SECTION IV.—THE ARTICLE AND THE VERB.

In German the definite Article has, in the Nominative singular, a distinct form for each gender:

Masculine: Der Mann, the man; Der Bruder, the brother.
Feminine: Die Frau, the woman; Die Schwester, the sister.
Neuter: Das Haus, the house; Das Glas, the glass.

Some nouns, denoting inanimate objects, are in German, as in most languages, called masculine or feminine; and some, denoting animate objects, are called neuter:

Masculine: Der Apfel, the apple; Der Baum, the tree.
Feminine: Die Traube, the grape; Die Nadel, the needle.
Neuter: Das Kind, the child; Das Büch, the book.

Many words that are treated as masculine or feminine in one language, are regarded as being of the opposite gender in another: thus, in French, apple (la pomme) is feminine, while grape (le raisin) is masculine. In German the word head (das Auge) is masculine; in French (la tête) it is feminine; and in Latin (caput) it is neuter. The word hand (das Hand, la main, manus) is feminine in the three languages.

CONJUGATION OF THE PRESENT TENSE SINGULAR of haben

Assertively:
Ich habe, I have; Er habe, he has; Wir haben, we have.

Interrogatively:
Sche habt?—have you?
Sche habt?—have you?
Sche habt?—have you?

VOCABULARY.

Nacht, also, too; Wasser, water; Brot, bread.
Braun, brown; Löffel, spoon; Saat, to sow.
Wasser, water; Brot, bread; Saat, to sow.
Wasser, water; Brot, bread; Saat, to sow.
VOCABULARY.

Kaffee, m. coffee.
Kaffee, m. coffee.
Würfel, m. miller.
Würfel, m. miller.
Was, what?
Was, what?
Mädchen, n. girl.
Mädchen, n. girl.
Sie, you.
Sie, you.
Wein, m. wine.
Wein, m. wine.
Wer, who?
Wer, who?

Résumé of Examples.


EXERCISE 4.


All German verbs are conjugated interrogatively, in the present and imperfect tenses, like have and be in English; that is, by placing the verb before its subject, without an auxiliary: Haben Sie das Wein? Have you the book? Leben Sie das Wein? Read you the book? (Do you read the book?) Haben er hier? Is he here? Wohin er hier? (Does he reside here?) Haben er hier, oder? Is he here, or? Schreiben er hier? Wrote he the letter? Was er hier? Was he here? Wohin er hier? (Did he reside here?)

CONJUGATION OF THE PRESENT TENSE SINGULAR OF HIS.

Assertively. Interrogatively.
Ich liebe, I love; ich lieben, you love; ich liebe, I love; (Do I love?) Sie lieben, you love; sie lieben, you love; (Do you love?) Er liebt, he loves; er liebt, he loves; (Does he love?)

DEFINITE ARTICLE MASCULINE AND NEUTER IN THE NOMINATIVE AND ACCUSATIVE.

Definite article masculine and neuter in the nominative and accusative.

THE MASCULINE FORMS.

Der Vater, the father.
Der Vater, the father.
Der Sohn, the son.
Der Sohn, the son.

THE NEUTER FORM.

Das Kind, the child.
Das Kind, the child.
Das Mädchen, the girl.
Das Mädchen, the girl.

VOCABULARY.

Bauer, m. peasant.
Bäuerin, f. peasant.
Lehrer, m. teacher.
Lehrer, m. teacher.
Bäuerin, f. teacher.
Bäuerin, f. teacher.
Buch, n. book.
Buch, n. book.
Leben, to love.
Leben, to love.
Buch, n. book.
Buch, n. book.
Mann, m. man.
Mann, m. man.
Sahne, n. milk.
Sahne, n. milk.
Mutter, f. mother.
Mutter, f. mother.
Kaffee, m. coffee.
Kaffee, m. coffee.
Brot, m. bread.
Brot, m. bread.
Brot, m. bread.
Brot, m. bread.

Résumé of Examples.


EXERCISE 5.


LESSONS IN LATIN.—II.

SECTION II.—PRELIMINARY INSTRUCTIONS IN THE VERBS.

In regard to the exercises which I am about to give, you should first learn the vocabulary by heart. If you are a word merchant, you may repeat the words over again and again while engaged in labour. Or you may make the words your own while walking to and from your employment. Among my personal friends is a gentleman who acquired the greater part of the words of the French language, while rising and dressing in the morning. Thousands of words have I myself learnt while wandering in the room, or conversing in Latin.

Having thoroughly mastered the vocabulary, take a slate and write down the Latin into English; then write the English into Latin. Look over what you have done carefully. Correct every mistake and error. If you look into the exercises you will find that the English will assist you in writing the Latin, and the Latin will assist you in writing the English. When you have got both the Latin and the English into as correct a state as you can, copy them neatly into a notebook. Having done so, read them carefully over, and compare each instance with the rule or the direction, and also the example. Leave nothing until you understand the reason. All the examples or illustrations that I give, as well as the chief rules, should be committed to memory. Before you proceed to a second lesson, ascertain that you are master of the first. It would be useful to work out the rules in one consecutive view, in order that, having them all at once under your eye, you may study them in their connection and as a whole, so as to see their bearing one upon another, and the general results to which they lead. Such a practice would have a very beneficial effect on your mind, byhabituating it to arrangement and order, and might be expected to afford you valuable aid, both in other studies and in your business pursuits. Carefully avoid haste and slovenliness. Do your best in all that you undertake. “Well,” not mere “much,” should be your watchword. Repeated reviews of the ground passed over are very desirable. Every Saturday you should go carefully over what you have done during the week. At the end of every month the work of the month should be reviewed. On arriving at a natural division of our subject—as for instance, when we have treated of the nouns—you should go over, and put together in your mind the substance of what has been said thereon. “Let us not be weary in well doing; for in due season we shall reap, if we faint not.” (Gal. vi. 9.)

VOCABULARY.

Curro, I run. The chief parts are curro, I run; curri, you run; currit, he runs; curri, we run; curri, you run; currit, they run.

EXERCISE 1.—LATIN-ENGLISH.

Find English words derived from some part of curro; find English words derived from curri, with prefixed; also with con prefixed; also with dis prefixed; also with ex prefixed.

Remark.—In order to make my meaning quite clear, I will myself do this exercise in part. From currus comes the English word course; from curri comes excursion, a circumlocution of course and curri comes excursion. If the reader is acquainted with, or is learning French, he will do well, as he passes on, to find out French words corresponding to, and derived from, Latin words; as in curri, French to run; cours, a course. By comparison he may occasionally find that the same sound or word has a different meaning in French from what it has in Latin or English. Thus, concursus in Latin means a coming together, as to a meeting, a concours of people; but the corresponding
LESSONS IN LATIN.

French, concours, signifies co-operation. So concurrence in English is agreement, but in French competition. By practising comparisons such as this, you will not only meet with many curious facts, but be assisted to understand the nature of language itself, as well as receive good mental discipline. If it seems strange to you that the same letters cur or cura should bear dissimilar meanings, a little reflection on the matter will soon take away your surprise. Let us go at once to the primary meaning of cura. Its primary meaning is to run. Now, men may run into, or run out of, or run together, or run about, for different purposes. For instance, they may run together in harmony, and then they concur; or they may run together in rivalry, and then they are in what the French call concurrence, that is, competition.

I have thus my fellow-student, opened out before you an immense field. It is only a hint or two that I can give; but if you follow these intimations, you will in time become not only a Latin scholar, but a good linguist.

In the former part of this lesson I had to employ the word cura, and in so doing I used particularly the form cur. This form is called the stem of the word. The stem of a word is that which contains its essential letters, or the letters which are necessary to make it what it is. Thus, cura is found in every form into which the verb cura passes. Observe that the second r is added merely to strengthen the word, or give force in pronunciation. You find this stem, cur or cura, for instance, in the English words current, incer, concourse, concurrence, discourse. Observe again, that many of our Latin words have come to us through the French. They have, therefore, entered the English in the form which they had received in the French. This is exemplified in concourse and discourse, where an o has been introduced by the French pronunciation, as these words come to us immediately from the French words concours and discours.

The stem of a word is found generally by cutting off the final vowel or syllable. In cura you obtain the stem cur by taking away the o. The o in reality is the sign of the first person singular, or I. The word for I is not prefixed in Latin, except when it is required for emphasis, because the terminations of the verb show clearly what person is meant—that is, whether it is the first person, I, or the second person, thou, or the third person, he. In the English there is a necessity for the constant use of the personal pronoun, because the endings of the verb are not so different from each other as in the Latin.

Thus, in English, we say, I run, you runnest, he runs, we run, you run, they run. Here, out of six persons, the verb has the same termination for—namely, I run, you run, you run, they run. But for the pronouns I, you, they, the reader or listener would not be aware from the use of the verb which person was intended. In the Latin, however, the verb has a peculiar ending for every person. After this explanation, we will call these terminations person-endings. These person-endings vary with the tense and the voice; that is, they are different in the past tense from what they are in the present tense; and they are different in the passive voice from what they are in the active voice. At present we will confine ourselves to the present tense and the active voice. In cura, the person-endings of the present tense, indicative mood, active voice, are as follow:—

**PERSON-ENDINGS.**

**ACTIVE VOICE.**

Singular.

1st person -o, I
2nd -is, thou
3rd -it, he

Plural.

1st person -mus, we
2nd -itis, ye
3rd -issit, ye

Adding the person-endings to the stem, we have the following example:—

**ACTIVE VOICE.**

1st person curro, I run
2nd curris, you run
3rd currit, he runs

These person-endings vary also in another way, which I proceed to explain. Latin verbs are commonly divided into four classes, which bear the technical name of conjugations. This division may not be the best, but is that which is customary, and therefore I retain it. These four classes or conjuga-

ditions are determined or characterised by the vowel which precedes the termination re in the infinitive mood; thus:

- The first conjugation ends in are, as amare, to love.
- The second conjugation ends in er, as dare, to teach.
- The third conjugation ends in re, as regare, to rule.
- The fourth conjugation ends in ire, as amare, to hear.

We say then that the first conjugation is known by having a long before re of the infinitive; the second by having Æ long; the third by having Æ short; the fourth by having Æ long. The same fact may be put before you in a different way; thus, Æ long is characteristic of the first conjugation; Æ long, of the second; Æ short, of the third; Æ long, of the fourth. In general it may be remarked, that in the first conjugation Æ long prevails; in the second, Æ long prevails; in the third, Æ short prevails; and in the fourth, Æ long prevails.

Now, curro, of which I have spoken before, is of the third conjugation. The person-endings in it will not therefore be the same as they are in the verb amo, I love. The person-endings in amo are o, as, a; amus, athus, and. In the tables or paradigms (p. 43) you will find, the person-endings are printed in italic, as amo, amus, amat, and will therefore easily recognise them, and ought in all cases to repeat them until you have imprinted them on your memory.

**FIRST CONJUGATION.**

**ACTIVE VOICE.**

**PRESENT INDICATIVE.**

1st person Amo, I love
2nd person Amas, thou lovest
3rd person Amat, he loves

**PASSIVE VOICE.**

1st person Amor, I am loved
2nd person Amatur, thou art loved
3rd person Amatur, he is loved

**PERSON-ENDINGS.**

Singular.

1st person -o, I
2nd person -es, thou
3rd person -et, he

Plural.

1st person -amus, we
2nd person -ae, ye
3rd person -ant, ye

Example.—Amare, to love; stem, amo.

**PRESENT ACTIVE INDICATIVE.**

Singular.

1st person Amo, I love
2nd person Amas, thou lovest
3rd person Amat, he loves

Plural.

1st person Amamus, we love
2nd person Amatis, you love
3rd person Amant, they love

**PERSON-ENDINGS.**

Singular.

1st person -o, I
2nd person -es, thou
3rd person -et, he

Plural.

1st person -amus, we
2nd person -ae, ye
3rd person -ant, ye

Observe, then, that in order to form any person, you must first get the stem, by cutting off the last syllable. Then to the stem thus obtained, add the proper person-ending. Suppose you have to deal with the verb laudo, I praise; and suppose you want to express in Latin the English they praise; the way to proceed is—three ways:—first, you put it in laudem, as in Latin you get loud; now, they praise is in the third person plural; the person-ending of the third person plural is ant, as shown above; subjoin ant to laud, and you have laudant, which means they praise. Or if you have to put laudos into English, by looking at the table you find that its termination—namely, as—is the person-ending of the second person singular, and consequently laudat means thou praisest. I have entered into this full and minute explanation once for all, if you take pains to make yourself master of it, you will not require its repetition. But take care not merely to consult the tables I give; you must commit them to memory, and never pass on until you have made them in each case your own. Having learnt the form or example, learn the vocabulary, and then put the Latin exercise into English, and the English exercise into Latin. Do this also from memory; but after you have done it, compare your translation with the table or example, and correct it according to need.
THE WORLD ACCORDING TO THE GREEKS AT THE HOMERIC EPOCH.

The legends or popular creeds of the extreme East. Among the tales more or less ingenious, we must not forget the ants that were as large as foxes, and that collected heaps of gold mixed with sand.

Herodotus appears to have been unacquainted with western Europe. He does not speak of Massilia (Marseilles), a city founded by the Phocaeans about 600 B.C., more than a century before he was born. Rome, which had been increasing in grandeur for about three hundred years before his time, is not even mentioned by name. Of Italy he only knew the south of that part anciently called Magna Graecia. The extreme western coasts of Africa were equally unknown to the Greeks; yet the Phenicians had made discoveries in the Atlantic Ocean, and the peripus (sailing round) or coasting voyage of Hanno was executed considerably before Herodotus. The African voyage of the Cartha-
ginian admiral, with the thirty thousand persons whom he had on board his vessels, is acknowledged to be authentic; opinions only differ as to the point where his maritime course terminated. Some will have it that, after having cleared the Pillars of Hercules, he went as far as the Gulf of Guinea, while others limit his exploratory voyage to the mouth of the Senegal river. Gossolin fixes the limit at Cape Num.

Pytheas, a citizen of Marseilles, performed a voyage to the north before the time of Alexander the Great. He discovered Albion, or Great Britain, and always sailing in a northern direction, he reached the mysterious place called Ultima Thule, which he saw covered with ice, enveloped in mist, and, as it were, immersed in a horrible chaos. But what was Thule? This is a question which has puzzled all historians and geographers. Some have considered with good reason that this country was Jutland or the coasts of Norway called Thulemark; or perhaps Iceland, as Pytheas sailed through the Scandinavian seas, and his remarks relating to the coasts of the Baltic have been acknowledged exact. Others have claimed this appellation for the Shetland Isles on the north of Scotland.

Aristotle, the great Greek philosopher and naturalist, maintained that the earth was of a spherical form, and he even stated the measure of its circumference at 400,000 stadia (a Greek itinerary measure, equal to about 600 feet). Indications of the existence of Madagascar have been noticed in his writings. As to Ceylon, he mentions it under the name of Tropobone, and that a long time before the age of Ptolemy. The limits of the world according to Aristotle were, on the east, the Indus; on the west, the Tartessus, or the Guadalquivir; on the north, the Tiphiasan Mountains, Albion, and Ierne (Ireland); on the south, Libya, in which he places the river Chremetes, which rises out of the same mountains as the Nile, in order to disemboguise itself into the Atlantic Ocean—an idea which leads to the supposition that he confounded the Nile with the Niger. He admitted that the Caspian Sea was a great inland lake, having no communication with any other sea.

The conquests of Alexander the Great led to the most distinct and extended notions of the ancient world. The most remarkable geographical fact of his reign was the exploration of the Indus. A fleet of 800 vessels, under the command of N. Archus, descended this river, and went along the coast of Asia to the bottom of the Persian Gulf. The expedition of Alexander opened the eyes of the Greeks, but produced at that time no results of any consequence to the science of geography. What was gained by his exploratory voyage was lost by the dismemberment of his empire; and the historians of the period relapsed into their former ignorance.

By degrees, however, geography assumed the dignity of a science. Eratosthenes, who flourished about 250 B.C., composed a treatise on the subject. He was a native of Cyrene in Africa, and the keeper of the Alexandrian Library. By means of instruments erected in the museum of the city of Alexandria, he found the obliquity of the ecliptic, to within half a degree of the truth. He was the first who attempted to determine the circumference of the earth by the actual measurement of an arc of one of its great circles. By means of sun-dials he found that Syene, near a cataract of the Nile, which was situated, as he thought, on the same meridian as Alexandria, was immediately under the tropic of Cancer, so that at the time of the summer solstice the sun was vertical to the inhabitants of Syene, and the gnomon had no shadow at noon. Thus, having measured the angle of the shadow of the gnomon at Alexandria, also at the time of the summer solstice, he found the distance of the sun from the zenith at noon to be 7° 12', or one-fiftieth part of the circumference of a great circle, viz., 360°. He then computed the distance between the two places, Alexandria and Syene, and found it 5,000 stadia. Accordingly, he multiplied this number by 50, and found the measure of the earth's circumference to be 250,000 stadia. Making allowance for the errors which he committed, for want of the delicate instruments of observation which we possess in modern times, this was a tolerable approximation to the truth. Syene, indeed, was not on the same meridian as Alexandria, but on one nearly 3° east of the meridian of that city; and instead of being exactly on the tropic, it was about half a degree north of that line. Eratosthenes affirmed the spherical figure of the earth, and asserted that the immensity of the ocean would not prevent vessels from going to India by continually shaping their course westward.

Hipparchus, who flourished about ninety years later than Eratosthenes, laid the foundation of astronomical geography;
LESSONS IN FRENCH.—III.

SECTION I.—FRENCH PRONUNCIATION (continued).

III. NAME AND SOUND OF THE VOWELS.

32. A, a.—Name, ah; sound, like the letter a in the English word mark.

Pronounce this English word mark aloud several times, with strict reference to the sound of the French letter a, until you are sure of having its correct sound.

The sound thus obtained always belongs to the French letter a in the alphabet; that is, whenever the French alphabet is repeated, always the first letter the sound of a in the English word mark, that is, ah.

But the French a does not always and invariably have this sound whenever and wherever it is used in a French word.

Its sound depends upon its position in a word, and upon the accent under which it is placed, either by itself, as constituting a single word, or within a word of one or more syllables.

The letter a has, then, three distinct sounds, which we illustrate by the sound of the letter a in the English word fat. Pronounce this English word fat aloud several times, with strict reference to the sound of the French letter a, until you are sure of having its correct sound.

The French letter a has, therefore, two distinct sounds, viz. —

A short sound, as in the English word fat.

A long sound, as in the English word mark.

The French letter a will be used to illustrate the sound of the French vowel a; and ah will be used to illustrate the long sound of the French vowel a.

A has the short sound represented by ah in the English word fat, when it is a word by itself, and generally when it begins or ends a French word. There are exceptions to this rule; but they will be readily noticed by the reader in the spelling by means of English letters, designed to illustrate the pronunciation of the sound from French words.

A has the long sound represented by ah in the English word mark, when it is pronounced as the first letter of the French alphabet, and also when under the circumflex accent, which will be illustrated hereafter.

Exercise yourselves upon the short sound of the French vowel a, in the following examples. Pronounce every French word in the following table aloud, and, when possible, always study your French lessons aloud.

FRENCH. PRON. | ENGLISH.
---|---
Abaca | A-ba-ka.
Affaire | A-fa-ray.
Alarma | A-la-rum.
Bal | Ba.l.

The above examples are intended to illustrate the short sound of the French vowel a. In the first word (abaca), careful not to pronounce it ah-way-bay, but give each a in each syllable the sound of a in the English word fat. In the next word, do not say ay-larum; remember to give the sound of a in the English word fat. Till the r in the last syllable of the word a-larum. It will be perceived the final e of this word (a-larum) is not sounded.

This vowel is sometimes under a grave accent, thus — à, voila; but its sound is not materially affected thereby.

33. A, à.—Under the circumflex accent, this vowel has the long sound represented by ah in the English word mark, and is named ah. It has, besides, a little more than the sound just spoken of, for the sound must be prolonged, and to do this conveniently the mouth must be opened a little wider than in uttering its short sound, represented by a in the English word fat.

Be careful, however, not to pronounce â like the sound of the English word ave, but give it the sound of ah prolonged, in the following examples, namely:—

FRENCH. PRON. | ENGLISH.
---|---
Àbâ | Ab-a.
Àbâ-mâ | Ab-a-mah.
Àbâ-nà | Ab-a-nah.
Àc | Ac.
Àc-rà | Ac-ray.
Àc-tà | Ak-ray.
Àc-tâ | Ac-ray.
Àc-té | Ac-ray.
Àc-wà | Ac-ray.
Àc-wà | Ac-ray.
Àc-wà | Ac-ray.
Àc-wà | Ac-ray.
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RESUMÉ OF

EXAMPLES.

Avez-vous quelque chose?
Je n'ai rien (literally, I have nothing).
Votre frère a-t-il chaud?
Il n'a pas froid ni chaud.
Votre soupe a-t-elle faim ou soif?
Elle n'a pas faim, mais soif.
Votre ami a-t-il sommeil?
Mon ami n'a pas sommeil ni peur.
Avez-vous raison ou tort?
Avez-vous du lait ou du vin?
Je n'ai pas du lait ni vin. (R. 3.)
Avez-vous le lait ou le vin?
Je n'ai ni le lait ni le vin. (R. 3.)
Avez-vous de beau drap ou de bon café?

VOCABULARY.

Au contraire, on the contrary.
Bouton, button.
Capitaine, captain.
Cousin, cousin.
Chaud, hot, warm.
Faim, hunger, hunger.
Ferblantier, maker of brass.

EXERCISE 9.

1. Qui a sommeil?
2. Mon frère a faim, mais il n'a pas sommeil.
3. Avez-vous raison ou tort?
4. J'ai raison, je n'ai pas tort.
5. Avez-vous le fusil de mon frère?
6. Mon frère a le fusil, non?
7. Avez-vous froid aujourd'hui?
8. Je n'ai pas froid; au contraire, j'ai chaud.
9. Avez-vous de bon pain?
10. Je n'ai pas de pain.
11. N'a-t-on pas de pain?

EXERCISE 10.

1. Are you sleepy, Sir?
2. No, Sir, I am not sleepy, but I am hungry.
3. Have you pepper or salt?
4. I have neither pepper nor salt; I have cheese.
5. Is your brother thirsty or hungry?
6. My brother is neither thirsty nor hungry.
7. Is your sister right or wrong?
8. She is not wrong, she is right.
9. Is the good tailor afraid?
10. He is not afraid, but ashamed.
11. Have you milk or cheese?
12. I have neither milk nor cheese; I have butter.
13. Have you the fine cloth or the good tea?
14. I have neither the fine cloth nor the good tea.
15. Is anything the matter with you, my good friend?
16. Nothing is the matter with me, my good Sir.
17. Have you no bread?
18. Yes, Madam, I have good bread, good butter, and good cheese.
19. Is the carpenter sleepy?
20. The carpenter is not sleepy, but the timber is hungry.
21. Have you the timber's wooden hammer?
22. I have not his wooden hammer.
23. Which hammer have you?
24. I have the steel hammer.
25. Have you a good cloth coat?
26. No, Sir, but I have a silk dress.
27. Has the tailor the good gold button?
28. Yes, Sir, he has the good gold button.

SECTION VII—PRONOUNS AND PRONOMINAL ADJECTIVES.

1. The pronouns le, him, it; la, her, it, are, in French, placed before the verb.* These pronouns assume the gender of the noun which they represent.

2. The vowel of the pronoun le is a elided before a verb commencing with a vowel or an h mute (§ 146).

3. The possessive adjectives mon, ma, m., my; ton, ta, t., thy; son, sa, s., his, her, in gender with the object possessed, that is, with the noun following them (§ 21 (1) (2)).

Mon père, m., father.
Avez-vous ma lettre, f.?
Il a son fusil, m.
Il a sa cravate, f.

4. Before a feminine noun in the singular, commencing with a vowel or an h mute, the masculine form, mon, ton, son, is used (§ 21 (3)).

J'ai mon épée, f.
C'est son vêtement, f.
Le général a son armée, f.

5. The adjectives notre, our; votre, your; leur, their, are used without variation before a noun of either gender in the singular (§ 21 (1)).

Notre argent, m., our money.
Votre canne, f., your cane.
Leur terre, f., their land.

6. The possessive pronouns le, mien, la, lienne, f., mine; le tien, m., la tienne, f., thine; le sien, m., la sienne, f., his or hers, can never be prefixed to nouns. The article preceding these pronouns, and forming an inseparable part of them, takes the gender of the object possessed; mien, tien, sien, sienne, vary for the feminine—nôtre and vôtre used as pronouns have the circumflex accent.

J'ai votre livre et le mien,
Elle a sa robe et la miennes.
Vous avez votre plume et la nôtre,

RÉSUMÉ DE EXEMPLES.

Votre ami a-t-il le marteau?
Il a, elle l'a.

avez-vous l'encre d'argent?
Nous ne l'avons pas.

avez-vous vos outils ou le mien?
Je n'ai ni le vôtre ni le mien.

avez-vous déjeuné ou la vôtre?
Elle n'ai ni la sienne ni la vôtre.

avez-vous pas?
Ne l'avez-vous pas?
Votre frère n'a-t-il pas?

VOCABULARY.

Assiette, f., plate.
Biscuit, m., biscuit.
Bouillon, m., broth.
Boucher, m., butcher.
Commode, f., chest of drawers.
Couperet, m., knife.
Miroir, m., looking-glass.

EXERCISE 11.

1. Avez-vous la fourchette d'argent?
2. Oui, Monsieur, je l'ai.
3. Le cuisinier a-t-il le beauf?
4. Non, Monsieur, il ne l'a pas.
5. Quel mouton avez-vous?
6. J'ai le bon mouton et le bon beauf de bouche.
7. Votre parent a-t-il la commode?
8. Non, Monsieur, il ne l'a pas.
9. A-t-il mon poisson?
10. Qui a tout le beauf du boulanger?
11. Le matelot n'a ni son pain ni son biscuit.
12. A-t-il son couteu et sa fourchette?
13. Il n'a ni son couteu ni sa fourchette, il a son assiette.
14. Quel plat a-t-il?
15. Il a le joli plat de porcelaine.
16. Avez-vous le mien ou le sien?
17. Je n'ai ni le vôtre ni le sien, j'ai le nôtre.
18. Avez-vous pour, Monsieur?
19. Non, Madame, je n'ai pas pour, j'ai faim.
20. Quelqu'un a-t-il mon mien ou ma?
22. Qu'avez-vous, Monsieur?
23. Je n'ai rien.

EXERCISE 12.

1. Have you the silver pencil-case?
2. No, Sir, I have it not.
3. Have you your brother's plate?
4. Yes, Madam, I have it.
5. Has the butcher the good biscuit?
6. He has it not; he has the good beef, the good mutton, and the good veal.
7. Have you my knife and mutton fork?
8. I have neither your knife nor your fork.
9. Who has the good tailor's biscuit?
10. The baker has it, and I have mine.
11. Have you mine also?
12. I have neither yours nor his. Are you hungry?

* Except in the second person singular, and in the first and second persons plural of the imperative, used affirmitively.

* The possessive adjective must in French be repeated before every noun (§ 21 (4)).
LESSONS IN DRAWING.—II.

The simple example of straight lines, as shown in Figs. 20, 21, 22, 23, will now claim the attention of the pupil; in these the positions of the lines must be indicated by points, marked in the examples by the letters a, b, c, d, etc., taking great care that their distances from, and their positions with regard to, each other shall be correctly arranged before a line is drawn; let the letters be a guide as to the order of arrangement. For example, mark the distance between a and b (Fig. 20), taking care they shall be horizontally placed, and that c and d are respectively perpendicularly arranged under a and b. In drawing the line a c any number of points between a c may be placed, and so with regard to the line b d; c and f must be placed so as to allow a straight line to be drawn between them to pass through c and d. The above remarks apply to Fig. 21. In Fig. 22, which is supposed to be a profile or side view of four steps, mark the line of the inclination of the steps—namely, the dotted line a b; it will not be difficult to arrange the remainder of this subject, if the pupil has well practised the examples given in Figs. 20 and 21.

In every example that the learner copies, he must examine and mark with care the character and extent of the angles or openings made by the meeting or intersection of any of the lines, whether straight or curved, of which the example that he is about to copy is composed; and he must also be exact in determining the relative position of the points in which these lines meet or intersect. When to these directions we have added the following—namely, that the learner must also carefully observe the lengths of the lines which form the angles, we have given in very few words the instructions that he chiefly requires to enable him to draw forms, such as ornamental scrolls, flowers, leaves, single figures, etc., in delineating which he can have no assistance whatever from the rules of linear perspective. Knowing from practical experience the necessity of repeating instructions whilst personally engaged in teaching, we trust the pupil will consider our repeating in various ways the more important and essential regulations which guide the mind, and consequently the hand, as intended to convey a deep impression of their importance.

Before commencing a drawing it should invariably be the practice of the pupil, when he has placed his copy before him, whether it be a drawing or the object itself, to look carefully over it for a few minutes, and examine its contours—that is, the bendings of the curves, and the forms which a combination of these curves present. By this close examination of the subject the mind will receive such an impression of it that, as he comes to understand its form, first as a whole, and the details afterwards, the hand, which is only an instrument, will readily execute the suggestions with which the mind has received. There are many who make the great mistake of supposing that the hand is to receive all the attention in training; on the contrary, let the mind fully understand the subject, and then the hand will need less practice in order to fulfil its requirements. In short, educate the mind, and the education of the hand will follow.

Fig. 24, a purse, is almost entirely an example of curved lines, like the vine leaf (Figs. 18, 19), but in this there is more uniformity—that is, the opposite sides have a reversed resemblance to each other. The pupil must notice the position of a and b, c and d, also a and e, b and d, and so on, with every other
angle or remarkable change which a line takes in its curvature. Perhaps after this remark it will be better to leave the pupil to himself whilst copying this subject, as by this time he must be, we hope, able to anticipate much that would be only a repetition of the principles already laid down.

We have given a vine leaf as a further illustration of this method of arranging a drawing—that is, marking in its characteristic points and angles. (See Figs. 18 and 19.) Fig. 18 is the first part of the work, which must be carried out as follows:—

Commence at some important and leading feature of the object, say the centre, at a; mark in b; observe the inclination of a to b; join a b; mark in c; also observe the distance of c from b; join a c. The line a d e will be found not a direct line, d is the point where it varies; mark d first and e next; join a d and d e; a f g is a similar line; also a h i. These are the great and leading characteristic lines and points, which it would be advisable to mark in the order we have written them. The secondary parts are t k c, i m n, o p g. The points r and s, t and u, must be arranged with an eye to c, b, and e. These are the minor divisions, all of which must be respectively joined together by straight lines, or in some special cases by a curve, as from r to t, or v to e. Partially rub out the arrangement—that is, "faint it," and then draw the finished outline as in Fig. 19, which may be, in the detail, further "marked in," as the points 1, 2, 3, 4, 5, etc. Let the student compare both figures as he proceeds.

As the above instructions apply to all flat objects, whether composed of straight or curved lines, we again urge most earnestly the strict observance of this practice, as so much depends upon it for the understanding and successfully carrying out of all that we shall have to advance hereafter in these lessons.

We have added in Figs. 16 and 17, and some smaller copies in outline (which are without numbers, as there is no necessity to make any special reference to them in our remarks), a few examples for practice, of subjects in the flat, composed of simple figures as easy as it is to make alphabetical characters by the conjunction of "straight strokes, pot-hooks, and hangars." The simple figures we are setting before the learner in these early lessons constitute in fact the alphabet of drawing, and with these, if he would make himself a sound draughtsman, he must become well acquainted; for just as the combination of letters, syllables, and words, forms in the printer's hands either a poem or an auctioneer's catalogue, so does the application of the elements of linear drawing constitute, in the hands of the artist, an historical picture, a portrait, a landscape, a design for an ornamental framework, or the plan and elevation of a building.

Unacquainted with these elements, how much industry, and even talent, has many a youth thrown away! Let us take an instance of such a youth. He makes his earliest essays, it may be, at copying some finished production, or some elaborate engraving. He tries his best to produce a neat and accurate copy, and he endeavours to give the details of his original direct lines and curves, advising the pupil not to shade his drawings for the present, until he has gained sufficient confidence in outline.

The value and importance of a correct and ready method of drawing the simple forms of objects cannot be over-estimated. He who is master of this enviable power can apply it to any branch of art he pleases. The greatest impediment to the progress of many a pupil is most likely to arise from his impatient desire to arrive, without a moment's delay, at the power of making a drawing. Irregular and misdirected efforts in copying drawings of cottages and stumps of trees appear to be a much more pleasant task than the performance of exercises so arranged as to lead the student from the knowledge of one principle to an acquaintance with another; nevertheless, the latter is essential to him who wishes to be master of drawing. The training of the hand and the eye which such exercises are calculated to impart, will make the copying of a large number

![Fig. 16](image-url)

![Fig. 17](image-url)

![Fig. 18](image-url)

![Fig. 19](image-url)

![Fig. 20](image-url)
with a praiseworthy degree of patient labour; but when all is done that he is able to do, his copy proves to be a failure in some essential points. It is out of proportion; the perspective lines are not given correctly; the curve-lines may not be zigzag, but they want the easy sweep of his exemplar; they are full of shoulders and joints; and the pendular lines are not upright, nor are the horizontal lines at right angles to them. When the first criticism of execution has abated, he perhaps discovers these faults himself; and if he makes the common mistake of supposing that the art of drawing is a gift, and that the pencil is a magician’s wand, manifesting its powers only in the hand of some rightful owner, he may then lose heart, and think that his faculties are not adapted for the pursuit of this noble art. If any of our readers have lines of unfortunate, let them recover their confidence, and prosecute their favourite pursuit under our guidance. The good method of practice, and the intelligible principles which we propose to explain and set before them, will so lead their hand and their eye, that ultimately they will accomplish all their desire.

Well-directed application does wonders in other arts, and why not in drawing? What exercises does not a musician or a singer go through, before he gets command of his voice or fingers? Who expects to arrive at that dazzling rapidity of motion visible in the touch of the violin-player, certain and instantaneous though it be, by any other method than that of hard and constant practice? Would not he who should begin to learn the use of any instrument by attempting complete airs, and always turning aside from the exercises which a master prescribe before the first arbour of execution has abated, be such a player as no player? Think what an amount of labour is necessarily expended in fingering by the young pianoforte-player. Greatly less labour than is necessary in prosecuting many other arts will make an able draughtsman, fit him for the performance of many useful works, and imbue him with those principles of drawing which are applicable throughout the whole range of this art.

It may be true that, to rise to the highest eminence in any science or art, requires a peculiar bent of the mind; but to acquire a useful practical knowledge of the art of drawing, it is by no means necessary that every one should be a genius. With regard to the sister arts—poetry and painting—it may be truly said, in regard to their elements, at least, that the writer finds with assurance the ability for their acquisition and their application. Every one, for instance, is poetical when he speaks on a subject with which he is well acquainted, or in which he is deeply interested; and, in like manner, every one is an artist, who is ready to make a sketch or a drawing of any object, which he wishes to explain to another, when he finds that language fails to convey his ideas. The art of drawing, therefore, may be attained to a sufficient extent for practice purposes by every one who exerts the necessary attention and assiduity. The artisan, the tradesman, or the connoisseur, may by the use of a few well-directed strokes of the pencil, convey an idea of his plans, operations, and views in relation to artistic productions, of which the most laboured and elegant composition, consisting of many hundred words, would fail to convey the slightest impression to the mind of the hearer or the reader.

LESSONS IN ARITHMETIC.—III.

SUBTRACTION.

1. If a less number be taken away from a greater, or, as it is called, subtracted from it, the number left behind is called the difference of the two numbers, or the remainder.

The sign (called minus) placed between two numbers indicates that one before which it stands is to be subtracted from the other.

2. When the individual figures composing the larger number are respectively larger than the corresponding figures of the smaller number, the process is evident. We have only to take the differences of the numbers of units, tens, hundreds, etc., respectively, and the resulting number can be at once written down. Thus, for instance, suppose it be required to find the difference between 9876 and 7653.

Write down the numbers one under the other, the units under the units, the tens under the tens, the hundreds under the hundreds, and so on, thus:

<table>
<thead>
<tr>
<th>Units</th>
<th>Tens</th>
<th>Hundreds</th>
<th>Thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Difference is 2223.

3. But suppose that the figures in the less number are not respectively less than the corresponding figure in the other number; we must then proceed somewhat differently.

The method we employ depends upon the following self-evident proposition, or

Axiom.—If two numbers be increased by the same quantity, their difference will not be altered.

4. Suppose that it be required to subtract 4789 from 5231.

Place the numbers one under the other, as before—

<table>
<thead>
<tr>
<th>Units</th>
<th>Tens</th>
<th>Hundreds</th>
<th>Thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Subtract 4789 from 5231; the remainder is 442.

9 units in the less cannot be taken from 1 unit of the greater; add, however, 10 units to the 1 unit in the upper, and add 10 to the lower number by changing the 5 in the tens place into a 15. The numbers are now 53, 2, 3, and 11; and 4 thousands, 7 hundreds, 9 tens, and 9 units. Now, 9 units from 11 units leave 2 units.

Again, 9 tens cannot be taken from 3 tens, but if we increase the 3 in the tens place of the upper number by ten, and the 7 in the hundreds place in the lower by one, we shall be adding the same quantity (a hundred) to each number, since any figure indicates a number ten times as great as the same figure in a number immediately on its right.

Then 9 tens from 13 tens leave 4 tens.

Again, 8 hundreds cannot be taken from 2 hundreds, but if we increase the 2 in the hundreds place of the upper number by 10, and the 4 in the thousands place in the lower number by 1, we shall be adding the same quantity (a thousand) to each number, for the reason we have already mentioned above.

Then, 8 hundreds taken from 12 hundreds leave 4 hundreds. And 5 thousands from 5 thousands leave nothing.

Hence the difference of the numbers is 4 hundreds, 4 tens, and 2 units; that is, 442.

5. The process may also be clearly exhibited as follows:

\[ 5231 = 5 \times 1000 + 2 \times 100 + 8 \times 10 + 1 \]
\[ 4789 = 4 \times 1000 + 7 \times 100 + 8 \times 10 + 9 \]

The difference between these numbers is the same as the following:

\[ 5 \times 1000 + 12 \times 100 + 13 \times 10 + 11 \]
\[ 5 \times 1000 + 8 \times 100 + 9 \times 10 + 9 \]

For we have added the same quantity to the original numbers, namely:

\[ 10 \times 100 + 10 \times 10 + 10 \times 4, 1110 \text{ to the upper,} \]
\[ 1000 + 100 + 10 \text{ i.e., 1110 to the lower.} \]

The difference is clearly seen to be, therefore:

\[ 4 \times 100 + 6 \times 10 + 2 \]

i.e., according to the principles of notation, 442.

6. From the above analysis of the process of subtraction will be perceived the truth of the following

- Rule for Subtraction. Write down the less number under the greater, so that units may stand under units, tens under tens, etc. Beginning at the right hand, subtract each figure in the lower number from the figure above it, and set down the remainder directly under the figure subtracted. When a figure in the lower number is larger than that above it, add 10 to the upper figure; then subtract as before, and add 1 to the next figure in the lower number.

* Articles 5 and 7 may be omitted until after the lesson on Multiplication has been read.
7. It may be remarked, instead of adding 1 to the next figure of the lower number in a case where a figure is larger than the one standing above it, it would be the same thing to subtract 1 from the next figure of the upper number.

The truth of this will appear from exhibiting the process of subtracting 4751 from 5251, as follows:

\[
\begin{align*}
5251 & = 5 \times 1000 + 2 \times 100 + 5 \times 10 + 1 \\
4751 & = 4 \times 1000 + 7 \times 100 + 8 \times 10 + 9
\end{align*}
\]

The difference of these will be the same as the difference of:

\[
4 \times 1000 + 11 \times 100 + 12 \times 10 + 11
\]

and

\[
4 \times 1000 + 7 \times 100 + 8 \times 10 + 9
\]


It is evidently:

\[
4 \times 100 + 4 \times 10 + 2, \text{ or } 442.
\]

Here we have not added anything to either number, but have only arranged the upper one in a different form.

The process given in the first rule is the most convenient in practice.

The learner is recommended to analyse the process he uses in the first few examples which he attempts.

8. Tests of Correctness.—(1.) Add the remainder to the smaller number; if the result so obtained be equal to the larger number, the work may be presumed to be correct; for it is evident that the smaller number and the remainder are the two parts into which the larger number is divided.

(2.) Subtract the remainder from the greater of the two numbers; if the difference is equal to the less number, the working may be considered to be correct.

**Exercise 5.**

1. From 5343 subtract 2731
2. From 8097 subtract 7854
3. From 510307 subtract 50489
4. From 9774 subtract 105671
5. From 4006723 subtract 5001
6. From 360100 subtract 100000
7. From 2035024 subtract 27040
8. From 96531768 subtract 875325
9. From 1000000 subtract 999999
10. From 8357600 subtract 483857
11. From 3540501 subtract 888888
12. From 5246300 subtract 9438675
13. From 70054313 subtract 59798109

15. From 12345979 subtract 1234578
16. From 24879786 subtract 112345678
17. From 100000000 subtract 12345679
18. From 4287124587 subtract 4287124588
19. From 6764 + 3765 take 6500 + 2430
20. From 2890 + 8475 take 4251 + 3042
21. From 8564 — 2573 take 4531 — 1735
22. From 7251 — 2846 take 1734 + 2056
23. From 9687 — 3401 take 2021 + 1754

24. What number is that to which 3425 being added, the sum will be 175250?

25. A man having 55000 pounds, paid 7520 pounds for a house, 3260 pounds for furniture, 2375 pounds for a library. How much had he left?

26. A man worth 163250 pounds bequeathed 15200 pounds apiece to his two sons, 16500 pounds to his daughter, to his wife as much as to his three children, and the remainder to an hospital. How much did his wife and how much did the hospital receive?

27. A man bought three farms: for the first he paid 5260 pounds, for the second 3585, and for the third as much as for the first two; he afterwards sold them all for 15280 pounds. How much did he gain or lose?

28. A jockey gave 150 crowns for a horse, and meeting an acquaintance, changed horses with him, giving 37 crowns to boot; meeting another he changed again, receiving 28 crowns to boot; he finally changed again, giving 78 crowns to boot, and then sold his last horse for 140 crowns. What did he lose?

29. Find the difference between every two successive numbers in the squares contained in Ex. 3 on Addition (page 23), taking care always to place the larger number uppermost—that is, for the minuend.

30. Find the difference between a million and a thousand and one.

31. From 4850902 subtract 28908; from the remainder subtract the same number; and from every successive remainder subtract the same number, until a remainder at last be obtained from which it cannot be subtracted; and then, tell how many times the subtraction has been performed.

32. What is the difference between a hundred thousand and ten millions one thousand, and a hundred millions ten thousand and one?
and legs perfectly straight, bend the body forward, with the head towards the ground, and touch the feet with the points of the fingers. When this can be done with ease, touch the floor in the same position. This will be difficult at first, but it will soon be accomplished with a little practice.

6. Place the arms "akimbo"; that is, with the elbows out and the hands resting on the hips. Sink down to the floor until you sit upon your heels, and then rise to the erect position. Repeat this several times in succession.

7. Bring the right arm level with the shoulder; then throw it back, and whirl it round at full length from the body. Exhale the left arm and shoulder in the same way. Then begin by throwing the arm forward, and whirl it as before. Practise the same movements with both arms simultaneously.

8. With the hands on the hips, raise each knee as high as you can, keeping the other leg perfectly straight. Then extend each leg sideways as far as possible, remaining a few seconds in that position.

9. Hop on one foot several times successively, then on the other, keeping the body erect.

These exercises will do much for the beginner in gymnastics, and will also suggest others of a similar description which he may practise with advantage.

We would remark here that the importance of regular walking exercise as a means of strengthening the frame and keeping the system in health must not be lost sight of, in the attention given to purely gymnastic pursuits. No exercise is more salutary in its effects, and it has the additional recommendation of taking the pedestrian into the fresh air, which is as necessary to the preservation of life and health as a proper supply of food.

We now come to the various kinds of gymnastic exercises which are practised with the aid of apparatus, and will mention first those which require only the simple pieces of apparatus, but are still of high utility.

For the introduction of two of these we are indebted to an American physician, Dr. Dio Lewis, who has bestowed great attention on gymnastics from a physiological point of view, and whose teaching and principles are being widely adopted in Europe as well as in America. These are the Bag and the Ring exercises, which we shall now describe.

The Bag Exercises, which may be used in families with great benefit, are practised simply with bags filled with beans, the directions for making which are given as follows by Dr. Lewis:

The material is a strong bed-ticking. Bags for young children should be, before sewing, seven inches square; for ladies, nine inches; for ladies and gentlemen exercising together, ten inches; for gentlemen alone, twelve inches. Sew them with strong linen or silk thread, doubled, nearly three-quarters of an inch from the edge, leaving a small opening at one corner to pour in the beans. Fill the bags three-quarters full, and they are ready for use. If used daily, once in two weeks they should be emptied and washed. To allow them to be played with after they are soiled is pretty sure to furnish much dust for the lungs of the players, besides soiling the hands and clothes. There cannot be too much care exercised in regard to this point of cleanliness. Before the bags are used in the first time they should be rinsed with water until it runs from them quite clean, when they must be dried; and every month or two afterwards this cleansing should be repeated.

The Bag Exercises should be performed by two persons practising together; and it is an advantage, when the practice is in-doors, to have suspended from the ceiling a hoop or rings, through which the bags may be thrown. This, however, is not necessary, although it tends to increase the interest of the players in the exercise.

The design of the exercise is to give freedom to the muscles of the chest and arms, and promote a healthy movement of the body generally. For this purpose the bags are thrown from one player to the other, in a variety of positions, which may be left in some measure to their own taste and inclination, provided it be remembered, as a rule, to keep the legs perfectly straight, the body upright, and the chest well thrown forward. Each position is exemplified in Fig. 1. Standing thus, the bag may be thrown first with the right arm, then with the left, then with left and right alternately; now, with both hands brought back behind the neck, throw the bag over the head, or, with the bag in the right hand, throw it from behind round the left arm, which is kept straight to the body; throw with the left hand in the same manner; and so on. Fig. 2 represents a more difficult position, from which the bag is thrown over the head. This will come easier with a little practice.

We pass on now to the Ring Exercises, which have received very high eulogium, and prove highly amusing as well as beneficial to the players. The ring is made of wood, usually cherry, and is one inch in thickness and six inches in diameter. This is sufficient to enable two persons to grasp it and use it with freedom. All the ring exercises are for two players, who should hold of equal or nearly equal strength. Two rings are required in the course of the exercises, each player grasping one in either hand. The rings should be well polished. They are inexpensive articles, being sold occasionally as low as one shilling per pair; and any wood-turner will supply them at a little more than this sum.

We give two figures as examples of the exercises that may be practised with either one or both hands. In the first, the players, standing in the position shown in Fig. 3, both pull hard with the right hand, and draw the right arm from right to left and from left to right; afterwards performing the same movements with the ring held in their left hands. Remember to keep the head well up and the shoulders back, with the feet placed at right angles, in all these movements.

In the second example, the players first stand back to back, with the rings held downwards; then each lunges forward with the right leg, and the hands are raised over the head, as shown in Fig. 4. They return to the back-to-back position, and step forward with the left leg in the same manner.

Among other ring exercises may be mentioned the following: The players, standing face to face, and with one foot well advanced, the other thrown back, both pull with one hand and push with the other alternately, one arm thus being extended to its full length, and the other drawn back as far as possible, at each movement. Then, standing in the same way, draw back with both arms, your partner pushing his as far forward as he can, and each doing this alternately. Standing in an erect position, each raise one hand and the other arm as possible, being careful not to bend the elbows. Raise and lower the arms alternately from the position represented in Fig. 4.
HISTORIC SKETCHES.—II.

THOMAS À BECKET AND THE CONSTITUTIONS OF CLARENDON.

It was a grand scene that presented itself in Westminster Hall when, in the spring of the year 1163, King Henry II. met Thomas à Becket, Archbishop of Canterbury, and the rest of the bishops of England. On the one side appeared, in all the pomp and magnificence of prelates of the Roman Church, the whole of the representatives of spiritual power in the country; on the other appeared, in an equally magnificent simplicity, the highest representative of the temporal power. Church and State were confronted. Why?

The king had a question to ask the bishops, one in which not he only, nor the people living at the time, but we also, had a keen personal interest; and in order that he might get their collective answer at once and the same time, he bade them meet him at Westminster in a body. The question he had to ask was very simple, but also very important: "Would the bishops conform to the law and ancient customs of the land, or would they not?" Timely warning had been given to the bishops of the nature of the question to be asked, and, under the guidance of the Archbishop of Canterbury, they had framed an answer. They would observe the law and the ancient customs of the realm, saving their own order. Only one prelate, Hilary, Bishop of Chichester, was found to give an unqualified answer in the affirmative, and for doing so he received the warm upbraiding of the primate.

Henry, who thought by putting a straightforward question to get an equally straightforward answer, was exceedingly disgruntled at the trick of the primate, which left the whole matter as much at large as it had been before the meeting. In vain he tried to change the mind of the bishops; and, baffled in his hope of binding them by their own admissions, he left the hall in a rage, and determined to take other means of bringing them to submission. To submission! But in what were the bishops opposed to him? What law or ancient custom of the kingdom had they disregarded? What need was there to summon them to Westminster, and to catechize them so severely? Above all, what harm was there in the saving clause inserted by the prelates in their answer, that it should so greatly incense the king? Let us see.

For many years the clergy had been striving to effect in England what they had actually effected in other countries—an independence of the civil courts, and a recognition of their superiority above the civil power. Steadily they worked towards the attainment of those great objects, their doctrine of the superiority of the spiritual over the temporal power ultimately blooming out into an assertion of right even to depose princes, and to absolve subjects from their allegiance. As yet this monstrous claim had not been advanced in England, but steps were being taken which were meant to lead up, and actually did lead up, to it. With some show of colour, perhaps, the clergy claimed that all questions of right to present to ecclesiastical benefices should be tried in the ecclesiastical courts. They also claimed that, as guardians of property which was held for religious purposes, they should not be taxed nor be compelled to do military service, whether in kind or by commutation, nor should they be obliged to sit with laymen in the grand council of the kingdom—that was to say, a House of Lords. The deans and chapters of cathedrals claimed the sole and exclusive right to elect the bishop of their see; privilege of sanctuary both to person and property was claimed for all churches and churchyards; and the clergy also asserted the unquestioned right to excommunicate whomsoever they pleased. These and certain other privileges, of which the tendency was to render clerks in holy orders independent of the state, were not, though pitiably advanced, sufficient to arouse the resolute opposition of Henry II. There were two other claims of the churchmen
which, if once allowed, would not only have made the clergy quite independent, but would have given them the opportunity and the means of wholly subverting the king's power. They said that if a man contracted with another to do a thing, and confirmed his promise by an oath, the fact that the oath was binding only on the conscience gave them jurisdiction, and in this way they drew before the spiritual courts many questions of ordinary Contracts, disputes about which ought rightly to have been tried in the king's courts of law, which were open to all comers, and from which an appeal lay to the king himself. The last and most important of the clerical claims, however, was that which asserted that no clergyman could be brought to trial in the king's courts, civil or criminal, for any breach of agreement, however gross, or for any crime, however heinous. If, of course, the king's judges, the bishop of the diocese in which the prisoner dwelt sent an order to the judge, notifying him that the man was in orders, and requiring him to surrender the fellow to the bishop's officer. When brought before the spiritual court the prisoner was often allowed to clear himself on his simple oath, uncorroborated by any witness, to the effect that he had not done that of which he was accused. If he confessed, or if the case was clearly proved against him, he was put to penance, sometimes he was put in prison, and sometimes—but rarely—he was degraded from his ecclesiastical rank. In this way crimes of the most abominable kind, and which, if committed by laymen, were punishable with death, were done with comparative impunity when clerks were the offenders. Nor was this all. By means of an absurd test, persons who were not, nor ever meant to be, in orders, and who had only taken the simple profession of a friar or a monk, Ability to read or write, no matter how imperfectly, was taken to be of itself sufficient proof that a man was a cleric, so that a layman arraigned before the king's justices had only to show that he could read or write what was afterwards appropriately called "the neck verse," and he was forthwith handed over to the ordinary to be put to his purgeation in the ecclesiastical courts.

This monstrous immunity, with its yet more monstrous abuses, was like the last straw that broke the camel's back. So flagrantly unjust was it, both in principle and practice, that all honest men were indignant, and cried aloud for some check upon it. The king, who was by means of it and the other pretended rights of the clergy gradually ceasing to be master in his own dominions, resolved to apply a curb, and to wipe away the last traces of the temporal powers of the Church. In 1154 he had striven to restrain the power of the clergy, and, aided by the clear head and bold hand of his bosom friend Thomas à Becket, had striven not unsuccessfully. Great had been the wrath poured on Becket's head when, as Lord Chancellor of England, he had made havoc altogether of many a pet clerical abuse. Under the idea that he would continue the same policy in a sphere where that policy would have the largest possible scope, Henry offered Becket the archbishopric of Canterbury when that see was vacant in 1161. Becket, it must be in fairness admitted, was very averse to accept the offer, and for thirteen months held out a persistent refusal. Finally, however, he yielded to the earnest solicitations and orders of the king, and was duly installed as Primate at Canterbury.

To the surprise of all men, and to the infinite disgrace of the king; Becket from the day of his consecration pursued a tactless, thoughtless, and often ill-judged course. Nowhere was there so bold an asserter of clerical rights, nowhere a more untiring worker on behalf of the power of the Church. He claimed lands which had once belonged to the see of Canterbury, but which had long been independent and in laymen's hands; he excommunicated* the owner of an advowson for ejecting a priest who had been presented by himself; he asserted the right of the spiritual courts to inquire into questions of contract confirmed by oath; and in every respect he proved himself to be the exact opposite of what Henry had looked for in him. The case which induced the king to try conclusions with Becket and the clerical party was an exceedingly gross one. A priest in Worcestershire had violated a gentleman's daughter, and afterwards murdered her father. When the scandal was about to be brought to trial before the king's justices, Becket claimed him as a clerk, and, getting possession of him, degraded him from his priest's office, and then insisted that he could not be tried again in the king's court for the same offence.

These were the circumstances under which King Henry summoned the bishops to Westminster; and the meaning of the words "saving our own order" is sufficiently clear. Henry left the hall in a rage, but it was not an impotent one. By promises, by threats, by various means, he detached most of the prelates from the king; only three of them, the archbishops of Canterbury, York, and Dublin, remained firm. It was Henry's wish to induce the prelates to swear an oath to the new position he had created, and to promise to conform to it; and in this he was successful. From the bishops Henry pressed all the bishops of the dioceses to meet him at Clarendon, a village in Wiltshire, and there, being backed, like Stephen de Langton on a later occasion, by "the whole nobility of England," he required their sworn assent to what he had been called the Constitutions of Clarendon.

The Constitutions were dreadfully hard eating for the bishops, especially difficult for those who had all their invidious privileges, some of which it must be confessed, were nothing less than bestowed by those "ancient customs" which the king had sworn the bishops to observe. Suits concerning advowsons and rights of presentation were to be decided in the civil courts; no cleric, no matter of what rank, was to be quit the kingdom without the royal permission; the pretended right to try questions of contracts made on oath was to be renounced; excommunicated persons who had been made to find security for their residence in any appointed place; laymen were not to be tried in spiritual courts except by approved good witnesses; no chief tenant of the crown to be excommunicated without the king's assent; the final appeal in all spiritual causes to be in the king; prelates to be regarded as barons of the realm, and to be taxed accordingly; bishops not to be elected without the royal assent; the privilege of sanctuary to be curtailed; and clerks accused of any crime to be tried as lay offenders, just as other men.

The Great Council of the barons unanimously approved the Constitutions, and, so far as the food was, all the prelates, except the primate, swore to accept it "legally, with good faith, and without fraud or reserve." Becket was resolute, though alone; friends as well as foes besieged his constancy, still he held out; and it was not till Richard de Hastings, Grand Prior of the Templars, found himself, holding the position of the king's chamberlain, went down on his knees and besought him, that he gave in. Unwillingly, and in hope of getting the pope to annul his oath, he swore "solemnly, and in the rest to accept the Constitutions "with good faith, and without fraud or reserve."

Pope Alexander refused to ratify the treaty; he released all who had sworn from their oaths, and threatened to excommunicate everybody who should try to support the king's demands. Henry, in the face of strong opposition, excommunicated, and plotted against his former friend; Henry took the revenues of the hostile bishops into his own hands, and by dint of perseverance managed to keep the clergy in check; and it is probable he would have done very much more than he did had it not been for the brutal murder of Thomas à Becket, which was a blander as well as a crime.

In the autumn of 1170 Becket had returned to Canterbury, nominally reconciled to the king; but the old question—which should be the greater—being revived, Henry is reported to have said in a hasty moment, "Is there not one of those who eat my
breath that will rid me of this trouble?" To Canterbury with their followers went four knights of Henry's court, and, acting entirely on their own responsibility, slew the archbishop on the steps of the altar.

The outcry raised in England, where the archbishop was looked upon with favour, not only on account of his bold conduct in standing up for his order, but also because he was supposed to be the champion of the Anglo-Saxon, the Norman Englishman, was loud and sincere. Abroad, the feeling of grief was more than equalled by anger, and a sort of holy horror was felt at the bare notion of slaying an archbishop. King Henry, there is every reason to think, was genuinely sorry for the violence that had been done. Though his "guide and his companion, and his own familiar friend," had proved to be the sharpest thorn in his side, he remembered too well the former days to wish him any personal harm. Notwithstanding, on him was charged the whole guilt of the murder. Punishment the most severe, disclaimers the most solemn, and ceremonies the most humiliating scarcely served to clear him. Purposely the Papal Court, which saw in Henry the strongest opponent of its pretensions, availed itself of the handle given to it, and strove to crush the king under a load of obloquy. To a very great extent it succeeded. Never again did Henry appear as the sponsor of the change of State rights as when he forced an assent to the Constitutions of Clarendon. The ghost of Thomas à Becket, now St. Thomas of Canterbury, haunted him, and the dead man's hand deprived the conqueror of his victory.

The Constitutions of Clarendon were disregarded, the death of Becket making it impossible for the king to fly in the face of the papal veto upon them. Some little submission of the clerical to the kingly power was made, but the work marked out by Henry II., the entire subjection of the clergy to the head of the state, was left unaccomplished till the dawn of the Reformation in England, when it was renewed and carried out in the fullest possible manner by that "stately lord who broke the bonds of Rome," and who was saved by natural causes from committing, in the case of Cardinal Wolsey, the egregious blunder committed by the knights of Henry II. when they plunged their swords into the bosom of Thomas à Becket at Canterbury.

SYNOPSIS OF EVENTS IN THE LIFE AND REIGN OF HENRY II.

Henry II., son of Geoffrey Plantagenet, Count of Anjou, and Matilda, daughter of Henry I., was the fifth King of England after the Conquest, and the first of the Plantagenet dynasty.

| Born at Mans, Normandy | 1153 | Murder of Thomas à Becket
|-------------------------|-----|-------------------------|
| Succession secured to Henry by Stephen | 1153 | England divided into judges' Circuits.
| Began to reign | 1154 | Subjugation of Ireland by Becket
| Conference at Clarendon | 1154 | Died at Chinon, Normandy

July 6, 1159

Sovereigns Contemporary with Henry II.

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12. Sometimes the sentence which ends with a note of interrogation should be read with the falling inflection of the voice.

14. At the comma, the rising inflection is used, and at the note of interrogation the falling inflection.

Examples.

What o'clock is it?
How do you do to-day?
How much did he give for his book?
Where is Abel thy brother?
How long, ye simple ones, will ye love simplicity?
Where wast thou, when I laid the foundations of the earth?

Sometimes the first part of an interrogative sentence should be read with the rising inflection of the voice, and the last part with the falling inflection. These parts are generally separated by a comma; thus,

"At the comma, the rising inflection is used, and at the note of interrogation the falling inflection."

Examples.

Shall I give you a peach, or an apple?
Are you going home, or to school?
Did he go to church, or did he stay at home?
Whether is it easier to say, Thy sins are forgiven, or to say, Arise and walk?
Why did the heathen rage, and the people imagine vain things?
Is your father well, the old man of whom ye spake?

15. Sometimes the first part of an interrogative sentence must be read with the falling inflection of the voice, and the last part with the rising inflection.

Examples.

Where have you been to-day? At home?
Who told you to return? Your father?
What is that on the top of the house? A bird?
What did you pay for that book? Three shillings?
Is not the life more than meat? and the body than raiment?
What went ye out to ales? A man clothed in soft raiment?
What went ye out to ales? A prophet?
How often shall my brother sin against me and I forgive him?
Until seven times?
16. In the following exercises some of the sentences are questions requiring the rising and some the falling inflection of the voice. A few sentences also ending with a period are inserted. No directions are given to the pupil with regard to the manner of reading them, it being desirable that his own understanding, under the guidance of nature alone, should direct him. But it may be observed that questions which can be answered by yes or no, generally require the rising inflection of the voice; and that questions which cannot be answered by yes or no, generally require the falling inflection.

**Exercise 1.**

John, where have you been this morning? Have you seen my father to-day? What excuse have you for coming late this morning? Did you not know that it is past the school hour? If you are so inattentive to your lessons, do you think that you will make much improvement? Will you go, or stay? Will you ride, or walk? Shall you go to-day, or to-morrow? Did he resemble his father, or his mother? Is this book yours, or mine? His, or hers? Do you hold the watch to-night? We do, sir. Did you say that he was armed? He was armed. Did you not speak to him? I did. Art thou he that should come, or do we look for another? Why are you so silent? Have you nothing to say? Who hath believed our report? To whom hath the arm of the Lord been revealed?

**III. THE NOTE OF EXCLAMATION.**

17. The note or mark of Exclamation is a round dot with an upright dash or stroke above it, which is always put at the end of a sentence expressing surprise, astonishment, wonder, or admiration, or other strong feelings.

18. In reading, when you come to a note of exclamation, you must stop in the same manner as if it were a note of interrogation.

19. You must stop only as long as you do at a period.

20. You must generally pronounce the word which comes immediately before a note of exclamation with the falling inflection of the voice.

**Examples.**

How cold it is to-day! What a beautiful house that is! How brightly the sun shines! How mysterious are the ways of God! How are the mighty fallen in the midst of the battle! How are the mighty fallen, and the weapons of war perished! Who shall set up his throne for thee, O Absalom, my son, my sin! Oh, what a fall was there, my countryman! It is a dear and awful thing to die! Oh! deep enchanting prelude to repose! The dawn of bliss the twilight of our woes!

21. In our remarks on the period, the student was taught that when he comes to a period, he must stop, as if he had nothing more to read. At the end of a paragraph, whether the period or any other mark be used, a longer pause should be made than at the end of an ordinary sentence. The notes of interrogation and exclamation generally require pauses of the same length with the period.

It may here be remarked, that good readers always make their pauses long; but whatever be the length of the pause, the pupil must be careful that every pause which he makes shall be a total cessation of the voice.

**Exercise 2.**

The sentences to be read as if marked.

George is a good boy. He learns his lesson well. He is attentive to the instructions of his teacher. His attendance at the proper time of school is always punctual. He is remarkable for his diligence and attention. He reads no other book than that which he is desired to read by his master. He studies no lessons but those which are appointed for the day. He takes no toys from his pocket to amuse himself or others. He pays no regard to those who attempt to divert his attention from his book.

Do you know who is a good scholar? Can you point out many

in this room? How negligent some of our fellow-pupils are! Ah! I am afraid many will regret that they have not improved their time! Why, here comes Charles! Did you think that he would return so soon? I suspect that he has not been pleased with his visit. Have you, Charles? And were your friends glad to see you? When is cousin Jane to be married? Will she make us a visit before she is married? Or will she wait until she has changed her name?

My dear Edward, how happy I am to see you! I heard of your approaching happiness with the highest pleasure. How does Rose do? And how is our whimsical old friend the Baron? You must be patient and answer all my questions. I have many inquiries to make.

The first dawn of morning found Waverley on the esplanade in front of the old Gothic gate of the castle. But he paced it long before the drawbridge was lowered. He produced his order to the sergeant of the guard, and was admitted. The place of his friend's confinement was a gloomy apartment in the central part of the castle.

Do you expect to be as high in your class as your brother? Did you recite your lessons as well as he did? No. Lazy boy! Careless boy! You have been less attentive than I have to your attention to your lessons. You cannot say a word of them. How foolish you have been! What a waste of time and talents you have made!

**LESSONS IN GEOMETRY.—II.**

**DEFINITIONS (continued).**

9. An angle is the inclination of two straight lines to each other, which meet in a point, and are not in the same direction. The point in which they meet is called the vertex of the angle, and each of the two straight lines is called a side or leg of the angle. The angle itself is generally called a plain rectilinear angle, because it necessarily lies in a plane, and is formed of straight lines. Curvilinear angles are such as are formed on the surface of a sphere or globe; but the consideration of such angles belongs to the higher geometry. The magnitudes of angles do not depend on the lengths of their legs or sides, but on the degree or amount of aperture between them, taken at the same distance from the vertex.

An angle is generally represented by three letters, one of which is always placed at the vertex, to distinguish it particularly from every other angle in a given figure, and the other two are placed somewhere on the legs of the angle, but generally at their extremities; and in reading or in speaking of the angle, the letter at the vertex is always placed between the other two, and uttered or written accordingly. Thus, in Fig. 4, which represents an angle, the name of the angle is either B A C or C A B; the point A is called its vertex; and the straight lines B A, C A, its sides or legs.

10. Angles are divided into two kinds, right and oblique, and oblique angles are divided into two species, acute and obtuse.

When one straight line meets another, at any point between its extremities, and makes the adjacent or contiguous angles equal to each other, each of them is called a right angle, and the legs of each of these angles are said to be perpendicular to one another. Thus, in Fig. 5, the straight line A B makes the straight line C D in the point A, and makes the adjacent angles C A B, D A B, equal to each other; each of these angles is therefore called a right angle; and the straight line A B is said to be perpendicular to the straight line A C, or D A, and consequently A C or A D is perpendicular to A B.

When one straight line meets another, at any point between its extremities, and makes the adjacent angles unequal to each other, one of these angles is called an oblique angle; that which is greater than a right angle is called an obtuse angle; and that which is less than a right angle is called an acute angle. Thus, in Fig. 6, the straight line A B meets the straight line C D in the point A, and makes the adjacent angles unequal to each other; each of these angles is therefore called an oblique angle; the angle C A B, which is greater than a right angle, is called.
LESSONS IN GEOMETRY.

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obtuse; and the angle $DAB$, which is less than a right angle, is called acute.

11. A plane figure, in geometry, is a portion of a plane surface, inclosed by one or more lines or boundaries. The sum of all the boundaries is called the perimeter of the figure, and the portion of surface contained within the perimeter is called its area.

12. A circle is a plane figure contained or bounded by a curved line, called the circumference or periphery, which is such that all straight lines drawn from a certain point within the figure to the circumference are equal to each other. This point is called the centre of the circle, and each of the straight lines is called a radius of the circle. The straight line drawn through the centre and terminated at both ends in the circumference, is called the diameter of the circle.

It is plain, from the definition, that all the radii must be equal to each other, that all the diameters must be equal to each other, and that the diameter is always double the radius. In speaking or writing, the circle is usually denoted by three letters, placed at any distance from each other, around the circumference; thus, in Fig. 7, the circle is denoted by the letters $A$, $C$, or $A$, $E$, $D$. The surface included between the radii $A$, $C$, or $O$, $B$, or any three of the other letters on the circumference. The point $O$ is the centre; each of the straight lines $O$, $A$, $O$, $B$, $O$, $C$, $O$, $E$, is a radius, and the straight line $A$, $B$ is a diameter.

13. An arc of a circle is any part of its circumference; the chord of an arc is the straight line which joins its extremities.

14. A segment of a circle is the surface inclosed by an arc and its chord.

15. A sector of a circle is the surface inclosed by an arc, and the two radii drawn from its extremities.

Thus, in Fig. 7, the portion of the circumference $AMC$, whose extremities are $A$ and $C$, is an arc; and the remaining portion $ABC$, having the same extremities, is also an arc; the straight line $AC$ is the chord of either of these arcs. The surface included between the arc $AMC$ and its chord $AC$, is the segment $AMC$; there is also the segment $ABC$. The surface included between the radii $O$, $C$, $O$, $B$, and the arc $C$, is called the sector $COB$; the remaining portion of the circle is also a sector.

16. A semicircle is the segment whose chord is a diameter. Thus, in Fig. 7, $ABC$ or $ABE$ is a semicircle. The term semicircle, which literally means half a circle, is restricted in geometry to the segment thus described; but there are many other ways of obtaining half a circle.

17. Plane rectilinear figures are described under various heads; as trilateral or triangular; quadrilateral or quadrangular; and multilateral or polygonal.

18. A triangle (Figs. 8, 9, 10, and 11) is a plane rectilinear figure contained by three straight lines, which are called its sides. No figure can be formed of two straight lines; hence, an angle is not a figure, its legs being unlimited as to length. Triangles are divided into various kinds, according to the relation of their sides or of their angles: as equilateral (Latin-
divided into regular and irregular; the former having all their sides and angles equal to each other; and the latter having any variation whatever in these respects. The sum of all the sides of a polygon is called its perimeter, and when viewed in position its contour. Irregular polygons are also divided into convex and non-convex; or, those whose angles are all salient, and those of which one or more are re-entrant. The irregular polygon (Fig. 20) has its angles at $a$, $c$, and $d$, salient; and its angles at $a$ and $b$, re-entrant.

34. Polygons are also divided into classes, according to the number of their sides; as, the pentagon (Fig. 21), having five sides; the heptagon (Fig. 22), having seven sides; the octagon having eight sides; and so on. According to this nomenclature, the triangle is called a trigon, and the quadrangle a tetragon.

LESSONS IN ARITHMETIC.—IV.

MULTIPLICATION.

1. The repeated addition of a number or quantity to itself is called multiplication. Thus, the result of the number 5, for instance, added to itself 6 times, is said to be 5 multiplied by 6.

$$5 + 5 + 5 + 5 + 5 + 5 = 30,$$

or 5 multiplied by 6 is 30.

When the numbers to be multiplied are large, it is evident that the process of addition would be very laborious. The process of multiplication which we are going to explain is, therefore, a short way of performing a series of additions. Let it, then, be borne in mind, that multiplication is, in fact, only addition.

2. Definitions.—The number to be repeated or multiplied is called the multiplicand. The number by which we multiply is called the multiplier; it, in fact, indicates how many times the multiplicand is to be repeated, or added to itself. The number produced by the operation is called the product. The multiplier and multiplicand are also called the factors of which the product is composed, because they make the product.

Thus, since 5 multiplied by 6 is 30, 5 and 6 are called factors of the number 30.

3. Before proceeding farther, the learner must make himself familiar with the following table, which gives all products of two numbers up to 12:

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>42</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>21</td>
<td>28</td>
<td>35</td>
<td>42</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>24</td>
<td>32</td>
<td>40</td>
<td>48</td>
<td>56</td>
</tr>
<tr>
<td>9</td>
<td>18</td>
<td>27</td>
<td>36</td>
<td>45</td>
<td>54</td>
<td>63</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>11</td>
<td>22</td>
<td>33</td>
<td>44</td>
<td>55</td>
<td>66</td>
<td>77</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>36</td>
<td>48</td>
<td>60</td>
<td>72</td>
<td>84</td>
</tr>
</tbody>
</table>

4. If several numbers be multiplied together, the result is called the continued product of the numbers. Thus, 30 is the continued product of 2, 3, and 5, because $2 	imes 3 	imes 5 = 30$.

N.B. On learning the multiplication table, let the following facts be noticed:

2. The product of any number multiplied by 10 is obtained by adding a cipher to the number.

3. The results of multiplying by 5 terminate alternately in 5 and 0. The first nine results of multiplying by 11 are found by merely repeating the figure to be multiplied. Thus, 11 times 7 are 77.

4. In the first ten results of multiplying by 9 the right hand figure regularly decreases, and the left hand figure increases by 1; also, the sum of the digits is 9. Thus, 9 times 2 are 18, 9 times 3 are 27.

5. It is evident that $2 	imes 3 	imes 5 = 30$, and $2 	imes 3 = 6$, and $6 	imes 5 = 30$ in multiplying any number, 5, for instance, by another, 6, for instance, it will be the same thing if we multiply it successively by the factors of which the second is composed. Thus, the product of any number multiplied by 28 might be got by multiplying it first by 7, and then multiplying the result by 4.

The product of any number multiplied by 10 is obtained by annexing a cipher to the number. The product of any number, therefore, multiplied by 100 will be obtained by adding two ciphers, because $10 	imes 10 = 100$; first multiplying by 10 adds one cipher, and then multiplying the result by 10 adds another cipher. Similarly a number is multiplied by any multiplier which consists of figures followed by any number of ciphers, by first multiplying by the number which is expressed by the figures without the ciphers, and then annexing the ciphers to the result. Thus, 5 times 45 being 225, we know that 500 times 45 is 22500.

6. The process of multiplication which we now proceed to explain, depends upon the self-evident fact that if the separate numbers of which a number is made up be multiplied by any factor, and the separate products added together, the result is the same as that obtained by multiplying the number itself by that factor. Thus,

$$5 + 4 + 2 = 11$$

$$7 	imes 5 = 35, 7 	imes 4 = 28, 7 	imes 2 = 14.$$  

$$35 + 28 + 14 = 77 = 7 	imes 11.$$  

7. We shall take two cases: first, that in which the multiplier consists only of one figure; and, secondly, when it is composed of any number of figures.

Case 1.—Required to multiply 2341 by 6.

$2341 = 2$ thousands $+ 3$ hundreds $+ 4$ tens $+ 1$ unit.

Multiplying these parts separately by 6, we get 6 units, 18 tens, 12 hundreds, and 12 thousands, which, written in figures and placed in lines for addition, are:

<table>
<thead>
<tr>
<th>6</th>
<th>18</th>
<th>12</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>36</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>12</td>
<td>36</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>12</td>
<td>36</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

Giving as the result 14946.

The process may be effected more shortly, as follows, in one line; the reason for the method will be sufficiently apparent from the preceding explanation:
LESSONS IN BOTANY.

55.

Writing the numbers as in the margin, proceed thus: 6 times 1 unit = 6 units; write the 6 units under the figure multiplied, and set the 4 or right-hand figure under the figure multiplied, and carry the 2 or left-hand figure to the next product, as in addition. 6 times 4 tens = 24 tens; set 3 hundreds are 18 hundreds, and 2 to carry make 20 hundreds; set the 0 under the figure multiplied, and carry the 2 to the next product, as above. 6 times 2 thousands = 12 thousands, and 2 to carry make 14 thousands. There being no more figures multiplied, set down the 14 in full, as in addition. The required product is 14046.

Before proceeding to the second case, the learner is requested to make himself familiar with the process of multiplying any number by one figure, by means of the following

Exercise 6.

(1.) Multiply 8 by 7; 549 by 5; 6879 by 9; 789011 by 8; 567893459 by 3; 9065783917 by 11, and the result by 7.
(2.) Find the continued product of 1, 2, 3, 4, 5, 6, 7, 3, 9.
(3.) Find the products of the number 142857, by the nine digits.
(4.) Find the products of the number 89898, the smallest number contained in the second square in Ex. 4, page 23, by the nine digits, and you will find these products in the same rule.
(5.) Multiply 857143 by 9; 76875989 by 8; 10100000 by 7; 79806099 by 8; and 9999999999 by 5.

(6.) Multiply the following numbers first by 2 and then by 3:

<table>
<thead>
<tr>
<th>Number</th>
<th>1st Product</th>
<th>2nd Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>55745</td>
<td>44580</td>
</tr>
<tr>
<td>2.</td>
<td>61824</td>
<td>49456</td>
</tr>
<tr>
<td>3.</td>
<td>38266</td>
<td>38599</td>
</tr>
<tr>
<td>4.</td>
<td>29495</td>
<td>22041</td>
</tr>
<tr>
<td>5.</td>
<td>21487</td>
<td>16189</td>
</tr>
<tr>
<td>6.</td>
<td>36883</td>
<td>27417</td>
</tr>
<tr>
<td>7.</td>
<td>15475</td>
<td>13821</td>
</tr>
<tr>
<td>8.</td>
<td>29324</td>
<td>25456</td>
</tr>
<tr>
<td>9.</td>
<td>35823</td>
<td>29659</td>
</tr>
</tbody>
</table>

(10.) I have a box divided into two parts; in each part there are three parrots; in each parrot there are four bags; in each bag there are five marbles. How many marbles are there in the box?
(11.) There are six farmers, each of whom has a grazing farm of seven fields; each field has eight corners, and in each corner there are nine sheep. How many sheep do the farmers own, and how many are feeding on their farms?

Case 2.—To multiply 675 by 337—

Is 675 = 300 + 30 + 7, if we multiply 675 by 7, by 30, and by 200 successively, we shall obtain the required product. Arrange the work as in operation (1):—

(1.)

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>337</td>
</tr>
</tbody>
</table>

Hence 227475 = 675 X 337

In working by this method it is unnecessary to write down the one sought at the end of the second line, and the two noughts at the end of the third line, etc., as in operation (1), if we only place each line one figure to the left of the one proceeding, so that the result appears as in operation (2) above.

The above examples will be sufficient to explain the truth of the following

Rule for Multiplication.—

(1.) When the multiplier consists of one figure, write it down under the unit's place of the multiplicand. Begin at the right hand, and multiply each figure of the multiplicand by the multiplier, setting down the result and carrying as in addition.

(2.) When the multiplier consists of more than one figure, write down the multiplier under the multiplicand, units under units, tens under tens, etc. Multiply each figure of the multiplicand by each figure of the multiplier separately, beginning with the units, and write the products so obtained in separate lines, placing the first figure of each line directly under the figure by which you multiply. Finally, adding these lines together, their sum will be the whole product of the two given numbers.

8. Method of finding the Continued product of the result. Multiply the multiplier by the multiplicand, and if the product thus obtained be the same as the other product, the work may be presumed to be correct.

9. Multiplication by reversing the Multiplier. — It may be remarked that multiplication may be performed by commencing with the last figure (that is, the extreme left-hand figure) of the multiplier, instead of with that in the unit's place. In this case, however, as will be seen from an example, we must set down each line one figure to the right of the preceding line.

Thus, in multiplying 2321 by 9, we may proceed as follows, as in operation (1), beginning with the left-hand figure of the multiplier; or, we might, to avoid confusion, reverse the multiplier, as in operation (2), and proceed in the same way. The ciphers which we omit in practice are added in the last operation, to explain the truth of the process.

Exercise 7.

(1.) Find the products of the following numbers:

<table>
<thead>
<tr>
<th>Number</th>
<th>1st Product</th>
<th>2nd Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>492</td>
<td>4599</td>
</tr>
<tr>
<td>2.</td>
<td>2145</td>
<td>22056</td>
</tr>
<tr>
<td>3.</td>
<td>3676</td>
<td>32012</td>
</tr>
<tr>
<td>4.</td>
<td>6999</td>
<td>62009</td>
</tr>
<tr>
<td>5.</td>
<td>7512</td>
<td>65208</td>
</tr>
<tr>
<td>6.</td>
<td>8791</td>
<td>75208</td>
</tr>
<tr>
<td>7.</td>
<td>11924</td>
<td>107320</td>
</tr>
<tr>
<td>8.</td>
<td>13777</td>
<td>123756</td>
</tr>
<tr>
<td>9.</td>
<td>16599</td>
<td>151396</td>
</tr>
</tbody>
</table>

(3.) Multiply 857143 by 10, by 23, by 43, by 97, by 103, by 957, and by 4567.

(4.) Find the products of the number 89989 by all the numbers from 11 to 49 inclusive. The answers will be found in the second square given in Ex. 4, page 23, in Addition.

LESSONS IN BOTANY.—II.

SECTION II.—ON THE SCIENTIFIC CLASSIFICATION OF VEGETABLES.

The observer who takes a survey of the various members of the vegetable world becomes cognisant of at least one prominent distinction between them. He soon perceives, that whilst certain vegetables have flowers others have not; or perhaps, more correctly speaking, if the second division really possess flowers, they are imperceptible.

This distinction was first laid hold of as a basis of classification by the celebrated Linnaeus, and to this extent the classification adopted by that great philosopher was strictly natural; beyond this, however, it was altogether artificial, as we shall find hereafter.

Now, taking advantage of this distinction, the great Swedish naturalist termed the evident flowering vegetables phanerogamous, from the Greek word φανέρωμα (phan'ev-9ma), I appear; or, phanerogamous, from the Greek word φανέρω (phan'ev-6), evident; and he designated the non-flowering, or more correctly speaking, the non-evident flowering plants, by the word cryptogamic, from the Greek word κρυπτόν (krypt'6n), concealed. The further classification of Linnaeus was artificial, as we have already stated. The nature of this classification we cannot study with advantage just yet. Hereafter we shall proceed to explain the principles on which it was based; but in those
lessons the artificial system of Linnaeus will not be adopted as a basis for teaching the science. In point of fact, the Linnean system may now be considered as obsolete. In making this division of plants into evident-flowering and non-evident flowering, or phanerogamous and cryptogamic, the learner must take care not to fall into mistakes. He must greatly expand his common notions of a flower, and not restrict the appellation to those pretty floral ornaments which become objects of attraction, and of which bouquets are made. On the contrary, he must admit to the right of being regarded as a flower any floral part, however small, even though a lens should prove necessary for the discovery. Thus, in common language, we do not usually speak of the oak, and the ash, and the beech, elm, etc., as being flower-bearing trees but they are, nevertheless; and consequently belong to the first grand division of evident flower-bearing, or phanerogamous or phanerogamous plants. In point of fact, the learner may remember as a rule, to which there are no excep-

ations, that every member of the vegetable world which bears a fruit, and consequently seeds, belongs to the phanerogamous division. By following the indications of this rule, we restrict the cryptogamic, or non-evident-flowering plants, to the seemingly narrow limits of ferns, mushrooms, mosses, and a few others, all of which are devoid of seeds, properly so called, but are furnished with a substitute for seeds, termed sporules or spores. Sporules, then, the learner may remember, are, so to speak, the seeds of flowerless and therefore seedless plants. In the study of botany we meet with a great many hard, but useful terms; they will spring up in our path often enough; therefore let us shoot them flying whenever we have a chance, and fix them on some sort of memory-peg, even although the latter may be a joke.

If the reader wishes to ascertain what these sporules are like, let him take the leaf of a fern—which, by the way, is no leaf at all, but a frond (we will explain the meaning of this term by-

and-by)—let him turn the lower surface of the frond uppermost, and there will be seen many rows of dark stripes. These are termed sporidia, and they contain the sporules of the plant, which sporules therefore may be got by opening the sporidia. Sporules, when regarded by the naked eye, look almost like dust; when examined under a microscope, however, their outlines can be easily recognised. The difference between a sporidiurn (singular of sporidium) and a real seed may be thus explained. A seed has only one part (the embryo or germ) from which the young plant can spring; whereas a sporule does not refuse to sprout from any side which may present itself to the necessary conditions of earth and moisture.

Although the sporules are thus easily discoverable in the fern tribe, yet the botanical student must not expect to find them thus readily in other members of the cryptogamic tribe, in various members of which not only does their position vary, but their presence is totally undiscoverable.

**SECTION III.—ON THE ORGANS OF VEGETABLES.**

Vegetable organs admit of the very natural division into those intended for nutriment and growth, and those intended for propagation. Hence we may speak of them as nutritive and reproductive organs. Nutritive organs consist of leaves, stems, branches, roots, and various appendages to all of these, hereafter to be described; whilst the reproductive organs of vegetables are flowers and their appendages.

The Root.—We have already seen that it does not suffice to constitute a root that the portion of the vegetable treated of be underground. Thus, for example, as it was remarked in the preceding lesson, the potato is not a root, but a tuber; an onion is not a root, but a bulb.

A root may be defined as a filamentous or thread-like (Latin *filum*, a thread) offset from the descending axis of the plant, differing from the stem itself in certain relations of a botanical structure, and each filament ending in a soft absorbent tuft.
declared the spongiople, the function of which consists in absorbing moisture, and conveying it into the structure of the plant. Hence the chief and primary use of the root is that of nutrition; but it also serves as a means of enabling the plant to take firm hold of the earth in which it grows. Representations of various roots are shown in Figs. 5, 6, 7, 8, and 9.

In most cases, the part at which the stem ends and the root begins is well defined. It is denominated the collar. Although the general characteristic of the root is to seek the ground, as the characteristic of the stem is to seek the air, nevertheless stems frequently assume a tendency to become roots, and roots to become stems. A very remarkable example of the former tendency is furnished by the banyan tree, or ficus religiosa, a native of India. This tree has a natural tendency to shoot down prolongations from its stem, which, taking root, cover the ground with an arbor-like growth of most fantastic appearance. The opposite tendency is recognizable in certain varieties of the elm, which shoot up sprouts from the root over large tracts of ground in the vicinity of the parent trunk, very much to the annoyance of the farmer, whose land is thus considerably damaged. Although the essential characteristic of a stem is to ascend into the air, yet certain forms of stem in some vegetables exist underground; of this kind are ginger, and the so-called orris-root. Stems of this kind are known in botany by the appellation of rhizomes (Fig. 3).

Usually the root is attached by the collar to an ascending stem, from which latter proceed the leaves; in certain plants, however—for instance, the primrose—there is no ascending stem, but an horizontal, underground one (the rhizome) takes its place, and from this the leaves immediately grow; such leaves are then termed "radical," that is to say, proceeding from the root, and the plant itself is said to be acanuliferous, from the Greek privative δ, without, and the Latin word caulis, a stem.

Sometimes the root is said to be "stoloniferous," that is to say, stolobearing, which expression requires the previous explanation of the word stol; a stol, then, is a little stem which springs from the axilla (literally, arm-pit), or point at which the leaves spring from the stem. The strawberry (Fig. 4) affords a common and well-marked illustration of this kind of root.

A bulb is an underground bud, from the upper part of which the stem arises, and from the lower part of which the root descends (Fig. 7). The onion furnishes us with a very familiar example.

Tubers or tubercles are expansions of underground stems, usually containing much feculent or starchy matter, and studded with eyes or buds. The potato and the dahlia (Fig. 8) furnish us with very familiar examples of a tuber.

The stems may be either annual, biennial, or perennial. It is termed annual when it becomes developed in the spring and dies before the winter, as, for instance, is the case with wheat; biennial, when it lives two years; of this kind is the carrot, which during the first year only produces leaves, and having lived two years flowers and dies. Perennial stems are those which live many years, as is the case with trees in general. As regards their hardness, trunks or stems are usually divided into herbaceous (Latin, herba, grass), subligneous, and ligneous (Latin, lignum, wood). Herbaceous stems are those in which woody fibre is almost altogether absent, and which are therefore soft and juicy; of this kind is the stem of parsley, hemlock, etc. Subligneous stems are those in which woody fibre, although present, does not exist in the smaller shoots; of this kind are sage and rue, the bases of the stems of which are hard and woody, and therefore continue for many years, whereas the

3. RHIzome AND ROOT-LEAVES OF THE PRIMROSE.

4. STOLONIFEROUS ROOT OF THE STRAWBERRY.

5. RADISH. SPINDLE-SHAPED ROOT.

6. DROPWORT. KNOTTY ROOT.

7. ONION. BULB WITH FILAMENTOUS ROOT.

8. DAHLIA. TUBEROUS ROOT.

9. PASTURE GRASS. FIBROUS ROOT.
LESSONS IN FRENCH.-IV.

SECTION I.-FRENCH PRONUNCIATION (continued).

III. NAME AND SOUND OF THE VOWELS (continued).

36. Before proceeding to the illustration of the sound and use of e mute or unaccented, let us commit the following extract to the careful perusal of the pupil. Speaking of the unaccented e, it is said—"Several of our best orthoepists express themselves thus on that subject:—'The proper utterance of the unaccented e characterizes, in fact, the pronunciation of the gentleman, as the boorish one marks the low-bred and ignorant."

The unaccented e is sometimes pronounced and sometimes not; and in that consists a great difficulty for foreigners, who, always pronouncing it full, are long before they are able to follow a French conversation, and thence are inclined to believe that the French speak much faster than any other people. The truth is that the French, taking them in general, do not speak faster than other people; but in conversation, and in familiar reading, they drop the unaccented e as often as they can do it, and thus go quicker through a sentence than does a foreigner, who gives the full sound of e in to every unaccented e he meets with. Thus the word contenance, and the phrase je n’ai pas roux tout le villement, will be pronounced by a foreigner and a Frenchman native of Gascony, con-to-nan-e je n’ai pas roux tout le vil-te-men; whereas a well-bred Frenchman will pronounce, cont-nan-e je n’ai pas roux tout le vil-te-men, sounding in the first word two syllables only, where the others would sound four; and in the sentence sounding six syllables, where the others would sound ten."

The French custom of clipping or shortening words as much as possible, in ordinary reading and common conversation, is well illustrated in the following sentence, namely—

"Quand vous serez la même, vous me trouverez la même."

This sentence contains thirteen syllables in prose, namely:

Quand-vous-serez-la-même-vous-m’avez-tout-le-villement, in poetry, même would have two syllables. However, in familiar reading and conversation, it is pronounced in eight syllables only, viz.:—Quand-vous-serez-la-même-vous-m’avez-tout-le-villement. The suppression of this e is precisely the reason why foreigners imagine that the French speak so very quickly.

37. E, O, MUTE OR UNACCENTED.—Name, uh; sound, like the sound of the letter u in the English word nut; or, like the sound of the last syllable of e in the words over and under, when spoken quickly.

The e mute or unaccented "is a mere emission of the voice without any distinct sound. It either succeeds a consonant, by the articulation of which it becomes sensible, or comes after a vowel, of which it may be considered the prolongation."

It is as terrifying difficult to illustrate the sound of this vowel by the aid of English letters, partly as it is a difficult attempt. True, it may be acquired from a teacher, by novel imitation; but alas, all learners are not good imitators! If it can be illustrated by analogous English sounds, it seems quite reasonable to suppose that through this process many more students would understand and acquire it, than if they were left merely to the doubtful policy of imitation. Let us try.

Before the pupil attempts to pronounce the French words used for examples, let him observe most carefully the sound of the last syllable of the following words, when uttered as they usually are in common conversation, namely:

Mother, Bros-her, Nov-em-ber, Si-te-or, Wa-te-r.

Take any one of the above English words, viz.:—the first, mother; pronounce it naturally and alone and with a full voice several times, until the common sound of the last syllable in particular is familiar to the ear. Take each of those words, and thus practice, by pronouncing aloud carefully, but naturally, observing at the same time the sound of the last syllable.

Now, by what combination of letters would you represent that sound? By ur, as in the first syllable of the English word ur-ner or ur. Manifestly, this latter. Below are a few words in which you will now proceed to pronounce aloud, giving to the vowel e in each example the last syllable of the word ne-er. Pronounce each of the following French words quickly and abruptly, as if an exclamation mark were placed over each one of them, namely:

Je like shu.

That is, a combination of the letter s, with the usual sound of the last syllable of the English word mother.

S like sh.

That is, a combination of the letter d, with the usual sound of the last syllable of the same word, mother.

Je like sh.

That is, a combination of the letters sh, with the same sound mentioned in the first example; or like the sound of the last syllable of the word ples-es, as usually pronounced, but without the sound of the y, which is sometimes heard; i.e., ples-es, and not ples-eur.

S like sh.

That is, a combination of the letter l, with the same sound mentioned in the first example; or like the sound of n in the first syllable of the English word matter.

S like sh.

That is, a combination of the letter n, with the same sound mentioned in the first example; or like the sound of n in the English word nut. Pronounce an in the word nut, and you have the correct pronunciation of the French word ne.

S like sh.

That is, exactly like the pronunciation of on as given in the first example.

S like sh.

That is, exactly like the sound of the last syllable of the English word we-tur.

Que like shu.

That is, like the sound of the last syllable of the English word baker, pronounced rather carelessly.

Take, if you please, another illustration, viz.:—the sound of u in the English word nut, as explained above, in illustrating the sound of the French word ne. This will give the correct sound of a mute or unaccented.

The sound of e mute or unaccented resembles the sound of the letter e of the word the, which is heard in pronouncing quickly those two words, viz.—the man. Apply the sound of this e, thus pronounced, to the e in the following words, viz.:—or, de, je, me, ne, so, te, que, etc.

Or lastly, the sound of e mute or unaccented is based upon the sound of the English a pronounced naturally. Let the organs of speech, the mouth and tongue, be nearly as possible the same position, whilst the lips are protruded as if to pou or whistle. Then, whilst the mouth is in this position, endeavour to pronounce the English a again; this, in a majority of cases, will give the correct sound of e mute or unaccented. Practise frequently on this last-mentioned plan aloud, and the ear will soon detect the vidiousness or correctness of the sound. Most pupils find it more or less difficult to acquire this sound; but perseverance will, in due time, overcome every obstacle.

In illustrating the sound of e mute or unaccented, the following signs will be used, sometimes one, again the other, viz.:—uh, and the apostrophe, thus:—

Je by shh, or by j'.

Section VIII.—DEMONSTRATIVE ADJECTIVES AND PRONOUNS.

1. The demonstrative adjectives ce, c'est, this or that, are always placed before nouns; they agree in gender with these nouns [§ 20 (1)].

Avez-vous ce parapluie? m., Have you this or that umbrella?
N’avez-vous pas cette bouteille? f., Have you not this or that bottle?

2. Before a word masculine singular, commencing with a vowel or h mute, cet takes the place of ce [§ 20 (1)].

N’avez-vous pas cet argent? Have you not this or that money?
Vous avez eu cet homard? You have had this crab.

3. When it is deemed necessary to express in French the different existing in English between the words this and that, French adverbs which, you will now proceed to pronounce aloud, giving to the vowel e in each example the last syllable of the word ne-er. Pronounce each of the following French words quickly and abruptly, as if an exclamation mark were placed over each one of them, namely:

That is, the adverb of the word that.

Je n’ai pas ce parasol-ci, Je n’ai pas this parasol, I have not that parasol.

4. The demonstrative pronouns, ci-dessu, ci-dessous, this or that, are used to represent nouns, but are never joined with them like adjectives [§ 38, § 37 (1)].
J'ai mon parapluie et celui de votre frère. 
Vous avez ma robe et celle de ma sœur.

3. Le pronomens ciel, cail, avec le addition de the words ci et cela, are used in the sense of this one, that one, the latter, the former [§ 57, 58]. They agree in gender with the word which they replace.

Avez-vous celui de votre frère? 
Je n'ai pas celui de mon frère, j'ai celui de ma sœur. (R. 6.)
Avez-vous celui-ci ou celui-là? 
Quelle robe avez-vous? 
J'ai celui-ci.
Avez-vous coc et cela? (V. 6.)

Résumé of Examples.
Avez-vous la livre de cet homme? 
Je n'ai pas mon livre, j'ai la mienne.
Le ouvrier a-t-il ce parapluie? 
Il n'a pas ce parapluie-ci, il a ce parapluie-là. (R. 3.)
Avez-vous celui de votre frère? 
Je n'ai pas celui de mon frère, j'ai celui de ma sœur. (R. 4.)
Avez-vous celui-ci ou celui-là? 
Quelle robe avez-vous? 
J'ai celui-ci.
Avez-vous coc et cela? (V. 6.)

Vocabulary.
Ardoise, f., slate.
Balai, m., broom.
Bois, m., wood.
Bouteille, f., bottle.
Dame, f., lady.
Étranger, m., stranger, foreigner.

Exercice 13.

Exercice 14.
1. Has your brother that lady's umbrella? 2. My brother has that lady's umbrella. 3. Have you this parasol or that one? 4. I have neither this (one) nor that (one). 5. Have you the stranger's gold watch? 6. No, Sir, I have the baker's. 7. Who has my slate? 8. I have my slate and your brother's. 9. Has the cook a silver salt stand? 10. The cook has a silver salt stand, and a silver dish. 11. Has the cook that poultry or that? 12. He has neither this nor that. 13. Has he this bread or that? 14. He has neither this nor that, he has the baker's good bread. 15. Have you my cotton parasol? 16. I have not your cotton parasol, I have your silk parasol. 17. Has the gardener a leather trunk? 18. The gardener has a leather trunk. 19. Who has your good cheese? 20. Nobody has your cheese, but some one has your brother's. 21. Have you mine or his? 22. I have neither yours nor his, I have the stranger's. 23. Has the cook this bottle or that broom? 24. He has this bottle. 25. Have you a lead inkstand? 26. No, Sir, I have a china inkstand. 27. Has the stranger poultry?

Exercice 15.
LES SONS IN PENMANSHIP.—IV.

As it is impossible for any one who is attempting to teach himself the art of Penmanship to write well without practice, we now give three more combinations of pairs of the four letters that the reader has already learned to make, before passing on to other letters of the alphabet in writing, for whose formation strokes are required that differ in shape and character from the first elementary stroke that forms the basis of the letters I, t, I.

At this stage of our Lessons in Penmanship, it may not be out of place to say something about the kind of handwriting that the students of this part of the Popular Educator are practising, and to give those who may feel disposed to rule paper for themselves, in imitation of our copy-slips, a few brief instructions that will enable them to do so.

First, with regard to the kind or description of handwriting that is practised by those who copy slips of elementary copy-slips, it should be said that it is called Large Text, and that it is the largest, plainest, and boldest of the four kinds of handwriting usually practised by learners. The three hands that yet remain to be named are termed Text Hand, Round Hand or Half Text, and Small or Running Hand. Of these, Large Text is usually written between lines half an inch apart; Text Hand, between lines one-third of an inch apart; Round Hand, between lines five-twenty-fourths of an inch apart, or rather less than one-fourth of an inch; and Small Hand, on single lines, and sometimes between double lines three-thirty-seconds of an inch apart, or rather less than one-eighth of an inch. For those who may not have a graduated scale of inches, we append a printed scale, showing the respective widths of the four kinds of writing that have been named.

Now, to show our readers how to rule a paper wherein to copy any of the examples that have been or will be given, let us suppose that the learner wishes to prepare paper for copying tI, as in Copy-slip No. 10. First rule two lines, one on either side of the page, close to the margin, from top to bottom, taking care that they are parallel to each other—that is to say, at equal distances from each other all the way down. Then rule a line across the top of the page, also close to the margin and at right angles to the parallel lines at the sides of the paper, or "square with them," as a joiner would say, and, commencing from this line, set off with compasses along the side lines distances equal to e d, d a, a c, c b, in order, as in Copy-slip No. 10, and repeat this as often as the length of the paper will allow, taking care to leave a space of one-fourth of an inch between the last of each set of five lines and the first of the next which
follows. The distances $a$, $b$, $c$, are each equal to one-fourth of an inch, and $d$ to three-sixteenths of an inch.

By following the above instructions, the learner will be enabled to rule his paper in sets of five horizontal and parallel lines, five lines being required in each set; in this case, to determine the height of the letters and their relative proportions one to another. To rule the diagonal lines (No. 5), set off a along the topmost line $e$, equal to thirteen-sixteenths of an inch, and draw a straight line through the points $b$ and $d$. This will serve as your guide line for regulating the remainder of the sloping lines, and all that remains to complete them is to set off spaces along the lines $e$, $b$, $b$, equal to $2\alpha$ or $2\beta$, and rule straight lines passing through every succeeding pair of points, commencing from the first pair $b$, through which the guide line for regulating the inclined lines was drawn.

LESSONS IN GERMAN.—III.

SECTION V.—THE NOUN. OLD DECLENSION.

There are in German four cases, namely: the Nominative, answering to the English nominative; the Genitive, answering to the English possessive; the Dative, which has no corresponding case in English; and the Accusative, which answers to the English objective.

Of the four cases, the dative, without a preposition, generally corresponds to our objective governed by to or for, as:—

Neuter. The

Masculine. The child is in the house.

The dog is under the tree.

The hunter goes to the forest.

The man is on the ship.

The cock is at the table.

DECLARATION OF THE DEFINITE ARTICLE MASCULINE AND
NEUTER IN THE SINGULAR.

Masculine. Nominative. Der, the; das, the; den, to.

Genitive. Des, the of; des, of; das, of.

Dative. Den, to or for; den, to or for; den, to.

Accusative. Den, the; das, the.

German nouns have two forms of declension, called the Old and the New. In the old declension, the genitive, like the corresponding case in English, is formed by affixing $s$ to the nominative, as:—

Masculine. Der, the father; Nominative. Der, the; das, the.

Genitive. Des, the of; des, of; der; das, of; das, of.

Dative. Den, to or for; den, to or for; den, to.

Accusative. Den, the; das, the.

NEWTON.

Declension of Nouns adding $s$ or $st$ to the nominative.

Masculine. Nominative. Der, the father; das Mann, the man.

Genitive. Des, the of; des Mann, the man's.

Dative. Den Mann, to; for the father; den Mann, to; for the man.

Accusative. Den Mann, the man; das Mann, the man.

DECLARATION OF NOUNS ADDING $s$ OR $st$ TO THE GENITIVE.

Masculine. Nominative. Der, the father; das Kind, the child.

Genitive. Des, the of; des Kind, the child's.

Dative. Den Kind, to; for the child; den Kind, to; for the child.

Accusative. Den Kind, the child; das Kind, the child.

CONJUGATION OF THE PRESENT SINGULAR OF SEIN AND SEIN.

I am; Sein, you are; he is; 1st person singular.

In 2nd person singular.

In 3rd person singular.

In 1st person plural.

In 2nd person plural.

In 3rd person plural.

EXAMPLES OF THE SEVERAL CASES.

Nominative. das Kind ist groß. The child is great.

The camel is strong.

The sun is red and warm.

The horse is beautiful and useful.

Nominative and Genitive. des Mann ist groß. The man is great.

The boy is tall.

The water of the sea is salt.

The tree of the forest is large.

The child's ball is soft.

Whether in cases of this kind, where the genitive is used to denote possession, we should say, der Ball ist des Kindes (the ball of the child), or des Kindes Ball (the child's ball), is a point regulated by no certain rule. The former mode is the more common in German.

Nominative and Dative.

Der Brief ist von dem Bater. The letter is from the father.

Der Bauern ist in dem Saale. The peasant is in the field.

Ger hard assist dem Bater. He sends it to the friend.

Nominative and Accusative.

Der Hund facht den Fisch. The dog bites the fish.

Der Schmied hämmert das Eisen. The smith hammers the iron.

Der Kind liest um den Bater. The child loves and praises the father.

Nominative, Dative, Genitive, and Accusative.

Der Vater des Kindes gibt dem Vater des Kindes (the father of the child gives the letter of the child) to (the brother of the bird).

Der Herr gehe des Staates schützt dem Herrn die Schwert. The ruler of the state sends the sword to the warrior.

VOCABULARY.

An, at.

Auf, on.

Ball, m. ball.

Brother, m. brother.

Bruder, m. brother.

Fisch, m. horse.

Durcheinander, thirsty.

Schaf, m. sheaf.

Sohn, m. son.

Stuhl, m. throne.

Stuhl, m. chair.

Tisch, m. table.

Unter, under.

Wo? where?

Zimmer, n. room.

Zimmermann, m. carpenter.

RéSUMÉ OF EXAMPLES.

Neuter. der Wolf lebt in der Wüste. The wolf lives in the forest.

The child loves the brother.

The teacher praises the scholar's industry.

The snow lies on the mountain.

The dog has the ball in the basket; he gives it to the beggar.

EXERCISE 6.


SECTION VI.—DEMONSTRATIVE PRONOUNS.

Das ist declined, in the masculine, precisely like the definite article; while in the neuter, as will be seen in the following declension, all its endings, except the dative, are alike [§ 62. (2)].
THE VOCABULARY.

VOCABULARY.

1. Arsl, m. apple.
2. Bürgeleister, m., bur-

gromaster, mayor.
3. Dicier, dicht, thin.
4. För, for (§ 113).
5. Garten, m. garden.
6. Geld, m. money.

RéSUMÉ OF EXAMPLES.

tiefe Mengung ist arm. Dicey This youth is poor. This child

is lăshăry.

Diefe Mengung ist nicht neu. Dicier This youth's is now. This

girl's ribbon is beautiful.

Geben Sie diesem Beter und tiefer Do you give this beggar and

Kinde Geld? this child money?

Sagen Sie diesem Kindem? Leben Do you love this Irishman?

miu Mitteh? whose penknife has this child?

Diefe Krestemer? Dieser Kret?
The teacher's.

EXERCISE 7.


7. Ijare wem tiefer Schüler? 8. Er (Sect. XVIII. 3) ist für

das Kinde des Caters. 9. Weifen Kafet hat vor Sefiotics Lehrer?

10. Ef hat tiefer Kret tiefer Grammer. 11. Wen wem haben die


die Garten vor den Obermeistern. 17. Wen wem haben tiefe Kret? 18. Ef

hat ihm (Sect. XVIII. 7) vor den Obermeister. 19. Zwar wem ist es?

20. Ef ist für den Vater vor Lehrer. 21. Geben Sie Egen, Effer,


SECTION VII.

CONJUGATION OF THE PRESENT SINGULAR, GEBEN AND GEBEN.

Ich gebe. I go.

Ich gebe. I give.

Sie geben, you, give.

Sie geben. you, give.

Sie geben, you, give.

Er gebe (Sect. XIX, 1), he gives.

The learner should mark the irregularity in the conjugation of geben.

VOCABULARY.

Al, old.
Aun, poor.
Bei, with.
Caußin, m. captain.
Deutschland, n. Germany.
Geben, m. noble-

Jubilé, merry.

Geben, to give.

Geben, to go.

THE TREE IS VERY LARGE.

He loves him very much.

THEIR MAN IS THEIR PATER.

What says this man to the teacher?

He says nothing to him.

Do you give the captain?

Who praises the servant?

Who does the servant praise?

EXERCISE 8.

1. Wo ist der Buet vor Steuermann? 2. Er ist bei dem Captain

in dem Schiff. 3. Ist der Sohn vor Steuermann auch bei ihm? 4. Nein,

er ist in Deutschland. 5. Wo ist der Vater? 6. Er ist mit dem Captain

in dem Schiffe. 7. Er ist bei dem Captain vor Sohn vor Steuermann? 8. Na, 2


ist vor und hinter dem. 10. Na, 3 ist der Mann vor Sohn vor Captain? 11. Nein,

er ist vor der Sohn vor Steuermann. 12. Nein, er ist vor der Sohn vor


gibt ihm nur Wasser. 21. Was geben der Mutter? 22. Na, 3 geben ihm Egen. 23. Na,

in der Mutter vor dem Cinse? 27. Na, 3 gebe in das in dem Egen. 28. Na, 3, und

wenn die Sohn vor Steuermann ist bei ihm. 29. Der Jäger gebe in das in dem

Vater, und ich gebe zu dem Buer.

MÉCHANICS.—II.

THE UNIT OF FORCE.—FORCES APPLIED TO A POINT.

Having in one first lesson explained the meaning of the word

"force," and shown how a force is applied and measured, we shall

next consider the simplest kind of mechanical problem, that of

several applied to a single point. Before I proceed, however, it

is advisable to fix clearly in your mind the concept of the

"unit of force." I have already laid down the rule, that a force must

be regarded as the product of the number of feet it would cause

the unit ivory ball, equal in weight to a cubic inch of pure water,

or move over in one second, when applied to it suddenly by a blow.

If the ball move over seven feet, the number 7 should be written

for the force; for if over a furlong, the number is 600, the feet in

a furlong. But suppose it moves over exactly one foot, then it is

clear that the number I should be written, and that particular

force is the "one" of forces. And the conclusion to which we thus are led is that—

THE UNIT OF FORCE is the force which would, if applied

instantaneously to the unit of mass, make it move over one foot

in one second.

But you can clearly see that the force which could produce

no greater velocity than this in the ball—which, instead of being

 ivory, we may take to be a ball of frozen water, a cubic inch

in volume—cannot be a strong force. In fact, it is equal to

a little less than eight grains of weight, that is, this unit

of force could be balanced by that which with an eight-grain

weight pulls downwards. How this is ascertained I cannot

here explain to you, as you would require some little knowledge

of dynamics to understand the proof. For the present, therefore,

we shall not take up the subject.

But this unit is evidently too small for practical purposes.
The strains in the mechanical powers, the lever, the wheel

and axe, the pulley, etc., and in roofs and bridges, cannot be

calculated in grains, on account of the large numbers we should

have to operate on. A larger unit is therefore necessary, and

the pound weight exactly answers the purpose. We can cal-

culate and measure forces in pounds, and in that case by a

deal too large, we can calculate them in hundred-

weights, or even in tons. All that is necessary is to keep clearly

in mind what your unit is in your calculation, and to know how

to pass from one unit to another. If, in the same calculation,
you were to use different units in different places—a pound

for instance, in one, and a hundred-weight in another—without

reducing the one to the other, the result could be nothing but

confusion and error.

But how are you to pass from one unit to another? This is

a nice point in practice, as we shall see in due time; but this much

is clear, that, if your unit by a hundred-weight, you should

multiply all the numbers which represent your forces by 112 (the

number of pounds in a hundred-weight), and then these

forces will be expressed in pounds. If they are already

expressed in pounds, then divide by 112, and you will have your

forces in hundreds and fractions of a hundred-weight. And so, from

hundred-weights you can pass to tons by dividing by 20, and
forces applied to the rope along its length is the difference between the united powers of the fifteen and of the eleven, whatever be the particular strength of each man, and its direction is that in which the fifteen pull. Suppose now that two forces only are employed, and that they are equal and in opposite directions; what will be the result? They will balance, or be in equilibrium. Now it is sometimes said that the body to which two such forces are applied at one of its points is in the same condition as if no force had been applied to it. This is not true, strictly. It is in the same condition so far as equilibrium is concerned, but not otherwise. It is not in the same condition as to pressure and strain. The rope is not in the same condition it was in a few minutes before, when two strong men were pulling at opposite ends of it with balanced strength. In the latter case it is strained along its whole length—every thread on the stretch, ready to snap. Its condition is very different on the two occasions—different in every circumstance, except that of there being no motion. So, also, if two equal and opposite pressures are applied to a round ball, it will be an equilibrium, but the condition of its substance will be changed. Its particles will be pressed towards one another inwards; and, if it be made of soft or elastic material, its form will be altered by the flattening effect of the opposing forces. And this is true, whatever be the magnitude of the ball; it may be as small as we please, even so small as an atom, or what is called a "material particle," and yet there will be this internal compression or straining. Thus we see that even the small forces which produce a change of the thing acted on by two equal and opposite forces cannot be said to be in the same condition before and after their application.

The case of equal and opposite forces presents some other points of interest, which may well occupy your attention in this lesson. Suppose, for example, two men pull against each other with equal strength at the opposite ends of a rope. What will be the strain on the rope? What will be its amount, considering strong pull, it is great; if it is slight, that is strained by the united strength of both, or by double the strength of either man. Such is not the case; the strain is only equal to the strength of one of the men. What is the reason of this? A moment's reflection makes it evident. Suppose one man only to pull; the rope follows him, and there is no strain on it. But the instant the other seizes his end and pulls, strain begins, caused by his resistance. If he gives a pull, the rope may be strained, or in another way, suppose the first man leads, pulling with all his might, while the other, holding on with less strength, is dragged after. The rope is strained in this case also. By how much? By the less of the two forces. The stronger pull becomes divided into two parts, one pulling both the rope and the second man in motion, and the other balancing the latter's pull. It is this second portion which strains the rope, and must be equal to the strength of the hinder man, while the other, which causes motion, is the difference of the two pulls or forces. Suppose, lastly, that the two pulls become equal, their difference becomes nothing, motion ceases, and the men come to a standstill. But the strain remains, as before, equal to the hinder force, which, being equal to that of the leading man, we can say it is equal to either of the forces.

Let us next suppose that one of the men an iron ring, fasten a piece of a rope around it so, to which one end of the rope is attached. So long as the rope hangs loosely from the ring there is no strain on it. Let the other man now pull at the far end, the rope at once is strained, evidently not by the wall, but by the man's pull. The wall puts forth no more effort to strain it than it did before; but simply resists the force communicated to it through the rope. It is, in fact, a case of a force applied at one end of a string passes through the rope, every point of which may be considered a point of application.

Again, take two equal weights attached to the ends of a cord which passes over a pulley. The strain on the cord which hangs down at either side is evidently equal to the weight on that side; and, since the weights are equal, the strains on both sides, and therefore all through the cord, are equal to that weight.

If two bullocks raise water from a pond in a large bucket by a rope which passes over a pulley, as the bucket ascends two forces are acting at the ends of the rope. The stronger pull of
the bullocks overcomes the weight of the water and bucket, and an amount of motion results, due to the difference of the two forces. The rope, however, is strained only by the weaker force, evidently so in the part which descends from the pulley to the bucket, and therefore also in the remainder, since the strain must be uniform along its whole length.

In all these cases the forces were of the nature of a pull, causing a stretching strain. But the conclusions hold equally good of pushing forces. If two such, equal to each other, be applied to a ball at opposite sides in opposite directions, the compressing strain within the ball will be equal to only one of the forces if the ball be pushed against a wall by only one of them, though the wall resists, the strain will still be the same — equal to the single force. The resistance counts for nothing. Also, when the two forces are unequal, and motion ensues, there is a compressing strain equal to the smaller force, while the motion produced is due to the difference of the forces. When a man ascends a ladder with a hod of mortar, there are two such compressing forces acting on his shoulder at the spot on which the hod rests — namely, his own muscular power pushing his shoulder upward, and the weight of the hod and mortar pushing it down. His ascent is effected by the difference of these forces, the muscular being the greater; while the compressing strain is evidently the weight of the loaded hod. These examples will make clear to you the principle I have been explaining; and you will find no difficulty in multiplying them by thousands of others yourselves.

We now pass to the case of three forces, whose directions are all different, applied to a point, and producing equilibrium. Now it is evident, first of all, that the three must pull or push in the same plane or flat, such as, for instance, the flat surface of a table; for if two of them pulled along that surface, while the third pulled in a slanting direction upwards, this latter force should lift the body off the table. Try the experiment with three strings attached to a ring which lies flat on a table, two of which are pulled horizontally along the table, and the third in any direction upwards. The ring will be lifted, and soon the three strings will come into one plane. I am not here taking into account the weight of the ring and strings, which are a fourth force applied to the body. For the sake of simplification, to enable you to understand the principle, I suppose these to be so small in comparison to the others as to count for nothing.

Secondly, when three forces applied to a point are in equilibrium, the resultant of any two of them is equal and opposite to the third force. This is also evident; for, if it were not, the resultant of the two and the third force, to which the three are equivalent, would not be two forces equal, and opposite to each other, and therefore could not make equilibrium. In the case of the ring on the table, to which the three strings are attached, if the direction of the effect of the pulls on two of the strings were not opposite to that of the third pull, the three would make the ring move to the side of the table, towards which those two directions incline. And, furthermore, even if the directions were opposite, the ring would move, if the effect of the two, or their resultant, were not equal to the third force. These two principles may be definitely stated as follows:

1. When three forces applied to a point are in equilibrium, they are in the same plane.

2. The resultant of any two of three forces in equilibrium at a point is equal and opposite to the third force.

From these principles it is evident that in order to ascertain when three forces applied to a point are in equilibrium, it is necessary first to discover what the resultant of any two of them is. If you find that the resultant is opposite to and equal to the third force, then you are certain of equilibrium. The question then is, how may the resultant of two forces be found? This we shall defer to the next lesson, closing this with the single instance in which, without looking for the resultant, we can say that three forces are in equilibrium; that is, when three forces are all equal, and make equal angles with each other, the first with the second, the second with the third, the third with the first, in order all round.

Take, for instance, three equal weights, attached to three strings, two of them much longer than the third, which are tied together in a knot at their other ends. If the two longer strings with their attached weights are now thrown over two pulleys in the same plane, one of the pulleys being even higher up than the other, and the third string and weight is allowed to hang down in the middle, we shall have a case of three equal forces applied to a point. Three equal weights acting over the pulley, and drawing the knot obliquely to either side, and the middle weight pulling it downwards. What position will the strings settle themselves into? Evidently so that the angles all round between the strings may be equal; for no reason in the world can be given why they should be unequal. Whatever reason could be assigned for supposing one of these angles greater than the other, since the forces are equal all round and all the other circumstances the same, that same reason should make that other angle greater than the first. The angles, therefore, must be equal. Let any one of you make the experiment, and measure the angles, and he will find the result to be as I have stated. But you will find this same conclusion arrived at in the next lesson in another and more satisfactory manner, by the Parallelogram of Forces.
ANIMAL PHYSIOLOGY.—II.

THE EYE (Continued).

Throughout these classes of animals which are called vertebrates, because they have an internal skeleton, the main central portion of which consists of a back-bone of pieces jointed to one another in a long row stretching from one end of the body to the other, the eye is essentially of the same structure as in man. It is true that there are differences in the proportion and shape of the parts, and in some cases additional parts are found, while in others the eye is so reduced and degraded as to be of little place in the choroid of pigment of metallo-brilliance. This may be well seen at the bottom of the eye of the ox inside; in others, the sclerotic is coloured, as any visitor at the Zoological Gardens may see to be the case in the eye of the chimpanzee.

These diversities, with many others, such as the contraction of the iris of the cat, so as to leave a slit instead of a circular opening, are interesting, but by no means so functionally important as others to be mentioned hereafter, when we describe eyes suited to conditions altogether different, such, for instance, as the fish's eye, which is constructed to see in water.

Birds, some of which are almost exclusively denizens of the air, and most of which have the power of batiking themselves to flight occasionally to escape pursuit, to hunt active prey, to search for new feeding-grounds, or to select a more genial climate at the change of the seasons, must have eyes suited to distant vision. Hence the lens is of a very flattened form, and does not increase in density from the outside to the inside as it does in mammals, and more strikingly in fish. The distance from the lens to the back part of the eye is small, and to the cornea large relatively; in other words, they have a larger amount of aqueous and a smaller amount of vitreous humour than brutes have. The back part of the eye too is flatter, and is a portion of a larger sphere in relation to the rest of the eye than in animals. The shape will be best seen by the aid of the diagram of the vertical section of the eye of a soaring bird.

When the eye is spherical and distended with fluid, as in man, there is no tendency of the pressure within to alter the shape of the ball; but when, as in the case of birds, it has any other form, the internal pressure would strain the elastic capsule of the eye in some parts more than in others. This strain can only be prevented by rendering those parts of the capsule which are exposed to the extra pressure more solid. In the case of the bird, this is effected by means of a series of bony plates which encircle the sclerotic, banded in its substance, and stretching from the rim of the cornea to the circumference of the large segment of the eye, on the inside of which the retina is spread out.

The structures described above, conducive to long sight in a thin medium, are especially to be remarked in soaring, raptorial birds, like the eagles, vultures, and hawks. These, as they wheel round at a great height, survey a large extent of

vertical section of the eye of a soaring bird.

1, Sclerotic; 2, Choroid; 3, Retina; 4, Pecten; 5, Vitreous humour; 6, Iris; 7, Cornea; 8, Lens; 9, Aqueous humour; 10, Lens ligament; 11, Ciliary processes; 12, Optic nerve.

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or no use; but in the majority of cases in brutes, reptiles, and fishes, and in all birds, the eye is well developed, and even where it can be of no use, still indications of it are found.

Our English mole is an instance of an animal with a degenerate condition of the eye. It is in this animal smaller than a pin's head, and has to be looked for carefully in the midst of the velvet fur. Of course, to an animal which lives underground, burrowing continually in soft earth, an eye would be useless, and even inconvenient; yet the rudiment of an eye is found.

Besides man, only apes (and some lizards, such as the chameleon, and perhaps some fish) have the yellow spot of distinct vision. Vision in some apes must be very powerful, for it is said a gentleman who owned a baboon used to ride away across the plain until he could only just see his dog-ape with the naked eye; then using his telescope, he made a number of gestures, which were immediately mimicked with precision by the animal.

In looking into the open eye the white is part of the opaque sclerotic. The coloured part is the iris seen through the transparent cornea and vitreous humour, while the pupil is the hole through the middle of this, which seems black because of the dark non-reflecting choroid at the back of the eye.

The iris gives the colour to the eye. When there is only a layer of pigment on the back part of this, the eye is blue; but when, in addition, spots or sheets of pigment are distributed through the substance of the iris, eyes of various colours are produced. Thus, fair people have usually blue eyes, and black eyes accompany an olive complexion and dark hair. In other words, people that have a surplus of internal paint elsewhere have it in the iris too.

Again, the lack of pigment is sometimes so great that even the choroid has none, and then the pupil looks red because the blood-vessels of the choroid can be seen through its front layer. Albinos, as individuals with the last peculiarity are called, are found among rabbits, mice, cats, and many other species, and are especially prone to occur under domestication. These creatures present an appearance which is very ethereal and fairy-like, so that artists have often introduced them into their fanciful pictures, as in Landseer's "Bottom and Titania." But however they may grace the ideal creation of the painter, they are less suited to this working-day world than their coarser brothers.

On the other hand, in some species a further deposit takes
feeling the bird. The swallow, which plunges with such reckless impulse through the air, will nevertheless seize a small insect as it dashes along with almost unerring certainty. Usually the prey is so small, that the wonderful powers of the bird displayed in the chase cannot be observed; but sometimes, when the insect has large wings, this dexterity may be seen.

The writer has seen a swallow seize, while in headlong flight, the beautiful, scarlet swallow-tail butterfly, and shear out its rapid body from between the wide wings, and let them float severally down; and then, not satisfied with a feast so little proportioned to the splendour in which it was dined up, glances round and seize again the several pieces before they had time to reach the ground. How, then, is a long sight and a keen short sight to be obtained from the same eye? This is done mainly by the aid of the eye's voluntary powers, which are so disposed that the edge of one is capable of sliding over the edge of its next neighbour, so that when the fibres of the muscle which unites them contract they compress the eye all round and make it more tubular, while the humours of the eye, thus subjected to pressure, cause the cornea to protrude more, and also the retina to be removed further from the lens. These motions are, in addition to the adjustment for distance, found in mammals.

Intimately connected with this pressure upon and alteration of the dimensions of the humours of the eye, is another peculiarity in the eye of a bird. This is a pucker, purse-like membrane, which is attached to the optic nerve, which in this class enters into the eye by a slit-like opening. This membrane is sometimes called a mureupitum, from its resemblance to a purse, and sometimes a pecten. This structure, which is supposed to take the place of the choroid in man, at least addresses to the interior of the eye to a different extent in different birds, and is composed of a tangle mass of blood-vessels, mixed with pigment granules. Whether this is simply an erectile organ, which can rapidly contract and enlarge suddenly as it is deprived of or injected with blood, or is capable of feeding the vitreous humour with liquid strained by it from the blood, and drawing it off again as circumstances require, is not known.

The eyes of reptiles are so different from one another, ranging in structure between the eye of the bird and that of the fish, that it is better at once to pass on to a description of an eye adapted to sight in water.

A fish, living as it does in an atmosphere which is many hundred times denser than air, and by no means so transparent, must have an eye suited to look at solid objects. It must therefore be able to concentrate the rays of light rapidly; yet it is under this disadvantage, that as it is only when passing from a rare into a dense transparent convex substance that diverging rays are bent towards one another, and the original rays pass through a dense medium, the cornea and aqueous humours can play no part in the bending of the rays towards one another, for they are of about the same density as water. The whole duty of refraction must thus be done by the lens. This is very dense, and of the sheets of which it is made up the inside are denser than the outside, while it is so convex both before and behind as to become a perfect globe.

Both the consistence and shape of the round lens may be seen by squeezing it out of the eye of a cooked fish, even by those whose taste for comparative anatomy is only stimulated at the dinner-table. In connection with this kind of lens we have a shallow eye. In other words, if the cornea, through which light enters, be turned upwards, the back of the eye on which the retina is spread resembles a sconcer, and not a cup as it does in animals and birds.

This is so much the case, that even though the hard capsule is shallower than in brutes, there is still left a large space between this and the choroid, and even this latter forms, as we have seen, one of the layers a horse-shoe shaped "gland" composed of blood-vessels, something like the pecent of a bird, though in a different place, and with exactly a converse function.

The hard outer coat is strengthened and held to its form by a cup-shaped bone or cartilage, which occupies the parts which are left unoccupied by the bird's eye-bones; while the latter are used to elongate the eye this maintains a shortened axis.

The cornea, or window, and the watery fluid behind it being useless to collect the rays are left, the one flat and the other in small quantity, and the result of this is that the fish can see distant objects as well through the air as through the water; and this is important, because almost all fish are surface fish; many feed on flies, and most have to be on their guard against aerial foes. The reader, then, need not be surprised when the sun-loving shoals of carp or club all plunge headlong into the depths when he appears on the river bank.

As a singular instance of the adaptation of means to ends, it is found that all animals, whether reptiles, birds, or brutes, which are amphibious, or which spend much time in the water, have eyes which, though they differ from those of fish, in some things have the same relation of the cornea and lens. Thus the whale and the dolphin (which are but brutes which have taken to the sea), the crocodile, and the frog, and the crocodile, have all spherical lenses and flat corneas.

Fish and frogs have on the outer layer of the choroid a layer of silvery or golden crystals, and this layer, which is continued round till it occupies the front layer of the iris, gives to the toad so metallic and bright an eye as to consecrate the legend that it has a jewel in its head. So Shakespeare—

"The toad, ugly and venomous,  
Wears yet a precious jewel in its head."

LESSONS ON GERMAN.—IV.

SECTION VIII.—INDEFINITE ARTICLE.

The indefinite article is less varied than the definite, having for the masculine and neuter nominative but one form, as—

Masculine: ein Mann, a man.  Neuter: ein Glas, a glass.

DECLENSION OF THE INDEFINITE ARTICLE MASCULINE AND NEUTER WITH NOUNS.

Masculine.  Neuter.
A. Ein Mann, a man; ein Kind, a child.
B. Eine Mutter, a woman; eine Schwester, a sister.
C. Ein Mann, a man; ein Kind, a child.
D. Ein Familien, a family; ein Geschlecht, a family.

OF THE COMPOUNDING OF NOUNS IN GERMAN.

Nouns are more frequently compounded in German than in English; and accordingly one word in German often requires for its full translation several in English, as—

Wirkungsfrei, sphere of action (action sphere)  Schimmelboot, web-footed bird (swimming fowl).

Klöter, beast of burden (burden animal)  Jungvögel, young animals (§ 7).

Quadrupel, domestic animal (house animal).

VOCABULARY.

a, a. ribbon  auf, a. upon.
aus, a. iron  halten, to hold.
emphasenstifter, m. letter of recommendation  besci, n. enemy.
ijrr, m. enemy.  Gesetz, n. law.
Kaninchen, n. camel  Geschäft, n. business.
Karnet, n. camel  Geschäft, m. business.

RESUME OF EXAMPLES.

Der Wolf ist ein Raubtier.  Der Wolf is a beast of prey.

Der Mann ist ein Geschöpf.  The carpenter is a mechanic.

Der Hammer ist ein Werkzeug.  Der Hammer is a tool (an instrument).

Das Wort ist ein Recht.  The conjunction is a part of speech.

Der Name eines Tieres ist ein Name of a thing (substance)  Disgevent.

Dieses ist der Großvater.  The child loves the grandfather.

EXERCISE 9.

### LESSONS IN GERMAN.

**Section IX. Declension of Adjectives.**

The adjective has thus far been employed only predicatively, in which use it is unvaried in form, as

**ST. ist hart, steel is hard.**

The terms _attributive_ and _predicative_ have, in grammar, a strictly conventional sense, and should be distinctly understood. If we say, _The deep river is here (ter tie 6iis i bi) the_, the adjective _deep_ is _attributive: for the quality, depth, is there referred to as a known and recognised attribute of the river. If we say, _The river is deep here (ter tie 6iis i bi tief), the adjective is _predicative_, for we then merely affirm or _predicate_ of the river that it has the quality, depth.

When used _attributively_, the adjective is varied by the addition of suffixes.

1. When not affected by a preceding word, the adjective is inflected according to

### The Old Declension.

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gut-er Stoff, good steel</td>
<td>gut-er Eisen, good iron</td>
</tr>
<tr>
<td>Gut-er Stoff, good steel</td>
<td>gut-er Eisen, good iron</td>
</tr>
<tr>
<td>Gut-em Stoff, good steel</td>
<td>Gut-em Eisen, to good iron</td>
</tr>
<tr>
<td>Gut-em Stoff, good steel</td>
<td>Gut-em Eisen, to good iron</td>
</tr>
</tbody>
</table>

The genitive of the old form is now seldom used; that of the new form being preferred. Thus, _gut Stoffes; guten Guten_, 

2. When preceded by any of the following words—

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Der</td>
<td>das (the); der, der (every)</td>
</tr>
<tr>
<td>Dier</td>
<td>der (that)</td>
</tr>
<tr>
<td>Alter</td>
<td>alles (all)</td>
</tr>
<tr>
<td>Ginder</td>
<td>eines (some); sieber, siches (such)</td>
</tr>
<tr>
<td>Gifther</td>
<td>eitives (some); weder, wethes (which)</td>
</tr>
</tbody>
</table>

The adjective adds, in the nominative masculine and in the nominative and accusative neuter, the letter _e, and in all the other cases _n; and is inflected according to

### The New Declension.

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Der gut-er, the good</td>
<td>das gut-er, the good</td>
</tr>
<tr>
<td>Des guten, of the good</td>
<td>des guten, of the good</td>
</tr>
<tr>
<td>Dem guten, for the good</td>
<td>dem guten, for the good</td>
</tr>
<tr>
<td>Den guten, the good</td>
<td>das gut-er, the good</td>
</tr>
</tbody>
</table>

### Vocabulary.

| Stoff, all | Jung, young | Sehnen, beautiful, fine |
| Engltauer, m. Englishman | Mein, small, little | Schwach, weak, feeble |
| Sirket, m. dress-coat | Wirtshaus, m. stall | Schwarz, black |
| Schelm, m. goldsmith | Reiz, n. caress | Stark, strong |
| Streich, large, great | Deinem, m. uncle | Umschauer, m. watchmaker |
| Gut, good, well | Stark, sharp | Werfer, m. thrower |

3. Résumé of Examples, Showing the Endings of Adjectives in the Nominative, after the New Declension.

<table>
<thead>
<tr>
<th>Adjectival</th>
<th>Predicative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gut-er Stoff ist halt</td>
<td>Gut-er Eisen ist halt</td>
</tr>
<tr>
<td>Nicht halt-er Steine sind halt</td>
<td>Nicht halt-er Eichen sind halt</td>
</tr>
</tbody>
</table>

**Exercise 10.**


### Section X. Declension of Adjectives (continued).

When preceded by any one of the following words—

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Der</td>
<td>mein (a or an); sein (his, its)</td>
</tr>
<tr>
<td>Mein</td>
<td>mein (my)</td>
</tr>
<tr>
<td>Tein</td>
<td>mein (thy)</td>
</tr>
<tr>
<td>Sein</td>
<td>sein (his, its)</td>
</tr>
<tr>
<td>Stein</td>
<td>sein (his, its)</td>
</tr>
<tr>
<td>Kein</td>
<td>sein (no, or not any)</td>
</tr>
</tbody>
</table>

The adjective has, in the nominative masculine and in the nominative and accusative neuter, the letter _e, and in all the other cases _n; and is said to be of

### The Mixed Declension.

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mein gut-er, my good</td>
<td>mein gut-er, my good</td>
</tr>
<tr>
<td>Mein guten, of my good</td>
<td>meinen guten, of my good</td>
</tr>
<tr>
<td>Meinum guten, for my good</td>
<td>meinem guten, for my good</td>
</tr>
<tr>
<td>Mein guten, my good</td>
<td>meinem guten, my good</td>
</tr>
</tbody>
</table>

1. In the preceding list of words, _ein, mein, mein, _it will be seen that their form for the masculine and neuter is the same; and hence that they do not (like the previous case, der, tiefer, etc., and like adjectives of the old declension) indicate the gender of the nouns which they precede. To _adjective, therefore, by taking the characteristic termination (e for the masculine and _e for the neuter) assumes the office of pointing out the gender of its noun, as

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gut-er, the good</td>
<td>Gut-er, the good</td>
</tr>
<tr>
<td>Guten, of the good</td>
<td>Guten, of the good</td>
</tr>
<tr>
<td>Gut, for the good</td>
<td>Gut, for the good</td>
</tr>
</tbody>
</table>

### Vocabulary.

| Aff, but | Dach, n. roof | Klamm, n. lamb |
| Naz, n. roof | Duft, not | Dicht, not |
| Beaut, lazy, idle | Schaf, n. sheep | Schaf, n. sheep |
| Feft, fat | Schaf, n. protection | Schaf, n. protection |
| Forst, m. Dutchman | Nahrung, m. defense | Forst, m. Dutchman |
| Keur, your | Schelin, n. swine | Keur, your |
| Keller, m. cellar | Stein, his | Keller, m. cellar |
| Gepa, n. sofa | Steep, steep | Gepa, n. sofa |
| Gepa, n. sofa | Stett, always | Gepa, n. sofa |
| Stett, always | Tier, n. animal, beast | Tro, true, faithful |
| Tier, n. animal, beast | Strick, n. animal, beast | Strick, n. animal, beast |
| Tief, deep | Tief, deep | Streich, contented, satisfied |
| Tief, wide | Streich, contented, satisfied | Streich, contented, satisfied |
2. Résumé of Examples, showing the Endings of Adjectives in the Nominative after the Mixed Declension.

Attributive. Predicative.
Ein wärm-er Mantel ist gut. A warm coat is good.
Ein wärm-er Kleid ist gut. A warm garment is good.
Reit wärm-er Sand ist alt. My good dog is old.
Reit wärm-er Sand ist alt. My old horse is good.
Dein schön-er Mantel ist weis. Thy beautiful bird is white.
Dein weis-er Skater ist schön. Thy white paper is beautiful.
Dein elast-er Skater ist schick. His hard steel is good.
Dein guter Bruder ist klein. His good iron is hard.
Dein kleiner Bruder ist klein. Her good brother is small.
Dein kleiner Bruder ist klein. Her little child is good.
Dein kleiner Bruder ist klein. Our large tree is beautiful.
Dein kleiner Bruder ist klein. Our beautiful house is large.
Dein kleiner Bruder ist klein. Your old trunk is black.
Dein kleiner Bruder ist klein. Your black ribbon is old.
Dein kleiner Garten ist groß. Their green garden is large.

Attributive. Predicative.
Dein wärm-er Mantel ist schick. A warm coat is good.
Dein wärm-er Mantel ist schick. A warm garment is good.
Dein wärm-er Mantel ist schick. My good dog is old.
Dein wärm-er Mantel ist schick. My old horse is good.
Dein wärm-er Mantel ist schick. Thy beautiful bird is white.
Dein wärm-er Mantel ist schick. Thy white paper is beautiful.
Dein wärm-er Mantel ist schick. His hard steel is good.
Dein wärm-er Mantel ist schick. His good iron is hard.
Dein wärm-er Mantel ist schick. Her good brother is small.
Dein wärm-er Mantel ist schick. Her little child is good.
Dein wärm-er Mantel ist schick. Our large tree is beautiful.
Dein wärm-er Mantel ist schick. Our beautiful house is large.
Dein wärm-er Mantel ist schick. Your old trunk is black.
Dein wärm-er Mantel ist schick. Your black ribbon is old.
Dein wärm-er Mantel ist schick. Their green garden is large.

Exercise 11.

LESSONS IN PENMANSHIP.—V.

Hitherto the attention of the learner has been confined to letters based on the elementary stroke called the “pot-hook” or “bottom-turn.” He may now proceed to copy the next elementary stroke, called the “top-turn” or “hanger,” as shown in Copy-slip No. 11.

This stroke will be found to enter into the composition of three letters only, and therefore plays by no means so important a part in the formation of the writing alphabet as the bottom-turn, which, as it has been already said, enters into the composition of no less than nine. It consists of a fine hair-stroke, commenced at the central line c, and carried upwards in a direction bending gradually towards the right, as far as the upper line a, where it is turned and changed into a broad down-stroke, which is brought downwards, with an equal pressure of the pen throughout, as far as the lower line b b.

The top-turn may be described as being precisely the reverse of the bottom-turn; or, in other words, the bottom-turn reversed, as may be seen by turning the page upside down, and examining the stroke in this position. It is only used in combination with other elementary strokes in forming letters, for unlike the bottom-turn, there is no letter of the writing alphabet which is formed of this stroke alone, or even by its repetition or any modification of it.

It is needful, therefore, for the learner to become acquainted with a third elementary stroke before he can proceed to the formation of any new letters, and this he will find in the top and bottom-turn shown in Copy-slip No. 12. This stroke enters into the composition of six letters of the writing alphabet, as the learner will find in future lessons. It consists of a fine hair-stroke, commenced at the central line c, brought upwards towards the right in a gentle curve, and turned at the upper line c a into a broad down-stroke, which is again narrowed as it approaches the lower line b b into a fine hair-stroke that is turned and carried upwards towards the right. It may be described as being formed of the upper half of the top-turn and the lower half of the bottom-turn, joined together on the line c. Examples of all these elementary strokes will be found in No. 1 of “Cassell’s Penny Copy-Books.” When the learner can make these strokes with ease, he will find that he is in a position to form two more letters of the writing alphabet without any difficulty whatever, while he has also advanced more than half-way towards the formation of the seven other letters that are partly made by the aid of these strokes. He may now proceed to copy the letters n and m, as shown in Copy-slip Nos. 13 and 14, observing that the letter n consists of a combination of these two strokes only, the top-turn being made first, and the top-and-bottom-turn added to it, while in the letter m the top-turn is repeated twice, and the letter is then completed by the addition of the top-and-bottom-turn.
LESSONS IN ARITHMETIC.—V.

DIVISION.

1. The process of finding how many times one number is contained in another is called Division.

The number by which we divide is called the Divisor.

The result—viz., the number of times which the Dividend contains the Divisor—is called the Quotient (Latin quotes, "how often.")

The sign \( \div \) placed between two numbers means that the first is to be divided by the second. Thus, \( 19 \div 5 = 3 \) divided by 5.

If the Dividend does not contain the Divisor an exact number of times, it will contain it a certain number of times (the Divisor) with a number left over, which will be less than the Divisor. The number left over in this case is called the Remainder.

Thus, when we say that 5 is contained in 19 3 times and 4 over, 15 the dividend, 5 the divisor, 3 the quotient, and 4 the remainder.

This fact may be exhibited in the following form:—

\[ 19 = 3 \times 5 + 4 \]

2. It will readily be perceived that division is, in reality, only a short method of performing a series of subtractions, in the same way as multiplication is a convenient method of performing a series of additions. For instance, to find how many times 5 is contained in 19, subtract 5 (the divisor) continually from 19 (the dividend) until the number of subtractions, which is less than 5 is left; then, counting the number of these subtractions, we shall get the quotient. Thus, 5 from 19 leaves 14, 5 from 14 leaves 9, 5 from 9 leaves 4. Since 5 has been subtracted 3 times from 19, leaving 4 as a remainder, we see that 19 divided by 5 has 3 for its quotient, leaving 4 as a remainder.

N.B.—It is evident, from the nature of division, that the product of the quotient and divisor, added to the remainder, is equal to the dividend.

3. Method of Division.—The method we are about to explain depends upon the truth of the following principle:—

If the dividend be split up into any number of parts, of which the sum is equal to the dividend, then, if we divide each part separately by the divisor, the sum of all the quotients so obtained will be the quotient required.

For instance, 18 is equal to the sum of 9 and 9. The quotients of these, divided respectively by 3, are 3, 3, and 1, which, added together, make 6, the quotient of 18 divided by 3.

Similarly, 30 is 23 + 8, and therefore 30 divided by 4 is the sum of the separate quotients of 23 and 8 by 4, which are 7 and 2 respectively. Hence 7 + 2, or 9, is the required quotient.

It must be observed that if, the quotient of a given dividend and divisor being known, the dividend be increased by annexing any number of ciphers to it, the new quotient is obtained by annexing the same number of ciphers to the quotient. Thus, 28 divided by 4 has the quotient 7; and 2800 divided by 7 is 400.

4. To divide 5356 by 4.

5356 = 5 thousands + 3 hundreds + 5 tens + 6 units.

Now 5 contains 1 once, with remainder 1; therefore 5 thousands contain 4 one thousand times, with remainder 1 thousand.

Add this remaining 1 thousand to the 3 hundreds, thus making 3 hundreds 1 thousand.

Now 13 contains 4 times, with remainder 1; therefore 3 hundreds contain 4 three hundred times, with remainder 1 hundred.

Add this remaining 1 hundred to the 5 tens, thus making 5 tens.

Now 15 contains 4 times, with remainder 3; therefore 15 tens contain 4 thirty times, with remainder 3 tens, or 30.

Add this remaining 30 to the 6 units, thus making 36 units.

Now 36 units contains 4 nine times.

Therefore 1 thousand, 3 hundreds, three tens, and 6 units are the number of the parts into which 5356 has been divided exactly the divisor 4 respectively. Their sum, therefore, is the required quotient: this is

\[ 1 \text{ thousand} + 3 \text{ hundreds} + 3 \text{ tens} + 9 \text{ units}, \text{i.e.} 1339. \]

5. The above is the analysis of the following shorter process, and will be seen fully to explain it:—

Write down the dividend and divisor in the margin (see page 410), then say 4 in 5 is contained 1 time, with 1 over. Write the quotient 1 under the 5, and placing the remaining 1 before the next figure of the dividend 3, say, 4 in 13

is contained 3 times and 1 over. Write the quotient 3 under the second figure in the dividend, and prefixing the remaining 1 to the 5, say 4 in 15 is contained 3 times and 1 over. Write the quotient 3 under the third figure in the dividend, and prefixing the remaining 2 to the 6, say, 4 in 36 is contained 2 times, with no remainder, and write down the 9 under the last or unit's figure of the dividend.

It will be seen that, when to get the first figure of the quotient, we say 4 in 5 is contained once, with remainder 1, we really indicate that 4 is contained in 5000 1000 times, with remainder 1000, which 1000 we carry on to add to the next three of the dividend, which really indicates 308, and so on; as will be seen by comparing the process with the analysis of the method in Article 4.

6. To divide 7499 by 9.

7499 = 7 thousands + 4 hundreds + 9 tens + 9 units.

Here, since 7, the first figure of the dividend, is less than the divisor, 9, we take two figures of the dividend, and say, 79 in 74 is contained 8 times, with a remainder 2, and put down the 8 under the second figure of the dividend (reckoning from the left-hand). Then, proceeding as in the previous example, we say, 9 in 29 is contained 3 times and 2 over; and again, 9 in 20 is contained 2 times and 2 over. This last 2 is 2 units, and is therefore the remainder left after dividing 7499 by 9. It is generally written after the quotient, as above.

This method, which is only conveniently applicable when the divisor is a small number (generally one figure), is called Short Division.

EXERCISE 8.

1. (1) Divide 658 by 2; 537 by 3; and 780110 by 6.

2. (Divide 4380127 by 8; 407792 by 11; and 53342790 by 9.

3. (Divide 41239789 by 12; and 54937865 by 5.

4. (Divide each of the numbers contained in the square in Ex. 4, page 23, successively by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

5. (Divide each of the numbers contained in the square in Ex. 4, page 23, successively by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

6. (Divide each of the numbers contained in the square in Ex. 4, page 23, successively by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

7. To divide 9298 by 35.

Arrange the figures as in the margin; then say, the largest number of times which 35 is contained in 92 is 2 times.

Write the 2 on the right, to form the first figure of the quotient, and subtract 2 × 35—i.e., 70—from 92, leaving 22. Annex to this remainder the next figure (9) in the dividend, thus making it 229.

Then say, the greatest number of times that 35 is contained in 229 is 6 (which must be found by trial).

Put down the 6 to form the next figure in the quotient, and subtract 6 times 35—i.e., 210—from 229, leaving 19. To this annex the last figure (5) of the dividend, making it 195.

Then say, the greatest number of times which 35 is contained in 195 is 5. Write down the 5 to form the next figure in the quotient, and subtract 5 times 35—i.e., 175—from 195, leaving 20.

265 is the required quotient, and 23 is the remainder.

Hence 928 = 265 × 35 + 23.

8. A careful examination of the above process will show that what we have really done is equivalent to saying: 35 is contained in 92 hundreds two hundred times, with a remainder 22 hundred; then, subtracting 200 times 35—i.e., 7 thousand—from 928, we have 2288 left.

Next we say: 35 is contained in 229 tens sixty times, with a remainder of 19 tens; then subtracting 60 times 35—i.e., 2100—from 2288, we have 198 left.

Next we say: 35 is contained five times in 198, with a remainder 3.

Hence we see that after taking away 35, first, 200 times from the dividend, again, 60 times from what is left, and again, 5 times from what is left, we have 23 units over, a number which is less than 35.

Hence we see that 32 is contained in 2285—i.e., 95 times—with a remainder 23.
The quotient is therefore 200 + 60 + 5, or 265, and the remainder 23.

9. The above explanations will sufficiently elucidate the following:

**Rules for Division:**

1. When the divisor contains only one figure, write the divisor on the left of the dividend, with a curved line between them. Beginning at the left hand, divide successively each figure of the dividend by the divisor, and place each quotient figure directly under the figure divided. If there be a remainder after dividing any figure, prefix it to the next figure of the dividend, and divide the number so formed as before. If there occur any figure which does not contain the divisor, place a cipher in the quotient, and prefix this figure to the next one of the dividend, as if it were a remainder, and proceed in the same manner to the last figure.

2. When the divisor contains more than one figure, beginning on the left of the dividend, find how many times the divisor is contained in the first fewest figures of the dividend which will contain it, and place the quotient figure on the right hand of the divisor, with a curved line between them; then multiply the divisor by this figure, and subtract the product from the figures divided. To the right of the remainder bring down the next figure of the dividend, and divide the number so formed as before. If this number be less than the divisor, annex a cipher to the quotient, and bring down the next figure continuing this process until the number thus obtained he equal to or greater than the divisor. Proceed in this manner until all the figures of the dividend are exhausted.

10. Tests of Correctness of Division:

1. Multiply the divisor by the quotient, and add the remainder to the product. This should, as already explained, give the dividend.

2. Subtract the remainder, if any, from the dividend, and divide the difference so obtained by the quotient. The result should be equal to the divisor, if the working be correct.

**Exercise 9.**

1. Divide 47850 by 42; 75043 by 52; and 93840 by 63.
2. Divide 325000 by 85; 421645 by 74; and 999999 by 47.
3. Divide 145290 by 1345; and 1912500 by 425.
4. Divide 8985810 by 37846; and 9303885 by 14565.
5. Divide 9749320 by 305; 505854782 by 2789; and 90870603940 by 457321.
6. Divide 100000000000000 by 111; 100000000000 by 333; and 100000000000000000 by 11111.
7. Divide the product of 12345 multiplied by 67890 by 97, 213, 4351, 59, 847, and 6939.

**LESSONS IN LATIN.—III.**

**PRELIMINARY INSTRUCTIONS IN THE VERBS OF THE FOUR CONJUGATIONS (continued).**

**SECOND CONJUGATION.**

<table>
<thead>
<tr>
<th>ACTIVE VOICE</th>
<th>PASSIVE VOICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT INDICATIVE</td>
<td>PRESENT INDICATIVE</td>
</tr>
<tr>
<td>PERSON-ENDINGS</td>
<td>PERSON-ENDINGS</td>
</tr>
<tr>
<td>Singular</td>
<td>Plural</td>
</tr>
<tr>
<td>I</td>
<td>-eas, -eau, -eae,</td>
</tr>
<tr>
<td>thou</td>
<td>-itis, -itae,</td>
</tr>
<tr>
<td>eis</td>
<td>-itum, -itum,</td>
</tr>
<tr>
<td>he</td>
<td>-est, -eas,</td>
</tr>
<tr>
<td>EXAMPLE.—Moni</td>
<td>to remind: stem. mon.</td>
</tr>
</tbody>
</table>

**PRESENT ACTIVE INDICATIVE.**

| 1st per. Mone, I remind | 1st per. Moner, I am reminded |
| 2nd | Monis, thou remind | 2nd | Monis, thou art reminded |
| 3rd | Monit, he reminds | 3rd | Monitur, he is reminded |

**PRESENT PASSIVE INDICATIVE.**

| 1st per. Monere, we remind | 1st per. Moneremus, we are reminded |
| 2nd | Monetis, you remind | 2nd | Monentis, you are reminded |
| 3rd | Momentis, they remind | 3rd | Monentur, they are reminded |

**VOCABULARY.**

Debso, 2 I owe. Mordio, 2 I bite.
Doco, 2 I teach. Moveo, 2 I move.
Exerceo, 2 I exercise. Parco, 2 I obey.
Florio, 2 I flourish. Tacco, 2 I am silent.
Gaudio, 2 I rejoice. Temo, 2 I hate.

**EXERCISE 5.—LATIN-ENGLISH.**

1. Thou fearest and art frightened. 2. If I am silent I am blamed.
3. He rejoices. 4. We run. They rejoice. 5. He tries to bite.
6. We try to educate. 7. Thou obeyest and art praised. 8. We bite.
9. If we bite we are blamed. 10. They exercise. 12. You are moved.
13. He dances. 14. They are delighted. 15. You are adorned.

**EXAMPLE.—Regère, to rule or guide: stem, reg.**

**PRESENT ACTIVE INDICATIVE.**

| 1st per. Rego, I rule | 2nd | Regis, thou rulest |
| 2nd | Regis, thou art ruled | 3rd | Regit, he rules |
| Plural | Regit, they rule |
| Singular | Plural |
| 1st per. Regimus, we rule | 2nd | Regitis, you rule |
| 2nd | Regentis, you are ruled | 3rd | Regent, they rule |

**VOCABULARY.**

Cedo, 3 I yield. Logo, 3 I read.
Defendo, 3 I defend. Occido, 3 I slay.
Diligo, 3 I love. Tecido, 3 I fall.
Pallo, 3 I deceive. Pingio, 3 I paint.
Ledo, 3 I injure. Pungo, 3 I prick.

**EXERCISE 7.—LATIN-ENGLISH.**


**EXERCISE 8.—ENGLISH-LATIN.**

1. I obey. 2. If I obey I am loved. 3. He is loved much. 4. He writes well. 5. They paint ill. 6. They dance well. 7. I rejoice if he reads much. 8. Thou paintest. 9. They are praised and are praised. 10. If you rule well you are loved. 11. I am defended. 12. You are defended. 13. He is deceived. 14. They are pricked.

**FOURTH CONJUGATION.**

<table>
<thead>
<tr>
<th>ACTIVE VOICE</th>
<th>PASSIVE VOICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT INDICATIVE</td>
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<td>PERSON-ENDINGS</td>
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</tr>
<tr>
<td>Singular</td>
<td>Plural</td>
</tr>
<tr>
<td>I</td>
<td>-imus, we</td>
</tr>
<tr>
<td>thou</td>
<td>-itis,</td>
</tr>
<tr>
<td>eis</td>
<td>-itum,</td>
</tr>
<tr>
<td>he</td>
<td>-est,</td>
</tr>
<tr>
<td>EXAMPLE.—Audire, to hear: stem. aud.</td>
<td></td>
</tr>
</tbody>
</table>
LESSONS IN DRAWING. 

**EXERCISE 9.—LATIN-ENGLISH.**


VOCABULARY.


**EXERCISE 10.—ENGLISH-LATIN.**

1. Why do you sing? 2. He is guarded. 3. They guard. 4. If you are guarded you are conquered. 5. He blames and punishes. 6. He hears and is instructed. 7. You are well educated. 8. Thou sleepest much. 9. They read. 10. If you dance you are delighted. 11. He is supported. 12. Why are they punished? 13. They are heard. 14. I am clothed ill. 15. They are struck and reminded.

RECAPITULATION—TERMINATIONS OR PERSON-ENDINGS OF THE FOUR CONJUGATIONS.

**INDICATIVE MOOD, PRESENT TENSE.**

**ACTIVE VOICE.**

<table>
<thead>
<tr>
<th>Latin零件</th>
<th>English零件</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st sing.</td>
<td>1. I hear</td>
</tr>
<tr>
<td>1st plur.</td>
<td>1. We hear</td>
</tr>
<tr>
<td>2nd sing.</td>
<td>2. Thou hearst</td>
</tr>
<tr>
<td>2nd plur.</td>
<td>2. Ye hear</td>
</tr>
<tr>
<td>3rd sing.</td>
<td>3. He hear</td>
</tr>
<tr>
<td>3rd plur.</td>
<td>3. Ye are heard</td>
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</table>

**PASSIVE VOICE.**

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<tr>
<td>1st sing.</td>
<td>1. I am heard</td>
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<tr>
<td>1st plur.</td>
<td>1. We are heard</td>
</tr>
<tr>
<td>2nd sing.</td>
<td>2. Thou art heard</td>
</tr>
<tr>
<td>2nd plur.</td>
<td>2. Ye are heard</td>
</tr>
<tr>
<td>3rd sing.</td>
<td>3. He is heard</td>
</tr>
<tr>
<td>3rd plur.</td>
<td>3. Ye are heard</td>
</tr>
</tbody>
</table>

**EXERCISE 11.—LATIN-ENGLISH.**


**EXERCISE 12.—ENGLISH-LATIN.**

1. They yield. 2. If you yield you are conquered. 3. If you are conquered you are bound. 4. You are supported. 5. You slay. 6. Why do they punish? 7. Why are they punished? 8. You are clothed ill. 9. Thou conquerest. 10. Thou art conquered. 11. Thou art endest. 12. Thou art bound. 13. They prick. 14. They are pricked. 15. Why dost thou move?

As in the exercises which are immediately to follow, we shall have occasion for parts of the verb, cause, to be, I shall here lay before you so much of that verb as may be necessary for my purpose.

**THE VERB ESE, to be.**

**INDICATIVE MOOD, PRESENT TENSE.**

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<td>2. Thou art</td>
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<td>2nd plur.</td>
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<td>3. He is</td>
</tr>
<tr>
<td>3rd plur.</td>
<td>3. Ye are</td>
</tr>
</tbody>
</table>

**VOCABULARY.**


**EXERCISE 13.—LATIN-ENGLISH.**


**EXERCISE 14.—ENGLISH-LATIN.**

1. I am learned. 2. I am not learned. 3. He is learned. 4. They are learned. 5. You are bad. 6. You are not bad. 7. Thou art good. 8. They are good. 9. They are not good. 10. Why are they not good? 11. He is blind. 12. He is not blind. 13. Why is he blind? 14. Thou art not unlearned. 15. Thou art blind and not safe. 16. They are blind. 17. You are good and safe. 18. He is very unlearned.

**KEY TO EXERCISES IN LESSONS IN LATIN.**

**EXERCISE 3.—ENGLISH-LATIN.**

1. I praise. 2. Thou blamest. 3. He adores. 4. We edenct. 5. You give. 6. They wound. 7. He tries. 8. He tries to dance. 9. Thou art wounded. 10. He is grievest. 11. We are praised. 12. Thou art doestest. 13. They are educated. 14. Thou art grieved. 15. You are wounded. 16. I am delighted. 17. Thou delightest. 18. He delights. 19. We delight. 20. You delight. 21. They delight. 22. I am delighted. 23. Thou art doestest. 24. They are educated. 25. Thou art doestest. 26. They are delighted. 27. They are delighted.

**EXERCISE 4.—ENGLISH-LATIN.**


LESSONS IN DRAWING. — III.

Before commencing our remarks upon the methods of drawing solid objects, we must lay before the pupil some very important rules with regard to retiring lines and retiring planes; these rules belong to Perspective. As we are now getting into deeper water, we must ask for the patient attention of the pupil in a branch of the subject which would be much easier to explain in his presence, with the help of a piece of chalk and the blackboard in writing. First, then, retiring lines are lines which go away from us. For instance, suppose we are standing at the end of a street and looking down its length; the lines of the eaves, and spouts, tees and bottoms of windows, and doors, etc., are retiring lines. And secondly, the fronts of the houses are retiring planes, or surfaces. Again, sit at the end of a table; the lines or edges on the right side and on the left are retiring lines, and the surface of the table, so that retiring planes, like retiring lines, may be horizontal (parallel with the earth), perpendicular (upright), or inclined. We also direct the attention of the pupil to Figs. 23, 29, etc. In Fig. 23, f, g, d, h, e, and t are horizontal retiring lines, and the whole surface of the pavement is a retiring horizontal plane. In Fig. 29 the wall to the left is a retiring perpendicular plane. In Fig. 30 the fronts of the steps are
parallhel perpendicular retiring planes. The tops of the steps are horizontal retiring planes. In Fig. 31 the lid of the box from its position is an inclined retiring plane.

We advise the pupil now to make himself familiar with the following fixed principles relating to retiring lines and planes—

1. The Line of Sight, or, as it is sometimes called, the horizontal line, represents the height of the eye in the picture, which, when we come to the explanation of these terms, we will mark in the illustrations H, L (see Figs. 28 and 29).

2. The Point of Sight, marked P, is the point opposite the eye in the picture, and is consequently upon the line of sight.

3. The Station Point is the place where the spectator is supposed to stand when viewing the object represented; marked S P.

4. A Ground Plan is the horizontal extent of the object when drawn upon the ground.

5. The Vanishing Point is that point in the plane or surface of the picture, where retiring lines if produced or continued, would meet or terminate; marked V P.

6. All retiring lines have vanishing points.

7. All horizontal retiring lines have their vanishing points upon the line of sight.

8. All parallel retiring lines have the same vanishing point.

9. All horizontal lines which are parallel with the picture plane, are drawn parallel with each other, and the line of sight.

10. All horizontal retiring lines forming right angles with the picture plane, or with our position, have the point of sight for their vanishing point.

11. All lines inclined with the horizon, and with the picture plane, have their vanishing points above or below the line of sight, according to the angle they form with the horizon, their vanishing points being always on a line perpendicular to the vanishing point upon the line of sight, to which they would have retired had they been horizontal.

Before going any further we will endeavour to explain the above fixed principles or definitions, taking them in their order.

1. The Line of Sight, H, L (horizontal line), is drawn parallel with the base of the picture, according to the height of the eye, from the ground. If we are drawing a house from a higher point of view than when standing or seated on the ground, the line of sight will be higher in the former than in the latter case.

2. The Point of Sight (P) is subject to the same conditions as to its height from the ground as the line of sight.

3. The Station Point (S P) may be at almost any distance from the object that is most convenient; but observe, if too near, we get a distorted view of the object when drawing from Nature. Let the reader for a moment place himself in an upright position, keep his head perfectly still, and turn his eyes to the right and to the left; all that he can possibly see whilst so doing is included in an angle of 60° (sixty degrees), considerably too near the objects he is looking at to make a pleasing picture, though it would not be wrong. But if he included more objects each way within a greater angle, he would have to turn his head, and consequently he would require two or more points of sight; this is only allowable in panoramas (viz., long pictures generally placed upon upright rollers, and so drawn out as a ribbon would be from a reel), when the view of a country for any number of miles in extent is exhibited; the proper or more convenient distance from the object is, when it is placed within an angle of from 20° to 25°.

Let a b, Fig. 25, be two objects to be drawn in the same picture; the distance from them at c would be the nearest approach we could make; then the angle a c b would be an angle of 60°. If we removed our position to d, then the angle would be much less, and more suitable for our picture.

We beg it may be understood that hereafter when we say drawing from Nature, we allude to all objects, trees, buildings, etc. Although buildings are not natural objects, yet they are included under this expression.

4th. Ground Plan. The best illustration of a ground plan is a map; it has nothing to do with heights or depths. Suppose the walls of a house were removed, and only the foundations left, we should then see the plan of the house.

5th. Vanishing Point (V P). If a line be drawn from the eye parallel to any original straight line of the object the point where that line cuts the picture plane (or surface of the picture) is the vanishing point of that original line. When the pupil has read this, let him rise from his chair, and stand about eight or nine feet from the window, and look out upon the objects beyond. Suppose that a house is in sight, having one of its corners towards him. If he stood without moving from the position and look at a long stick having a piece of charcoal, or something that will make a mark on glass, fastened to the end, he might trace the form of the house upon the glass in the same way as tracing a drawing through a piece of thin paper; he would then have made a true perspective drawing of that house upon the glass. This glass is the picture plane; the place where he stands when making the tracing is the station point.

Now, supposing the retiring line of the building to be tracing is on the left as he looks at it, let him raise his left arm and hold it parallel to that retiring line or plane of the building; he will then be pointing to the vanishing point of the retiring line, and all horizontal lines upon that plane would be retiring also, and consequently meet at the same vanishing point.

He might, for the sake of experiment, actually make a tracing on the window of one or more of the parallel lines of the building, and at the same time make a mark upon the glass for the vanishing point. Then if he continue the traced lines on the glass he would eventually find that they will meet the mark upon the wall, mark being the vanishing point; and he would also find that the mark upon the wall is on a level with his eye, on the line of sight. He would find also that if there were any other lines parallel with the window, those lines when traced would be parallel with the line of sight, and be drawn
horizontally on the glass. This explains all that is meant in the definitions numbered 5, 6, 7, 8, 9. If there be no other lines of walls or buildings to be seen through the window which are at right angles with it, these lines have the point of sight for their vanishing point; just as the retiring lines of the covers of the books at a and b in Fig. 26, which are at right angles to the edge of the table on which they are lying have their vanishing point in the point of sight, while those that are not at right angles to the edge of the table, as at k and l, have their vanishing points to the right and left of the point of sight. This observation will explain Definition 10.

Definition 11 will come under our notice hereafter, when we will go more into the consideration of the above fixed principles with the help of diagrams.

An object can be placed in two positions, to which the rules of perspective are applicable—parallel and angular.

Parallel perspective is a term used in reference to objects of a rectangular form, such as the interior of a room, a cube, etc., when these objects are so placed that their retiring sides are at a right angle with the picture plane, P R, and the remaining sides are parallel to the same, as in Fig. 27 (a).

Angular perspective alludes to objects of the same form so placed that all the sides retire, as in Fig. 27 (b), which is the plan of a room in angular perspective, having one of its angles towards the picture plane, P R, and its four sides retiring.

Parallel perspective is the more simple of the two, and easier to be understood, we therefore commence with that. The first example is a pavement (Fig. 28).

Draw the horizontal line, H L, and place upon it a point marked P S and V P (point of sight and vanishing point). The reason that it is both the point of sight and the vanishing point has been explained in Definition 10. Then mark the distance of a from P S, through a draw the line b c, and divide it in the points d and e; place the pencil on P S, and draw it over the paper through b to f, mark f, join b f, proceed precisely in the same way with the other lines d e g and h c. Now observe, if all these lines were produced towards the line of sight, H L, they would meet at the P S. The other parallel lines, b i, m n, etc., must be carefully arranged according to the principles we have already laid down in our introductory lessons. The pupil may naturally inquire if there are not some perspective rules for regulating the retiring horizontal distances of objects, as well as their heights. We answer, there are. We do not intend to avoid this question, but put it off for the present, lest the pupil should become too early involved in technicalities that belong especially to geometrical perspective—a branch of drawing to be considered hereafter. With reference to the retiring lines of the pavement (Fig. 28), we have a fitting illustration in a railroad; probably the pupil has observed when standing on a railway bridge and looking down the line, that the rails as they retired seemingly converged to a point in the distance; that point would be the vanishing point; therefore, in drawing lines so placed, our having a vanishing point renders the task much easier, and insures that which is so very desirable, a truthful result. Let Fig. 28 be practised over and over again, until the various lines which compose it can be drawn with ease and readiness. Fig. 29 is the same, with the addition of a wall on the left. After the last example the manner of drawing it will be self-evident. Fig. 30, a flight of steps; the retiring edges of the steps are all drawn towards the P S. The other examples require no further explanation. Should the pupil in going along with us through these lessons have made some failures, and found some difficulties, there is no doubt that most of them may be attributed to one great neglect which all beginners so readily fall into, that is, the not marking in the distances before they attempt to draw the lines. It is the common failing with the majority of beginners, that they attempt to draw the lines without first arranging their positions. We have said quite enough of the practical way of proceeding with the arrangement of lines, but once more, let the attention of the pupil be ever directed to the whereabouts of the lines of his drawing.
LESSONS IN ENGLISH.—III.

SIMPLE PROPOSITIONS.—THE PARTS OF SPEECH.

In English nouns, there are at the most only two cases, so we are without an objective or accusative case. Yet sentences in English, as in Latin, have their object. That object must be recognised. Let it be called the object of the proposition, for so it is; in any given instance let it be termed the object of the verb, for it is the object of the verb.

Here you must carefully distinguish between a case and a relation. A case denotes a change in a noun corresponding to the change in its relation. This you will see in these two propositions:

1. *Deus factum mundum fecit.*
2. *Mundus factus est a Deo.*

The world was made by God.

Now, without knowing Latin you may clearly understand what case means, and learn that in English we have no objective case. The *Deus* of number 1 becomes *Deo* in number 2; but in both, the English word *God* remains the same, though in the former, is in what is commonly called the nominative, and in the latter in what is commonly called the ablative case. Look also at mundus and mundum; you see that the nominative mundus is, in the objective or accusative case, changed into mundum. Here you clearly have two cases, but the English word world represents both. Consequently, if world is in the nominative it is not also in the objective case, for there is no alteration of form whatever. Yet in the latter case there is a change of relation; for while in number 1 world is the object, in number 2 it is the subject of the proposition. The English, then, does not conform to the Latin custom of expressing diversity of relations in nouns by diversity of form, or gives—so only in a limited degree. In fact, the tendency of the English language has long been to drop the terminations and inflexions which it borrowed from its Anglo-Saxon parent. The tendency has for ages continued to become more and more strong. It is a tendency which deserves encouragement, for in proportion as it is effectual, it gives freedom and power to the language, and makes the acquisition of it easier, and the diffusion of its knowledge.

I have intimated that propositions have each an object as well as a subject. Such is generally the case, and such is the case more widely than may at first appear. In our standard phrase *Alfred reads*, no object is expressed. And the statement may be made without any clear reference to an object. Verbs in which there is no reference, or no clear and obvious reference to an object, are called *intransitive verbs*—that is, verbs which are not altered in their meaning, when the subject is *in*; e.g. Alfred *rides*, Alfred *sleeps*, Alfred *runs*, Alfred rides, Alfred sings, Alfred *rides* a fine horse. Alfred *sings* a fine song.

If, however, propositions in general have an object, then we must add an object to our grammatical formula; thus:

**Verb.** Alfred reads writing.

**Subject.** Alfred

**Predicate.** Alfred reads writing and manuscript.

The grammatical formula is thus made complete. The verb *reads* is, as we have seen, equivalent in grammar (or logic) to the *form* is good; where the former is the copula, and the latter the attribute; so that an attribute with its copula is equivalent to the verb and its object, in forming the predicate of a proposition.

The proposition which, as it stands, has all the essential parts of a proposition, may receive additions in order to express modifications of the meaning. Introduce *and* and, then it runs:

*Alfred reads writing and manuscript.*

This particle *and* is termed a conjunction. Conjunctions (Latin, *cum*, with, and, anglo, *I joint*) join together words and sentences. And, in this case, unites manuscript with writing. Before writing insert a *; then the proposition stands thus:

*Alfred reads a writing.*

A is called an article (properly in Latin a *little joint*). A is called the *indefinite article*, inasmuch as it leaves it indefinite what object is meant, merely intimating that it is not many objects but only one object that is intended. A, indeed, is only a variety of our word one, *the*. Being so, its original form was *the*. The *a* is now dropped before a consonant for the sake of euphony (Greek, eu, well, and plano, a sound; meaning agreeable sound).

Contrasted with the indefinite article *a*, is another form, which bears the name of the *definite article*; that is, the. *The* is a reduced form of *these*. Consequently the *refer* to an object previously mentioned or known as—

*Alfred reads the writing.*

He reads, that is, some writing known to the speaker.

We have already found a form of speech which qualifies nouns—namely, the *adjective*. We may therefore insert a suitable adjective in this lengthening form; thus:

**Subject.** Alfred

**Predicate.** Alfred reads the obscure writing and manuscript.

We have hitherto modified the *predicate*. Still more may it be modified. The *verb* reads may undergo a modification of import. Introduce the word *soon*:

**Subject.** Alfred

**Predicate.** Alfred soon reads the obscure writing and manuscript.

Two other parts of speech may be introduced by inserting the words to me, as—

**Subject.** He

**Predicate.** He gave the book to me.

These are all cases where *to, from, with, and of* are prepositions.

In the ordinary list of the parts of speech stands the *participle*. This word, of Latin origin, denotes the *partaker* (from pars, a part, and capio, I take). The participle is so denominated because it partakes of the qualities of the verb and the adjective. Thus *shining* is a participle from the verb to *shine*. It may also be employed as an adjective. Thus,

**Participial.** The sun shining disperses the clouds.

**Adjective.** The shining sun dazzles the eyes.

The right of the *participle* to be accounted a separate part of speech has been contested not without reason. Perhaps less valid is the claim of the *interjection*. An interjection (inter, between, and jacio, I cast) is a sound of surprise, or sorrow, thrown out under the impulse of strong and sudden emotion, as *O! Oh! Ah!* and is with little propriety placed among the forms of articulate speech. Let us introduce a *participle* into our model—

**Subject.** Alfred

**Predicate.** Alfred studying soon reads to me the obscure writing and manuscript.


The form is thus seen to comprise nine parts of speech. If the *interjection*, or *exclamation*, is to be reckoned a part of speech, it may be prefixed in the shape of *Yet*! Here, then, we find a condensed view of allied parts of speech. In the remarks by which the view has been prefaced and prepared, lies the kernel of the entire English Grammar. If you have gone with me understandingly thus far, you will have no difficulty in following me to the end, for having developed these general facts and principles, I have now only to take up each part of speech in
succession, and, in connection with it, enter into such particulars as may appear desirable with a view to my object.

Before I close the chapter, however, I will add a few general remarks respecting the actual classification, which bears the name of the noun (or can parts of speech. The aim of the classification is to arrange under separate heads all the words of the English (or any other) language. Now a good classification has two qualities: first, it is exhaustive; secondly, it is distinctive. It is exhaustive—that is, it comprises and places under some suitable head all the facts. It is distinctive—that is, it makes such clear and sharp distinctions as to place the several facts each under its own head, without confounding similar facts together, or putting under one head facts which may properly stand under another head.

The classification under review is neither exhaustive nor distinctive. It is not exhaustive, for it leaves out the infinitive mood, which has as good a right to be called a part of speech as the participle. It is not distinctive, for the term adjective makes no distinction where a distinction exists, and the term participle makes a distinction where no distinction is required. Indeed, the classification is wholly unsatisfactory, being based not on a principle, but on vague and general views. Something less objectionable may be offered in the following words.

Speech corresponds to the realities which it represents. Those realities are thoughts and things. Now, thoughts and things may be reduced to three classes: 1. Objects; 2. qualities of objects; 3. actions. Consequently, the essential parts of speech are the noun, the adjective, and the verb. But objects and their qualities are of the same things differently viewed. We may therefore strike out quality. Thus we have two classes left, namely, the noun and the verb. Verbs, however, are the names of action, as nouns are the names of being. Hence language resolves itself into names. We may, then, declare that speech is made up of names. These names may be expanded and divided into 1. names of being, or nouns; 2. names of action, or verbs; and 3. names of qualities, or adjectives. Under the last head, or names of qualities, may stand either parts of speech, for the adverb names the quality of the action of the verb, and the article names the extent in which the noun is to be taken. The term particles has not inappropriately been applied to adverbs and conjunctions, for, to a considerable degree they appear to be parts (particles—that is, little parts) or fragments of once existing nouns and verbs. If, however, our analysis of language into names of being and names of action is correct, then the sentence which, as given above, contains all the nine parts of speech, may be reduced to two: as,

**SUBJECT.**

Alfred

**PREDICATE.**

**reads.**

Name of action.

and thus we are brought back to the very form with which we commenced our former lesson on "Simple Propositions." Clearly, as compared with these two parts, the other words in the sentence are incidental, and of small moment. It may be desirable to give another germ or two expanded into the full forms.

**SUBJECT.**

Nelson

**PREDICATE.**

fought **OBJECT.**

fought the enemy.

Nelson, fought, often fought the enemy.

Brave Nelson, defending danger, often fought the cruel enemy.

Brave Nelson, defending danger and death, often fought the cruel enemy.

(1) (2) (3) (4) (5) (6) (7) (8) Brave Nelson, defending danger and death, often fought the enemy of his country.


Other explanatory words or phrases might be added. Thus, to the subject might be appended the words sailing from England, or Brave Nelson, sailing from England, and defending danger, fought.

Or, you might qualify fought by the adverb successfully. You might also make the sentence compound by inserting after fought the words, and conquered; thus:

Brave Nelson, sailing from England, and defending danger, fought successfully. You might also make the sentence compound by inserting after fought the words, and conquered; thus:

**SUBJECT.**

Brave Nelson

**PREDICATE.**

fought and conquered the enemy, etc.


In the last example, one part of speech is omitted to exercise the mind of the student, who is also expected to effect the reduction of the proposition to the name of being and the name of action.

Let the reader carefully study and analyse the following sentences:

1. Propositions without an object.


2. Propositions with an object.

   The sun lights the earth. The trees produce fruit. The rain waters the meadows. Storms purify the air. The universe proclaims its Author.

Qualifying words may be added at will, as:

3. Propositions with a subject and object qualified.

   My young brother tossed the little animals. Avaricious tradesmen overcharge all their goods. A diligent scholar learns all his lessons.

I subjoin some fragments to be made into complete sentences:

1. Propositions lacking subjects.

   - leads a blind man. - lends his sick mother. - neglect their duty. - avoids bad company. - promises a rich harvest. - cost much money.

2. Propositions lacking objects.

   Disobedient children deserve — The proud despise — Thick clouds cover — A bad child grieve — An honest debtor pays — Wise men revel —

3. Propositions lacking verbs.


It may here be necessary, by anticipation, to inform the totally uneducated student that, when the verb is singular it has s at the end, when plural it is without s. The verb must be in the singular number when the noun or pronoun connected with it denotes only one person or thing; and the verb must be in the plural number when the noun or pronoun connected with it denotes more than one person or thing; e.g.:

**Singular:** A boy loves — the house stands — the duck swims.

**Plural:** Boys love — houses stand — ducks swim.

The rule might be put in another form, as, when the noun has an s (or is in the plural) the verb is without; and when the verb has an s the noun is without.

**LESSONS IN GEOGRAPHY.** — III.

**NOTIONS OF THE GREEKS AND ROMANS.**

This desire for nautical expeditions, which, under the excitement of commercial enterprise, had begun to spread among the nations, was restrained by the conquests of the Romans. These conquests, however, if they did not extend the boundaries of the known world, at least enriched the domain of geographical knowledge with new facts, and more exact than those which had been collected and taken for granted by the writers of former ages. The three Punic (Carthaginian) wars, the Illyrian war, the contests with the Gauls, the expeditions against Spain, and those of Zidus Gallus into Arabia and Ethiopia, all contributed, in their turn, to give to this science a more positive character and more varied details. Polybius, about 150 years before the age of Hipparchus, gave a description of the world which, notwithstanding his numerous errors, evinced remarkable progress in the knowledge of the globe. The new acquisitions of the Romans, and of Mithridates Eupator, the campaigns of Julius Caesar in Gaul and in Britain, rendered accessible the knowledge of countries hitherto but partially explored, or altogether unknown. Ptolemaeus, a Syrian, resident at Rhodes, endeavoured to correct the measurement of the earth's circumference formerly made by Eratosthenes. He observed that when the star Canopus, in the constellation Argo, became visible in the horizon of Rhodes, it was elevated seven degrees and a half above the horizon of Alexandria. He supposed these places to
be under the same meridian, and, from the reckoning of navigators, he found the distance between them to be 5,000 stadia. Now, seven degrees and a half being the forty-eighth part of a great circle of the sphere, this gives the circumference of the earth equal to 240,000 stadia. This was a nearer approximation to the truth than that of Eratosthenes, but it was founded on erroneous data; for the arc of the great circle between the two places above mentioned was only about 5° 15', and the difference between their two meridians was rather more than 2°.

Strabo, who flourished under the reign of Augustus Caesar, corrected many errors of the geographers who preceded him, and made some of his own. The limits of his knowledge of the world were, on the north, Ferme or Ireland, and the mouth of the Elbe. He denied the existence of Thule, and asserted that the earth was not habitable at the distance of 4,000 stadia north of Britain. On the east, he considered Ceylon, Taprobane and Thine, the borders of the world, and it is doubtful whether his knowledge of it extended as far as the mouths of the Ganges. He knew the western coast of Africa as far as Cape Nun. But he partook of the error of those who represented the Caspian Sea as united to the Northern Ocean; and he rejected the positive information of Herodotus on this point. He acknowledged little regard for the authority of this ancient historian, and his doubt on the subject of the voyages of Pythias, Hanno, and Eudoxus, showed his ignorance of many important geographical questions.

Strabo adopted the division of the earth into climates recognised by Greek and Roman authors previous to his time. Long before him, indeed, as well as after him, the globe was divided into five zones, namely, two frigid or frozen zones near the poles, one torrid or central zone scorched by the sun and extending along the equatorial line on each side of it, and two others called the temperate zones, occupying the rest of the world. The last-named were considered to be the only habitable portions of the globe; and as to the torrid zone, it was supposed to be condemned, on account of its fiery climate, not only to eternal solitude, but to present an invincible obstacle to the exploration of the countries situated beyond the equator. It will afford an illustration of the force of those ideas which prevailed on the subject of the zones of the globe, and on the relative position of the great divisions of the earth, when we reflect on the fact that they maintained their ground in the minds of men for a period of no less than twelve centuries of the history of the world.

When we consider the advanced state of the arts and sciences in the age of Augustus Caesar, at least compared with those which preceded it, we cannot but wonder at the imperfect state of geographical knowledge which existed in the Roman world at this period. Horace considered Great Britain and the Thames as the confines of the earth; and Virgil, as we have already remarked, placed the source of the Nile in India. The geographical productions of Dionysius Periegetes and of Pomponius Mela, written within a period of fifty years after the Christian era, contain nothing worthy of notice, being mere compilations of what was then known, and by no means improved.

When the legions of the Emperor Claudius Caesar, A.D. 40, marched to the conquest of Britain, this country was a new world to the Romans. The fleet of Agricola, thirty-five years afterwards, circumnavigated Scotland, explored the surrounding seas, and re-discovered the famous Thule. But even at this epoch Great Britain was still a mysterious country; Tacitus says it was bounded on the east by Germany, on the south by Gaul, and on the west by Spain. As to Ireland, he places it midway between Spain and Great Britain. The interior of Germany became known to the Romans in consequence of their active commerce with certain northern parts of Europe, which arose from the passion of the Roman ladies forascus or yellow amber. In the east, a discovery of very great importance advanced the progress of navigation and geography. Hippalus, about the middle of the first century, established the fact of the periodicity of the monsoons, or trade-winds, in the Indian Ocean, which from that period has regulated the motions of the western navigators to India and the Asiatic Archipelago.

On the south, the expedition of the Consul Quintus Paulinus into the country of Sejdmisana, on the borders of the Sahara, or Great Desert of Africa, disclosed those parts of the modern Morocco and Algeria which extend southwards, from the southern side of Mount Atlas to the confines of the sun-scorched desert. The campaigns of Cornelius Balbus in a neighbouring and parallel region, was accompanied with still more interesting results. The Roman army set out for Tripoli, traversed the desert, penetrated into Fezzan, and advanced even into the country visited by Messrs. Denham and Clapperton in 1822, that is, to the vicinity of Bornou. Of the scientific information gained by
those enterprises, the celebrated Caius Soundus Pliny availed himself, in his Natural History. He also knew how to dip with considerable discernment into the writings of the Greeks; but he appears not to have considered it necessary to consult the work of Strabo. From the information he had obtained in this way, he assigned to the different quarters of the world then known the following magnitudes:—To Europe, one-third; to Asia, one-half; to Africa, one-sixth; to the islands, one-sixth.

Mariners of Tyre, who preceded Ptolemy, was distinguished for his geographical knowledge. He took advantage of all ancient and contemporary writers to compose a complete treatise on the subject of geography and maps; and he even prepared new editions of his books, corrected and improved in proportion as he obtained more exact information; but it is to be regretted that these have not reached us. At last appeared, about the middle of the 3rd century, the famous Ptolemy, who lived at Alexandria in Egypt, and taught astronomy there. His system of astronomy and geography, which stood unimpeached for about twelve centuries, and received the name of the Ptolemaic system from its author, was not superseded till Copernicus appeared; and notwithstanding his errors, due more to the ignorance of mankind than to himself, his name is still revered as a geographer and astronomical observer. His work entitled the "Mappae Sphaerica, or Great Construction," is a monument of his labour and his learning. He examined the ratio of the length of the gnomon or style of the sun-dial to its shadow at the equinoctes and the solstices; he calculated eclipses; he investigated the calculations founded on the difference of climate, and carefully consulted the reports of travellers and navigators. He reduced his information and observations into a regular system, and expressed the positions of places by longitude and latitude. He taught how to determine the longitude by lunar eclipses, and by this method ascertained that all merchant ships to be able to find their way with tolerable accuracy.

According to Ptolemy, the limits of the world were Thule on the north, and the Prassum Promontorium on the south, the former being, most probably, some part of Norway, and the latter some unknown point south-west of Madagascar. Its limits on the west were the Fortunade Isles, now the Canaries; and on the east, the coast of India and Siam. He represented the theory of all preceding geographers, who represented the world as surrounded by an impassable ocean on all sides; and he replaced it by an indefinite expanse of unknown land. He rejected the true reports of circumnavigation of Africa, and extended its limits southward beyond all reasonable bounds.

With Europe, Ptolemy was tolerably well acquainted; and he described Germany and Sarmatia with some degree of accuracy. He knew the Ems, the Weser, the Elbe, the Oder, and the Vistula. He calls Jutland the Cimbri Chennai or Peninsula, and the Baltic, the Sarmatic Ocean; but he failed in his account of this inland sea. He was better acquainted with the south of Russia in Europe, with the Tanais, the Dorysthenes, and the Euxine, or Black Sea. In his description of the Mediterranean there are many errors; but his account is more accurate with them all than that of any previous geographer. In regard to his Asia, his knowledge and method of proceeding, though some features can be still identified with fact. Here he described the "Golden Chennai," and the Magna Sinus, or Great Bay of India. These appear to have been the Indo-Chinese countries of Ava, Pegu, and Malacca, with their adjacent gulfs or bays; and Thine, which he places at this remote corner, is supposed to be Siam, rather than any place in China.

The Series of Ptolemy in the north of Asia is supposed, with good reason, to be China, which was reached by great trading caravans, which proceeded from Byzantium (or Constantinople), across Asia Minor, crossing the Empires at Hierapolis, and passing through Media, by way of Euchates to Hecatompylos, the capital of Parthia. Their next route was through Hyrcania, Aria, Mirmiana, and Bactria, whence they ascended the table-land of the interior of Asia, passed over the Mounts Comebolous, or Bocor Mountains, and reached the celebrated Lithinas Pyros, or "Stone Tower," a station whose site is still a doubtful question among geographers. From this station to the frontier of Soria was a seven months' hard and perilous journey. The description which Ptolemy gives of Soria corresponds more exactly to China than to any other country; and his account of the manners and customs of the inhabitants identifies it still more. Moreover, the staple commodity of this overland trade was silk, for which China has been celebrated from time immemorial. Ptolemy appears to have had a considerable knowledge of Hindostan or India, both within and beyond the Ganges; a knowledge said to be superior to that of the moderns till within the limits of the present century. With regard to Africa, this statement may just be reversed. But, on the whole, his work must be considered a singular monument of industry, and a valuable book of reference in all matters relating to the ancient geography of the world.

LESSONS IN FRENCH.—V.

SECTION L—FRENCH PRONUNCIATION (continued).

III. NAME AND SOUND OF THE VOWELS.

38. É, è, acute.—Name, oy; sound, like the letters oy in the English word proxy.

EXAMPLES.

FRENCH. PRONUN. ENGLISH. FRENCH. PRONUN. ENGLISH.
Arrivé Ar-er-vay Arrived. Oblégi O-blo-zhay Obliged.
Elevé Ay-lé-vay Raised. Préceder Przay-day To proceed.
Filagré Fluh-gorn-ay Wheeled. Promédié Fray-may Passed.
Fongé For-chay Forged. Trouvé Troo-vay Found.
Mérté May-reyt Worth.

39. É, è, grave.—Name, oi; sound, like the letters oy in the English word stair.

EXAMPLES.

FRENCH. PRONUN. ENGLISH. FRENCH. PRONUN. ENGLISH.
Chère Shaar' Cheer. Madeira Maed-air Madeira.
Colère Ro-kair Passionate. Mandrie Man-dair Manatee.
Élève Ay-lé-vay Pupil. Mère Mair Mother.
Élévo Fan-ri'z Feyer. Moelle Mod-dal Patterns.
Lurbé Bav Legal. Raltropt.

40. É, è, circful.—Name, oi; sound, like the letters oy in the English word stair.

É has a longer and broader sound than ë. The mouth must be opened wider in pronouncing the former than the latter. In ordinary reading and common conversation, the difference between é and ë is hardly perceptible. Still there is a difference; just the difference between pronouncing é like the letters oy in the English word stair with the mouth half opened, and pronouncing the same letters in the word in which the mouth well opened, and also prolonging the sound. Practice will demonstrate this.

EXAMPLES.

FRENCH. PRONUN. ENGLISH. FRENCH. PRONUN. ENGLISH.
Bôto Bo-tay A boat. Foré Fro-ray Forest.
Crôno Kraym Cream. Mâme Maim The same.
Crêpo Kraip Creps. Prêcher Pray-shay To preach.
Dépêche Day-push Dispatch. Prêt Pray Ready.
Être Alt' To be. Étoe Rav Dream.
Extre Eks-trelm Extreme. Têto Tait Head.

SECTION XII.—PLURALS OF PRONOUNS, ETC.

1. The plural form of the pronouns, is, or ; is, er or , is les, them, for both genders. Its place is also before the verb.

Vous les avez. Les avez-vous? You have them. Have you them?
Nous les avons pas. We have not them.

2. The plural of the article, preceded by the preposition de, or from, is des for both genders.

Des livre, des plumes. Of or from the books, of the pens.
Des frenés, des scours. Of or from the brothers, of the sisters.

3. The same form of the article is placed before plural nouns used in a partitive sense [Sect. IV. 1].

J'ai des habits. I have clothes.
Vous avez des maisons. You have houses.
**SECTION XI.**

**AGREEMENT OF ADJECTIVES—FEMININE OF ADJECTIVES.**

1. The adjective in French, whatever may be its place,* agrees in gender and number with the noun which it qualifies [§ 15 (1) (2)].

2. Adjectives ending with _e_ mute, i.e., not accented, retain that termination for the feminine.

3. Adjectives not ending in _e_ mute take _e_ for the feminine.

4. Exceptions.—Adjectives ending in _el_, _en_, _et_, or _es_, and _e_, double the last consonant and take _e_ to the feminine.

5. Adjectives ending in _f_ change the _f_ into _v_; those ending in _e_ change that letter into _s_ for the feminine.

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**EXERCISE 17.**


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**EXERCISE 18.**

1. _Have you my tables or yours?_ 2. _I have neither yours nor mine, I have the inkeeper's._ 3. _Have you them?_ 4. _No, Sir, I have them not._ 5. _Has your sister my horses?_ 6. _Yes, Sir, she has your two horses and your brother's._ 7. _Are you right or wrong?_ 8. _I am right, I am not wrong._ 9. _Has the tinman my silver candlesticks or yours?_ 10. _He has neither your nor your candlesticks nor mine._ 11. _What has he?_ 12. _He has the cabinet-maker's wooden tables._ 13. _Has he your mahogany chairs?_ 14. _No, Sir, he has my white marble tables._ 15. _Have you these tables or those?_ 16. _I have neither these nor those, I have the cabinet-maker's._ 17. _Have you good pencil-cases?_ 18. _No, Sir, but I have good pencils._ 19. _Has the traveller iron guns?_ 20. _Yes, Sir, he has mine, yours, and his._ 21. _Has he not your brother's?_ 22. _He has not my brother's._ 23. _Has the workman my iron hammers?_ 24. _Yes, Sir, he has them._ 25. _Has my brother your pens or my cousin's?_ 26. _He has mine and yours._ 27. _Have you the children's clothes?_ 28. _Yes, Madam, I have them._ 29. _Have you your sister's hat?_ 30. _I have my cousin's, f._ 31. _Is anything the matter with your brother?_ 32. _He is cold and hungry._ 33. _Have you horses?_ 34. _Yes, Sir, I have two horses._ 35. _I have two horse-hair mattresses and one wool mattress._

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* For the place of adjectives see Sect. XIII, and Sect. VI. 5.
OUR HOLIDAY.

Gymnastic Exercises.—II.

RETURNING to exercises which may be practised without the aid of a companion, we have next to mention a class of light gymnastics known as the

WAND EXERCISES.

These are especially beneficial in inducing flexibility of the shoulder-joint, and form a useful preparation for more arduous movements at a later stage of the learner’s progress.

The wand is a smooth stick, one inch in diameter and four feet long, with the ends rounded. For very young persons a length of three feet is sufficient. The following are among the exercises to be practised with this instrument.

1. Grasp the wand with the hands at either end, as seen in Fig. 5; the attitude being perfectly erect, and the chest thrown forward. Now, without bending the elbows, bring the wand down behind you as far as you can, then raise it again to the original position above the head, and repeat these movements twenty times in succession.

Vocabulary.

Beau, bel, belle, handsome.

Belle, good.

Content, -e, pleased.

Cramate, -e, cravate.

Dame, -e, lady.

Dameur, -e, dressmaker.

Digne, -e, elegant.

Vocabulary.

Filie, -e, daughter.

Haut, -e, cost.

Heureux, -e, Happy.

Ici, there.

Meilleur, -e, better.

Nos, -e, us.

Pareil, -e, equal.

Pommele, -e, idle.

Pommelez, -e, idle.

Pommelez, -e, idle.

Pommelez, -e, idle.

Quelq'un, a.

Rien, no.

Sel, -e, salt.

Tendre, -e, tender.

Excellence, -e, excellence.

EXERCISE 19.


EXERCISE 20.

1. Is your little sister pleased? 2. Yes, Madam, she is pleased. 3. Is that little girl handsome? 4. That little girl is not handsome, but she is good. 5. Have you good clothes and good silk? 6. My coat and silk are here. 7. Is your sister happy? 8. My sister is good and happy. 9. Has that physician’s sister friends? 10. No, Madam, she has no friends. 11. Is your meat good? 12. My meat is good, but my cheese is better. 13. Has the bookseller a handsome china inkstand? 14. He has a fine silver inkstand and a pair of leather shoes. 15. Have you my silk parasols? 16. I have your cotton umbrellas. 17. Is your brother’s coat handsome? 18. My brother has a handsome coat and an old silk cravat. 19. Have you relations and friends? 20. I have no relations, but I have friends. 21. Is that handsome lady wrong? 22. That handsome lady is not wrong. 23. Have you handsome china? 24. Our china is handsome and good. 25. It is better than yours. 26. Is not that little girl hungry? 27. That handsome little girl is neither hungry nor thirsty. 28. What is that which is the most important? 29. She has neither relations nor friends. 30. Is this gold watch good? 31. This one is good, but that one is better. 32. Have you it? 33. I have it, but I have not your sister’s. 34. I have neither yours nor mine, I have your mother’s.

THE DUMB BELLS.

We now come to Dumb Bell exercises, which are a well-known and very ancient means of physical culture. The best modern gymnasts, however, have introduced an important change in the practice with dumb bells. Formerly it was the custom to employ the heaviest bells that could be used by the learner, and to put him only through a small variety of motions with them. Now the most approved system is founded on the use of a light dumb bell, with which the pupil is taught to perform a great variety of active and graceful movements, calculated to advance the flexibility as well as the strength of all the muscles of the body. Some gymnasts maintain that the dumb bell should range only between two pounds and five pounds in weight, according to the strength of the learner; but Dr. Dio Lewis, who takes the lead as a recent authority in gymnastics, and who has a most approved system, is of opinion that bells weighing two pounds are enough heavy for any man, provided he wishes to attain to something more than the strength required for lifting heavy weights. He recommends that, as the dumb bells should be of considerable size, they should be made of wood; and wooden dumb bells only are used in his own gymnasium at Boston, U.S. The handle should be at least half an inch longer than the width of the hand, and of such a size as can be easily grasped with the right hand in the middle.

Before describing the light dumb bell exercises, we will, however, say a few words as to the use of the heavier metal bells, with which some of our readers may be already provided. The object of their use is chiefly to strengthen the muscles of the
wrist and arms, and among the most suitable exercises for this purpose are the following:

1. The dumb bells are held close before the chest, the arms from the shoulder to the elbow resting by the side. The body must be erect, the heels touching, and the feet at right angles. Now raise the dumb bells slowly, first with one hand and then with the other, as high above the head as you can reach; bringing them back to the position in front of you. Then exercise both arms together in the same way.

2. Hold the bells down by the sides, and raise the arms until they are extended at full length in a horizontal position from the shoulders; raise and depress each arm alternately, then lower them both down to the sides, and repeat the former movement.

3. From the original position stretch the arms out before you, then bring them gradually back as far as you can without bending the elbows, and keeping the dumb bells grasped in the hands with the thumbs uppermost. Move the arms forward again, making the dumb bells meet in front, and then backward, trying to cause them to touch behind, which you will be able to accomplish with ease.

As the learner gains strength, the speed with which these movements are made may be increased.

Some of the other exercises usually practised without apparatus, which we have described in our first paper on Gymnastics, may also be performed with the heavier dumb bells.

1. The light dumb-bell exercises are commenced by holding the arms straight down, with the bells in an exactly horizontal position from the hips, the thumbs outward. Now turn the thumb ends of the bells to the hips, and back again, ten times. Be careful at each turn to keep the bells perfectly straight, so that a line run through one dumb bell would also pass through the other.

2. Now, with the arm from the shoulder to the elbow close by the side, hold the bells before you with the thumbs outward. Then turn the bells until their ends are reversed, as before, making them come in line at each movement, and repeat this ten times in succession. These exercises will do much to strengthen the wrists.

3. Hold the bells straight in front, the arms being extended, and the knuckles pointing downward; then twist the arms until the position of the dumb bells is reversed, the knuckles being upward.

4. Thrust the bells downward, upward, forward, and sideways, bringing them back to the chest after each movement, and repeating the series five times. Take great care that at each movement the arms and the bells be exactly parallel to each other.

5. Swing the bells energetically backward and forward, making them meet both in front of the chest and behind the back.

6. Go through the "charging" exercises already described among the wand movements, each dumb bell in turn serving the purpose of an imaginary wand for the guidance of the gymnast in the position.

7. Hold one dumb bell high above the head with the right hand, the arm being quite straight; let the other bell rest on the neck—the arm, of course, being bent; change the position of each arm alternately. Now, with the bells still in these positions, stretch the left leg backward as far as possible, and, when it has reached its limit, sink the body in a perpendicular line. Rise to the perpendicular again, and then stretch back the other leg in the same way. Repeat these movements five times.

8. Standing erect, arms down, carry them to the horizontal position, then above the head as seen in Fig. 8. Now down to the horizontal again, and then to the floor, as seen in the dotted lines in the figure. Repeat these movements ten times, and without bending the knees or the elbows.

Here we must leave the dumb bells; but, as in the case of the other exercises, the examples which we have now given will be sufficient to suggest numerous variations and additions to the learner.

We pass on now to another kind of exercise, which will give the learner more severe work than any of those to which we have yet alluded.

INDIAN CLUBS.

The clubs are made of wood; they should be about eighteen inches long, somewhat tapering in form, from three to four inches in diameter at the thickest end, and the other forming a convenient handle for the grasp. The weight of the clubs should be just such as will allow the learner to use them with tolerable freedom; for anything like a violent or undue strain upon the muscles is to be avoided in our gymnastic training.

We need not give a detailed list of Indian club exercises. Many of those performed with the dumb bells, etc., can be practised to equal advantage with the clubs, and the learner who has studied the rules and movements we have already given, will know how to proceed with these implements. It will assist him, however, to have before him the two illustrations given on this page. Fig. 7 indicates the proper position of the body from which all the exercises should be commenced, the clubs being used either in perpendicular or horizontal positions, or sometimes in both simultaneously, as in the cut.

Fig. 6 shows the kind of movement which may be practised in order to obtain entire freedom with the clubs, the dotted lines describing their direction. Having reached the back, bring the arms to the side, with the clubs hanging downward; then sweep them the reverse way to that shown in the illustration, holding them above the head, and arching the body as much as possible. Remember in the club exercises, as in all others, the invariable rule, never to bend the knees or the elbows unless the character of the movement contemplated renders it absolutely necessary to do so.
LESSONS IN BOTANY.—III.

SECTION IV.—STRUCTURE OF THE STEM OF VEGETABLES.

This is a very important point, and helps to furnish us with a means of dividing plants, at least flowering plants, into two primary groups: one being woody, the tree, that which takes place during the growth of an oak from the acorn. The acorn, on being planted in the ground, sends down its root, and sends up its stem. At first this stem is a tiny thing of very inconsiderable diameter; year by year, however, it grows, until a gigantic tree results. If we now cut this tree across and examine the structure of its section, we shall recognise the following appearances. In the first place, commencing our examination from within outward we shall find the bark, or cortex (Latin, cortex, bark)—separable into two distinct layers, the outer of which is termed the cuticle (Latin, cutis, skin), or epidermis, (Greek ἐπιδερμίς, pronounced ἐπί-der'-mis, the outer skin), and the inner one the liber, so called because the ancients occasionally employed this portion of the bark as a substitute for paper in the making of books—liber being the Latin for book. Passing onwards, we observe the woody fibre and its central pith. The woody fibre itself is evidently of two kinds, or at least is so put together that wood of two degrees of hardness results. The external portion of wood is the softer and lighter in colour, and termed by botanists alburnum, from the Latin word albus, white; the interval is the harder, and termed by botanists duramen, from the Latin durus, hard, although carpenters denominate it heart-wood. Lastly, in the centre comes the pith or medulla, from the Latin, medulla, the marrow, which traces its origin to another Latin word, medius, the middle, the marrow being in the middle of the bone. Regarding this section a little more attentively, we shall observe passing from the pith to the bark, and establishing a connexion between the two, a series of white rays, termed by the botanist medullary rays, and by the carpenter silver grain. We shall also observe that the section displays a series of ring-like forms concentric one within the other. These are a very important characteristic. They not only prove that wood has been generated by continued deposition of woody matter around a central line, or, in other words, by an external deposition, but they enable us in many cases actually to read off the age of any particular tree—the thickness corresponding with one ring being indicative of one year's growth. Inasmuch as the formation of an oak tree is thus demonstrated to be the consequence of a deposition of successive layers of wood, either actually or without—it is said to be like all others subjected to the same kind of growth, exogenous plants from two Greek words, ἐξω (ex'-o), without, and γεννάω (gen-nά-o), g hard, as in gum), I generate.

Fig. 10 represents the internal structure of an exogenous stem.

It is true that the peculiar disposition of rings thus spoken of cannot always be recognised. For example, as a rule, trees which grow in hot climates are checked so little in their progress, the winter to which they are exposed being so short, that their growth of course is scarcely interfered with by any impediment. Under these circumstances, there is scarcely any winter pause sufficient to create a line of demarcation between ring and ring; the progress of deposition goes on continuously. However, the manner of deposition is not the less external because we cannot see the rings.

Very different from this method of increase is that by which another grand division of plants augments in size. For an example we must no longer have recourse to a section of a plant of our temperate zone, but must appeal to the larger tropical productions of this kind. If we cut a piece of bamboo, or cane (with which most of us are familiar), horizontally, we shall find a very different kind of structure to that which we recognised in the oak. There will be no longer seen any real bark, nor any pith, and the concentric rays will be also absent, but the tissue of which the stem is made up may be compared to long strings of woody fibre tightly packed together. These concentric rings, in point of fact, could not have existed; inasmuch as a cane does not grow by deposition of woody matter externally, but internally, or, more properly speaking, upwards. A young cane is just as big round as an old cane, the only difference between them consisting in the matters of hardness and of length. Hence, bamboos, and all vegetables which grow by this kind of increment, are termed endogenous, from two Greek words, ἐν (en), within, and γεννάω (gen-nά-o), I generate. The largest specimen of endogenous growth is furnished by palm trees—those magnificent denizens of tropical forests, to which we are so much indebted for dates, cocoa-nuts, palm-oil, vegetable wax, and numerous other useful products. Fig. 11 is a representation of the section of a palm tree, in which the peculiarities of endogenous structure are very well developed. All the endogenous productions of temperate climates are small, though very important. In proof of the latter assertion it may suffice to mention the grasses; not only those dwarf species which carpet our lawns and our fields with verdure, but wheat, barley, oats, rice, maize, all of which are grasses, botanically considered, are endogenous. Indeed, size has little to do with the definition of a grass; for if we proceed to tropical climates, we shall there find grasses of still more gigantic dimensions. Thus the sugar cane, which grows to the elevation of fifteen or sixteen feet, is a grass, as in like manner is the still taller cane, out of the stem of which, when split, we make chair-bottoms, baskets, window-blinds, etc., and which, when simply cut into convenient lengths, is so useful for other purposes of our younger readers.

The reader will not fail to remember that we, a few pages back, divided vegetables into phanogamous and cryptogamous (we are sure we need not repeat the meaning of these terms). We may now carry our natural classification still further, and say that phanogamous plants admit of division into exogenous and endogenous ones. This division is quite natural, even if we
have regard merely to the structure of the stem; but the agreement is much wider than this, and recognisable by other animals, we shall see presently, when we come to consider the nature and peculiarities of leaves and seeds.

SECTION V.—CONCERNING LEAVES AND THEIR USES.

There are two methods of teaching the nature of a thing; one is by definition, the other by example. Of these the latter is usually the more vivid, but the former is the more precise. Accordingly, then, we shall commence by stating that in botanical language a leaf admits of definition as "a thin flattened expansion of epidermis, containing between its two layers vascular and cellular tissue, nerves, and veins, and performing the functions of exhalation and respiration." Such is the botanical definition of a leaf. Probably the learner may not understand this definition at first, but a little contemplation will enable him to do so. With the object of enabling him to understand the definition, suppose we go through its clauses one by one.

Firstly, then, a thin flattened expansion of epidermis, we assume to be self-evident expression. The epidermis means, as we have already stated, the outside bark—at least, this is its botanical acceptation. Literally, the Greek word ἕρπεσιν means skin, as we have said above, and is also applied to the cuticle enclosing nerves and veins, vascular and cellular tissue. All these terms have been pretty well explained. We may add, however, that when cellular tissue exists confusedly thrown together, as it does in the substance of a leaf, or as it appears in the orange, then such cellular tissue is denominated parenchyma, from the Greek word παρενχύμα pronounced par-en'kú-ma "anything poured out."

Before we quite finish with our remarks relative to the substances which enter into leaves, it is necessary to observe that the green colouring matter of leaves is termed by botanists and by chemists chlorophyl, from the two Greek words χλωρις (pronounced kló-ris) yellowish green, and φυλόν (pronounced ful'on), a leaf. This chlorophyl is subject to be sicmised in autumn, as we all know, but the cause of this alteration has not yet been explained.

READING AND ELOCUTION.—III.

IV. THE COMMA.

22. The mark used for a comma is a round dot with a small curve appended to it, turning from right to left.

23. When you come to a comma in reading, you must, in general, make a short pause or stop, so long as would enable you to count one.

24. The last word before a comma is most frequently read with the falling inflection of the voice.

25. In reading, when you come to a comma, you must keep your voice suspended as if some one had stopped you before you had read all that you intended to read.

26. In the following examples keep your breath suspended when you come to the comma; but let the short pause or stop which you make, be a total cessation of the voice.

Examples.

Diligence, industry, and proper improvement of time, are material duties of the young.

He is religious, generous, just, charitable and humane.

By wisdom, by art, by the united strength of a civil community, men have been enabled to subdue the whole race of lions, bears, and serpents.

The genuine glory, the proper distinction of the rational species, arises not from the perfection of the mental powers.

Courage is apt to be fierce, and strength is often exerted in acts of oppression.

Wisdom is the associate of justice. It assists her to form equal laws, to pursue just measures, to correct power, to protect weakness, and to unite individuals in a common interest and general welfare.

Heroes may kill tyrants, but it is wisdom and laws that prevent tyranny and oppression.

27. When a not of interrogation occurs at the end of a sentence, the parts, and even the words, of the sentence separated by commas, should each be read like a question.
MECHANICS.

Did you read as correctly, speak as properly, or behave as well as James? Art thou the Thracian robber, of whose exploits I have heard so much?

Who shall separate us from the love of Christ? shall tribulation, or distress, or persecution, or famine, or peril, or sword? How are the dead raised up, and with what body do they come? For what is our hope, our joy, or crown of rejoicing?

Have you not unceasingly your time, wasted your talents, and passed your life in idleness and vice? Have you been taught anything of the nature, structure, and laws of the body which you inhabit?

Were you ever made to understand the operation of diet, air, exercise, and modes of dress, upon the human frame?

28. Sometimes the word preceding a comma is to be read like that preceding a period, with the falling inflection of the voice.

Examples.
It is said by unbelievers that religion is dull, unsociable, uncharitable, enthusiastic, a damper of human joy, a morose intruder upon human pleasure.

Nothing is more erroneous, unjust, or untrue, than the statement in the preceding sentence. Perhaps you have mistaken sobriety for dulness, equanimity for moroseness, disinclination to bad company for averse to society, abhorrence of vice for uncharitableness, and piety for enthusiasm. Henry was careless, thoughtless, heedless, and insatiable. This is partial, unjust, uncharitable, and iniquitous. The history of religion is marasculated by its enemies, for instances of persecution, of squalors, and of enthusiastic irregularities.

Religion is often supposed to be something which must be practiced apart from everything else, a distinct profession, a peculiar occupation.

29. Sometimes the word preceding a comma is to be read like that preceding an exclamation.

Examples.
How can you destroy those beautiful things which your father procured for you! that beautiful top, those polished marbles, that excellent ball, and that beautifully painted kite, oh how can you destroy them, and expect that he will buy you new ones!

How cast thou renounce the boundless store of charms that Nature has prepared for thee, the waving woodland, the resounding shore, the pomp of groves, the garbure of fields, all that the genial ray of morning gilds, and all that choos to the song of even, all that the mountains' sheltering bosom shields, and all the dread magnificence of heaven, how canst thou renounce them and hope to be happy?

O Winter! ruler of the inverted year! thy scattered hair with sleek-like ashles filled, thy breath concealed upon thy lips, thy cheeks fringed with a board made white with other snows than those of age, thy forehead wrapped in cloths! the waving woodland, the resounding shore, the pomp of groves, the garbure of fields, all that the genial ray of morning gilds, and all that choos to the song of even, all that the mountains' sheltering bosom shields, and all the dread magnificence of heaven, how canst thou renounce them and hope to be happy?

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30. Sometimes the word preceding a comma and other marks, is to be read without any pause or inflection of the voice.

Examples.
You see, my son, this wide and large firmament over our heads, where the sun and moon, and all the stars appear in their turns.

Therefore, my child, fear and worship, and love God.

He that can read as well as you can, James, need not be ashamed to read aloud.

I consider it my duty, at this time, to tell you that you have done something of which you ought to be ashamed.

The Spaniards, whilst thus employed, were surrounded by many of the natives, who gazed, in silent admiration, upon actions which they could not comprehend, and of which they did not foresee the consequence. This was the first manifestation of the Spaniards, the whiteness of their skins, their beards, their arms, appeared strange and surprising.

Yet, fair as thou art, thou shunnest to glide, beautiful stream! by the village side, but windest away from the haunts of men, to silent valley and shaded grove. But it is not for man, either solely or principally, that night is made.

We imagine, that, in a world of our own creation, there would always be a blessing in the air, and flowers and fruits on the earth.

Share with you I said his father—so the industrious must lose his labour to feed the idle.

31. Sometimes the pause of a comma must be made where there is no pause in the book. Spaces are left in the following sentences where the pause is proper to be made.

Examples.
The Europeans were hardly less amazed at the scene now set before them. Their black hair long and curled floated upon their shoulders, or was bound in tresses around their head.

Persons of reflection and sensibility contemplate with interest the scenes of nature.

The succession and contrasts of the seasons give scope to care and foresight in the diligence and industry which are essential to the dignity and enjoyment of human beings.

The eye is sweetly rested on every object to which it turns. It is grateful to perceive how widely yet chastely Nature hath mixed her duties and painted her role.

Winter compensates for the want of attractions abroad by fireside delights and homelike joys. In all this interchange and variety we find reason to acknowledge the wise and benedictory cares of the God of seasons.

32. The pupil may read the following sentences; but before reading them, he should point out after what word the pause should be made. The pause is not printed in the sentences, but it must be made when reading them. And here it may be observed, that the commas are more frequently used to point out the grammatical divisions of a sentence, than to indicate a rest or cessation of the voice.

Good reading depends much upon skill and judgment in making those pauses which the meaning of the sentence dictates, but which are not noted in the book; and the sooner the pupil is taught to make them, with proper discrimination, the sooner and more rapid will be his progress in the art of reading.

Examples.
The golden head that was wont to rise at that part of the table was now wakening.

For even though absent from school I shall prepare the lesson.

For even though dead I will control the trophies of the capitol. It is now two hundred years since attempts have been made to civilise the North American savage.

Dancing wall has something more in it than the fulfilling of a duty.

You will expect me to say something of the lonely records of the former races that inhabited this country.

There is no virtue without a characteristic beauty to make it particularly loved by the good, and to make the bad ashamed of their neglect of it.

A sacrifice was never yet offered to a principle, that was not made up to us by self-apparoval, and the consideration of what our degradation would have been had we done otherwise!

The succession and contrasts of the seasons give scope to that care and foresight, vigilance and industry, which are essential to the dignity and enjoyment of human beings, whose happiness is connected with the exertion of their faculties.

A lion of the largest size measures from eight to nine feet from the toes to the top of his tail, which last is of itself about four feet long. The height of the larger specimens is four or five feet.

A benison upon thee, gentle huntsman! Whose towers are these that overlook the wood?

The incidents of the last few days have been such as will probably never again be witnessed by the people of America, and such as were never before witnessed by any nation under heaven.

To the memory of André his country has erected the most magnificent monument, and bestowed on his family the highest honours and musez liberal encouragements. Not he but stone has been erected, and the traveller asks in vain for the place of his long sleep.

MECHANICS.—III.

FORCES APPLIED TO A SINGLE POINT.—PARALLELGRAM OF FORCES, ETC.

In this lesson we have to consider how the resultant of two, and thence of any number of forces, applied to a single point, may be found. You will keep in mind that by a "single point," I mean a point in a body; and that will save me always adding the latter words when I use the former. Of course, forces applied to "a material point" are included in the description, and these you will find, in due time, to be of very great importance.

As to the joint effect of two or more forces so applied I term them their "resultant," so we name the separate forces of which it is the effect its components. There are thus two operations, the Composition of Forces, and the Resolution of Forces, with which we may be concerned in Mechanics; by the former of which we
denote the putting together, compounding, or finding the resultant of any number of forces, and by the latter the separating, or resolving, of any given force into the two or more to which it may be considered equivalent. The composition we first consider; but this requires a short digression on

THE PARALLELOGRAM.

The resultant of two forces is found by the aid of the "paral-
lelogram of forces;" and, as some of you may not know what a parallelogram precisely is, I shall explain the term, and tell you a few things about it which, in Mechanics, it is desirable you should know.

A parallelogram is a four-sided figure whose pairs of opposite sides and opposite angles are equal. In the adjoining figure, ABCD is a parallelogram, if the side AB is equal to DC, and also BC to AD. The two cross lines, A C and B D, are called the "di-
gonals of the parallelogram." Now, if you ex-
amine the two triangles, A B C, A D C, which are on opposite sides of the diagonal, A C, you will see reason for believing that they must be equal to each other. They are, in fact, the same triangle on opposite sides of that line; for they have A C for a common side, and the other two pairs of sides are equal, namely, A B equal to D C, and A D to B C; and you cannot without three straight lines make two different triangles. This you can satisfy yourselves of by experiment, by putting three rods of different lengths together so as to form a close figure.

Now, the point to which I am trying to lead you, and which you will soon find of importance, is that, since these triangles are equal, so is one and the same triangle in two positions. Hence, if they are to be equal to each other. Hence, if you arrive at the following important properties of a parallelogram:

1. That the opposite angles, A B C and A D C, are equal, also the opposite angles, B A D and B C D.

2. That either diagonal makes equal angles with the pairs of opposite sides, A B D equal to C D B, and A D B equal to C B D.

It is on account of this latter property the figure is called "parallelogram." The opposite sides are not only equal, but parallel, on account of their making equal angles with either diagonal. However, keep in mind that these angles are equal, for this knowledge is necessary to your properly understanding what we next come to, namely—

THE PARALLELOGRAM OF FORCES.

The forces in our cuts and diagrams being represented, as agreed on, by lines, and their directions by arrow-heads attached to their remote ends, this principle may be stated as follows—

If two forces applied to a point are represented in magnitude and direction by two straight lines, their resultant is represented in magnitude and direction by the diagonal passing through that point of the parallelogram of which these lines are two adjoining sides.

In Fig. 2 let P O, Q be the two forces, and draw from P and Q the two dotted lines parallel to them which meet in R, then the dotted diagonal, O R, of the parallelogram thus formed is the resultant, both in magnitude and direction, of P and Q.

Now, I shall not here give you the strict mathematical proof of this proposition; it is too complicated, and involves so much close reasoning, that to force it on a student in the begin-
ning of a treatise on me-
chamics would be to throw an unnecessary difficulty in his way. The best course is to defer it until you have become more accustomed to mechanical reasoning, and then return to it. In the meantime you can satisfy yourselves that it is true by a reference to the two following experiments, one derived from equilibrium, the other from motion.

First Experiment.—Let three weights, u v w, be attached to three cords, as in Fig. 3, which are knotted together at o; and let two of the cords, longer than the third, with their at-
tached weights, be thrown over two pulleys, p q, which move freely in the same plane round axles fastened into a wall or upright board. Arrange, then, the weights and cords until equilibrium is produced. It is evident, from the principle stated at the close of the last lesson, that the force, w, must be equal and opposite to the resultant of u and v, acting over the pulleys at o. Now, take on the cord o p, a length o a, equal in inches to the num-
ber of pounds in u, and on o q another, o b, equal to the pounds in v, and then draw the parallels, A B and B E, to o p and o q, meeting in B; O R will then be the resultant of u and v, if the principle of the parallelogram of forces be true. It should, therefore, be opposite in di-
rection to the force w, and the number of inches in it should be equal to the number of pounds in w. Now, on trial it is found that O R is opposite to w, that is to say, that it points vertically to the plumb-line; and it is also found that the number of inches in its length is that of the pounds in w.

Second Experiment.—Let us suppose that a parallelogram O A B B is described anyhow on a perfectly smooth horizontal table, and that at the point o, two springs are fitted so that one of them, on being let go, would make the unit ivory ball move over o a in the same time that the other would make it move over o b. It is evident that the lines o a and o b would then represent these forces. Furthermore, it should follow, if the principle of the parallelogram of forces be true, that, when both springs are let go together so as to strike the ball, it should move over the diagonal o r of the parallelogram in the same time as the ball moved over o a and o b, separately. Now, this is what, on trial, exactly hap-
pen. The ball does move over the diagonal, and moves over it in the same time that it previously moved over the sides. This it could not do if the resultant of two forces was not repre-
sented in magnitude and direction by the diagonal. Instruments are fitted up for lecture-rooms by which the experiment can be made, and the result always is as I have stated.

Taking the principle, then, as established, let us observe its con-
sequences. You are given two forces, acting at a point, and you want their resultant. Make, you will immediately say, a parallelogram of the two forces, and the diagonal is the required line. Not so fast; you need not describe the whole of that figure, a part will suffice. Now, if from the end o of o, you draw o A parallel and equal to o b, it is clear you do not want to draw o r at all. o A gives you in the far end of the result-
ant, and all you have to do then is to join r with o, and your object is gained. Thus your paral-
lelogram of forces suddenly becomes a triangle of forces; and you may lay this down as your rule in future for compounding two forces.

Draw from the extremity of one of the forces a line equal, and parallel to, the other force; and the third side of the triangle so formed by joining the end of this line with the point of application is the resultant.

There is great advantage in this substitution of the triangle for the parallelogram, for it saves the drawing of unnecessary
lines, which, as you will see, when many forces have to be compounded, would cause much confusion in your figures.

Let us apply this principle now to compound any number of forces acting on a point. Let there be five, and that will illustrate the rule as well as a thousand could. Suppose forces, \( \mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e} \), applied to the point, \( O \). By the triangular rule, if I draw \( \mathbf{a} \) in line \( AB \) parallel and equal to \( \mathbf{O} \mathbf{B} \), the line joining \( O \) with the resultant of the first two forces. I shall not actually draw this line, \( O \mathbf{B} \); let us suppose it drawn. Now, if I compound this resultant with \( \mathbf{O} \mathbf{C} \), I have the resultant of three of the forces. I say, that, by the same rule, is got by drawing from \( O \) a line \( \mathbf{OC} \), equal and parallel to \( \mathbf{O} \mathbf{C} \). The line \( O \mathbf{B} \) is this resultant of three. Again we shall not draw it. The resultant of this and \( O \mathbf{D} \), for the same reason, would be \( O \mathbf{E} \), got by drawing \( \mathbf{R}_3 \) parallel and equal to \( \mathbf{O} \mathbf{D} \), and, lastly, the resultant of this and \( \mathbf{O} \mathbf{E} \) would be \( \mathbf{O} \mathbf{R} \), the line, \( \mathbf{R}_3 \), being equal and parallel to \( \mathbf{O} \mathbf{E} \). We have thus exhausted all the forces, and evidently \( \mathbf{O} \mathbf{R} \), the resultant of the whole five. There was here no confusing ourselves with parallelograms; all we had to do was to draw line after line, one attached to the other, carefully observing to keep their magnitudes and directions aright. A kind of unfinished polygon was thus formed, and the line \( \mathbf{O} \mathbf{R} \), which closes up the polygon, joining the last point \( \mathbf{R}_5 \), with the point of application, \( \mathbf{O} \), is the resultant in magnitude and in direction. Thus you have made another step in advance, and arrived at the Polygon of Forces. You have learned how, by the mere careful drawing of lines, to determine the resultant of any number of forces. All you require is paper and pencil, a rule, compasses, a scale, and a pair of parallel rulers.

Now, there is one point about this polygon I wish you carefully to note. You will observe that the arrows on its sides, representing the directions of the forces you have compounded, all point from left to right, as you go round the figure, turning it with you so as to bring each side in succession to the top. The resultant, however, points in the opposite direction, from right to left, when that side is uppermost. This is as it should be; the direction of the resultant, as you go round the figure, must be opposite to those of the components. The use of this you will see in the next lesson.

Now, let us suppose that, in determining the resultant after this method, we come to the end of the operation, the end, \( \mathbf{R}_n \), of the last line, \( \mathbf{R}_n \), chanced to coincide with, or fall upon the point of application, \( \mathbf{O} \). The polygon would close itself without any joining line; what is the meaning of this? It means that there is no resultant; the line, \( \mathbf{O} \mathbf{R}_n \), is nothing, and therefore the resultant is nothing, and the forces produce equilibrium. What a valuable result we have arrived at! A method by which we can, by rule and compass, tell at once whether any number of forces make equilibrium at a point or not. All we have to do is to describe the polygon of forces, and if it closes up itself, there is equilibrium; if it does not, the forces do not make equilibrium, and the resultant is in magnitude the side which is necessary to close the figure.

Deferring the further expansion of this subject to the next lesson, I shall now turn back and apply these principles to a few elementary examples.

First Example.—Three equal forces act at a point in different directions—what condition should they fulfil in order to be in equilibrium? Get your ruler and compass and, for the sake of saving time, as we are only constructing the figure by which their resultant may be found. From the end of one of the forces you are to draw a line equal and parallel to the second equal force, and from the end of that another line, equal and parallel to the third. You will thus have three lines strung together, all equal to each other. But if the forces are in equilibrium, the end of the last line must fall on the point of application, that is to say, the polygon of forces must close up, and form a triangle. Your construction will then give you a triangle of three equal sides, commonly called an equilateral triangle. But such a triangle must have all its angles equal; also the angles between the sides of the triangle, or of the polygon of forces, are the angles between the forces themselves, since they are parallel to these forces. This comes from the properties, 1 and 2, of the parallelogram referred to above; therefore, in the case we are considering, the three equal forces must act at equal angles, as I showed otherwise must be the case at the close of the last lesson.

Second Example.—Let a weight hang from the ceiling by means of two cords of unequal length, as in Fig. 7. It is evidently at rest. Whatever be the forces called into action, they produce equilibrium. Is there nothing further to ascertain? What may be desirable to know is how much each cord is strained. Our assurance that the cords will support the weight depends on this knowledge. Let \( r \) and \( q \) be the two points of support of the strings which meet at \( O \). Now, whatever be the straints on the cords, \( O r, O q \), they make equilibrium with \( w \), the weight. Therefore, if we suppose a length, \( a \), of \( O r \) to represent the strain on \( O r \), and from \( A \) draw \( a \) \( \parallel \) to \( r \), parallel to \( o q \), equal to the strain, \( O n \), on \( O q \), then, since the three forces are in equilibrium, the line, \( O \mathbf{R} \), closing up the triangle must be equal to, and in the direction as, the third force, or weight, \( w \). This, then, tells us what to do. Measure on \( O R \) upward as many inches as there are pounds in \( w \); and from \( R \) then draw \( R A \) parallel to the cord \( O r \) to meet the cord \( O A \). The number of inches in \( O A \) will represent in pounds the strain on \( O r \), and those on \( O A \) the strain on \( O q \). All, therefore, that we desire to know is determined.

Third Example.—A horse pulls a roller up a smooth inclined plane or slope; what is the force the horse must exert when he just keeps the roller at rest? And by how much does the roller press on the plane?

Let the horse pull in any direction, \( O \mathbf{A} \). Then there will be three forces acting on the roller; namely, its own weight right downwards, the horse's pull, and the resistance of the plane or slope, perpendicular to itself. There must be this third force, for the other two, not being opposite to each other, cannot make equilibrium. The roller is somehow supported by the plane; and it cannot be unless by its resistance; and a plane cannot resist except perpendicularly to itself. This third force, you thus see, must be taken perpendicular to the plane. It is represented in the figure by \( O \mathbf{B} \). Now apply the polygon of forces. Let \( O c \) represent the weight of the roller, and from \( c \) suppose a line, \( c \mathbf{R} \), drawn equal and parallel to \( O \mathbf{A} \), the horse's pull. Then, since there is equilibrium, the polygon of forces should close up and become a triangle—that is, the line joining \( O \) with \( O \mathbf{A} \) should be the pressure, and therefore should be perpendicular to the plane. What then are we to do? Take \( O \mathbf{R} \) in inches to the number of pounds in the roller draw then from \( \mathbf{A} \) a line \( \mathbf{R} \mathbf{P} \) parallel to the horse's pull, to meet the line drawn from the centre \( O \) of the roller perpendicularly to the plane; \( \mathbf{CR} \) so determined will in inches tell the pounds in the horse's pull, and \( O \mathbf{R} \) the amount by which the roller presses the plane. You can easily see from this that as the slope increases the pull will increase and the pressure diminish. This is what naturally we should expect. The plane I have supposed to be smooth; for, where there is friction against the roller caused by roughness in itself or in the plane, or in both, the question is much altered, as in due time you will see.
LESSONS IN FRENCH.—VI.

SECTION I.—FRENCH PRONUNCIATION (continued).

III. NAME AND SOUND OF THE VOWELS.

41. I, I,—Name, EE, ee; sound, like the letters oo in the English word see.

This vowel receives but one kind of accent, and that is the circumflex, viz.: i; though it is comparatively seldom found thus accented. This vowel has two sounds, viz., long and short, long, as in the English word see, and short, like i in the English word pie, or nearly like it. It becomes nasal in combination with the letters m and n, in which case the character of its own sound is completely changed, which is indeed true of all the vowels.

In these Lessons, the vowel i, i, will be represented by the two letters oo, when long or under the circumflex accent, and by e when it has the short sound.

EXAMPLES.

FRENCH. PRONUN. ENGLISH.

Ciro see Sewer.
Diro Dreer To say.
Dit Dee Said.
Il ill Ha.
Iris Ee-ris Iris.
Line Loom Flee.

SECTION XII.—AGREEMENT OF ADJECTIVES.—PLURAL OF ADJECTIVES.

1. An adjective qualifying a plural noun, or two or more singular nouns of the same gender, assumes the gender of the noun or nouns, and is put in the plural.

Les arbres et les fruits sont beaux,
Les fleurs et les plantes sont belles,
Votre jardin est très-beau,
Votre jardin est très-belle,
Votre jardin est très-beaux,
Votre jardin est très-belles.

2. An adjective qualifying two or more nouns of different genders is put in the plural masculine [§ 18].

Mon frère et ma sœur sont contents,
Votre mari et ma femme sont agréables.
La peau et la plume sont bonnes,
Les peaux et les plumes sont agréables.
Le mari et le marié sont heureux,
Les maris et les mariés sont heureux.

3. The plural of the feminine of adjectives is invariably formed by the addition of an s.

Vous avez des jolies maisons,
Vous avez des jolies maisons, des maisons jolies.
Vous avez des jolies maisons, de belles maisons.
Vous avez des jolies maisons, des maisons jolies.
Vous avez des jolies maisons, de belles maisons.
Vous avez des jolies maisons, des maisons jolies.

4. The plural of the masculine adjectives is generally formed by the addition of an s.

Les écoliers sont attentifs,
Les écoliers sont attentifs,
Les écoliers sont attentifs,
Les écoliers sont attentifs,
Les écoliers sont attentifs,
Les écoliers sont attentifs.

5. The terminations s and x are not changed for the plural masculine.

Nos fruits sont mûrs,
Vos bois sont magnifiques,
Votre bois est magnifique,
Votre bois est magnifique,
Votre bois est magnifique,
Votre bois est magnifique.

6. To the termination cat, x is added for the plural masculine.

Vos chevaux sont très-beaux,
Votre cheval est très-beau,
Vos chevaux sont très-beaux,
Votre cheval est très-beau,
Vos chevaux sont très-beaux,
Votre cheval est très-beau.

7. The termination ai is generally changed into aux for the plural masculine.

Les hommes sont égaux,
Les hommes sont égaux,
Les hommes sont égaux,
Les hommes sont égaux,
Les hommes sont égaux,
Les hommes sont égaux.

8. For more explicit rules, and for exceptions, see § 17, Part II.

9. PRESENT OF THE INDICATIVE OF ÊTRE, TO BE.

Negatively.

Je ne suis pas, I am not.
Tu n'es pas, Thou art not.
Il n'est pas, He is not.
Elle n'est pas, She is not.
Nous ne sommes pas, We are not.
Vous n'êtes pas, You are not.

d'ne sont pas, m., They are not.
Elles ne sont pas, f., They are not.

Negatively and Interrogatively.

No suis-jo pas? Am I not?
N'es-tu pas? Art thou not?
N'est-il pas? Is he not?
N'est-elle pas? Is she not?
No sommes-nous? Are we not?
No êtes-vous? Are you not?
Ne sont-ils pas? m., Are they not?
Ne sont-elles pas? f., Are they not?

RéSUMÉ OF EXAMPLES.

Avez-vous des écoliers attentifs? Have you attentive scholars?
Avez-vous des écolières attentives? Have you attentive scholars?
Les écoliers et mes écolières sont très attentifs et très-studieux.
Ces écolières sont-elles studieuses? Are those young ladies studious?
Elles ne sont pas très-studieuses.
Ces règles sont-elles générales? Are those rules general?
Ces principes sont généraux.
Leurs habitudes sont supérieures.
Avez-vous peur de ces chevaux rétiens? Are you afraid of those restless horses?
Vos montures d'or sont excellentes.
Les miennes sont-elles meilleures? Are mine better than yours?
Les vôtres sont meilleures que les miennes.

VOCABULARY.

Agréable, agreeable.
Mauvais, o., bad.
Mule, f., mule.
Oisif, re, idle.
Pantoufles, t., slippers.
Personne, m., nobody.
Rôf, v., rustic.
Sournois, often.
Travail, m., labour.
Très, very.
Utile, useful.
Velours, m., velvet.
Vil, re, quick, lively.

EXERCISE 21.


EXERCISE 22.

1. Are your brothers and sisters very (bien) quick? 2. My brothers are quick, but my sisters are not quick. 3. Have you not two restive horses? 4. No, but I have a restive mule. 5. Have you not two good pairs of silk gloves? 6. I have a good pair of yellow gloves, and two pairs of silk gloves. 7. Are you not afraid of your friends? 8. No, Sir, I am never afraid of my friends. 9. I am afraid of nobody. 10. Are you right or wrong? 11. I am right. 12. Have you my beautiful leather slippers, or my old satin slippers? 13. I have your old leather shoes and your velvet slippers. 14. Are those ladies pleased? 15. Those ladies are pleased, and they are right. 16. Has the German lady your father's shoes or mien? 17. She has neither his shoes nor her shoes, she has my sister's. 18. Has your elder brother good houses or bad? 19. His houses are better than yours and than mine.* 20. Are his houses old? 21. His houses are old, but they are good. 22. Have you them? 23. No, Sir, I have them not, I have no houses. 24. Have you my brother's or my sister's? 25. Your sister has her and my mother's. 26. Are your scholars attentive? 27. My scholars are very attentive and very studious. 28. Are those German ladies studious? 29. They are very studious and very attentive. 30. Are you often wrong?

SECTION XIII.—PLACE OF THE ADJECTIVES.—RELATIVE PRONOUN EN.

1. The adverb in French follows the noun much more frequently than it precedes it [§ 85 (1)].

Vous avez des amis fidèles, You have faithful friends,
Ma soeur a des livres instructifs, My sister has instructive books.

* Que meaning which, and que conjunction, are never understood in French, they must be repeated before every noun, pronoun, and verb [§ 47. R. 1].
2. Those adjectives which generally precede the nouns have been mentioned [Sect. VI. 5], and will be found [§ 86 (11)].

Nous avons une histoire intéressante. We have an interesting history.

3. The adjectives which are placed after nouns are: — 1st. All participles, present and past, used as adjectives.

Nous avons une histoire intéressante. We have an interesting history.

4. 2nd. All such as express form, colour, taste; such as relate to hearing and touching; such as denote the matter of which an object is composed; as also such as refer to nationality, or to any defects of the body [§ 85 (4) (5) (6) (7)].

Nos parents ont des cheveux noirs. Our relations have black hair.

5. 3rd. Almost all adjectives ending in -e, -e, -e, and -e.

Avez-vous un frère? Have you a brother?

6. Some adjectives have a different meaning, according to their position before or after the noun [§ 86].

Un brave homme, a worthy man. Un homme brave, a brave man.

7. Es is used for the English words some or any, expressed or understood, but not followed by a noun; en also has the sense of it, of them, thereof, generally understood in English sentences, particularly in answers to questions [§ 39 (17), § 104, § 110 (2) (3)].

Avez-vous des souliers de cuir? Have you leather shoes?

Avez-vous de bons plumes? Have you good pens?

8. An adjective used substantively, and having a partitive signification (in a sentence containing the pronoun en), must be preceded by the preposition de in the same manner as if the noun were expressed [see Sect. VI. 4].

Avez-vous de beaux jardinières? Have you fine gardens?

Résumé of Examples.

Avez-vous de beaux jardinières? Have you fine gardens?

Oui, j'en ai de beaux. Yes, I have some fine.

Votre frère n'a pas des souliers noirs. Has he none, but my sister has some.

Il n'en a pas, mais ma sœur en a. No, but I have some.

N'a-t-elle pas aussi une robe bleanche? Has she not also a white dress?

Non, elle n'en a pas. No, she has none.

Qui en a une? Who has one?

Qui n'en a pas? Who has none?

Le bonheur n'exploit pas de la viande. Has he none, he has none.

Il en a, il n'en a pas. He has some, he has none.

Il en a une. He has one.

Il en a une. He has one.

Il en a beaucoup. He has many.

Il n'en a qu'un. He has but little of it.

Il en a à peu près. He has nearly.

Il en a assez. He has enough.

Vocabulary.

Ameurant, am. loving, affectionate. Laine, f. wool.

Amérique, -e, American. Laineuse, f., Miss.

Anglais, -e, English. Monseigneur, m., Sir, Mr., gentleman.

Arabe, Arabian. Parent, m., relation.

Aubergiste, -e, innkeeper. Soldat, m., soldier.

Baguette, much, many. Terre, f., earth.

Belge, Belgian. Gothic, f., land.

Bijou, m., jewel. Tartre, m., tartar.

Brave, worth, worthy. Tresse, f., plait.

Clair, m., clear. Vue, f., view.

Chien, m., dog. Valise, f., valise.

Couteau, m., knife. Vase, m., vase.

Français, -e, French. Vêtement, m., clothing.

Gardeur, m., gardener. Violon, m., violin.

Guitare, f., guitar. Voisine, f., neighbour.

Haut, a., high. Vrai, a., true.

Heureux, a., happy. Vieux, a., old.

Hispanique, -e, Spanish. Voyeur, m., vulture.

II. Exercise 24.

1. Has your brother Arabian horses? 2. Yes, Sir, he has some. 3. Has he handsome ones? 4. Yes, Sir, he has handsome ones. 5. Are the good Americans wrong? 6. No, Miss, they are not wrong, they are right. 7. Have you a French shawl? 8. Yes, Sir, I have one, I have a handsome French shawl. 9. Have your innkeeper your silver knife or mine? 10. If the silver knife, he has his sister's great steel knife. 11. Has the Belgian a good guitar? 12. He has an excellent French guitar. 13. He has an excellent one. 14. Has the gentleman amusing books? 15. Yes, Sir, he has two. 16. Has the general French or Arabian horses? 17. He has neither French nor Arabian horses, he has English horses. 18. Who has Arabian horses? 19. The Arabian has none. 20. Do the Englishman any? 21. The Englishman has some. 22. Do the Englishman any? 23. Do you have a friend in America? 24. My friend's has one, but my relations have none. 25. Are you not wrong, Sir? 26. Yes, Madam, I am wrong. 27. Are those knives English? 28. Yes, Sir, they are Belgian. 29. Do you have relations? 30. I have two, and they are here (ici). 31. Has the Englishman butcher meat? 32. Yes, Sir, he has much. 33. Has he much money? 34. He has but little. 35. Has the Belgian general brave soldiers? 36. Yes, Sir, he has good ones.

Historic Sketches.—III.

SIR RICHARD GRENVILLE, WHEN HE CRIED "NO SURRENDER!"

During the time Queen Elizabeth was on the throne of England (1553 to 1603), there was a public feeling of a kind and intensity unequalled by any that has existed either before or since. It was a feeling in which political and religious hatred were closely combined, and which was fanned from a spark to a flame by repeated provocations. There are those yet living who can freshly remember the rancorous animosity which existed in this country towards the French, when the great French war was at its height. That animosity, bitter as it was, and tersely expressed in the summary of advice which Nelson is said to have given his midshipman—"Fear God; honour the king; and hate a Frenchman as you do the devil"—was not, if we may judge from the circumstances attending it, so bitter, or so uncompromising as the hatred Elizabeth's Englishmen had for the Spaniard and the Pope.

In that day, the kings of Spain, which now has sunk so low, was only being weighed in the balance. She had been found wanting in many things which, as the event proved, were necessary to her life as a nation; but she had not been found wanting in strength. Her power was enormous, and the ambition of her princes aimed at universal dominion. Spain, the Netherlands, Naples, and Sicily were her European possessions, and in Germany her influence was all-powerful. In the West Indies and in the Philippines, she acknowledged in many a place, while the whole of the Western hemisphere was under his sway. By succession, by marriage, by purchase, or by conquest, the territory of the Spanish king was so great that it was well said the nation never rested in his dominions. The wealth of the mines of Mexico and Peru was his; the most splendid troops that Europe could produce did that bidding; diplomats the most subtle and the most accomplished were his servants, and among his naval and military commanders were men of names the most renowned and illustrious. No other power in Europe, whether allied or single-handed, was willing to measure itself with Spain; the odds were so great, the issues so momentous, that lesser nations preferred to put up almost with anything rather than bring down upon their people the wrath of the cruel and haughty Spaniards. It was only when desperation drove the most honor-bound to the consequences that resistance was offered to the dominant and domineering power—and then, as in the Netherlands, when...
the people were goaded into insurrection, the fight was long and bloody, and the victory dearly won.

The strength of Spain was tremendous, crushing; but there was a canker in it, which, eating through, eventually proved fatal to the life of the tall tree. The King of Spain, Philip II., arbiter as he was of the fate of millions, mighty and feared as he was, was the abject slave of another power. The priests of the Roman Church were his masters, the Pope of Rome was his lord, and the mind of the man was in perfect subjection to the rule of his spiritual guides. So the interests, or supposed interests of the Roman-Catholic Church became identified with those of the Spanish crown. Wherever the Spaniard came, there came the priest, and the two together represented pure despotism in the State, and a Church system which was carried out through the medium of the Inquisition. Countries in which the Roman Church was already deeply rooted viewed the approach of the Spanish ecclesiastics with jealousy and dislike, though they were not necessarily in danger of injury at their hands. But in countries where the Roman faith was not the faith of the people, where the Protestant form of Christianity, or no Christianity at all, was the popular religion, the coming of the paniards and the Pope was a thing to be dreaded and grieved over. Protestants and freedom-loving Catholics learned in the Low Countries, from the Duke of Alva, Requesens, and other Spanish rulers, how that the tender mercies of the cruel are cruel also. In the newly-discovered regions of America, which the enterprise of Columbus had opened to Spain, the religious system of the Spaniards was so unlike the religion of Him whom "the common people heard gladly," that

"the poor Indian, whose untutored mind

See God in clouds, or hears him in the wind,

fled in horror from it, preferring death to conversion. Champ.
of life, to bring them to the knowledge of God and the belief of the holy Church; for if they had continued still to chaste them according to the rigour of the said Inquisition, they would have caused them all to die by fire.

Such then were the causes of the deep hatred already spoken of as existing among Englishmen during the reign of Elizabeth. The Spanish political power and the Spanish ecclesiastical power, each lasted after dominion, and allowed no considerations or scruples to stand in their way. Each helped the other; the priests taught the "right divine" of the Spanish king "to govern wrong," and the Spanish king in return upheld, with brutal obstinacy, the priests' Inquisition—an institution of which more will be said in another paper; but of which it will be enough here to say that it was a spiritual tribunal, irresponsible and acting in secret, which punished men and women with all punishments, including death, for not acting in strict accordance with the rules of the Roman-Catholic Church.

Englishmen, after the Reformation especially, hated both these powers. The one cramped their action and their enterprise, forbidding them under pain of being treated as pirates to trade to places where the Spaniards claimed to have a monopoly, as in America; the other oppressed their souls with burdens too heavy to be borne, and then killed them for stumbling. Generous sympathy also for those who suffered wrong at the oppressor's hands, and were unable to help themselves, glowed in the English breast; and that sympathy, in an age of adventure and of chivalrous feeling, was not slow to express itself in action. It had received a fillip, too, in a point which nearly concerned the best interests of the nation. An attempt had been made after the death of Edward VI, in 1553, to introduce both the detested powers into England. Philip II. of Spain, was actually married to Queen Mary of England, and through this alliance was, to a man, hostile to the introduction of the Inquisition, and swore it would not have it at any price, the energy and watchfulness of the best men were required to prevent the planting of the Spanish political power. In 1558 Elizabeth came to the throne, and not only roused the wrath of disappointment and jealousy by her prompt rejection of Spanish advances, but directly and indirectly she challenged the Spaniards by the uncompromising Protestantism of her policy.

Her subjects were imbued with the same spirit as the Queen. The Spaniards were looked upon as public enemies, whom to destroy was to do God service; and many was the private adventure made by persons of good name and reputation, to make war upon them. In a time when the two governments were at peace, cruisers were fitted out in England—notably in West-country ports—to prey upon the enemy's commerce on the Spanish Main and in the West Indies. Such men as Sir John Hawkins, Sir Martin Frobisher, Sir Walter Raleigh, Sir Francis Drake, Sir Humphrey Gilbert, and Sir Richard Grenville, sailed on their own account upon expeditions which, directed against any other power than Spain, would have been called piratical, or at least, buccaneering; and they won honour and no small profit in the course of them. After the Spanish Armada, sent in 1588 for the avowed purpose of conquering England and establishing despotism and priestcraft therein, had shown the depth of the Spanish ill-will, the Government acted pretty much as its subjects had done, and made war whenever it chose. There was no declaration of war. After the Armada there could be nothing but perpetual war between the nations, and a fresh declaration of an old fact would have been unnecessary as well as tiresome. So whenever a Spanish treasure fleet was coming home, or a Spanish squadron of merchantmen was known to be on the seas, the English royal vessels slipped out of port, and smote the Philippines wherever they found them.

One of the most courageous and indomitable of the English rovers was Sir Richard Grenville, of Stowe, in Cornwall, a gentleman of ancient family and large fortune, an enthusiastic admirer of all that was generous and manly. He hated the Spaniards with an exceeding bitter hatred, and again and again left his pleasant home in Cornwall to roam the seas after the enemies of God and man, as he considered them to be. He had been eminently successful, both in distant expeditions and in repelling the attack of the Armada on the English coast itself; and his name was a terror to many a Spanish sailor. It happened, in the year 1591, that a Government expedition of the kind above-mentioned was about to sail under orders of Lord Thomas Howard, to intercept the Spanish treasure ships on their way from the West Indies. Sir Richard was appointed second in command, and hoisted his flag on board the Revenge; the rest of the squadron including eight fighting ships, with tenders and victuallers. The account of the action in which the Revenge fought single-handed for England is given here as best showing the kind of spirit it was which animated Englishmen at the time when their enemies were the detested upholders of Absolutism in Church and State.

Lord Thomas Howard sailed with his ships in August, 1591, and after cruising about for some time, put into the Western Islands, to recruit his men, ill with scurvy, and to wait there for the treasure ships. On the 31st of August, 1591, the lookout men reported a fleet in sight, and great was the joy and greedy, perhaps, the expectation of the English warriors. But a nearer view disclosed, not the Spanish treasure ships, but a fleet of fifty-three ships of war, which had been equipped and sent out for the very purpose of pouncing on the pouncers. Half the English crews were on shore, ill, and the rest were very wanting and victualling the ships. Lord Thomas looked at his vessels and sickly crews, and then at the enemy's ships, concerning which the cry was still, "They come." Eight against fifty-three—the disproportion was too great. He determined not to try conclusions with them, and having recalled his key signal, stood out of the Bay of Flores, and succeeded in getting away.

There was one ship, however, which did not follow. Sir Richard Grenville felt it to be almost an immoral act to retreat before a Spanishard, and though he was too good an officer wilfully to disobey the orders of his superior, yet, taking advantage of some unavoidable delay which occurred in getting his men from the shore, to stay behind. The other English ships gained the offing, and thither, too, was sent the master of one of the victuallers, who, seeing Sir Richard's danger, offered to stay and share it with him.

On came the Spanish fleet, on the weather bow of the Revenge. Some of the officers remonstrated with the admiral, and advised him to crowd all sail and try to oust the enemy; but Sir Richard declared "he would much rather die than leave such a mark of dishonour on himself, his country, and the Queen."
LESIONS IN MUSIC.—II.

It is important that the learner should become thoroughly and practically familiar with the structure of that musical "scale of all nations and of all time" which was partially described in the last lesson. The following account, by General T. Perronet Thompson, who is no less distinguished for his philosophical and learned disputations on the science of music than for the other great services which, by pen and speech, he has rendered to his countrymen—the following account by him, of the first attempts of philosophy to measure this scale, will interest the student:

"The dispute upon this point (the application of science to music), is at least as old as the contest between Aristoxenus and the Pythagoreans, which dates as early as 300 years before Christ. The objection which Aristoxenus had, was, in reality, nothing but a good ear declaring itself against a faulty division. The musical mathematicians of antiquity took as many as three successive steps into the truth, but their next was a marvellous blunder. * * * "The histories of all nations refer to very early periods the discovery that certain successions or combinations of sounds have the effect upon the ear which is implied by music; and it may be presumed that in all countries a considerable degree of practical acquaintance has been acquired with the sounds before any person has thought of investigating the cause. The story of Pythagoras listening to blacksmiths' hammers, and discovering that the different sounds had some relation to the weights, has been sufficient to secure to that philosopher the renown of being the first who sought for the explanation of musical relations in the properties of matter. The account given by Nicomachus is, that Pythagoras 'heard some iron hammers striking on an anvil, and giving out sounds that made most harmonious combinations with one another, all except one pair,' which led him to inquire what were the peculiarities of the hammers which produced these different effects. Whether this is an exact account or not, some observation of this kind appears to have speedily led to the discovery, that of strings of the same thickness and composition, and stretched by the same force (some of these I have described what is called in unison) which were of equal lengths;—that if of two strings in unison, as above, one was shortened by a half, it produced a sound which, though very far from being in unison with the sound of the other, might be heard contemporaneously with it, with a strong sensation of satisfaction and consciousness of agreement, and that the two sounds in fact bore that particular relation to each other by which two voices, spoken at the same moment, though the different sounds proceeded from those of a man and a child, coming at the same time or air as really as if they sang in unison, being what musicians have since distinguished by the title of octaves;—that if, instead of a half, the string were shortened by a third part, there was produced a note which, heard either in combination with or succession to the first, created one of those marked effects which all who had attained to any degree of musical execution by the guidance of the ear had treasured up as among the most efficient weapons in the armory of sweet sounds, being what modern musicians name the fifth;—and that if, instead of a third part, it was shortened by a fourth, there was produced another note very distinct from the last, but which, like it, was immediately recognisable as one of the relations which experimental musicians had agreed in placing among their sources of delight, being the same which in modern times is called the fourth.

"So far, Pythagoras and his followers appear to have run well. Instead, however, of pursuing the clue of which they already had hold, and examining the effects of shortening the original string by a fifth part and by a sixth, they strayed into..."
shortening the results of previous experiments by a third, and lengthening them by an eighth, and here was the beginning of the invention. The attempt (beyond these three steps) at the division of the "Canon"—in other words, at the division of a string into the lengths which produce the sounds that make music in a single key—was a failure."

The experiments of modern philosophers have been rewarded with the discovery that a musical string divided in the proportions given underneath will produce the notes of the scale as there described. Let it be noticed that the figure 1 stands for the whole length of the string; whether a foot, a rod, or even an inch; and that sound being taken for the key note—DOH. It may also be mentioned that the same numbers denote the comparative lengths of organ pipes capable of sounding the corresponding notes.

Perhaps these proportions will be better understood by the annexed diagram. A single string thus stretched and used for these experiments is called a monochord. If the student is working from a mechanical view, let him make one and verify the measurements here given. Let him suspend a board of four or five feet in length against a wall. To the upper part of this board fasten the end of a piece of forte-soft or other musical string which is of the same thickness throughout. Let the wire pass down the face of the board, over a firm wooden bridge, an inch or so high, and close to the top, and over a movable bridge at the bottom; and let it be kept stretched by a heavy weight. Set your movable bridge in such a position (the weight will keep in its place) at the bottom, marking the spot, and take the sound of the whole string, by the help of a fiddle bow, for your DOH, or key-note. Then (having properly measured and marked the board) move the bridge to the other divisions, sounding each note as before. It may be well to mention that Colonel Thompson maintains, and with good show of reason, what he calls the "duplication" of Ray and TE. They are sometimes sounded by good singers and violin-players a very small distance from their usual position given above. These experiments will fix in your mind a clear notion of the scale.

It will be well for you to understand the connection between these musical notes and the vibrations of the sonorous body which produces them—whether that body be the string of a violin, the air in an organ pipe, a small plate of glass or metal, or the "chords vocales"—the vocal chords—of that wonderful little box instrument, called the "lyra"—which you can feel in your own throat. Sounds produced by irregular vibrations are not musical. They form the "saw, rattle, hiss, buzz, creak," or some other noise. But sounds produced by equal and regular vibrations are musical. "That musical notes are produced by a rapid succession of aerial impulses at equal intervals, is very clearly illustrated by an instrument called the lyra, the invention of Cagniard de la Tour. A blast of air is forced through a narrow aperture in a pipe; and a flat circular disk, perforated near its circumference with a number of small holes equidistant, and in a circle concentric with the disk, is so applied to the pipe, that the blast is interrupted by it, excepting when one of the holes is in the opposite side of that of the pipe; and when the former is made to revolve rapidly, the resulting aerial impulses cause a series of isochronous vibrations that produce a musical note, and the corresponding number of its vibrations can very easily be computed, from knowing the number of holes and of revolutions of the plate. The results obtained by this instrument agree exactly with those found by other methods."

The following are the results of such experiments as those just referred to. Mathematicians may notice that the proportion of the vibratings is inversely as the length of the strings given above. But we here print the fractions with a common denominator to make the relations more obvious.

### The Notes of the Scale

<table>
<thead>
<tr>
<th>Name of Notes</th>
<th>DOH</th>
<th>RAY</th>
<th>ME</th>
<th>FAH</th>
<th>SOR</th>
<th>LAH</th>
<th>TE</th>
<th>DOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of String</td>
<td>1</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

Now this evidently means that the lower note of the "great tone" has 1,280 vibrations, while the higher note has 1,440, and (as the lengths of string are in inverse proportion to the vibrations) that it takes 1,440 degrees of the string, while the higher tone takes 1,280 such degrees. Therefore the proportional difference between them, whichever way you look at it, is one hundred and sixty degrees. In the same way you will find that the difference between the two notes of this "small tone" is one hundred and forty-four degrees, and that the interval of the "tonule" is ninety degrees. The degrees in each case are of similar value, all measured on the same scale (common denominator) of 1,440 degrees. We may therefore treat them as two scales, and add these two "great tones," two "small tones," and two "tonules" together; and we shall obtain a perfectly measured scale of 248 degrees. As all these numbers, however, will divide by 2, retaining, of course, the same proportion to one another, it is better to regard the scale as composed of 474 degrees, containing three "great tones" of 80 degrees, two "small tones" of 72 degrees, and two "tonules" of 45 degrees, and this is the smallest perfect measurement of the scale in plain figures. But if the pupil will go one step further, and divide each of these intervals by nine, he will see how we obtain the "octave scale" of fifty-three degrees. The "tonule" will be exactly 5 degrees, the small tone exactly 8 degrees, and the great tone only one-ninth of a degree less than 9 degrees. Adding these together, as before, you will have the "Index scale," as Colonel Thompson calls it, of "fifty-three," and you will see that it is three-ninths or one-third of a degree too large. We strongly advise the pupil to construct a "monochord," and try for himself whether this is not in truth an accurate description of that scale of related notes which God has made most suitable to human ears and souls. All the books of science are agreed that it is; and experience bears the same testimony. It is the more important that you should understand these points, because the true scale is dreadfully abused by the common keyed-instruments. Many of these are tuned by what is called "equal temperament," that is, the scale is divided into twelve equal semitones, and it follows that the tones are all 79 degrees (of the perfect scale of 474), while they ought to be sometimes 80 and sometimes 72 degrees! and the "tonules" (semitones) are both 34 instead of 45! They might as well cut down the fingers of a statue to "equal temperament!" Human ingenuity will surely deliver us soon from this monstrous distortion. You will understand now why it is so pleasant to sing "without the piano!"
THE POPULAR EDUCATOR.

You will have noticed, in connection with these statements, that a sound produced by twice the number of vibrations (or half the length of string), as compared with any other sound, is so much like that other sound as to be called by the same name—thus, Doh and Do#. Notes thus related are said to be at the interval of an “octave” (eighth), the one to the other. They are also called “replicates” of one another. Each note of the scale, therefore, has its higher and lower replicates as far as the voice can reach. A figure “one” (or “two,” if needed) above the note shows that it is the higher replicate. A figure below a note shows it is the lower replicate. Be careful to notice this in connection with the exercises which follow.

**EXERCISE 5.—KEY G.**

In this exercise you should take a middle sound of your voice (neither high nor low) for the key-note or Doh. A friend again will be needed to set you a “pattern” with voice or instrument. Tell him to play or sing G, D, B, G, D, B, G. He may understand these names better than those by which you are learning, and to which your attention must at present be confined. Take care to sing the upper So# with a clear trumpet-like sound, and Me with a calm but firm effect. Sing the exercise slowly, but with sustained decision. It will greatly add to your pleasure if you can get a friend to sing the second line of notes while you are singing the first. This exercise, too, will give you confidence. (If you are singing from the staff above, remember that one voice will take the higher notes of each couple while the other voice is taking the lower notes. The open notes, which you have here, when they occur in the same tune with the black notes, which were used in the former exercises, are to be sung twice as long, in time, as the black notes; and the open notes without a stem, like the last note in this exercise, are to be twice as long as those with a stem. This relative length does not, however, hold true out of the same tune. An open note in one tune may be no longer than a black note in another, and a black note in one tune no shorter than an open note in another. Let it, however, be repeated that it will be much better for the learner not to pay any attention at present to the old “notation” (way of writing), or to the remarks thus placed between brackets. He may get his mind puzzled with the notation of music, when he ought to be giving his whole attention to music itself. Sing exclusively from the syllables, and never leave an exercise until you can sing it correctly from memory, pointing on the modulator the while.)

**EXERCISE 6.—KEY D (OR C).**

Take some low sound of your voice for this and the next exercise. Be careful to give an “accent” (additional force, not length of sound) to the notes which follow an upright bar.

**EXERCISE 7.—KEY D (OR C).**

The exercise which follows differs from the present only in this quality of “accent,” and yet how great the difference! Learn to sing both the upper and the lower “parts.”

**EXERCISE 8.—BRAILSFDORF’S CHANT.—KEY F.**

The attention of the learner is directed exclusively to that which lies between the two staves of five lines. Do not attempt the words until you have perfectly mastered the syllables. Tell your musical friend, who sets you the “pattern,” to play in the treble clef with one flat. If, however, you can sing the “scale” with accuracy you will not need his help. Take some rather low sound for Doh. Sound the “tonic chord,” or Doh, Me, So#. Let the three notes be well established in your ear. Then notice that the first note of the upper line is Me. Sing Me with a somewhat prolonged sound, as indicated by the mark of continuance. Then trace the other notes on the modulator as you sing them, at every mistake or uncertainty striking the “chord,” and beginning again with great patience. When you can sol-fa the chant from the modulator by memory, then learn to use, instead of the syllables, the words “One, two, three, four; one, two, three, four, five, six;” still pointing to the right notes on the modulator. It may be well for you now to learn the second line of notes (to be sung by another voice along with the upper line) as you learnt the first, and not, for the present, attempt the words. But if you wish to use the words, then first learn to sing the words “Trust in the Lord with” on the single note Me. To do this with distinct utterance, you should divide
the note (in your mind) into two equal beats or "pulses" of time (you can mark them by beating on the table with your hand); and then the words "Trust in the" will go to the first beat, and "Lord with" to the second. The large dot above the line shows this division. The words "all thine heart" fall easily to their right notes. To the note Soh you will sing the words "and lean not unto thine." "And" is scarcely heard. Dividing Soh, like the other "reciting note" Me, into two beats (and reciting notes of a chant like this may be divided into as many beats as you please), you will have the words "lean not unto" to the first beat, and "thine" along filling the second. The word "own" you perceive is "slurred" on to two notes. Take care not to sing the syllables "standing" quickly and sharply. Let them take as much time as the syllables "under" in the same word. The second verse of words, printed underneath, is divided on the same plan as the first. The double bar, you will observe, separates the words of the "reciting note" from those of the "cadence" (as it is called) of the chant. On the upper "staff" you miss the square note for Doh, because the tune begins on Me, and Doh does not occur in the "air." The place of Doh, however, is in the first space, reckoning from the bottom of the staff. On the lower staff it was necessary to make an additional line to carry Soh. This is called a "ledger line."

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**COPY-SLIP, NO. 15.—COMBINATION OF THE LETTERS U, U.**

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**COPY-SLIP, NO. 16.—COMBINATION OF THE LETTERS I, M.**

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**COPY-SLIP, NO. 17.—COMBINATION OF THE LETTERS U, U, T.**

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**COPY-SLIP, NO. 18.—COMBINATION OF THE LETTERS I, U, I.**

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**COPY-SLIP, NO. 19.—COMBINATION OF THE LETTERS T, U, N.**

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LESSONS IN PENMANSHIP.—VI.

In our last lesson we showed our learners how to make the letters M and N by combinations of the top-turn and the top-and-bottom-turn. In the present lesson we set before them five Copy-slips for practice, comprising various combinations of the letters M and N with the letters I, U, T, and L, which they learned to form from the simple bottom-turn. Doubtless many of those who have been endeavouring to teach themselves the art of Penmanship by the aid of our lessons, are now beginning to see that, after all, it is not such a difficult matter to learn to write, since by learning to form only three strokes of a very simple kind, they have found that they have acquired the power of writing six out of the twenty-six letters that form the alphabet. They will soon see that this is by no means the utmost limit of their progress, when in the course of future lessons they discover how many letters there are into whose composition these three elementary strokes also enter.

In preparing paper for copying all our elementary copy-slips in large text, the learner must not omit to insert the diagonal lines as they appear in Copy-slips Nos. 1 to 6 inclusive, as long as he finds them absolutely necessary for the regulation of the slope of his letters, and to enable him to preserve a proper distance between them. To save trouble in ruling sheet after sheet of paper with horizontal and diagonal lines at the proper distances from each other, and to save expense as well, the learner might rule with a sharp-pointed steel instrument, such as a bradawl, one side of a cheap slate with sets of lines similar to those in our copy-slips, taking care, however, to leave a space of one inch and a quarter between each set, to enable him to add the extra horizontal lines that will be required when he begins to make looped letters, and letters such as P and Q, that extend below the lower of the two horizontal lines that contain what we have called the body of the letter. A slate thus prepared will be found useful for acquiring facility in forming the various letters, but the learner must by no means omit to write on paper as well.
LESSONS IN GERMAN.—V.

SECTION XI.—FORMATION OF ADJECTIVES DENOTING MATERIAL.

Adjectives denoting the material of which a thing is made are formed by suffixing to the nouns the letters n, en, or en. Ex. -t, teer (leather, leathern); Gilbert, geltin (gold, golden); Wit, Witer (lead, leaden), etc. If the root vowel be a, o, or u, it is frequently changed to the corresponding umlaut, as: -t, tütigen (glass, made of glass); -t, tütigen (wood, wooden). (See Sect. II. 12, a, etc.)

VOCABULARY.

Becher, m. cup, beaker. -t, teer, cup.
Beilet, n. pencil. -t, teer, pencil.
Gesen, iron. -t, teer, iron.
As, a. barrel, cask. -ter, m. joiner.
Kisten, wood. -t, teer, wood.
Reif, m. kettle, boiler. -t, teer, kettle.

RéSUMÉ OF EXAMPLES.

Ihr silberner tisch ist schön, and Your silver spoon is beautiful, mein eigener Meister, and my iron knife is heavy. Dieser seine Tisch ist schwer. This stone table is heavy.

Das Leben des Kindes ist ein gutes. The life of the child is good.

Ist nicht ein eiserner Schiffbauers? Is not an iron ship durable?

EXERCISE 12.


EXERCISE 13.


SECTION XII.—THE FEMININE GENDER OF ARTICLES, NOUNS, ADJECTIVES, Etc.

The articles in the feminine singular are declined thus:

-rt, die, the; (tir) ein, a; (meine).
-rt, der, of the; (tir) eint, of a; (meiner).
-rt, to or for the; (tir) eint, to or for a; (meiner).
-rt, die, the; (tir) ein, a; (meine).

The pupil having now had in due course all the forms of the article in the singular, may note, that like tiber (which differs from the definite article only in having an instead of a in the nom. and acc. neuter, Sect. VII.), are declined all the words in list 2, Sect. IX.; and that like ein, are inflected all those in the list, ein, mein, sein, etc., Sect. X.

Feminine nouns are in the singular indeclinable; as, nom. die Schale (the silk); gen. der Schale; dat. der Schale; acc. die Schale.

The adjective in the feminine singular has two forms. When it stands alone, or unaffected by a preceding word (§ 29), the nominative and accusative end in e, the genitive and dative in en. It is then said to be of

THE OLD DECLENSION.

-rt, good; (the)
-rt, good; (the)

When preceded by either of the articles, or by any one of the adjective pronouns (see lists Sect. IX. and XI.), the adjective terminates in the nominative and accusative as in the old declension, but in the genitive and dative in en.

Thus:

-rt, the good; (the)
-rt, of the good; (the)
-rt, to or for the good; (the)
-rt, mei, my old; (meiner)
-rt, of my old; (meiner)
-rt, to or for the good; (the)
-rt, mei, my old; (meiner)

I. The personal pronoun Sie (you) is always written with a capital initial, while se (she or her) is only thus written at the beginning of a sentence. Hence in writing, no ambiguity can arise. Ex., 3d sie Sie, I see you; 3d se, I see her. When Sie is used in the nominative, the form of the verb determines the person. Ex., Sie sehen ihn, you see him; Sie ist ihn, she sees him. Whether, however, Sie (when in the accusative) stands for you or her, can only be determined by the context. The orthography of the possessive pronouns 3er (your) and 3er (her) is also identical, and, in speaking, is liable to equal ambiguity. Thus, Ihr Buch ist gut, may signify, your book is large, or her book is large; and, se, habe ich Buch, may mean, I have their book, or I have her book. The significations of it in the accusative, and of 3er in all the cases, must of course, when spoken, be determined by the connection. (See Declension, Sect. XVII.)

VOCABULARY.

Blattstiel, f. library.
Sdìttliche, f. spectacle.
Dame, f. lady.
Peter, m. pen.
Rein, f. clean.
Schloss, n. castle.
Wittiner, m. miss.
Young lady.

EXERCISE 14.


EXERCISE 15.

LESIONS IN ARITHMETIC.—VI.

ABBREVIATED METHODS OF MULTIPLICATION AND DIVISION.

1. The methods of multiplication and division explained in the previous lessons are those ordinarily employed; and the learner must make himself perfectly familiar with them before proceeding further.

These processes, however, in particular cases, can often be materially facilitated by various artifices. Some of these shorter methods we subjoin, not only because they are useful in themselves, but because they are valuable as exercises, in explaining the fundamental principles of arithmetic.

2. Any number which is formed by multiplying two or more numbers or factors together is called a composite number. It has already been explained in a former lesson that the same numbers multiplied together will give the same product, in whatever order the multiplication is effected.

Hence, to multiply any number by one which is composite—

\[ 352 \times 7 \]

- i.e., which is composed of several factors—we have only to multiply the number first by one factor, the result by another factor, and so on.

Thus, to multiply 352 by 28, since 28 = 7 × 4, we can perform the operation as indicated in the margin.

\[ 352 \times 28 = 352 \times (7 \times 4) \]

**Exercise 10.**

(1.) Resolve the following sets of numbers into their factors:

- 1, 9, 10, 14, 22.
- 2, 31, 54, 56, 83.
- 3, 45, 72, 61, 66.
- 4, 57, 24, 54, 72, 54.

(2.) What will 24 horses cost at 74 crowns apiece.

(3.) What will 45 hogsheads of tobacco cost, at 128 crowns a hogshead?

(4.) What will 54 acres of land cost, at 150 crowns per acre?

(5.) At 118 shillings per week, how much will it cost a family to board 49 weeks?

(6.) If a man travel at the rate of 72 miles a day, how far will he travel in 64 days?

(7.) At 163 crowns per ton, how much will 72 tons of lead cost?

(8.) What will 81 pieces of broadcloth cost, at 245 shillings apiece?

(9.) What will 84 carriages cost, at 384 crowns apiece?

(10.) What will a railway 132 miles in length cost, at the rate of £1,960 a mile?

(11.) If I can walk a mile in 16 minutes, how long will it take me to walk 374 miles?

3. Similarly, it will be seen that to divide by any composite number, we have only to divide by one factor, then divide the quotient by another factor, and so on.

\[ \frac{7}{352} \]

\[ \frac{4}{198} \]

\[ \frac{322}{3956} \]

Thus, to divide 3956 by 28, arrange the process as indicated in the margin.

In this case there is no remainder. But suppose it be required to divide 9873 by 28.

\[ \frac{7}{9873} \]

\[ \frac{4}{1403} \]

\[ \frac{322}{3956} \]

Proceeding as before, we get a remainder 3 after the division by 7, and a remainder 2 after the division by 4. The first remainder 3 means 3 units; and the 2 which remains after dividing 1403 by 4, means two sevens of the 1410 sevens which are contained in 9873. Hence the whole remainder will be 2 sevens + 3 units—i.e., 17.

The process may be exhibited analytically thus:

\[ 9873 = 1410 \times 7 + 3 \]
\[ = 322 \times 4 \times 7 + 2 \times 7 + 3 \]
\[ = 322 \times 28 + 14 + 3 \]
\[ = 322 \times 28 + 17 \]

Therefore 9873 divided by 28 has a quotient 352, and remainder 17. Hence, when there are two factors, to find the whole remainder, multiply the second remainder into the first divisor, and add the first remainder.

4. If there are more than two factors, similar considerations will show that the following rule will give the whole remainder:

-Multiply the last remainder into the continued product of all the divisors but the last, but last one remainder into the product of all the divisors except the last two, and so on. Add all these results and the first remainder together; the sum will be the whole remainder.

**Example.** To divide 17285 by 84.

\[ 17285 \]

\[ 7 \]

\[ 230 \]

\[ 4 \]

\[ 617 \]

\[ 3 \]

And the whole remainder is \( 2 \times 4 \times 7 + 1 \times 7 + 2 \), that is, 

\[ 50 + 7 + 2 \], or 65.

It does not follow that this process is in all cases simpler than the method of Long Division; sometimes, however, it is more convenient.

**Exercise 11.**

(1.) Work the following examples in division:

1. 16128 ÷ 24.
2. 17250 ÷ 54.
3. 26790 ÷ 56.
4. 91060 ÷ 72.
5. 162857 + 112.
6. 136456 ÷ 108.
7. 352

(2.) How many acres of land, at 35 crowns an acre, can you buy for 4650 crowns.

(3.) A man divided 937 crowns equally among 27 persons, who belonged to three families, each family containing nine persons: how many crowns did each person receive?

(4.) A man bought a quantity of clover seed amounting to 507 pints, which he wished to divide into parcels containing 64 pints each: how many parcels can he make?

5. **Multiplying and dividing by powers of 10, and by numbers ending in any number of ciphers.**

The products of two tens, three tens, four tens, etc., are called respectively the second, third, fourth, etc., powers of 10. They are 100, 1000, 10000, etc. Thus, the second power is 1 followed by two ciphers, the third 1 followed by three ciphers, and so on; the number of the ciphers in each case being the same as that of the power.

It has been already explained that to multiply by 10, or any power of 10, we have only to annex to the multiplicand the number of ciphers corresponding to the power. Thus, 345 multiplied by 1000 is 345000.

If any number of the right-hand figures in the multiplier be ciphers—as, for instance, in 75000—then, as we have already seen in Lesson IV., Art. 5, we need only multiply the multiplicand by 75, and annex to the product the same number of ciphers, in this case three.

**Exercise 12**

(1.) Work the following examples in multiplication:

1. 135189 × 1000.
2. 3129467 × 10000.
3. 5530078 × 100000.
4. 68903147 × 1000000.
5. 4849043500 × 100000000.
6. 8730120500 × 1000000000.
7. 9240390190 × 10000000000.
8. 14579 × 20000.
9. 535034 × 410000.
10. 4530425 × 620000.
11. 25960900 × 5100000.

(2.) What will 10 boxes of lemons cost, at 63 shillings per box?

(3.) How many bushels of corn will 465 acres of land produce, at 100 bushels per acre?

(4.) Allowing 365 days for a year, how many days are there in 1000 years?

(5.) How much will 50 hogs weigh, at 375 pounds apiece?

(6.) If 1 barrel of flour weighs 192 pounds, how much will 500 barrels weigh?

**Lessons in Geometry.—III.**

**Instruments used in practical geometry.**

In the operations of practical geometry, a case of mathematical instruments must be considered as an essential requisite. These instruments vary in number and quality, according to their price. Some are made of wood, bone, and ivory—as rulers and scales; others are made of brass and steel, German
silver, and other compound metals, such as compasses, drawing pens, and protractors. We shall proceed to describe the most useful, and afterwards to show their application.

The Common Ruler or Straight-edge.—This instrument generally consists of the bevelled edge of the plano or diagonal scale, of the common Gunter’s scale, of an ordinary foot rule, or of a plain flat rule made with a fine straight edge, for the sole purpose of drawing straight lines from one point to another, or through any two points. It is sometimes made in the form of a right-angled triangle (Fig. 1), with a similar edge, to serve the various purposes of drawing straight lines, perpendiculars, right-angled triangles, and parallel straight lines. In the mechanical arts, a straight line is most readily obtained by fixing a well-chalked string firmly at both ends over the place where it is wanted, on a board or stone, raising it, when tense (i.e., stretched), above the same, and then letting it drop suddenly, when the white or chalky trace of the string will be marked on the board or stone as a straight line.

The Parallel Ruler.—This very useful instrument is constructed in a variety of forms. Those represented in Figs. 2, 3, and 4, are the most common, and the cheapest. The defect of the construction in Figs. 3 and 4 is, that in drawing a parallel to a straight line through a given point, if the latter be at a considerable distance from the former, the ruler may, from its lateral motion, pass the point altogether, and render the problem nugatory. This defect is obviated by the construction in Fig. 1, which, provided they are properly managed, but this management is the result of a little practice.

The triangular ruler represented in Fig. 1 being made to slide against a fixed ruler or straight-edge, as represented in Fig. 5, is frequently employed for the purpose of drawing parallel straight lines. In many cases this apparatus will be found even more handy for this purpose than the parallel rulers represented above. Fig. 5 represents the same triangle in two different positions, and not two separate triangles.

In order to test the accuracy of a ruler, let it be applied to one eye, and viewed along its edge from one end to the other; the slightest departure from the straight line will then become visible. A good ruler, besides having a straight edge, must be perfectly flat and even, flexible, and made of well-seasoned wood. Some are made of ivory, bone, and metal; these are less liable to be affected by changes in temperature, or by the humidity of the atmosphere. Parallel straight lines are most easily drawn by artists and mechanics, with an F or a T square, of which the form is distinctly noted by the name.

The Compasses.—Of compasses there are several kinds. This instrument, which usually consists of two equal legs joined at one extremity, is employed for measuring the lengths of straight lines, measuring and laying off distances, and describing circles or arcs of circles in general. The Dividers, or compasses with dry points, represented in Fig. 6, are chiefly used for dividing straight lines into equal parts, or into parts having any other proportion to each other. The best kind are furnished with a screw for tightening the screw-axle at the joint. Others are furnished with an arc and tangent screw to fix the legs at any required distance apart.

The Socket Compasses, represented in Fig. 7, are furnished with movable points, or pieces, which can be inserted in the socket at pleasure, according to the use which is to be made of them. It is chiefly employed in describing, that is drawing circles, in ink, or in pencil, or in mere trace. The tracing-point in Fig. 7 is furnished with a joint and a screw, in order to keep it perpendicular to the paper when the legs are stretched to a great length. The ink-point, represented in Fig. 8, is furnished with a screw, to admit more or less ink at pleasure, with a joint for the same purpose as the tracer, and with a joint in one of the leaves of the point to admit of its being cleaned. The pencil or crayon-point, represented in Fig. 9, is furnished with a joint for keeping the pencil or crayon perpendicular to the paper, and a socket or case for holding it. The socket compasses are also furnished with a lengthening bar, represented in Fig. 10, which is furnished with a socket exactly the same as that of the leg, in order to admit of the description, that is, the drawing of larger circles than those which can be drawn only by the use of the movable points and legs of the compasses.

The Bow Compasses, so called because in their first construction they could be shut up into a hoop, which served as a handle to them; or the Plung Compasses, represented in Fig. 11, and so called because the stationary leg screws into the plug, and in like a plug, are only used for describing circles of a very small size. Such compasses are of the greatest utility to draughtsmen and engineers in drawing their plans. The plug construction seems to present some advantages over the old bows.

Beam Compasses are employed for describing circles of very large radius, and such as are far beyond the reach of a case of mathematical instruments. They consist of a long beam or bar, carrying two brass cursors, that is, pieces on which it runs. One of these is fixed at one end, and the other slides along the beam, and is furnished with a screw to fix it at any required distance. To the cursors may be screwed points of any kind, whether steel tracers, pencils, or crayons, or ink points. This apparatus is represented in Fig. 12. To the fixed cursor there is sometimes applied an adjusting or trimmer screw, as seen in the figure, to enable a given distance or radius to be taken with the greatest nicety.

In a case of mathematical instruments are also contained a Tracer and Drawing Pen, for drawing straight lines in trace, or in ink. These two are usually joined in one instrument, the tracing point being screwed into the drawing pen, this instrument is represented in Fig. 13, where the ink-point is constructed exactly on the same principle as that of the socket compasses. In choosing a drawing pen, it is better to select one which has an ink-point made of German silver. The steel ink-points are apt to get rusty if they are not kept carefully wiped, and lines drawn in red ink with a steel-pointed drawing pen soon get discoloured, owing to the action of the ink on the metal while in the pen.
ANIMAL PHYSIOLOGY.—III.

THE EYES (concluded).

The eyes of the animals lower than fish, none of which have a backbone, and which are called invertebrate animals, are closely related to their powers of moving from place to place. If an animal can dart rapidly about, more especially if it can move swiftly for some time at a stretch, its eyes are usually very perfect; but if it can only crawl sluggishly, its eyes are of an inferior structure.

If we omit those lowest of all animals, which Cuvier classed together as radicle, because their parts were disposed like the spokes of a wheel, the rest are divided into two great sub-kingdoms. The type of the one, called mollusca, is the snail; and of the other, named articulata, the honey-bee is the representative species.

It is impossible to say which of these two sub-kingdoms is the highest, but they are very different. That of which the insect is the type is noted for the swiftness and agility of the movements of the animals that form it; while the other is equally remarkable for the sluggishness of the species which compose it. Indeed, the word just used is derived from this peculiarity in the slug.

These peculiarities are, however, but general ones, applying to most, but not all of the species of each sub-kingdom; for each sub-kingdom contains several thousands of different kinds of animals. Thus we find some insects more inert than most slugs, and some of the slug class as active as many insects. In accordance with what has been written, the eye of the garden-snail is evidently an organ not at all comparable to eyes we have described as those of the higher classes. This eye is situated at the end of the longer and upper pair of horns, and is only exposed when these are at their longest. Even when exposed its sense of sight is so obtuse that it seems only conscious of light and darkness, as our skin makes us conscious of heat and cold, and has no knowledge of images. The organ seems little better than a refined organ of touch, for garden-slugs will withdraw their eyes far sooner if blown upon, or the hand be placed between them and the light, than when threatened by the fingers. Nevertheless, the eye has a spherical lens, sclerotic, choroid, and retina, but all of very simple structure. The most remarkable circumstance connected with this eye is that it can be retracted by drawing it down through the tubular horn, as one might draw the end of the finger of a glove down through the rest of the finger; and this is done by a special muscle, which is a slip of the great muscular band, with which the snail draws in, not only its horns, but its whole head, strongly though slowly.

The eye is exposed by a successive contraction of the circular muscles which are round the horn, beginning at the base and ending at the top; this action has the same effect on the parts of the tube, and finally upon the eye, as driving a coin into the end of an old-fashioned purse by the aid of a ring which slides on the outside. The rest of the slugs and snails, which creep on their bellies, have eyes somewhat similar, and similarly situated; but while the garden-snail has four horns, some water-slugs have only two, and the eyes are placed on the outside of these, halfway up, while the whip-like extremities act as feelers, as the short horns of the garden-snail do. The lower orders of the mollusca, such as the oyster, etc., have eyes inferior even to these, though they are sometimes numerous and curiously placed; thus, the kind of oyster which occupies the fan-shell, and is called a penquet, has a row of eyes running round the edge of the two sides of the animal's cloak, which lines the two shells that enclose it.

The highest class of mollusca have greater power of motion than any of the rest, and swim rapidly through the sea, both backwards and forwards, seizing their prey with long, whip-like arms; and these creatures have large and elaborate eyes, not unlike those of animals, but even more complex in some respects; for there is not only a third retina, but the retina always is, by a black membrane, but behind this choroid is another expanded retina, as though this had some other office than to receive impressions. Perhaps some process analogous to the development of the image in the dark room of the photographer is effected in this singularly situated organ. The creature whose large eyes have just now been mentioned has been introduced as a prominent character in Victor Hugo's "Toilers of the Sea," and the description is probably about as faithful as the description of brigands and other horrors described by novelists usually are.

Turning now to the higher sub-kingdoms, we find in it eyes of the most remarkable description. They are best explained by the diagram.

If we examine the head of a wasp or bee, we find on the top of the head, looking towards the sky, three eyes set in a triangle. These eyes are simple, and not unlike the eye of other creatures; but besides these, on the side of the head, stretching almost from its crown to the jaws beneath, are two compound eyes, which, under the microscope, are seen to present innumerable six-sided spaces, which look like the ends of the cells of a honeycomb. On dissection, each of these six-sided faces is found to be the outer surface of a double convex lens, behind which is a layer of black paint, which is comparatively thick at the edges of the lens, but thins towards the centre, where a hole is left through its middle. This hole is the pupil. Behind the pigment is a cone of transparent matter, whose point is directed inwards, and embracing this point is the end of a nerve thread. The threads from each eyelet run inwards to a sheet of nervous matter common to the whole eye, and from this sheet other nerve cords, but much fewer in number than the first, run to the main thick optic nerve. The peculiar structure of the compound eye is such that each can only receive impressions from its end. An insect, therefore, one would think, receives thousands of distinct pictures; but whether it so harmonises them in its common
rotina as to be conscious of only one, as we are though we have

the simple eyes of insects seem to be used for distant objects,
for if these be painted over with red sealing-wax dissolved in
strong spirit, so as to blind them, the insect has no power of
directing its flight, but towers straight upward towards the sky.
The curious compound eyes must be used, therefore, for near
objects, and as they stretch round the head and look every way,
they must save the insect much trouble in turning the head as it
runs in and out the bells and tubes of flowers searching for
honey and pollen.

Lobsters and crabs, belonging to another order of the jointed
animals, have similar eyes, but they are set on a two-jointed
stem, and the facets are square, and not six-sided.

This kind of eye, however, is by no means found in all animals
of this sub-kingdom.
The whole tribe of spiders has only
simple eyes; but there are usually eight of them set in two
rows on the front part of the head.

It is singular to find also that caterpillars, though they
exhibit beneath the skin the head indications of the com-
pound eye, which as butterflies they afterwards possess, have
totally different temporary eyes, six on each side placed in a
horizontal line above the jaws.

Some of the lower families of jointed animals have but one
eye, in the middle of their heads, and this of peculiar structure,
intermediate between a simple and a compound eye. One of
these is hence called cyclops.

Among the animals of lower grade than those of the soft sing-
like and the jointed sub-kingdom, little has been made out about
the organ of vision. In many of them specks of colour with a
nerve running to them are found; but as we cannot ask these
animals what their sensations are, and their intelligence is of so
low an order that we can infer but little from their movements,
we can only conjecture them to be eyes.

Thus, the star-fish has specks at the ends of its rays, and the
reader may have noticed the beautiful blue knobs which appear
round the outside of the base of the arms of the common sea
anemone whether it has fully opened. The great floating jelly-fish,
which, as it is seen from a ship, reminds one of an animated
umbrella, has specks round the edge, where the whalebone
knobs should be. All these and a thousand other structures
seem to be made in reference to light; but probably the impres-
sions they receive are as faint and dull compared to the vivid
pictures presented to the sense of the higher animals, as the
information which light brings to the infant, whose eye is not yet
sufficiently developed to guide its wandering hands, is crude when
compared with the ideas which are presented to the mind of a
man by means of wondrous light, its marvellous recipient—the
eye, and its yet more marvellous interpreter—the mind.

LESSONS IN LATIN.—IV.

NOUNS, SUBSTANTIVE AND ADJECTIVE.

Our English nouns remain unchanged, whether they form the
subject or the object of a proposition.

Reader, do you know the exact meaning of these terms, namely, "the subject or the object of a proposition?" I will explain them to you.
You probably know what in
English grammar is meant by the nominative case, and the
objective case. Well, the subject of a proposition or statement corresponds to the English nominative case, and the object of
a proposition corresponds to the English objective case. What
in English grammar you call the objective case, is in Latin
grammar called the accusative case.

View the matter in another way. Here is a proposition—

The dog bit a man.

In this proposition or sentence, dog is the subject, and man is the object. If you will study the proposition you will see that
dog is the doer or actor, and man is that which is acted upon.

Hence you may form the general rule, that the subject is the
doer, the actor, or agent, and the object is the being or thing
which is acted upon. You may put the same rule in these
words: the subject originates the action spoken of in the verb;
the object receives the action spoken of in the verb. Or again,
you may say, the subject is that from which the action comes;
the object is that on which the action falls. The act of biting
came from the dog, and fell upon the man.

As I wish to make everything clear as we proceed, I will
enter here a little more into this matter.

A proposition is the enunciation or statement of a thought or
a fact. Thus, fire burns; you are good; boys love play, are
each a proposition. Of course the statement must be complete,
or there is no proposition. What you say must make sense in
itself, or there is no proposition, but only one word or more.
Thus, if, instead of saying fire burns, you say merely fire, or burns,
you do not utter a proposition, for you do not make a statement.

If you affirm you are, I naturally ask, what? for you have left
the sentence unfinished. So if you declare that boys love, the
question arises, what? and only when you have added the
word play, do you finish the sentence by making the sense
complete.

Of the three propositions given above, the first is the
shortest. It is indeed a specimen of the simplest proposition
there is, or can be. Less than two words, then, cannot in
English form a proposition. But of what does this proposition
consist? It consists of the noun fire, and the verb burns. Hence you learn that in every sentence there must be at least a
noun or pronoun, and a verb. The noun, you see, is the
subject of the proposition, for it is the agent or the cause of
action. In grammar, we have therefore a designation for the verb;
we say the verb burns is the predicate. By the predicate of a
proposition, we mean that which is asserted or declared of the
subject. What is here asserted? this, namely, that fire burns;
burns, then, is the predicate.

In this case, the predicate is one word, a verb. Sometimes
the predicate consists of two words. It may even comprise
several words. In the instance given above, you are good, the
predicate is, are good. Hence, the predicate consists of the verb
are, and the adjectival good. The former predicate, burns, was a
simple predicate; this predicate is a compound predicate. Now,
this compound predicate has two parts; first, the verb are,
which is called the copula, or link; and the adjectival good,
which is called the attribute, or that quality which is ascribed
to the subject you. Thus explained, the sentence stands as
follows:—

Subject. Copula. Attribute.
You are good.

You will easily see how this sentence may receive additions
or modifications or additions, or modifications, or additions,
or modifications or additions, or modifications, or additions,
or modifications to modify the sense. It is, as it stands, an affirmative sentence.

By adding not to are, you make it a negative sentence. You
may also qualify the attribute good by prefixing an adverb, as,
very good. If you wish to make it interrogative, you have only
to invert the copula and the subject, and say, are you good?

In the third of the instances given above, there is a rather
different kind of sentence, or preposition.

Now, according to what I have just said, boys is the subject,
love the copula, or verb, and play the object. The difference
here is, that instead of an attribute in the predicate, you have
an object. The proposition, viewed logically, stands thus:—


Observe, too, here, how, having got the main parts, the essential
parts of a sentence or proposition, you may at will add others.
Thus, for boys, you may say the boys; or bad boys; or the bad
boys. The verb, too, you may qualify by an adverb, thus,
always love. Or you may qualify play, by putting an adverb
before it, as much play. But what you carefully insert, the essential parts of the sentence remain the same, as you may
see in this arrangement:—

Subject. Copula. Object.
The bad boys always love much play.

The bad boys. Which bad boys? Something is implied or
understood, that is, there is something in the speaker's mind
which is not expressed in his words. Say that he means the
bad boys whom I mentioned; then, you see, the sense is complete, thus:

The bad boys whom I mentioned always love much play.
Latin they do undergo a change; and that change is at the end of the adjective, as it is at the end of the noun. A change for another purpose takes place at the end of nouns and adjectives in Latin. By such changes gender or sex is denoted. In English, you know, we say, good bride, good bridegroom; that is, good is the same whether it qualify a feminine or a masculine noun. Not so in Latin. In Latin, good in the former instance would be bona; in the latter, bonus. So sponsus, bridegroom, becomes in the feminine, sponsa, bride.

KEY TO EXERCISES IN LESSONS IN LATIN.—III.

Exercise 5.—Latin-English.

1. Thou owest (oughtest). 2. He teaches. 3. He is exercised.
4. We flourish. 5. You rejoice. 6. They are bitten. 7. We move.
8. They more. 9. Thou dost move. 10. He fears. 11. He is frightened.
15. If you obey you are praised. 16. If we are silent we are praised.
17. Thou art taught and art educated. 18. They are silent and are praised. 19. I am bitten and am wounded. 20. If thou woundest thou art blamed.
21. They are held.

Exercise 6.—English-Latin.


Exercise 7.—Latin-English.

1. Thou dost receive. 2. He is deceived. 3. We are deceived. 4. I deceive and am blamed. 5. He yields. 6. Thou rendest. 7. He writeth. 8. He rends well. 9. Thou dost deceivest greatly. 10. If he is loved he rejoices. 11. We are pricked. 12. Thou conquerest.
13. We are conquered. 14. They are conquered. 15. He falls. 16. Thou slayest. 17. If thou slayest thou art blamed. 18. He reminds (advises) well. 19. Thou art badly educated. 20. We are greatly moved.
21. We do dance and are rejoiced. 22. He is injured. 23. You are injured. 24. You defend. 25. They are defended. 26. I am loved.

Exercise 8.—English-Latin.


Exercise 9.—Latin-English.

1. Thou guardest. 2. He is supported. 3. He comes. 4. Why sleepest thou? 5. He sleeps well. 6. He is instructed. 7. Thou prickest. 8. He slays. 9. Thou dost deceivest greatly. 10. He is heard. 11. If thou sleepest much thou art punished. 12. He finds. 13. If thou instructest well thou art praised. 14. He is bound. 15. Why art thou silent? 16. He is silent and is punished. 17. They are found.
18. Thou art clothed. 19. They are well clothed. 20. If you are clothed well you are delighted. 21. They are badly instructed.
22. If thou art conquered thou art bound.

Exercise 10.—English-Latin.


Exercise 11.—Latin-English.

1. I yield. 2. Thou rendest. 3. We move. 4. Thou art exercised.
5. They bite. 6. They flourish and rejoice. 7. He tries to read.
8. Why dost thou read badly? 9. He sleeps badly. 10. Thou art much loved. 11. You are conquered. 12. They write well. 13. If you paint well you are praised.
14. We are founded. 15. We fight. 16. Why do you punish? 17. We are clothed. 18. We bind.
19. We are conquered. 20. We are bound. 21. You conquer.
22. Thou art guarded. 23. He is adorned. 24. They are praised.
25. We are feared. 26. Thouarest much. 27. You are bitten.
28. We educate. 29. They dance badly.

Exercise 12.—English-Latin.


Exercise 13.—Latin-English.

1. We are good. 2. He is good. 3. Thou art good. 4. I am not good. 5. He is blind. 6. He is not blind. 7. They are very learned.
8. You are safe. 9. You are not safe. 10. I am unlearned. 11. You
LEONARDO

EXERCISE 14.—ENGLISH-LATIN.


LESIONS IN GEOGRAPHY.—IV.

ARABIAN NOTIONS—EUROPEAN TRAVELS—DISCOVERY OF AMERICA.

From the time of Ptolemy down to the tenth century of the Christian era, no geographical work appeared, either to supply the place of his, or to add to the knowledge which it conveyed. The invasion of the Roman empire by the northern hordes, the general anarchy which followed, and the seclusion into which literature was driven, produced a retrogression of all the arts and sciences. Especially is this particularly observable in geography, which may be formed of the ignorance which prevailed in this science immediately anterior to the time of the crusades, by inspecting a map of the world published at that period. The sea, as in the age of Homer, is made to surround the world, which is divided into three parts, Europe, Asia, and Africa. Asia is as large as the other two parts; Africa is joined to Asia on the south, and the Indian Ocean is made an inland sea. On the coast there is no indication of the parthian islands, or the garden of Eden, by the words hic est paradisus. Europe and Asia are separated from Africa by a very long canal, which some believed to be the Nile, others the Hellespont, and others again the Indian Ocean. Africa is considered the country of fable and mystery; its northern part only is seen, the rest is unapproachable on account of the torrents of flame poured on it by the sun. After the discovery of the Canary Isles and Cape Bojador, there is no geographer represented in one of these islands, and the figures of colossal statues brandishing formidable clubs to warn navigators that they must not go beyond this point.

A fantastic dream, filled with chimeras and ridiculous sights, hovered over the world during the middle ages. The cosmological theories then rife, were inferior to the happy notions which prevailed in pagan antiquity. Light, however, had begun to dawn. At the commencement of the eighth century, pious monks had retired into Ireland and the Faroe Islands. In A.D. 795 Christian missionaries had visited Iceland, which was considered the ancient Thule of Pytheas. In A.D. 855 the Norwegians landed on this island; proceeding farther west, they reached Greenland, and enlarged the boundary of geographical knowledge. Certain writers have advanced the opinion that the problem of a communication between the Atlantic Ocean and the great sea, now called the Pacific, was really current among the maritime people of that period. It is nevertheless an historical fact that during the eleventh and twelfth centuries, when we find that all the known seas were praised and envied by the vessels of the Scandinavians. The conquests of these pirates in Europe are well known. Their voyages in the icy regions are almost unknown to the general reader.

The expeditions we have now referred to were turned to some advantage by the geographers of the period, but all the light they were calculated to give was not rendered available. The learned writers of the eighth, ninth, and tenth centuries, when we find that all the known seas were praised and envied by the vessels of the Scandinavians. The conquests of these pirates in Europe are well known. Their voyages in the icy regions are almost unknown to the general reader.

The expeditions we have now referred to were turned to some advantage by the geographers of the period, but all the light they were calculated to give was not rendered available. The learned writers of the eighth, ninth, and tenth centuries, when we find that all the known seas were praised and envied by the vessels of the Scandinavians. The conquests of these pirates in Europe are well known. Their voyages in the icy regions are almost unknown to the general reader.
in his expeditions, and thus travelled over Central Asia; in 1333, an Italian merchant, Baldusco Pogolotti, went to Pekin by the central Asiatic route; and in 1403 Clavijo was sent as an ambassador by the court of Spain to Samarcand. About the end of the fourteenth century the brothers Zeni re-discovered Greenland, and announced the existence of a large island, which they called Pecland. Modern geographers have not yet arrived at a satisfactory solution of the problem, to what country or island this name applies.

Africa had almost become unknown, when the Portuguese began to explore the western part of this continent. This nation, animated by a zeal for making voyages and discoveries, undertook to rectify the errors of geographers, and to contradict the dreams of Greek and Roman antiquity, as well as the reveries of the middle ages, by experimentally proving the fact that there was a land inhabited, that was accessible to man as the temperate regions. Previous to the year 1411, the Portuguese had never ventured beyond Cape Nun, which they considered as an impassable limit. An expedition was then prepared and sent out, which proved completely successful; it not only doubled this redoubtable cape, but extended its researches as far as Cape Bojador. Then commenced that series of successful enterprises which have gained for this people their lasting reputation as early discoverers of unknown lands. Under the direction of Henry of Portugal, a noble and zealous prince, in 1432, exploring squadrons from Lisbon doubled Cape Bojador, discovered the river Senegal, reconnoitred the coast of Africa from Cape Blanc to Cape Verde, landed on the islands which take their name from the latter cape, and took possession of the Azores, situated about nine hundred miles from the African continent.

Some years later the Portuguese crossed the equinoctial line or equator, and established the fact, hitherto problematical, that the torrid zone was not only habitable, but also very populous and fertile. No longer did the black statues of the Canary Islands appeal to the fears of the traveller, and forbid him to go a step beyond that limit. Suddenly also was the Sea of Darkness illumined by the rays of the tropical sun, and soon were its waves opened up as a public highway to entrepising navigators. After now exploring expeditions to the kingdoms of Benin and Congo, the Portuguese, under Bartholomow Diaz, in 1482, reached the Cape of Good Hope, which was then called by him the Cape of Tempests, on account of the stormy aspect which it presented to them on its first appearance. In 1487, however, under the auspices of Emmanuel of Portugal, Vasco de Gama doubled the Cape of Good Hope, and reached India, after having sailed along the whole western and southern coast of Africa.

Whilst the Portuguese were thus striking out a new route to the East Indies, the Spaniards were opening up America to Europe. The latter years of the fifteenth century made this double present to Christendom. The erroneous representations which the map-makers presented at this period, and which, according to the authority of Ptolomy and the travels of Marco Polo, gave an exaggerated extent to Asia on the east, led Christopher Columbus to imagine that by sailing continually westward, it was possible to reach the continent of Asia and the East Indies. There was, besides, a vague but common belief that there existed towards the west a great unknown land.

The history of all the difficulties which the illustrious Genoese met with in the execution of his project, and of all the obstacles which ignorance, indifference, and jealousy raised up against him is well known; but the facts of the discovery must be repeated here. The three vessels charged with this great exploring expedition set sail on the 3rd of August, 1492, and after a short rest at the Canary Islands, were re-fitted on the 6th of September following. From that moment the crew of the little fleet, alarmed at the immensity of the ocean, and destitute of the hope of success to sustain their courage, cherished a thousand apprehensions which almost led them to despair. Despondency gave place to anger, and anger produced revolt. The envy of the great leader of the enterprise calmed these extravagant fears, and warned off the dangers to which his life was threatened. Yet keen anguish continued to agitate his noble heart during those long and dreary nights when the land, indicated by certain customary signs, seemed to fly from his presence. At last, at ten o'clock on the night of the 11th of October, 1492, Columbus distinctly perceived a light. Some hours afterwards, the rising sun showed him in the distance the land which he sought. America was discovered!

The first land seen by Columbus was the island of Guanahani, which is now called San Salvador. The Spaniards discovered, in succession, the West India Islands, including Cuba and Hayti, which received the name of Hispaniola, and in 1497 Columbus set foot for the first time on the mainland of the continent of North America. It has been said that Amerigo Vespucci visited, a year before Columbus, the coasts of Guiana and Terra Firma, now Venezuela; but this conjecture. Two years later, however, this learned Florentine carefully reconnoitred the northern coast of South America.

In the space of a few years, constant accessions were made to these discoveries in the New World. In 1497, John Cabot, accompanied by his sons Lewis and Sebastian, discovered Newfoundland and Labrador, and is said to have sailed southward along the coast of North America as far as Florida. Yanez Pinzon, in 1500, reached Brazil, and three months after him, Alvarez Cabral landed on the same coast, which he transferred to the sovereignty of Portugal; while Gaspar Cortesou touched at the coast of Labrador, which had already been discovered by Cabot. Ponce de Leon, in 1512, landed in Florida. Three years later, the Rio de la Plata, or River Plate, was laid open to Europe by Juan Diaz de la Muela. Magellan, one of the most illustrious of these early voyagers, in 1520, established the fact of the existence of the strait which bears his name, saw Tierra del Fuego, and reached the Philippine Islands, after having ploughed the Pacific Ocean, which Nunez de Balboa had taken possession of, in the name of the king of Spain! This Balboa was the first who saw, from the elevated shores of Central America, the waters of the great Pacific Ocean, which he named the South Sea. Now the Spaniards commenced the exploration of the new continent. The curiosity of Europe was raised to its highest pitch. An unknown and mighty world unfolded its wonders to bold adventurers, when Mexico, Guatemala, and Peru exhibited to the eyes of the astonished Europeans the splendours of their imperial cities, and their inhabitants told them of the priceless store of inexhaustible treasures that lay hid in the bowels of their mountains.

But the wealth of the men of the New World proved their ruin, and led to their speedy subjugation and the overthrow of empires and dynasties that were older, perhaps, than any that existed in that quarter of the globe from which their conquerors came. The sight of gold and silver used for purposes for which the baser metals were thought even too valuable in Europe; the indifference with which Mexicans and Peruvians alike regarded that which the Europeans looked upon as the only thing which could render life desirable; and the incredible news that, any day they liked, they could get more than a strong man could stagger under, at the price of a few hours' work with spade and pick, raised in the human vultures that had flocked west-
ward in the track marked out by Columbus, a hunger and thirst for gold so craving and inestimable, that no amount of the precious metals was able to satisfy the one or allay the other.

The first voyage of Columbus in 1492, and the discovery of Cuba and several of the West India Islands, including Hispaniola, now called Hayti or St. Domingo, at which he landed before he returned to Spain in the following year, led to the immediate colonisation of the Caribbean Archipelago and the Isthmus of Panama or Darien, that links together the two great peninsulas of the American continent. To these colonies came all the adventurous spirits in Spain who coveted wealth, fame, or glory. Among them were some whose social position_debarked them from rising in their own country, and settled a small colony of the landed gentry to make a reputation as well elsewhere. Of these, the most notable was Francis Pizarro, the natural son of an unnatural parent, an officer in the service of Ferdinand the Catholic and Isabella of Castile, king and queen of all Spain, who cared so little for the “flesh of his flesh, and bone of his bone,” that he allowed the lad to grow up to manhood, without care or culture, in no better position than that of the keeper of the hogs that wallowed in the filth of his courtyard. But when Spain was echoing through its length and breadth with the marvellous adventures of Columbus, the news of the discovery of the New World reached even the young swineherd in his obscurity, and turning his back on kinsmen and country without a sigh, he worked his passage to the far Western country, where the base-born huger of wood and drawer of water could win as much wealth and honour as the noblest of the high-bred Spaniards, provided that he had brim enough to scheme and plan, sufficient determination to act, and thews and sinews strong enough to strike.

To the colony of Darien on the Spanish main went Francis Pizarro, Diego D’Almagro—a man who knew even less about his begetters than Pizarro did, and who took his name from the town in whose streets he was picked up—and a host of kindred spirits with little better lineage to boast of than they had. This is the story of the recently established colony by which the wealth of the New World was steadily gravitating, the ex-swineherd rose rapidly to a position of importance, while a doublon was no more to him than an acorn had been when he drove his hogs to feed in the shady alleys of the oak-woods of old Spain. By plundering and robbing right and left, he had got enough to make him long for more, when a rumour reached him that the great gold-fields of the Western world were to be found in Peru, and put him on the scent of playing the same part in the land of the Incas that Hernan Cortez had played in the country of Montezuma. Cortez had upset a powerful government, that held sway over an empire whose area was more than a thousand thousand square miles in extent, and had done pretty much as he pleased in Mexico, a city of 300,000 inhabitants, with only a trifling force of 600 or 700 Spaniards of whom he lost a third before he reached the heart of the empire. In the space of two years (1519-21) Cortez had reduced this prosperous and powerful country to the position of a Spanish vice-royalty; and what Cortez had done in Mexico, Pizarro could surely do in Peru. So thither he sailed from Panama in 1524, with one ship and about eighty men, and soon found out enough to assure him that he was on the right track to increased wealth and extended power. But hardships and privations quickly thinned the ranks of his followers, and he found it necessary to call fresh recruits to his standard before he attempted to carry out his plans. After a hasty visit to Spain to obtain from Charles V. the governorship of the newly-discovered country, he went back to the Spanish main, and, by the aid of the conqueror of Mexico, equipped a second expedition against Peru. The civil war which was then raging between the Incas Atahualpa and his brother Huascar favoured his attempts. He took the former prisoner, and, having wrung from him gold and silver enough to fill a room twenty-two yards long, he murdered him as high as he could reach, he murdered him, seized his capital, and declared his country to be henceforth an appanage of the Spanish crown. Following up the good fortune of Pizarro, D’Almagro, who had acted as Pizarro’s lieutenant in the conquest of Peru, marched southwards into Chili to win a province for himself. His success led him to aim at making himself master of the whole of the Spanish territories in South America, and a struggle for the supremacy ensued between the former friends which brought about death for both, for D’Almagro was taken prisoner and strangled by order of Pizarro in 1538, while Pizarro himself was assassinated by D’Almagro’s son in 1541.

Other leaders at the head of handfuls of men, so to speak, were equally, though not so notably, successful in other parts of the American continent; and fifty years had not elapsed from the time of the discovery of America, ere the whole of the continent south of the Isthmus of Panama, and a large very large portion of that on the north, had been reduced from the position of independent empires to that of dependencies of Spain and Portugal.

LESSONS IN GERMAN.—VI.

SECTION XIII.—NOUNS OF THE NEW DECLENSION.

Nouns of the New Declension form their genitive by adding n or en to the nominative, as:—Nom. Der Mensch, the man, the human being; der Herr, the lord, or Mr.; der Bischof, the bishop; etc. Gen. Des Menschen, des Herrn, des Bischöfchen, n. Nouns of this declension retain the form of the genitive in the dative and accusative. Nearly all masculine nouns that end in e belong to the New Declension.

NEW DECLENSION OF THE NOUN.

1. Der gute Mensch, the good boy; des Dichter, the ox; des guten Knecht, the good boy’s; dem guten Knechte, to the ox; der guten Knechte, the ox; dem guten Knechte, to the ox.

VOCABULARY.

Adj., adjenent, fattigizing — coltisome.

Grund, m. Christian, French, m. German, French.

Voci. liberty, freedom.

Freihaut, f. republic, republic.

Fürst, m. prince.

Gefäls, n. countenance, face.

Gewissen, n. conscience.

Graf, m. count.

Resümé of Examples.


2. Der dritte Bischof sitzt unter vier, of the Lord eight hundred and fourteen.

3. Der dritte Bischof sitzt unter vier, The gallican Hungary is the .

4. Das dritte Reich is ein schönes, The fragrant violet is a beautiful.

5. Der dritte Reich is ein schönes, Production of the spring.

6. Ein dritter Mann is ein saftiges A good conscience is a soft.

7. Ein dritter Mann is ein saftiges. A good conscience is a soft.

Exercise 16.


Exercise 17.

Section IV.—Absolute Possessives, Etc.
1. When mein, dein, sein, etc. (§ 53) are not followed by an adjective or a noun, they are called absolute possessives, and are declined, as are also sein and sein, like an adjective of the Old Declension, as—

Mein iht ist gross, und sein-cr (sein) My hat is large, and his (his) hat is small. 
Sein iht ist gross, und mein-cr (mein) His hat is large, and mine (my) hat is small. 
Sein book ist neu, echt (Buch) His book is new, here (her) is all, and 2bez (2bez) (book) is old, and yours (your) is beautiful. 
Er hat Sch, und Sie haben扁-es He has money, and you have (tein Geb). 

Gesch and feins (the neuters) often drop the vowel of the final syllable; thus producing the forms sicht and feins, as—

Er hat ein M, Sie haben sein, He has a horse, you have one, und ich habe feins, and I have none.

Old Declension of the Adjective in All Genders.
Masculine. Feminine. Neuter.

2. Guast is to be rendered "something," "anything," as haben Sie euast? have you anything? Ich habe Euast, I have something.

Nicht (not) is seldom used with euast; "not anything" being translated by night, which also signifies "nothing," as Ich habe night, I have not anything, or, I have nothing. So euast is best translated, "such a thing.

3. "At all" in such phrases as "nothing at all," "none at all," and the like, has in German its equivalent in the particle gar, which, however, always comes immediately before the word to which it relates. Kindred to this, is the still stronger expression, "gar und gar," wholly and utterly; "gar und gar nuit," wholly and utterly not, i.e., by no means; not at all.

4. When an adjective is used with "euast" or "nicht," it follows the Old Declension, and is written with a capital initial; as—

Ich habe euast Eirinet, I have something beautiful. 
Er sagt nichts Euastest, he says nothing bad. 
Er spricht von euast Deuts, you speak of something new.

5. German verbs are conjugated irregularly in the present and imperfect tenses, without an auxiliary, like the English verbs "have" and "be," as—

Ich habe nicht, I have not. 
Er feh nach, he sees not (he does not see). 
Er hatte nicht, he had not. 
Er fah nicht, I saw not (I did not see).

Vocabulary.

Alter, other. Alter, other. 
Barbarer, m. barber. 
Bau, blue. 
Breit, m. book-binder. 
Etwas, something, anything. Gar (R. 3 above).

Sauer, sour. Sauer, sour. 
Gest, f. barley. Gest, beautiful, fine. 
Hafer, m. oats. Eisch, f. soap. 
Ker, here. Saft, sweet. 
Lein, n. leather. Bragen, m. wheat. 
Macht, nothing. 
Magen, little, few. 

Exercise 18.

Exercise 19.

Lessons in Drawing, IV.
As it is necessary to dwell a little longer upon Parallel Perspective, in order to lay before our readers as many varied examples as we can in this division of the subject, we will for a few minutes restrict our observations to the details and method of drawing Fig. 32. But before taking up our pencil, let us say a few words upon a general principle of procedure, which incites the careful attention of all who are seeking to acquire a knowledge of Drawing by the aid of these lessons. There is one question almost always asked by beginners, and as, no doubt, the inquiry will be made by many, if not all, of our readers who wish to become good draughtsmen, we answer it now. The question we allude to is, "Where shall I begin?" This is a very natural query, and may be answered in more than one way, according to the nature of the subject to be copied.

We wish our readers to understand that the instructions contained in these lessons apply to drawing from objects as well as drawing from copies, and the same method is to be observed in both cases. If the subject before us is a drawing of a building, as in Fig. 32, begin by drawing the line of sight; this line must be ruled, but let it be the curved line in the work. Then place the point of sight, and mark in the distance of the nearest line to this point on each side of it, and then the succeeding ones, without passing over a single line. It is much easier to mark in the distances between lines close together than when they are wide apart. The whole distance from r to z is made up of the intermediate distances, v w a, a b, b c, c d, and d z, and if we correctly determine all the intermediate distances, we undoubtedly obtain the whole distance correctly. The reason we commence upon the line of sight from the point of sight is, because the eye is on a level with the parts of the subject on and near this line and point, from which we gradually extend our drawing to the outer limits. Once more we must impress upon our readers that this plan is to be followed when drawing from both copies and Nature, as it must be evident, when drawing from Nature, that the parts opposite the eye can be
more easily and correctly arranged for the commencement of a drawing than those parts which are much above, or to the right or left of the eye. We have frequently seen beginners sit down to draw a house from a copy, and commence with the chimney, scratching away without having made any settlement as to the walls, doors, windows, etc., and when they get to the bottom find it altogether out of proportion. Who can expect anything but difficulty and failure, if he attempt to copy a drawing after this manner? No, we must copy from copies as we would copy from objects. When we are seated opposite the house of which we are about to make a drawing, it will naturally occur to the mind that the parts most in view, and best seen and understood, must be the first to be drawn, for from them the proportions of the wall have the same vanishing point. A question may be asked with regard to the point of sight, as to whether the drawing, Fig. 33 (or any other where the point of sight is the principal vanishing point), could have been correctly made if the point of sight had been to the left of the door at g, instead of the right? Certainly it could. We have stated the point of sight determines the part of the building which is directly opposite us from the spot where we stand. This spot, remember, is called the "station point." If the point of sight had been to the left in this subject, we should not have seen such a broad extent of the retiring side of the projecting wall, c e; if it had been at h, we should not be able to see this retiring side at all, since we cannot see round a corner. Therefore.

Fig. 32

all the rest of the subject are made and arranged. It very rarely occurs to any one, when drawing from the object, that to begin with the chimney is the right thing; then why should we do it when drawing from copies? When drawing a building, always commence with the parts opposite and on a level with the eye, and proceed to the foundation; then the superstructure may next be sketched, and the chimneys added last of all. Follow this practice in drawing from copies, and you will not find any difficulty when you are drawing from objects.

When the question, "Where are we to begin?" refers to ornament, or to an arrangement of objects which can be placed on a table, look well at the whole first; then examine it carefully to discover the principal lines and characteristic angles, and begin with those nearest to the centre, passing outwardly from all sides of the centre gradually, without allowing any line of importance to be unnoticed, that is, unmarked.

In Fig. 32 the eye of the pupil will quickly recognise the lines which go to the point of sight, and he will observe that the retiring lines of the window thrown open at a right angle it will be evident that four or five persons might sit in a row, all draw the same object, and all produce correct drawings, though not all alike, arising from the difference of position, each having his own point of sight, and each drawing his retiring lines to that point.

We said, when giving an explanation of the definitions or fixed principles relating to retiring lines and planes, that the last (Definition 11) should engage our attention at a future time; we will now endeavour to make it clear with the help of a drawing, after repeating the definition itself, which was as follows—"All lines inclined with the horizon and with the picture plane, have their vanishing points above or below the line of sight, according to the angle they form with the horizon, their vanishing points being always on a line perpendicular to the vanishing point upon the line of sight, to which they would have retired had they been horizontal."

In Fig. 33 the learner will perceive that the inclined retiring lines are the lines of the roof e b and e d. If the roof had been flat—that is, horizontal—its line would have been c e, and would
be directed towards PS; but one end being raised from e to d,
the whole plane of the roof becomes inclined, consequently the
vanishing point is raised according to the angle of inclination;
thus e d being determined, continue it until it cuts the perpen-
dicular line drawn from the point of sight, PS, which will be at
improve, the hand by practice will soon become able to carry
out with facility all that the mind and eye require.
We call perspective a portion of the grammar of Art, which
assists us to draw correctly, as the grammar of a language helps
us to speak and write correctly; and, without a grammar, it

V P. Then, as the opposite side, a b, is, in reality, parallel to c d,
a b must have the same vanishing point; and all inclined lines of
the slates would, if produced, meet at the same point, namely, V P.
We regret that at this stage we cannot give a geometrical proof
of this fact, because we fear to confuse the mind of a beginner
with too many rules; but we propose to give him this proof
would be as hopeless to succeed in the one as it would be in
the other.
Our readers will begin to see the importance of having a
vanishing point, by the help of which we are enabled to draw
parallel retiring lines, both horizontal and inclined, accurately.
The eye of the draughtsman may be very correct, but he must

fig. 33

hereafter. He must, in copying this example, mark the distance
from e to c in the usual manner; draw c d, and carry his pencil
on to the perpendicular from PS; the vanishing point, V P,
will then be a guide for the remaining inclined lines. The eye,
in determining the positions and proportions of lines, is very
deceptive; many have recourse to measuring, in order to ensure
a correct outline. We beg the pupil not to measure; the
understanding and the eye must be educated; and, as these
not disdain to use a help which is not only true in principle,
but a ready and decisive way of setting at rest every doubt
and uncertainty relating to the treatment of these lines, which
without vanishing points would be very difficult to determine.
In Fig. 34, the lid of the box to the right inclines downwars-
that is, the upper edge is nearest us—consequently, the V P
of the lid is below the line of sight; the lid of the cellar retires
upwards, having its V P above the line of sight.
LESSONS IN FRENCH.—VII.

SECTION I.—FRENCH PRONUNCIATION (continued).

III. NAME AND SOUND OF THE VOWELS.

43. O, O.—The o has, in French, three different sounds: short, as in cob; broad and prolonged, as in cord; and full, as in coat.

The short sound, as in cob, is the most common one. The o has a broad and prolonged sound, as in cord, when followed by an r, thus—caster, encore, etc. The full sound, as in coat, is always given to the o when it has a circumflex accent over it. It is also full when final, as in coco, loto, etc., and when followed by a mute consonant, as in mot, dos, etc.

EXAMPLES OF THE SHORT SOUND.

Bloc. Blolc.
Bodine. Bod-ine.
Croise. Croiser.

EXAMPLES OF THE BROAD, PROLONGED SOUND.

Castor. Kas-tor.
Butor. Bu-tor.
Encore. Ana-ker.
Corde. Kord.

The o has a broad and prolonged sound, as in cord, when followed by an r, thus—castor, encore, etc. The full sound, as in coat, is always given to the o when it has a circumflex accent over it. It is also full when final, as in coco, loto, etc., and when followed by a mute consonant, as in mot, dos, etc.

EXAMPLES OF THE FULL SOUND ACCENTED.

Gobelet. Gob'-lay.
Locale. Lo-kal.
Mode. Mod.

Gob'lay. Gobelet.
Lo-kal. Locale.
Mod. Mode.

EXAMPLES OF THE FULL SOUND UNACCENTED.

Mot. Mot.
Dos. Do.
Repos. Rep'o.

Examples.

1. Professions et Métiers.—Professions and Trades.

Acteur, m., actor.
Apothicaire, m., apothecary.
Artiste, m., artist.
Aumônier, m., chaplain.
Bouc'hier, m., butcher.
Brassier, m., brewer.
Brodeuse, f., embroiderer.
Charbonnier, m., coalman.
Charlatan, m., quack.
Chatelet, m., caretman.
Chaudronnier, m., cook.
Chirurgien, m., surgeon.
Correspondant, m., correspondent.
Courtier, m., dealer.
Couturier, f., seamstress.
Couvreur, m., mason, tiler.
Curé, m., vicar.
Dentiste, m., dentist.
Drapier, m., draper.
Eclatéaste, m., clergyman.
Épicier, m., grocer.
Evêque, m., bishop.
Financier, m., banker.
Fripier, m., dealer in old clothes.

2. LIST OF WORDS FOR EXERCISES IN COMPOSING.

The words in the following lists are given as suggestive of thought. In conducting the exercise a particular word is selected, as relieuer (bookbinder), and the student is required to compose a French sentence containing this term. He is duly notified that he is at liberty to take any thought suggested by the word, and to produce a sentence of any form found in any of the sections; regard being had all along to the rules, notes, exceptions, etc., that may bear upon the case. Thus, adopting as a model the sentence Votre marchand est bien obligé (Sect. XVI, Réc. 17), or, Le Doncst a-t-il quelques sommes ? (Sect. XVII, 7), etc., let him endeavour to produce others of the like kind.

A little practice will render the exercise both easy and interesting. It will soon come to be easy to incorporate not only one, but two, three, or more of the words taken from the lists.

FRENCH. Pronun. English.
Buche. Bush.
Brouillon Brul-lab'lu Th' t'be burned.
Brilbot Bru-lou Fireship.
Briller Bru-lay To burn.
Cra. Kru Growth.

FRENCH. Pronun. English.
Bûché. Bush.
Brouillon. Brul-lab'lu. Th't be burned.

EXAMPLES.
LESSONS IN ENGLISH.

PARSING AND COMPOSITION.

By parsing is meant the telling of the parts (pars, Latin, a part) of speech of which a composition consists. Parsing, besides assigning the parts of speech, states the condition in which the words are and, the relations in which they stand. In its complete form, parsing cannot be done until the student is acquainted with the entire grammar. But he may parse as he goes, and as far as he goes. Viewed in this light, parsing is a sort of practical review made by the student of what he has learned. Such a practice, if pursued to the end, leads to a system of complete parsing. And such a practice will greatly conduce to a thorough familiarity with the

Exercice 26.

1. Are you more attentive than your sister? 2. I am not so attentive as your brother. 3. Have you more courage than my brother? 4. I have quito as much. 5. Has the blacksmith as much money as iron? 6. He has more of the latter than of the former. (See. VIII. 5.) 7. He has more modesty than his Spaniard? 8. He has more. 9. He has more than your friend's sister. 10. Are you not cold, Sir? 11. No, Sir, but I am afraid and sleepy. 12. Has the Dutchman more cheese than the Italian? 13. He has more cheese and more money. 14. Have you as much English silk as Italian silk? 15. I have more of this than that. 16. Who has more friends than the Spaniard? 17. Your friend has more. 18. Has the Spaniard as much your money as of his? 19. I have less of mine than his. 20. Have you more silk cloaks than cloth cloaks? 21. We have more of these than of those. 22. Have you good cloaks? 23. Yes, Sir, I have good cloaks, good hats, and good leather shoes. 24. Have you more plates than dishes? 25. I have not more plates than dishes, but I have more glasses than plates. 26. Are you not very cold? 27. No, Sir, I am neither cold nor warm. 28. Has your carpenter wood? 29. Yes, Sir, he has wood, money, cheese, and meat. 30. Who has more money than the carpenter? 31. The Dutchman has more. 32. Who has more engravings than books? 33. The bookseller has more of these than of those. 34. Are you as attentive as your friend? 35. I am more attentive than my friend.

Résumé of Examples.

Avez-vous autant de livres anglais, que de livres italiens? J'ai aut ant aut ant. J'ai aut ant de ceux-ci, que de ceux-là. Il est aussi heureux que vous. Avez-vous plus d'assiettes que de plats? J'ai plus de ceux-ci, que de ceux-là. Est-il plus complaisant qu'aux frères? Le Français a-t-il moins de légumes, que de fruits? Il a moins de livres, que de manuscrits.
English or any other tongue. Through such a practice, I shall endeavour to conduct my readers.

Let it, then, be understood that every exercise given for parsing is intended to embrace everything that has previously been taught. For instance, we have been occupied with the definition and the classification of the parts of speech considered as members of a simple sentence. In the first lesson on parsing, then, you are expected to make a practical application, in the sentences supplied for the purpose, of the information already conveyed. Similar must be your proceeding in every successive lesson, always embracing the whole past in the present. I will give an instance. Let the sentence to be parsed be

A virtuous mind dislikes flattery.

Viewing the sentence, first in relation to the parts of speech, I enter into its structure and mark it thus:

SUBJECT. A virtuous mind.

PREDICATE. dislikes flattery.

I then take up each word in succession, and give as full an account of it as I can, e.g.:

A is the indefinite article, abbreviated from an, which has the same root as one; an is used before words beginning with a vowel, and a before words beginning with a consonant.

Virtuous is an adjective, qualifying the word mind; it comes from the Latin virtus, which originally meant valour; the conduct of a virtuous mind is called virtuousness.

Dislikes is a verb; it is a verb because it averts or declares something, and together with flattery, it constitutes the predicate of the proposition, or that which is stated of the subject, virtuous mind.

Flattery is a noun, being the object to the verb dislikes. The whole forms a simple sentence.

EXERCISES FOR PARSING.

A mingleable topic often trips. The language of truth is plain. Truth is, therefore, plain. Flattery is the bane of vanity. The smiles of the world are deceitful. Constancy in friendship denotes a generous mind. Fidelity is inseparable from love. The language of flattery is false. Flattery is the bane of vanity. The smiles of the world are deceitful. Constancy in friendship denotes a generous mind.

After having carefully gone through the exercises in parsing, and so ascertained that you are well acquainted with the previous instruction, you should, at the end of each successive lesson or section, attempt to write a short composition out of your own head. For this purpose, you may choose as your subject some one of the sentences given you to parse, and express your thoughts upon it as well as you can. At first, never mind that your words are few—never mind that your sentences are grammatical—never mind that your thoughts are poor and superficial. Only write something, and let that which you write be your own. If you wanted a lesson in spelling, or in tracing letters, then transcription would be right. But you have to practise in composition. Composition is the expression of thought; therefore think, and then put down what you think; and put down nothing but your own thoughts.

A little practice in finding materials for composition, if you put to your own mind some questions. Suppose that the theme or subject on which you intend to write is this proposition, or

THEME. One vice is more expensive than many virtues.

Ask these questions:—

1. Do I know the meaning of each word and the import of the whole?
2. Is the statement true?
3. If true; on what grounds, or for what reasons?
4. If not true; can I state it so as to make it true? If not, can I show that it is untrue?
5. If true; can I write down any fact or anecdote exemplifying its truth? something that I have read? heard? known? If true; can I, by blending together reasoning and fact, produce an essay illustrative of its truth?

The great difficulty with young writers is to find materials. In consequence, historical subjects are most suited to them. But in historical subjects, mere copying is easy, and hence it is apt to be substituted for original composition. It is, then, dangerous to entrust boys with mere historical subjects. As, however, I write for young men and young women, I shall supply historical subjects; and, in order that the source of information may be accessible to all my scholars, I shall take some of these subjects, at least at the first, from the Bible. And narrative being the easiest form of composition, I shall begin with supplying you with subjects for short narratives. Here, then, is your first

HISTORICAL THEME. God made the world.

Now this is the method you are to observe. Read carefully, and as often as necessary, the account given in the commencement of the book Genesis of the creation of the universe. When you have impressed the record on your mind, close the Bible, and, taking slate and pencil, write down as much as possible in your own words, and in simple sentences, the substance of the account. Look over what you have written and correct it. Having corrected it according to the best of your own judgment, compare it with the original. Compare it first in relation to the facts; if in respect to the facts your report is not correct, make it correct. Compare it next in regard to the spelling, and correct your spelling by the spelling of the Bible. And compare it as to its accuracy. You have one word, the Bible has another. If your word is positively inaccurate, strike it out, and put in its place the scriptural word. But a deviation in word on your part is desirable rather than not, for it shows that you have comprehended the meaning of the passage, and that you possess, instead of a mere slavish imitation, a power of reproduction which may in time enable you to write truly original compositions. If, therefore, your word is only somewhat what less appropriate than the word used on the sacred page, let it stand; but at the same time ask yourself, and endeavour to ascertain, why your word is less suitable. Should you, as you can hardly fail to do, at least as your mind grows and your taste improves, meet in the Scriptures with forms of expression which seem to you specially happy or specially forcible, transcribe them into a little note-book, kept in the pocket, ever at hand to receive memoranda, or things deserving to be remembered, things requiring explanation, things illustrative of important truth, etc.; and having transcribed them, look at them from time to time until you have made them permanently your own.

There is what may be called domestic history, out of which you may draw a constant supply of useful and interesting materials. By domestic history I mean the occurrences and events of your own home, even in their humblest details. Here you may find themes enough. Take as a

DOMESTIC THEME. My own history during a day.

Write down on your slate every minute particular, such as the time you rose, the meals you took, where you went, the times at which you left the house, where you went to, what you did, whom you met, with whom you conversed, what was said, etc., until the day’s duties and pleasures are closed and you retire to your bed. Do not commit the folly of thinking such a subject unworthy of your notice. You are learning to inform yourself, and can begin well only by beginning with that with which you are familiar. If you are poetically inclined, you may narrate

A morning walk.

But begin with prose; let rhyme alone for a while; it is very easy to tag together similar sounds. It is good sense and good feeling expressed in correct English that I want to lead you to, and for so important a purpose practice in prose is indispensable.

But whatever your theme is, be very rigid with yourself; pass no error; correct all mistakes; be as particular as if you were writing for the press. And having, according to the best of your ability, made your exercise correct, copy it out into an essay-book—a book kept exclusively to receive your attempts at composition; copy it into the book as neatly and as well in every respect as you can. The attention to neatness, which I recommend, is closely connected with the attainment of accuracy. You will find benefit as well as pleasure in looking back on your
It may be desirable to show you in an example how an humble theme may be well treated in composition. I take for the purpose one of Pestalozzi’s “Paternal Instructions.” It is on the domestic business of **Baking**.

Baking, like all cooking, is a fruit of civilisation. The savage knows of no preparation for his food; he eats everything raw, like the brutes; and accordingly he eats it like them, with brutal greediness. A proper diet is possible only when the food is prepared by art. Baking, therefore, and every other sort of cooking, is a far more important business than at first sight it appears to be. By baking we procure the most wholesome of all nutriment—that bread which, as a common necessary of life, we daily ask of God in the most comprehensive of all prayers.

It may be useful to beginners to see the same thought expressed in simple propositions—that is, propositions or sentences, not having more than one subject and one object.

**Baking.**—The same in simple sentences.

Baking is a fruit of civilisation. Indeed, all cooking is a fruit of civilisation. The savage knows of no preparation for his food. The savage eats everything raw. The brutes eat everything raw. The brutes also eat with greediness. With similar greediness does the savage take his food. Art may be employed in preparing food. In a proper diet food is prepared by art. Baking, therefore, is an important business. Indeed, cooking in general is an important business. Cooking is thought to be important. Still more important in reality is baking. By baking we procure the most wholesome of all nutriment. By baking we obtain bread. Bread is a common necessary of life. We daily ask bread of God. We ask bread of God in the most comprehensive of all prayers.

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**COPY-SLIP NO. 20.—COMBINATION OF THE LETTERS l, i, t.**

**COPY-SLIP NO. 21.—COMBINATION OF THE LETTERS m, u, t.**

**COPY-SLIP NO. 22.—COMBINATION OF THE LETTERS t, i, m.**

**COPY-SLIP NO. 23.—COMBINATION OF THE LETTERS m, i, l.**

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**LESSONS IN PENMANSHIP.—VII.**

Our readers, who have accompanied us thus far in our lessons in Penmanship, finding that they are now beginning to form letters composed of the bottom-turn, the top-turn, and the top-and-bottom turn, with comparative ease, may be wishing to hasten on a little more rapidly, and to be trying their hand at writing capitals as well as the small letters. This is a laudable wish, without doubt, and one which will be gratified in due time; but, for the present, our learners must be content to advance slowly, remembering that slow progress is the surest and safest method of attaining proficiency in any art, as the pupil is thereby saved from the danger of hurrying on from one point to another, for the sake of novelty, before he is thoroughly grounded in the rudiments of the art that he is seeking to acquire. Many who now find themselves able to make a thick down-stroke of uniform breadth throughout, such as is found in the letter l, would lose much of the facility with which they are now imitating the copies we have placed before them, if they tried to copy capital letters at this stage of their instruction. The reason is this, that the letters which the pupil has hitherto been copying consist, for the most part, of a straight stroke, while there is not a single capital letter that is not formed of sweeping curves, which cannot be made in a sufficiently graceful manner, unless the learner has obtained that pliancy of wrist, freedom of execution, and command over his pen, which can only be acquired by constant practice on the simpler letters. If he were now to try to trace out the curves, that form the letter A he would find that his hand would begin to shake, and his down-stroke be crooked and ragged throughout, owing to the change of direction in which he is compelled to turn his pen; and when he returned to the easier letters, he would further find that the check he has received had rendered him less able to write letters that he had previously formed with ease. For this reason we continue our copies in large text, as exhibited above.
LESSONS IN ARITHMETIC.—VII.
ABRIDGED METHODS OF MULTIPLICATION AND DIVISION

(continued).

6. To divide by 10, or any power of 10.

If the dividend have more ciphers for its right-hand figures than occur in the power of 10 by which it is to be divided, we need only take away from it the number of ciphers in the divisor to obtain the quotient. Thus, 873000 divided by 1000 respectively, gives quotients 8730 and 873. But suppose that the dividend has no ciphers for its right-hand figures. Take, for instance, the case of 87546 divided by 100. Cut off the two right-hand figures—viz., 46—from the dividend; then 873 will be the quotient and 46 the remainder. This is evident by exhibiting the process analytically, thus:

\[
\begin{align*}
87546 & = 87300 + 46 \\
& = 873 \times 100 + 46 \\
\end{align*}
\]

Therefore 873 is the quotient, and 46 the remainder.

The same rule applies to dividing by any power of 10.

7. Next, suppose the divisor to be not a power of 10, but to have ciphers for its extreme right-hand figures; for instance, to divide 2764 by 300. There being two ciphers in 300, cut off the two right-hand figures—viz., 64—from the dividend, and divide the 27 by 3; this gives 9, which will be the quotient, and 64 will be the remainder. This is evident by exhibiting the process analytically, thus:

\[
\begin{align*}
2764 & = 2700 + 64 \\
& = 9 \times 300 + 64 \\
\end{align*}
\]

Therefore 9 is the quotient, and 64 the remainder.

8. In this last case there is no remainder after dividing 27 by 3. But suppose we have 2904 to divide by 300:

Proceeding as before, cutting off the 64 and dividing 29 by 3, we get a quotient 9 and a remainder 2. But evidently this remainder is in reality 2 hundreds, or 200; and therefore, since 64 is also left over, the whole remainder will be 264. Hence, in this case, any remainder which is left must be prefixed to the figures cut off, in order to give the whole remainder. The process is exhibited analytically as follows:

\[
\begin{align*}
2904 & = 2700 + 204 \\
& = 9 \times 300 + 204 \\
\end{align*}
\]

Hence 9 is the quotient, and 204 the remainder.

9. We subjoin one other example:

To divide 2352983 by 72900.

Cutting off three figures, viz., 483, from the dividend—since there are three ciphers in the divisor—we divide 23529 by 729, by the common process of Long Division. This gives a quotient 35, and a remainder 24. Hence the required quotient is 35, and the whole remainder will be got by prefixing the 24 to the figures 483 cut off from the dividend. Hence the whole remainder is 24483. The process is analytically exhibited as follows:

\[
\begin{align*}
2352983 & = 2352900 + 83 \\
& = 33 \times 72900 + 83 \\
\end{align*}
\]

Hence the quotient is 33, and the remainder 24483.

EXERCISE 13.

1. In one pound there are ten florins; how many pounds are there in 200 florins? In 340 florins? In 500 florins?

2. In one metre there are 100 centimetres; how many metres are there in 65000 centimetres? In 765000 centimetres?

3. Work the following sums in division:

\[
\begin{align*}
1. & \ 2975000 \div 100000 & 3. & \ 52937180339 \div 100000000 \\
2. & \ 14450379 \div 100000 & 4. & \ 3806000 \div 17000 \\
\end{align*}
\]

4. How many vehicles at 70 pounds apiece, can you buy for 7350 pounds?

5. How many barrels will it take to pack 36800 pounds of pork, allowing 200 pounds to a barrel?

10. We do not go into a detailed explanation of the following articles, which are often useful in performing calculations without writing, or in mental arithmetic, as it is called. The truth of them will readily be seen by any one who has mastered the previous processes, and their explanation will be a useful exercise for the student.

11. To multiply by 5.—Annex 0 to the multiplicand, and divide by 2.

To divide by 5.—Multiply by 2 and cut off the last figure, \( \text{half of which will be the remainder.} \)

To multiply by 15.—Annex 0, and to the result add half.

To divide by 15.—Multiply by 2, cut off the last figure, and divide by 3; prefix the remainder so obtained to the figure cut off; half the number so formed will be the true remainder.

**EXAMPLE.**—To divide 327 by 15:

\[
\begin{align*}
2 \times 327 & = 654 \\
3 \times 654 & = 1962 \\
21 \text{ quotient,} \\
\end{align*}
\]

Thus, leaving 2 as remainder from 56.

Putting this 2 before the figure cut off—viz., the 4—we get 24, which divided by 2 gives 12, the full remainder.

To multiply by 75.—Annex two ciphers to the dividend, and subtract from it its fourth part.

To divide by 75.—Multiply by 4, cut off two figures, and divide by 3. Place before the two figures cut off the remainder got by dividing by 3, and divide the number so obtained by 4; this will give the whole remainder.

Thus, to divide 2331 by 75, we have—

\[
\begin{align*}
2331 & = 2300 + 31 \\
& = 9 \times 250 + 31 \\
31 & \text{ quotient,} \\
\end{align*}
\]

With remainder 1 from the 94.

Prefacing this 1 to the 31 cut off, we have 104, which divided by 4 gives 26, the full remainder.

To multiply by 125.—Annex three ciphers, and divide by 8.

To divide by 125.—Multiply by 8, and cut off the three right-hand figures. These three figures divided by 8 give the remainder, the other figures being the quotient.

The truth of these processes will be better understood after the learner has read the chapter on Fractions.

**EXERCISE 14.**

1. Work the following sums in division by means of the artifices shown above:

\[
\begin{align*}
1. & \ 6035 \div 5 & 7. & \ 3875 \div 125 \\
2. & \ 3256 \div 5 & 8. & \ 1125 \div 75 \\
3. & \ 1356 \div 15 & 9. & \ 4880 \div 25 \\
4. & \ 3883 \div 25 & 10. & \ 3850 \div 5 \\
5. & \ 3507 \div 45 & 11. & \ 12300 \div 60 \\
6. & \ 2550 \div 25 & 12. & \ 23700 \div 25 \\
42940 & \div 25 & 13. & \ 8250 \div 25 \\
\end{align*}
\]

12. To multiply by a number represented by any number of nines repeated.

Annex as many ciphers to the multiplicand as there are nines in the multiplier, and from the number so formed subtract the original number. Thus, to find 49270 \times 99

492700

49270 subtract

463724 Answer.

**EXERCISE 15.**

1. Work the following examples in multiplication:

\[
\begin{align*}
1. & \ 1761 \times 99 & 2. & \ 7901 \times 999 & 3. & \ 6034 \times 999 \\
4. & \ 463 \times 9999 & & & & \\
13. & \ \text{To multiply in one line by a number expressed by two figures.} \\
\text{To the product of any figure in the multiplicand, multiplied by the units' figure of the multiplier, add the product got by multiplying the figure next on the right of the figure first mentioned by the figure in the tens' place of the multiplier. Write down the units' figure of the number obtained by this process, and carry on the other (or others) as in common multiplication.} \\
\text{EXAMPLE.}—\text{To multiply} \ 5768 \text{ by} \ 73 \text{ in one line:} \\
& \ 5768 \\
& \ 73 \\
& \ 421044 \\
\end{align*}
\]
A little consideration will show the truth of this method.
An analogous method can be applied to multiplication by more than two figures, but it is liable to cause confusion.

Exercise 16.
1. Work the following examples in multiplication by the above method:

<table>
<thead>
<tr>
<th>1. 321 x 29</th>
<th>2. 5263 x 62</th>
<th>3. 4275 x 93</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. 3226 x 86</td>
<td>5. 6283 x 57</td>
<td>6. 5063 x 59</td>
</tr>
</tbody>
</table>

14. Multiplication in two lines by a number of figures.
A multiplication by four figures can often conveniently be effected in two lines as follows:

Multiply in one line by the figures in the units' and tens' places, as in Art. 13, and then again in one line by those in the hundreds' and thousands' places, placing the second line under the first two places to the left.

Example.—Multiply 3456 by 2342.

\[ 3456 \]
\[ 2342 \]
\[ 143152 \]
\[ 79488 \]
\[ (3456 x 42) \]
\[ (3456 x 23, or by 2302, if the ciphers were included.) \]
\[ 862052 \]

Exercise 17.
1. Work the following examples in multiplication by the above method:

<table>
<thead>
<tr>
<th>1. 1065 x 3241</th>
<th>2. 32152 x 8412</th>
<th>3. 2783 x 3219</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. 23215 x 32684</td>
<td>5. 6192 x 5343</td>
<td>6. 32072 x 5232</td>
</tr>
</tbody>
</table>

15. Multiplication when the number formed by the figures or figures of the multiplier on the extreme right hand is a factor of that formed by the other figures.

Multiply first by the figure in the units' place, and then this partial product by the other factor, as follows:

Example 1.—Multiply 5359 by 427.

Here 42 = 6 x 7.

\[ 5359 \]
\[ 427 \]
\[ 37723 \]
\[ 23833 \]
\[ (6 x 7 x 539) \]
\[ 5399 \]
\[ (6 x 70 x 539) \]

Example 2.—Multiply 27432 by 9612.

Here 96 = 8 x 12.

\[ 27432 \]
\[ 9612 \]
\[ 232184 \times 8 \text{ for second line} \]
\[ 233172 \]
\[ 230676384 \]

16. If the multiplier be such that the number formed by the figure or figures on the extreme left hand is a factor of the rest, we can perform the multiplication by a similar method.

Example 1.—Multiply 53496 by 1236.

Here 12 is a factor of 36; \[ 36 = 3 \times 12. \]

\[ 53496 \]
\[ 1236 \]
\[ 64192 \]
\[ \text{product by } 1200 \]
\[ 192956 \]
\[ \text{product by } 3 \times 12 \]
\[ 6021006 \]

Example 2.—Multiply 53496 by 123614.

\[ 53496 \]
\[ 123614 \]
\[ 641902 \]
\[ \text{product by } 1200 \]
\[ 1929560 \]
\[ \text{product by } 3 \times 12 \]
\[ 6021006 \]

Exercise 18.
1. Work the following examples in multiplication by the above method:

<table>
<thead>
<tr>
<th>1. 125 x 235</th>
<th>2. 8812 x 643</th>
<th>3. 5194 x 1059</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. 4835 x 1325</td>
<td>5. 754 x 549</td>
<td>6. 945 x 7711</td>
</tr>
<tr>
<td>7. 61234 x 1206</td>
<td>8. 6051 x 1967</td>
<td>9. 5063 x 593</td>
</tr>
</tbody>
</table>

**Exercise 19.**

We leave for the present the subject of gymnastics, which has been the topic of our last two papers, and turn for our recreation to a highly popular game at this season of the year, viz.,

**FOOTBALL.**

Football is one of the oldest of our English sports, having been played all over the country for some hundreds of years. The rough methods in vogue of playing the game brought it under the censure of one of our monarchs, King James I., but it survived his displeasure, and its popularity, if possible, increased.

Towns and villages were pitted against each other—not, as in the case of cricket, through the medium of a few individuals chosen to represent them, but by the side of nearly all their able-bodied representatives. For football is a game in which a large number of persons can join, and, where space was unlimited, an unlimited number could play.

One or two vestiges of the ancient game still linger in Old England, where, on a certain day of the year, the more active members of the population turn out in a body, and play at football in the olden style.

But this custom is now considered "more honoured in the breach than the observance," and football occupies a similar position to other games as a holiday recreation.

Many modes of playing football are in use, especially in our chief public schools, each of which has its own cherished rules and practices differing from the rest.

The Eton game differs from that played at Harrow, and both from the famous game of Rugby. Winchester, Marlborough, and Shrewsbury, too, have their peculiar styles, and what is allowed in some is strictly forbidden in others.

This variation in practice has been a disadvantage to the game, and several attempts have been made to bring about uniformity. In the case of the chief schools we have mentioned, little progress towards it has yet been effected; but something has been done by an association of football clubs in various parts of the kingdom, which have adopted a set of rules for their guidance. These rules are a digest of all other codes in use, and to these we shall presently refer.

In all football play, whatever the difference of the practice in particular points of the game, the object sought to be gained by the rival players is the same, namely, to drive the ball to the boss or goal of their opponents. This will be best understood from a diagram of the ground, which in length should be from 50 yards upwards:

**Touch.**

**Goal A**

**Goal B**

**Touch.**

Here the lines drawn on each side represent the boundary within which the game is played. These lines are usually marked out by flags, and the space beyond them is technically known as touch. The two dots towards either end show the position of two posts, which constitute the goal of one of the two parties, say A or B, into which the players are divided.

The play begins in the centre of the ground, and the object of each party is to kick the ball through the goal posts of their opponents. On attaining this, the game is won for the side that accomplishes it. It may be renewed again, the parties then changing goals, in order that each in turn may have any advantage as arising from fall of ground, direction of wind, etc.; and at the termination of the play each side counts so many games as goals may have been secured by its players. Each side usually has its captain, and its goal-keeper, whose especial duty it is to guard the goal, as far as may lie in his power, when the ball is driven towards it.

The balls are usually made of ox-bladders covered with leather, but India-rubber is sometimes employed for the lining. Individual clubs may be obtaining from at 8s. to 12s.

The rules which we subjoin will be sufficient explanation of the precise mode of commencing and continuing the play. But we may remark with regard to all rules, that the more nearly

* Our readers wishing to obtain information as to the practices of the different schools, will find an account of them in "Cassell's Illustrated Family Paper," for December 31st, 1864.
the practice of the players is confined to the impelling of the ball by kicks alone, and the more closely the kicks are confined to the ball, and not distributed among the players, the more perfect is the game itself, and the more likely to retain and increase its popularity. It is the barbarous custom (we can use no other term), in some celebrated modes of play, to allow the practice of hacking, or kicking freely at the shins or legs of an opponent, in certain positions of the game, in order to disable him from carrying on the ball. From this custom serious consequences have occasionally resulted. Accidents will occasionally happen, from the nature of the game, under any circumstances; and that it requires courage to make an efficient player, and a disregard of the chance of a little danger, will not be considered a drawback by high-spirited youths who engage in it. But there is no occasion to add to the probability of personal injury by rules and practices which seem to invite it.

The following are the laws of the game, as determined in February, 1867, by a general meeting of representatives of clubs forming the Football Association. These laws, however, it is understood, are subject to such modifications as future experience may suggest:

1. The maximum length of ground shall be 200 yards, the maximum breadth shall be 100 yards; the length and breadth shall be marked off with flags; and the goals shall be upright posts, eight yards apart, with a tape across them eight feet from the ground.

2. The winners of the toss shall have the choice of goals. The game shall be commenced by a place kick from the centre of the ground by the side losing the toss. The other side shall not approach within ten yards of the ball until it is kicked off.

3. After a goal is won, the losing side shall kick off, and goals shall be changed.

4. A goal shall be won when the ball passes between the goal posts, under the tape, not being thrown, knocked on, or carried.

5. When the ball is in touch, the first player who touches it shall throw it from the point on the boundary line where it left the ground, in a direction at right angles with the boundary line, and it shall not be in play until it has touched the ground; and the player throwing it shall not play it until it has been played by another player.

6. When a player has kicked the ball, any one of the same side who is nearer to the opponent's goal line is out of play, and may not touch the ball himself, nor in any way whatever prevent any other player from doing so until the ball has been played, unless there are at least three of his opponents between him and their own goal; but no player is out of play when the ball is kicked from behind the goal line.

7. When the ball is kicked behind the goal line, it must be kicked off by the side behind whose goal it went, within six yards of the limit of their goal. The side who thus kick the ball are entitled to a fair kick off in whatever way they please, without any obstruction, the opposite side not being able to approach within six yards of the ball.

8. No player shall carry or knock on the ball.

9. Neither tripping nor hacking shall be allowed, and no player shall use his hands to hold or push his adversary.

10. A player shall not throw the ball, or pass it to another.

11. No player shall take the ball from the ground with his hands while it is in play, under any pretense whatever.

12. No player shall wear projecting nails, iron plates, or gutta percha on the soles or heels of his boots.

The following is a definition of the terms used in the above rules:

A place kick is a kick at the ball while it is on the ground, in any position in which the kicker may choose to place it.

Hacking is kicking an adversary intentionally.

Tripping is throwing an adversary by the use of the legs.

Knocking on is when a player strikes or propels the ball with his hands or arms.

Holding includes the obstruction of a player by the hand or any part of the arm below the elbow.

Touch is that part of the field, on either side of the ground, which is beyond the line of flags.
In addition to the mathematical instruments described in our last lesson, there is also an instrument called a protractor, for measuring angles upon paper, which is represented in Fig. 14, and consists of a semicircle divided into degrees, from 0° to 180° each way, the 90th degree being right above the centre, O. The straight line, A B, in the figure is the diameter of the semicircle, and is called the fiducial (or true) edge of the protractor to be applied to one of the legs of the angle to be measured. The arch, A M B, being the fiducial edge to be applied to the other leg. Thus, in order to measure the angle X O Y, the centre of the instrument is placed on the vertex, O, of the angle, and the edge O A on the leg O Y, so as to coincide with it exactly; then the angle A O M, on the arch A M B, determined by the point M, through which the other leg, O X, passes, is the measure of the angle X O Y. In this case, the measure appears to be nearly 45 degrees, as the figure represents divisions on the arch or limb of the protractor at every five degrees.

This apparatus for measuring angles is sometimes engraved on the upper side of a pair of parallel rulers, and sometimes on the obverse side of a plane scale. The protractor is more commonly made so that the centre of the semicircle, and the fiducial edge containing it, shall be on the outside of the instrument rather than on the inside, as above.

The Plane Scale is a flat rule having several lines of equal parts, on one side divided according to certain proportional parts of an inch; and having, on the other side, the diagonal scale, decimally divided so as to measure units, tens, and hundreds of equal parts, with a very considerable degree of exactness. The construction of this scale, so useful in graphical (i.e., drawing) operations, such as the construction of plans, maps, and charts, architectural designs, plans and sections of machinery, etc., is founded on the properties of similar triangles, as treated in the sixth book of Euclid. We shall endeavour to give our readers a practical idea of its construction.

On a straight line, A E (Fig. 15), divided into any convenient number of equal parts, A B, B C, C D, D E, etc., one, A B, is assumed as the standard unit of measure. From the different points, A, B, C, D, E, etc., perpendiculars of a convenient length, as A A', B B', C C', D D', E E', etc., are drawn to the straight line A E, and terminated in the straight line A' E' parallel to A E. The unit A B is divided into 10 equal parts; then the opposite part, A' B', is similarly divided; next the perpendicular B B' is divided into 10 equal parts, and through each division straight lines parallel to A B or A' B' are drawn. The divisions of the straight line A E are now marked with the numbers 1, 2, 3, etc., from C to E, to denote units. The divisions of the standard unit A B are marked 1, 2, 3, 4, 5, 6, 7, 8, 9, from B to A, to denote tenth parts of a unit; and the divisions of the perpendicular A' B' are marked 1, 2, 3, 4, 5, 6, 7, 8, 9, from B' to A', to denote hundredths of a unit.

Or, if the divisions of the straight line A E denote hundredths, those between B and A denote tens, and those between B' and A' denote units. The scale is rendered complete by drawing straight lines from B on B A, to 1 on B' A'; from 1 on B A, to 2 on B' A'; from 2 on B A, to 3 on B' A'; and so on, till one be drawn from 9 on B A, to A' on B' A'.

By the nature of similar triangles, hereafter to be explained, the small part of the parallel to the base B B', within the triangle B' B A', at the division marked 1, is one-tenth of the base B B', and consequently one-hundredth part of the line B A; the small parts of the other parallels are in succession, two-hundredths, three-hundredths, etc. Hence, if a straight line is to be measured, take its length in the compasses, and apply it to the scale from 1 towards E. If it measures an exact number of units from 1 to E, then the straight line may be said to measure 3, 30, or 300 equal parts, according as A is made to stand for 1 unit, 1 ten, or 1 hundred. If it does not measure from 1 to E exactly, but extends from 1 exactly to one of the division marks between B and A, say 4, then the straight line may be said to measure 3 4, or 340 equal parts, according to the standard unit, as before. If it does not extend from 1 to the division marked 4 between B and A exactly, but falls somewhere between 4 and 5, then move the compasses downwards, preserving one point always in the line E E', and both points parallel to A B, till the other point fall on the intersection of the diagonal marked 4 4, with one of the parallel straight lines marked on B B', say 6; then the straight line may be said to measure 3 4 6, or 346 equal parts, according to the standard unit, as before.

For the purposes of navigation, dialling, etc., the plane scale has frequently on the side opposite to the diagonal scale just described, a set of lines, besides those of equal parts, containing divisions for the measurement of leagues, rhumbs, chords, sines, tangents, semi-tangents, secants, lines of longitude, etc. Such scales are considered the best, as they are generally executed with great care. The scale called Gunter's scale has the same divisions on one side of it, as are to be found on the plane scale, but of a larger size, and when well constructed, admitting of greater accuracy; but being usually made of boxwood, this is seldom the case. The obverse side of Gunter's scale has a set of lines representing the logarithms of the numbers which denote these divisions; by means of the logarithmic lines, arithmetical calculations can be performed instrumentally, that is, without the operation of the ordinary rules. A modification of this instrument, called the sliding Gunter, is still more ingenious in its construction, and still more useful as an instrument of calculation.

The explanation of these instruments, however, belongs to a more advanced state of knowledge among the generality of our readers. This we hope to reach by their perseverence.
THE SANLI-K CUBE.

This letter should be pronounced as if printed thus, namely, moi:i-er; divided thus, namely, moi:i-en, but pronounced in two syllables, namely, mo:i-en.

Joyeur should be pronounced as if printed thus, namely, jo:i-en; divided thus, namely, jo:i-tu, but pronounced in two syllables, namely, jo:i-tu.

Royauine should be pronounced as if printed thus, namely, ro:iu-aine; divided thus, namely, ro:i-tu-aine, but pronounced in two syllables, namely, ro:i-tu-aine.

The pupil need not attempt to pronounce these three French words used as examples, because the combination of vowels and other letters occurring in them has not yet been illustrated.

The pronunciation of y with these and other combinations of letters will be explained in future lessons.

In the following words the y, though not placed between two vowels, is under the same rule, namely:

Pays, meaning a country, should be pronounced as if printed thus; divided thus, namely, pet-is, and pronounced pa-e.

Payage, meaning a landscape, should be pronounced as if printed pa-e, divided thus, namely, pet-i-sege, and pronounced pa-e-seah.

IV. NAME AND SOUND OF THE CONSONANTS.

As a general rule, none of the consonants, when final, have a distinct and independent sound; but it is immediately followed by a word beginning with a vowel or h mute, in which case the consonant is joined with the following word in pronunciation.

47. B, b.—In any position within a word, this letter has the sound of the English letter b.

When doubled within a word, only one b is sounded, viz.:—

\begin{table}
\centering
\begin{tabular}{l l l}
| French | Pronunciation | English |
\hline
Abbesse & Ab-ess & Abbess \\
Rabbi & Rab-bi & Rabbi \\
Sabbat & Sab-bat & Sabbath \\
\end{tabular}
\end{table}

At the end of proper names, b is always sounded.

In these words, namely, a-plomb and plomb, the b is silent, and the next two preceding letters in each word, namely, ox, take the nasal sound of on.

48. C, c.—This letter has two entirely distinct sounds, namely, hard and soft. Before the vowels a, o, u, and e, and also before the consonants c, t, n, and y, it has the hard sound of the letter k in the English word kill, namely:

\begin{table}
\centering
\begin{tabular}{l l l}
| French | Pronunciation | English |
\hline
Comité & Ka-ee-tay & Committee \\
Comité & Ke-ee-tay & Committee \\
Cabe & Kub-ay & Cage \\
Cerc & Kar-ur & Heart \\
\end{tabular}
\end{table}

But before c, t, and y, and also with the cedilla before a, o, and u, it has the soft sound of the letter s in the English word sea, namely:

\begin{table}
\centering
\begin{tabular}{l l l}
| French | Pronunciation | English |
\hline
Clé & Seal & Key \\
Clac & Seh & Clack \\
Cycle & Sook & Cycle \\
\end{tabular}
\end{table}

When final, and not preceded by the letter n, c is generally sounded like the letter k in the English word book, namely:

\begin{table}
\centering
\begin{tabular}{l l l}
| French | Pronunciation | English |
\hline
Avec & A-vuk & With \\
Bé & Be & Be \\
\end{tabular}
\end{table}

In a few words, however, c final is not sounded, and these exceptions are best found out by consulting a French pronunciation dictionary. In a few words, c has the sound of the letter g in the English word go, namely, second, secondaire, secondairement, seconde, secondement, seconder, secondaire.

In these words the c, which commences the second syllable, has the sound of the s, namely, second, as if printed second, pronounced t-soun, etc. We do not illustrate all the sounds of these French words here, because of the nasal sounds contained in them.

49. D, d.—This letter generally has the sound of the letter d in the English word deed. It is usually silent when final, except in proper names.

The principal exception to the above rule is, when d is final before a vowel or an h mute. In such a case, the d has the sound of the letter t in the English word top; and in pronunciation:

\begin{table}
\centering
\begin{tabular}{l l}
| English | Pronunciation |
\hline
From | From |
Dix | Diks |
\end{tabular}
\end{table}

* See foot-note, page 19.
tion is joined with the following word, as if it were its first letter, as will be seen in the two examples which follow, viz.—

Un grand acteur, as if printed Un grand acteur.
Un grand homme, as if printed Un grand homme.

In another instance, the d has also the sound of f, t, v, at the end of the third person singular of the indicative mood of verbs, when followed by the pronouns il, elle, or on. In these cases the d has the sound of the English t, and is joined to the following word in pronunciation, as if it were that word's first letter, namely:

Entend-il? as if printed Entend-il?

Conte-d'elle bien? as if printed Conte-d'elle bien?

Vend-il? as if printed Vend-il?

Répond-on ainsi? as if printed Répond-on ainsi?

SECTION XIV.—LIST OF WORDS FOR EXERCISES IN COMPOSING (continued).

3. Le Corps Humain.—The Human Body.

Levre, f. lip.
Membres, m. pl., limb.
Menton, m. chin.
Molle, f. narrow.
Moustache, f. moustache.
Muscle, m. muscle.
Nef, m. nerve.
Nez, m. nose.
Ongle, m. nail.
Oreille, f. ear.
Ou, m. nose.
Pilier, m. pillar.
Papille, f. papilla.
Peau, f. skin.
Poumon, m. lung.
Prunelle, f. pupil of the eye.
Rate, f. spleen.
Reins, m. pl., kidneys.
Sang, m. blood.
Sein, m. breast.
Sourcils, m. pl., eyebrows.
Squelette, m. skeleton.
Talon, m. heel.
Teint, m. complexion.
Temps, f. pl., terms.
Trait, m. feature.
Visage, m. face.

4. Maladies, Infirmités, etc.—Maladies, Infirmities, etc.

Fleure scarlatine, f. scarlet fever.
Goutte, f. gout.
Grippe, f. cold.
Indisposition, f. indisposition.
Lo crane, adj. squinting.
Malaise, m. indisposition.
Mauvaise, f. bad.
Moustache, f. moustache.
Ondoiement, f. diastopry.
Ordonnance, f. prescription.
Petit-cœur, f. small heart.
Palmes, f. consumption.
Pomme, m. apple.
Rhume, m. cold.
Rougeole, f. measles.
Surdité, f. deafness.
Toux, f. cough.
Ulcer, m. ulcer.
Vertige, m. dizziness.

5. Habitudes.—Articles of Dress.

Agrafe, f. clasp.
Aiguille, f. needle.
Aiguille à cheveux, f. hair-pin.
Bague, f. ring.
Bain, m. bathe.
Bain, m. dip.
Bastille, f. bastile.
Bijouterie, f. jewellery.
Bonnet, m. cap.
Boucles, f. pince.
Boucles, f. lock of hair.
Boules d'orilles, m. pl., ear-rings.
Bourse, f. purse.
Bracelet, m. bracelet.

Diamant, m. diamond.
Dentelle, f. lace.
Doublure, f. lining.
Fer, m., nail, casket, jewel-box.
Finger, f., index finger.
Speron, m. pl., spurs.
Sprint, f. pin.
Stiel, m., needle-case.
Toua, f. fan.
Flacon, m. smelling-bottle.
Fourrure, f. fur.
Fuse, m. dress coat.
Frunge, f. fringe.
Garniture, f. trimming.
Gilet, m. vest, waistcoat.
Grunt, m. garter.
Guêtres, f. pl., gaiters.
Habit, m. coat.
Chapeau, f. hat.
Lunettes, f. pl., spectacles.

SECTION XVI.—COMPARISON OF ADJECTIVES—ETC.

1. The superlative absolute is formed by placing très, fort, or bien, very, before the adjective [§ 14 (11)].

Ces chaussettes sont très-utiles,
Our tailor is very obliging.

2. The superlative relative is formed by adding the article le, la, les, to a comparative [§ 14 (9)].

Votre neveu est le plus savant de all your nephews is the most learned
tous.

3. Encore is used in French in the sense of more, some more,
any more, still, used affirmatively and interrogatively, but not
negatively.

Avez-vous encore du café?
I have any more coffee?

J'ai encore du café.
I have some more.

J'en ai encore.
I have some more, or some left.

4. Ne—plus is used in the sense of not any more, and no more,
or none left.

Je n'ai plus de livres.
I have no more books.

Je n'ai plus de chocolat.
I have no chocolate left.

5. Ne—guère means but little, but few.

Je n'ai guère d'amis.
I have but few friends.

Je n'ai guère.
I have but few—but little.

6. The pronouns moi, toi, lui, eux, are used instead of the
nominative pronouns je, tu, il, ils, after the que of a comparison,
and when the verb is understood.

Vous êtes plus heureux que moi.
You are happier than I.

Vous avez plus de mérite que lui.
You have more merit than he.

RÉSUMÉ OF

Votre marchand est bien obligant.
Voilà le meilleur de ces garçons.

Nous avons encore des amis.
You have still (or yet) credit.

Vous avez encore du crédit.
You have any more payment?

Avez-vous encore une piastre?
That is the best of those boys.

Le marchon a-lui encore des briques?
We have some more (or still) friends.

Il n'en a plus.
You have still (or yet) credit.

Il n'a plus de briques.
You have no more bricks.

Il n'en a guère.
He has no more bricks.

Il n'en a plus guère.
He has but few.

Je n'ai guère de livres.
He has but few books.

Avez-vous plus de courage que lui?
You are more courageous (lit., have
more courage) than he?

Il a moins de courage que moi.
He is less courageous (lit., has less
courage) than I.

VOCABULARY.

Agrafe, f. clasp.
Aiguille, f. needle.
Alouette, f., sedge.
Alouette à cheveux, f. hair-pin.
Bague, f. ring.
Bain, m. bathe.
Bain, m. dip.
Bastille, f. bastile.
Bijouterie, f. jewellery.
Bonnet, m. cap.
Boucles, f. pince.
Boucles, f. lock of hair.
Boules d'orilles, m. pl., ear-rings.
Bourse, f. purse.
Bracelet, m. bracelet.

Directeur, f., director.
Doublure, f. lining.
Fer, m., nail, casket, jewel-box.
Finger, f., index finger.
Speron, m. pl., spurs.
Sprint, f. pin.
Stiel, m., needle-case.
Toua, f. fan.
Flacon, m. smelling-bottle.
Fourrure, f. fur.
Fuse, m. dress coat.
Frunge, f. fringe.
Garniture, f. trimming.
Gilet, m. vest, waistcoat.
Grunt, m. garter.
Guêtres, f. pl., gaiters.
Habit, m. coat.
Chapeau, f. hat.
Lunettes, f. pl., spectacles.

SECTION XI.

1. Votre dictionnaire est-il très-correct? 2. Il est plus correct
que celui de Boyer. 3. Votre dictionnaire est le plus correct de
tous. 4. Quel est le meilleur de ces jardins? 5. Celui-ci est
SECTION XVII.—ADVERBS OF QUANTITY, ETC.

1. The adverbs of quantity, combien, how much, how many; trop, too much, too many; beaucoup, much, many; assez, enough; peu, little, few; guère, but little, few; and the word pas, meaning so, when coming before a noun or an adjective, are followed by the proposition de.

Combien de fleurs avez-vous? How many flowers have you?
J'ai beaucoup de fleurs. I have many flowers.
Vous avez trop de fleurs. You have too many flowers.
Votre sœur a assez de temps. Your sister has enough time.

2. The adverb bien, used in the sense of beaucoup (much), is followed by the proposition de, joined to or blended with the article le, la, les [Sect. IV.].

Vous avez bien de la complaisance. You have much kindness.
Elle a bien de l'amis. She has many friends.

3. Quelque chose, something, anything [Sect. V., VI.], and rien nothing, not anything, take de before an adjective.

Votre ami a quelque chose agréable. Your friend has something pleasant.
Avez-vous quelque chose de bon? Have you anything good?
Je n'ai rien de bon. I have nothing (not anything) good.

4. Quel, m., quelle, f., quels, m. pl., quelles, f. pl., are used interrogatively for which or what before a noun.

Quelle serviette avez-vous? What or which napkin have you?
Quelles bourgeois avoirs-tu? What garments have your friend?

5. Que is used for what before a verb.

Qu'avez-vous? What is the matter with you?

6. Lequel, m., laquelle, f., lesquels, m. pl., lesquelles, f. pl., are used absolutely for the word which, not followed by a noun, and equivalent to which one, which ones.

Lequel de vos fils a-t-il? Which (one) of your sons have?
Lesquelles avones-vous? Which (ones) have you seen?

7. Quelques is used before a plural noun for a few, some; quelques uns, m., quelques unes, f., are used absolutely, with the same meaning. Pluriel means several, and is variable.

Résumé of Examples.

Combien de poires avez-vous? How many pears have you?
Nous avons beaucoup de poires. We have many pears.
Nous en avons beaucoup. We have too many (of them).
Nous avons assez de cerises. We have enough cherries.
Nous n'avons pas assez. We have not enough (of them).
Vous n'avez guère de pêches. You have but few peaches.
Votre jardinier a bien des pêches. You have your share of peaches.
N'avez-vous pas de pêches? Have you no peaches?
J'ai beaucoup de pêches et abricots. I have many peaches and apricots.

Le boucher a-t-il quelque chose de bon? Has the butcher anything good?
Il a quelque chose de bon et de mauvaise. He has bad as well as good.

Il n'a rien de bon. He has nothing (nothing) good.
Quelques poires (f.) avez-vous? What or which pears have you?
Nous avons de votre sceur. We have your sister's.
Quel habi (m.) avez-vous? What or which coat have you?
Nous avons celui du tailleur. We have the tailor's.
N'avez-vous de bon? What have you good?
Lequel avez-vous? Which one?
Lesquels votre frère a-t-il? Which (ones) has your brother?

Vocabulary.

Abricot, m. apricot.
Fleur, f. flower.
Ananas, m. pineapple.
Boueure, m. batter.
Cerise, f. cherry.
Dictionnaire, m. dictionary.
Epicier, m. grocer.
Etranger, -en, foreign.
Jardin, m. garden.
Pomme, f. apple.
Beurre, m. butter.
Légume, m. vegetable.
Magasin, m. warehouse.
Oncle, uncle.
Poivre, m. pepper.
Poivres, f. pepper.
Rue, f. street.
Sauce, m. sugar.
Thé, m. tea.

Exercice 28.

1. Has your brother a very good dictionary? His dictionary is not very correct. 2. Has your father more courage than he? 3. He has much more courage than your nephew. 4. Has your brothers credit? They have but little credit, but they have money. 5. Is your aunt obliging? My aunt is very obliging. 6. Have you still books, pens, and paper? I have no more books, but I have still good pens and excellent English paper. 11. Who has still paper? I have no more, but my brother has some more. 12. Have you any news, Sir? No, Madam, I have none to-day. 13. Have you as much wood as my brother's son? 14. No, Madam, I have none more. 15. Has he any news? 20. Yes, Sir, I have them all. 21. Has your aunt much of it left? 22. She has but little more of it. 31. Has your brother any more English horses? 32. He has no more. 33. He has two more. 34. Have you a handsome French shawl left? 35. I have no more French shawls, but I have an English one.

Exercice 29.


Exercice 30.

1. Has your gardener many vegetables? 2. Yes, Sir, he has many. 3. How many gardens has he? 4. He has several gardens and several houses. 5. Have you many books? 6. I have but few, but my friend has many. 7. What coat has your brother? 8. He has a good cloth coat. 9. Has your uncle many peaches? 10. He has but few peaches, but he has many cherries. 11. How many plums has the tailor? 12. The tailor has no plums, he has cloth and silk. 13. What silk has your friend the merchant? 14. He has a great deal (beaucoup) of silk, and a great deal of money. 15. Has the gardener anything good (bon) in his many pineapples? 16. He has many pineapples. 17. Has he more vegetables than fruit? 18. He has more of these than of those. 19. Has your uncle many pears and cherries? 20. He has a few, and he has many apples and plums. 21. Have you a few? 22. I have still many, but my brother has no more. 23. Which peaches has he? 24. He has large (grosses) peaches. 25. Which (ones) have you? 26. I have the best peaches. 27. He has no good merchant in his Warehouse and he has something good in his garden. 28. How many potatoes has the foreigner? 30. He has not many. 31. Has he good vegetables? 32. He has good vegetables. 33. Is he right or wrong? 34. He is right, but you are wrong. 35. He has neither this book nor that, he has the book-seller's.
LESSONS IN PENMANSHIP.—VIII.

After one more exercise in letters formed by combinations of the bottom-turn, top-turn, and top-and-bottom-turn, the learner, in Copy-slip No. 25, passes on to a new elementary stroke, the fourth in order of the simple forms of which the letters of the writing alphabet are compounded.

This new stroke is called the "straight stroke." It is a down-stroke of uniform breadth from top to bottom, formed by bringing the pen from the top-line ee to the bottom line bb, with an equal pressure throughout. The chief difficulty in forming this stroke lies in lifting the pen smartly and quickly from the paper when it has been brought as far as the line bb, so that the termination a a, b b; but, as there is not a single letter into whose composition a straight stroke of this length enters, it is obviously absurd, as well as almost useless, to oblige the pupil to commence his lessons by copying a stroke that he is never called upon to make afterwards in any copy that he may write. In our system of teaching the art of Penmanship, we cause the pupil to write the simplest and easiest letters first, and then proceed to those that are more difficult, in all cases teaching him first to write the elementary strokes of which each set of letters in its sequence is formed, and then to combine them, so as to form the letters themselves. This, therefore, will explain why we did not commence our lessons with the straight stroke, according to the usual practice, and why we now introduce this

COPY-SLIP NO. 2A.—COMBINATION OF THE LETTERS l, u, m.

COPY-SLIP NO. 23.—THE "STRAIGHT STROKE."

COPY-SLIP NO. 26.—THE "STRAIGHT STROKE" AND THE "TOP-AND-BOTTOM TURN."

COPY-SLIP NO. 27.—THE LETTER h.

of the stroke on that line may be as square and clearly defined in every respect as its commencement on the line ee. The learner has already had some practice in terminating a thick down-stroke on the line bb, in making the "hanger" or top-turn, and all letters into whose composition the top-turn enters. But these have been short strokes, and in making the letter l, the only letter that he has yet made that is equal in length to the straight stroke, he has been accustomed to lessen the pressure on the pen before he reaches the line bb, in order to finish the letter with a fine hair-stroke turned upwards towards the right. Any trifling difficulty, however, that he may experience in making the straight stroke at first will soon vanish, if he has brought his pen down as far as the line ee he remember that he has only to finish the stroke as if he were making the simple top-turn, which must now be easy enough to him.

In learning to write, the pupil is generally taught, first of all, to make a straight stroke, no longer than that portion of the stroke in Copy-slip No. 25 which is contained between the lines stroke as the fourth in order of the simple elementary stroke, and in the only form in which it is used in writing, instead of the short form usually given, in which shape, as we have observed, it is never afterwards used by the pupil.

In Copy-slip No. 26 the pupil proceeds to form the straight stroke and the top-and-bottom-turn in alternation, and in Copy-slip No. 27 he finds that these strokes, when joined together, form the letter h. The straight stroke enters into the composition of three letters—h, p, and k; but of these we confine ourselves to h and p for the present.

ESSAYS ON LIFE AND DUTY.—I.

INTRODUCTORY.

If we stand still for a moment in the great rush and hurry of this time, and look both around us on what is, and also backward as far as the eye can reach on what has been, we are struck at first sight with the vastness of the world's labour.
the immense bulk of that which was and is produced; and the thought is fascinated by the sense of that aggregate of human effort, and happiness, and suffering, which has lain striving and sleeping beneath the broad heavens since the birth of time.

"And what," we ask ourselves, "is the motive, and what are the conditions of all this action and suffering?" Men are affected under the influences of stiffl gusts and gales of passion; but also under the steady trade-winds of necessity, of self-interest, of ambition, of benevolence, of duty. Physical need is the most universal and the most imposing claimant upon man's time and sinew. It staves most of us in the face, and staves some of us with cruel pertinacity. There is nothing more apparent than that God intended that our existence should dwell upon the little: the great is wrapped in this naked fact—however rough, and hard, and humiliating it may seem—we must start in all our reasoning. The benefits of fortune make, indeed, an apparent exception to this rule. There is a class of men who do not find toil necessary to life, or even to its luxuries; but it is not apparent to all that a life without exertion—exertion systematic, continued, and directed to an object—is a life without happiness, and that idleness is not only useless, but practically evil.

But when we have got thus far, we have advanced but a small step, however necessary that step is. Man cannot live by bread alone. His first want is not his greatest; no, nor nearly so. What a different sight should we look upon as compared to that which is now in sense and memory before us of the world and man's work upon it, if his sole necessity here had been the food and clothing strong enough to keep him alive? We should not see, as we do now, cities, and temples, and ships: power, and beauty, and thought grown into shapes of wood and stone upon the earth, and into culture of tree and flower, bird and beast, colour and sound, heat and force. We must look to other cravings, besides that of hunger, in man, to find the secret of that eternal twisting of the matter and spirit about him, the moulding of it into fresh forms, the digging, and the building, and the questioning. No hard necessity of food is laid upon him here, but he tells us as if all eternity waited upon his success. What a bustling, suffering, hoping creature it is! Let us look at him more closely. He is inquisitive—the pictures of his senses will not satisfy him. He is fond of power and possession—the dominion of his own body and birthplace will not satisfy him. He is fond of beauty and order—the flower and the wind will not satisfy him. He knows of right and wrong—obedience to his passions will not satisfy him. He knows of an unworthy power—and his own supremacy will not satisfy him. Of all these dissatisfaction and needs, that which is attendant on the moral faculties— the sense of right and wrong, and of responsibility—is the most curious and distinctive in man. Remove this, and it were better for him that he had but the hunger of the brute; the world is without form and void, and there is darkness upon the face of the deep.

Now, whatsoever different forms education may impose upon this sense of right and wrong, the minds of men; whatever they may, by length of time, persuade themselves about it; however it may be disregarded, violated, attended to—it is universal in all rational minds, and is as much a part of man's mental system as hunger is of his physical system. The laws of God as revealed to him in the Bible sanction, direct, and enforce it; the laws of society so far as the partial expression of it. Moreover, mankind in general acquiesce in a judicial system which punishes the transgressions of a man against his fellow, and most men fear a judicial system which shall take a like cognizance of the faults which are secret to ourselves. We have, therefore, come to another element in the great history of man's thought, and word, and work; or, rather, to two separate principles, closely akin—

the moral faculty and the fear of God.

This is not the place for any metaphysical discussion as to the relations of these two; and we have accennced now with the former rather than the latter. That is, we wish to confine ourselves to the view of man as under the influence of certain principles which he finds to be part of his nature. Against these many things tempt him to rebel, but he feels that there is a warning voice which will not suffer him to do so in ignorance of coming retribution, and which tells him, without arguments, without passion, without partiality, that every principle thus violated is sure to avenge itself with a merciless reaction.

We hope in succeeding papers to point out the practical bearing upon life of these great moral principles in man, and

under such headings as "Truth," "Temperance," "Character," etc., to bring before our readers the united ideas of life and

LESSONS IN GERMAN.—VII.

SECTION XV.—THE PLURAL NUMBER OF ARTICLES, NOUNS, ADJECTIVES, ETC.

In the plural the adjective, when not preceded by a declinable word (the personal pronouns excepted), is inflected according to the Old Declension.

1. The definite article, the demonstrative and possessive pronouns, have, in the plural, the same form for all genders, and are declined like adjectives of the Old Declension.

Adjectives, when preceded by the definite article, a demonstrative, or possessive, or relative pronoun, end in all cases of the plural in en, and are of the New Declension.

DECLENSION OF THE DEFINITE ARTICLE, DEMONSTRATIVE AND POSSESSIVE PRONOUNS IN THE PLURAL.

In the feminine singular, the definite article is: sine, her; sing. of the feminine singular; sich, their; n. of the feminine singular; diese, their; m. of the feminine singular; die, them; m. of the feminine plural.

NEWDECLENSIONOFADJECTIVESINTHEPLURAL.

1. Jene güte, the good; sein jene, of the good; seines jene, of his good; order, or; for those good; seine jene, of their good.

2. Jene, the good; sein jene, of the good; seines jene, of his good; order, or; for those good; seine jene, of their good.

RULES FOR THE FORMATION OF THE PLURAL OF NOUNS.

Old Declension.

Rule 1. Masculine nouns ending in e, en, en, have the same form in the plural, as—der Wunder, the wonder; der Wunder, the wonder.

Rule 2. Masculine nouns of other terminations add e (in a few words er), and assume the plural, as—der Meister, the master; der Meister, the master; der Meister, the master; der Meister, the master.

Rule 3. Neuter nouns ending in e, en, en, and en, have the same form in the plural, as—des Wunder, the wonder; des Wunder, the wonder; des Wunder, the wonder.
LESSONS IN GERMAN.

Das Mädchen, the girl; die Mädchen, the girls. Singular: Das Mädchen, the little man. Plural: Die Mädchen, the little men.

Exception.—Stifter, cloister, takes the limit.

Rule 4. Neuter nouns of other terminations add e (or en), as:—3,th, year; 3,th, years. Schiff, ship; Schiff, ships. Beast, beast; Boas (sometimes written Bete), boats. Singular: Das Schiff, the image. Plural: Die Schiffe, the images.

Sie, raft, and Schiff, pipe, take the limit.

New Declension.

Rule 5. Masculine nouns of the New Declension which end in e, or unaccented e, or e, add n in the oblique cases of the singular, and retain this form in all cases of the plural, as:—Der MFne, the boy; die Männe, die Jungen. Der linar, the Hungarian; die Jungen, die Ungarn. Der Bauer, the Bavarian; den Bäumen, die Bäume. Der See, has been in the oblique cases of the singular, and Jungen in all cases of the plural. There are some words ending in a where the (e) is dropped, as e.g. St. Der Bauer, the barbarian; der Barbar, the Barbares: Plural, die Barbarer.

Rule 6. Masculine nouns of other terminations add en, as:—Der Geiz, the count; der Graf, the Gräfen. Der Mar, the bear; die Maren, die Bären. Der Hüt, the ox; der Öfen, die Öfen.

Rule 7. Feminine nouns ending in e, or e, form the plural by adding n, as:—Näte, scar; Nuten. Gabel, fork; Gabeln.

Rule 8. Feminine nouns of other terminations add en, as:—Frau, woman; Frauen, women; Wirt, watch; Warten. Nouns terminating in *in* (which formerly used to be spelt *im*) double the n in the plural, before they take e, as:—Die Brust, the breast. Plural, die Brusten. (See § XIV. 1.)

Rule 9. Nouns which in the nominative plural end in n, have all cases alike; those of other terminations add e in the dative, and have all other cases alike.

Note.—The masculine nouns Alp, ancestor; horn, horn; Bitter, spangle; stift, forest; Bau, province; Quester, godfather; Verber, laurel; Mag, mast; Nachbar, neighbour; Beu, peacock; See, lake; Kern, spar; Staat, state; Stad, city; Streit, ray; Strauß, ostrich; lauter, cousin; Uncharten, subject; Sierat or Seurat, ornament; and the neuter, Nage, eye; Bitt, bed; Curt, end; Zett, shirt; and Chirt, ear, form the singular according to the Old, and the plural according to the New Declension. Some and Curt have also the forms Bitter and Beu; the masculine nouns Neb, rock; öre, peace; fage, peace; ös, spark; Spazier, thought; Glaube, faith; Gatte, heap; Name, name; Zame, seed; Enat, in uary; Wilte, will; form the New Declension, and also take e in the genitive singular, as:—Der Öst, e. Der Östen, e Östen. They, however, often end in the nominative singular in e, and are regularly inflected according to the Old Declension, as:—Der Östen; der Östene.

A few examples will explain the former part of this note:—

Sing. St. Der Gem. G. Der Gem. Plur. Der Gem. (also Beur.)

N. Der Stadteil. G. Der Stadte. Die Stadte.

Der Schwmer, the pain, forms the genitive, and > is Fer, the heart, the genitive and dative singular, in the same way, and both form the plural according to the New Declension.

OLD DECLENSION OF THE ADJECTIVE, PLURAL. (See Sect. XIV.)

N. Gut-e (Brot-e), good (wines).

O. Gut-e (Brot), of good (wines).

N. Gut-en (Ber-en), to good (wines).

O. Gut-e (Brot), good (wines).

DECLENSION OF THE ARTICLE AND ADJECTIVE IN THE PLURAL.

N. Der gut (Gut-e), the good (hats).

O. Der gut (Gut-e), of the good (hats).

N. Der guten (Gut-en), to the good (hats).

O. Der guten (Gut-en), good (hats).

DECLENSION OF A POSSESSIVE PRONOUN AND AN ADJECTIVE IN THE PLURAL.

N. Mein guten (RuD), my good (nails).

O. Mein guten (Rud), my good (nails).

N. Mein guten (Rud-n), to my good (nails).

O. Mein guten (Rud), my good (nails).

When several consecutive adjectives precede and qualify the same noun, they must, in termination, bo all alike, as:—Er hat gute, feine, blauen Züge. Er hat das gute, fine, blue face. Sie haben gute, rese, blauen Hüt. Sie haben das gute, fine, blue hat. (§ 34, 2.) The pupil's attention is directed to the changes which the adjectives undergo according to the article is absent or present, of which more will be said hereafter.

NEW DECLENSION OF NOUNS PLURAL.

N. Der Schiffen, the oxen; die Schiffen, the princes.

O. Der Schiffen, of the oxen; der Schiffen, of the princes.

N. Der Schiffen, to, for the oxen; der Schiffen, to, for the princes.

O. Der Schiffen, to the, the princes.

CONJUGATION OF THE PRESENT TENSE OF "hat er" AND "sein" IN THE PLURAL.

Wir haben, we have; wir hat, you we; wir hat, you we; wir haben, they have; wir hat, they are.

VOCABULARY.

New, f. exercise.

Baum, m. tree.

Weite, both.

Birne, f. pear.

Zweif, m. pear.

Denn, for, because.

Geste, adj. honest, honesty.

Sinngefl, m. thimble.

Stief, m. joy, delight.

Weib, f. woman.

Glatt, m. straight.

Gest, adj. yellow.

Gemälde, n. painting.

Stich, like, equal.

Sch, adj. high (poetic form).

Sell, beef, hog.

Rausch, f. drunkenness.

Räub, f. plunder.

Ruf, n. people.

RESUME OF EXAMPLES.

Koffer; is unmeinlich.

Sie suchen auf den Schiffen ihrer, to seek upon the ships of their enemy's strength the cause of their enemy's ruin.

Diese schöne Geschirr 'in' von meiner, This beautiful present is from my sister.

Dieses Haus, these houses, is my sister's house; these houses, these houses.

Weltgarten, f. the garden, and those vineyards are the one rich farmer.

EXERCISE 20.

HISTORIC SKETCHES.—IV.

CHARLES I. WHEN THE COMMONS CRIED "PRIVILEGE."

The 4th of January, 1641-2, was one of the most momentous days for England that ever dawned. Westminster Hall, which had been the scene of so many an important national drama, and which was yet to be the scene of many more, was the place in which the events that made this day memorable were enacted. The coronation and the fall of kings, the trial and condemnation of great subjects, the meeting of the first Parliament, the concession of great national boon, those walls had witnessed. The occasion was about to be more momentous than any of these in point of pomp and circumstance, second to none of them in importance. The 4th of January, 1641, was the day on which the great question was practically tried, whether the King of England should or should not rule without the aid of his Parliament. In various forms, more or less outrageous, the question had been submitted before. Henry VIII. tried it, and so, with less pertinacity, did Elizabeth, and the Parliament had withstood them. It was hardly likely that what the men of 1530 and the men of 1601 had resisted, against the influence and power of the great Tudors, their descendants would accept in 1641 from the hands of Charles Stuart.

During the reign of James I.—1603 to 1625—the House of Commons had successfully striven to curb the royal power. Popery was grand and lordly ambition, and were ruled for want of use, had been revived, not without opposition. James I., the "British Solomon," or, as he was called by a wise man of his own day, "the wisest fool in Europe," clung with the tenacity of a leech to those attributes of royalty which a small-hearted man would most value, and which were not the less annoying because they were so petty. Not all petty, though; some of the claims which the Commons disallowed were important enough. They re-established on the first possible basis the principle, that the king has no right to levy, under any pretence whatever, a tax upon his subjects, without the consent of Parliament; they procured the abolition of an enormous abuse of the power to grant monopolies or patents; they asserted, in the most solemn manner, the inviolability of the persons of members of Parliament, unless in cases of felony; and they revived the power which Hallam says, "had lain like a sword in the scabbard," unused since the reign of Henry VI., a period of 175 years, to impeach the king's ministers for bad conduct. They had impeached Lord Bacon and Lord Middlesex for their misdemeanours in office, and these noblemen, as in all cases where the House of Commons is the accuser, were tried by the House of Lords. They were heavily punished; but the effect of their punishment was salutary beyond the cases immed- iately resorted to. The Ministers for the time were, therefore, the weapon of the Commons, and were cautious beyond what they had been; and so the arm of the king was paralysed down quite half its length. Some ministers there were in the next reign, that of Charles I., who neglected the warning, or thought themselves able to despise it, and they fell like the Earl of Strafford and like Laud, whose fall brought the king's head also to the block.

Having done so much, the Parliament—many of the leading spirits in James's Parliaments sat in the Parliaments of Charles I. —was not disposed, certainly, to recede. On the contrary, it was bent on yet further restraining the royal power, by putting checks on the Court of Star Chamber (an irregular tribunal, acting above and without the law of the land, and of late years much abused) and High Commission (an equally irregular and illegal tribunal for ecclesiastical causes), by all the constitutional means in their power. Unfortunately, the king was as much resolved to win conquests for the royal prerogative as the Commons were to win them from it. Without the ability, without the brutality of Henry VIII., before which many obstacles had been removed, Charles I. had all that monarch's greed of power, and even more exalted notions of the nature of the royal dignity. He rested his claims on the so-called "right divine of kings," and, right or wrong, at their conscience, which had to give account to the King of kings, but under no circumstances to the people committed to its care. He lacked the ferocity which was half the battle to "bluff King Hal," and, linked with a certain amount of cruelty which he had in common with him, were a timidity and indecision which were fatal to success in his career as a tyrant. There were also stronger men opposed to him than resisted Richard III. and Henry VIII. The longue courbe had come in evil times for him; but the people of England reaped the benefit of his misfortunes, and won many a fair privilege, which they left as a rich legacy unto their issue.

Before Charles had been three years upon the throne, the Commons, who had during that time suffered very greatly in several particulars, presented for his signature the Petition of Right, a statute which was not intended to declare, as it did not declare, that the crown possessed no new privileges, but merely set forth—for the purpose of having them confirmed—some rights which had been invaded, but of which the origin was as old as Magna Charta. The petition contained but four demands, which the king was required to grant, viz.:

1. That no money should be levied in future, under any pretense whatever, by virtue of the king's prerogative.
2. That the committal to prison of Mr. Hampden and four others for refusing to pay an unlawful impost, should be recognised as illegal.
3. That soldiers should not be billeted on private persons.
4. That no man should henceforth be tried by martial law.

The petition was presented in 1628. Charles tried every expedient, every shift and turn, in the hope of avoiding the necessity of complying with it. When at length compelled to give some answer, he gave a remake and a laboured one, and finally showed his intention to ride rough-shod over the Act at the first opportunity. It was only on the peremptory refusal of the Commons to accept his qualified assent, and after much pressure had been brought to bear, that he agreed to give the royal assent in the usual way: "Sicte droit faict comme est desire." (Let right be done as prayed.)

Scarcely was the ink of his signature dry on the king's seal as events evaded the petition. He evaded the church taxes under new names; he imprisoned six members of Parliament for their conduct in the House; with the help of the Earl of Strafford, he attempted to govern the kingdom without a Parliament, and with the help of Archbishop Laud, to govern despotically the Church. Sentences the most severe and cruel were procured in the Star Chamber against those who resisted the Government, and in the Higher Commission Court against those who offended in matters ecclesiastical. So great was the oppression, both in Church and State, that many, unable any longer to endure it, sailed across the Atlantic; to seek in the New World a home and a soil in which freedom might flourish. Then came homespun wars, undertaken against the wish, and in favour of the enemies, of the nation; then came the troubles in Scotland, which quickly threw off the yoke Charles tried to lay upon it; there were the disputes respecting the king's favour, there were the trials and executions of Strafford and Archbishop Laud; the Irish rebellion; the angry reception of the Grand Remonstrance; and finally, there was the attempt to arrest the five members of the House of Commons.

This last was the drop that filled the bucket, and made it overflow. Charles, indignant at the speech and behaviour of Lord Kimbolton (son of the Earl of Manchester), and five members of the Lower House (Sir Arthur Hazeldig, Messrs. Hollis, Hampden, Pym, and Strode), during the recent differences between the king and the Parliament, in an evil hour, listened to the advice of Henrietta, his queen, and to the advice of Lord Digby and the courtiers. They urged him to show himself a king, advised him that no private gentleman would suffer himself to be addressed as he had been by the accused, and recommended the arrest of the members on a charge of high treason.

The members accordingly gave, on 3rd of January, 1641, for the arrest of the persons named. Their houses were occupied, their studies sealed up, and their papers seized. A pursuivant went down to the House of Commons, and, in the king's name, demanded the surrender of the accused. He was, however, sent back without any definite answer; the House voted that what had been done by the royal officers was a breach of the privilege of Parliament; and the king, angry at the non-compliance with his demand, resolved the next day in person to the House, and himself arrest the accused men.

Mr. Isaac D'Israeli says, "When Charles went down to the House to seize on the five leading members of the Opposition, the queen could not restrain her lively temper, and impatiently
babbled the plot, so that one of the ladies in attendance dispatched a hasty note to the parties, who, as the king entered the House, had just time to leave it.” The lady in question was the Countess of Carlisle, who was on intimate terms with several of the accused. On receipt of her note, which was communicated to the House, a brief but excited debate took place. Some were for directing the accused to absent themselves, hoping thereby to avoid an unseemly quarrel; others were inclined to have them remain, and to make common cause with them in case of any violence being offered. While the debate was yet going on, the gentlemen most concerned being themselves undecided as to the best course to adopt, a friend of Mr. Fiennes, a member, came hurriedly, and told him that the king had already left Whitehall, at the head of 200 armed men, and was coming in the direction of the House. There was no time for further talk. Action must be taken forthwith. A motion was hurriedly passed, giving leave to the five members to absent themselves, and they quitted the House a few seconds only before the King entered it.

Up Westminster Hall—the place which was in a few years to witness his trial and condemnation—King Charles walked, followed by his ordinary retinue, and a force of soldiers variously estimated at two, three, and even five hundred men. “It struck such a fear and terror into all those that kept shops in the said Hall, or near the gate thereof, as they instantly shut up their shops, looking for nothing but bloodshed and desolation”—so wrote an eye-witness of the affair. Arrived in the Hall, the armed men formed a lane, stretching down the whole length of it; the king passed along, and going up the staircase out of the Hall went into the Commons’ House, “where never king was (as they say) but once King Henry the Eighth.”

Attended only by his nephew Rupert, the son of the Elector Palatine of the Rhine, the king entered the House, the door of which, however, was kept open; and through the open door were to be seen officers and soldiers armed with swords and pistols, while the Earl of Roeborough and a Captain Hide stood within the door, and leaned upon it.

The Speaker of the House, Lenthal, had been instructed to sit still, with the mace before him; but when the king entered and the whole House rose and uncovered their heads, Lenthal also rose and stood in front of the chair. Charles removed his hat, and bowed to either side of the House as he came up. “Mr. Speaker, I must for a time make bold with your chair,” he said, as he approached Lenthal, who made way for him, though the king did not sit down in the chair, but stood on the step of it.

A deep silence reigned in the House, till the king, who had been occupied in looking round for the five members, said, breaking in upon the silence, “Gentlemen, I am sorry for this occasion of coming unto you. Yesterday I sent a serjeant-at-arms upon a very important occasion, to apprehend some that, by my command, were accused of high treason; whereunto I did expect obedience, and not a message. And I must declare unto you here, that albeit no king that ever was in England shall be more careful of your privileges, to maintain them to the uttermost of his power, than I shall be, yet you must know that in cases of treason no person hath a privilege. And therefore I am come to know if any of these persons that were accused are here.”

No one answered. Charles, after a pause, made a few more remarks, and then asked specifically for each of the accused.

No one informing him, he turned to Speaker Lenthal, requiring to be told; but Lenthal, kneeling, humbly desired to be excused, saying: “I have neither eyes to see nor tongue to speak in this place but as the House is pleased to direct me, whose servant I am here; and I humbly beg your Majesty’s pardon that I cannot give any other answer than this to what your Majesty is pleased to demand of me.”

Baffled by the silence, and by the extreme courtesy evinced by the attitude of the House, the king went on to make some further remarks, with difficulty concealing, in the midst of his excitement, the natural infirmity of his speech. Not seeing those for whom he sought, he said, “Well, since I see all my birds are flown, I do expect from you that you will send them
unto me as soon as they return hither. ... I will trouble
you no more, but tell you I do expect, as soon as they come
to town, you will send them to me; otherwise, I must take
my own course to find them."

With the same show of respect they had shown him when he
came in, the assembled members waited on him as he again
dropped down their ranks. Bareheaded and in silence, they
allowed him to get as far as the door; but ere that had closed
upon him low muttered of anger were raised, and the cry of
"Privilege, privilege!" mingled ominously with the conversa-
tion which the King told his friends in the Hall of the result
of his errand.

The five members were not arrested, though the king spared
no pains to take them. By all means in his power he tried to
get hold of them—by warrants, by proclamations, by personal
application. No one would betray them; and it having been
resolved to restore them to the House in the Commons' House,
the speaker and the temper of which this resolution was the
sign, and within a week of his foolish visit to Westminster to
arrest the members he was a fugitive from London, deeming
himself not safe from the violence his actions had aroused.

By his recent conduct, no more than consistent with his
former conduct, he had thrown down a challenge to the nation.
The House of Commons took it up. Mr. Forster well says:
"He had committed an act which the members could not
be defeated, without a complete overthrow of the power of
the king. He could not remain at Whitehall if they returned
to Westminster. Charles raised the issue, the Commons accepted
it, and so began our Great Civil War."

SYNOPSIS OF THE LIFE AND REIGN OF CHARLES I.

Charles I. was the second son of James I., by his Queen, Anne
of Denmark. He was the twenty-fifth sovereign of England
after the Norman Conquest, and the second of the Stuart
dynasty.

Born at Dunfermline Nov. 19, 1600.
Began to reign. Mar. 27, 1625.
Petition of Rights. 1629.
Persecution of the Puritans. 1633.
Refusal of Hampden to pay ship-money. 1634.
Hampden executed. 1638.
Scottish Covenant against Episcopacy. 1638.
The "Long Parliament" summoned. 1640.
Impeachment of Laud and Strafford. 1641.
Execution of Strafford. 1641.
Impeachment of the Five Members demanded by
Charles. 1642.
The "Troubles" commence. 1642.
Royal Standard raised at Nottingham. Aug. 23, 1642.
Battle of Worcester Sept. 29, 1642.
Battle of Edgehill Oct. 23, 1642.
Battle of Stratton Hts. May 16, 1643.
Death of Hampden June 15, 1643.
Battle of Lansdown July 5, 1643.

READING AND ELOCUTION. IV.

PUNCTUATION (continued).

V. THE SEMICOLON.

33. The Semicolon is formed by a period above a comma.

34. When you come to a semicolon in reading, you must
in general make a pause twice as long as you would make at a
comma.

Sometimes you must use the falling inflection of the voice
when you come to a semicolon, and sometimes you must keep
your voice suspended, as directed in the case of the comma.
Whatever may be the length of the pause, let it be a total
cessation of the voice.

Examples.

That God whom you see daily worship; whom I daily call upon
to bless both you and me, and all mankind; whose wondrous acts
are recorded in those Scriptures which you constantly read; that
God who created the heaven and the earth is your Father and
Friend.

My son, as you have been used to look to me in all your actions,
and have been afraid to do anything unless you first knew my will;
so let me now be a rule of your life to look up to God in all your
actions.

If I have seen any perish for want of clothing, or any poor without
covering; if his labors have not blessed me, and if I were not warned
with the violence of my sheep; if I have lifted up my hand against
the fatherless, when I saw my help in the gate; then let mine
arm be broken from the bone.

The stranger did not lodge in the street; but I opened my doors to
the poor traveller.

If my land cry against me, or the arrows thereof complains; if I
have eaten the fruits thereof without money, or have caused the
owners thereof to lose their life; let thistles grow instead of what,
and cockles instead of barley.

When the fair moon, refugent lamp of light, o'er heaven's clear
nurse spreads her sacred light; when not a breath disturbs the
dispersal serene, and not a cloud descends the solemn scene; around her
theib the vivid planets roll, and stars unnumbered glide the glowing pole;

Queen Anne, virtuous mother of my sheep, when I have lifted up my hand against
the fatherless, when I saw my help in the gate; then let mine
arm be broken from the bone.

The stranger did not lodge in the street; but I opened my doors to
the poor traveller.

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Queen Anne, virtuous mother of my sheep, when I have lifted up my hand against
the fatherless, when I saw my help in the gate; then let mine
arm be broken from the bone.

36. Sometimes you must use the falling inflection of the voice
when you come to a semicolon, in reading.

Examples.

Let your dress be sober, clean, and modest; not to set off the beauty
of your person, but to declare the sobriety of your mind; that your
outward garb may resemble the inward plainness and simplicity of
your heart.

In meat and drink, observe the rules of Christian temperance and sobriety;
consider your body only as the servant and minister of your
soul; and only so nourish it, as it may best perform an humble and
obedient service.

To all the weaknesses and infirmities of your fellow-
creatures; cover their frailties; love their excellences; encourage
their virtues; relieve their wants; rejoice in their prosperity; com-
passionate their distress; receive their friendship; overlook their
unkindness; forgive their malice; be a servant of servants; and
condescend to do the lowest offices for the lowest of mankind.

Struck with the sight of so fine a tree, he fastened to his
own, hoping to find as large a crop upon it; but, to his great surprise, he
saw scarcely anything, except branches, covered with moss, and a few
thistle leaves.

In sleep's serene oblivion laid, I've safely passed the silent night;
in the break of day, he beheld the morning light.

New-born, I bless the waking hour; once more, with awe, rejoicetho;
be; my conscious soul resumes her power, and soars, my guardian
angel, the macrocosm, to the morning light.

That deeper shade shall break away; that deeper sleep shall leave
mine eyes; thy light shall give eternal day; thy love, the rapture of
the skies.
MECHANICS.

In the sight of our law the African slave-trader is a pirate and a felon; and in the sight of heaven, an offender far beyond the ordinary depth of human guilt. What hope of liberty is there remaining, if whatsoever is their pleasure, it is lawful for them to do; if what is lawful for them to do, they are able to do; if what they are able to do, they dare do; if what they dare do, they really execute; and what they execute, is in no way offensive to you?

It is not the use of the innocent amusements of life which is dangerous, but the abuse of them; it is not when they are occasionally, but when they are constantly pursued, that the love of amusement degenerates into vice. And when, from being an occasional indulgence, it becomes an habitual desire.

The prevailing colour of the body of a tiger is a deep tawny, or orange yellow; the face, throat, and lower part of the belly are nearly white; and the whole is traversed by numerous long black stripes.

The horse, next to the Hottentot, is the favourite prey of the lion; and the elephant and caanul are both highly relished; while the sheep, owing probably to its woolly fleece, is seldom molested.

The horse is quick-sighted; he can see things in the night which his rider cannot perceive; but when it is too dark for his sight, his sense of smeling is his guide.

37. The semicolon is sometimes used as a note of interrogation, and sometimes as an exclamation.

Examples.

I ask thou not at defiance my authority; violated the public peace, and passed thy life in injuring the persons and properties of thy fellow-subjects?

Oh, it was impious; it was unmanly; it was poor and pitiful!

Have not you too gone about the earth like an evil genius; blasting the fruits of peace and industry; plundering, ravaging, killing without law, without justice, merely to gratify an insatiable lust for dominion. Is it not, then, a danger of the mind; a false creation, proceeding from the heat-generated by the brain?

By such apologies shall man insult his Creator; and shall he hope to flatter the ear of Omnipotence? Think you that such excuses will gain new importance in their ascent to the Majesty on high; and will you trust the interests of eternity in the hands of those superficial advocates?

And shall not the Christian blush to repine; the Christian, from whom the veil is removed; to whose eyes are revealed the glories of heaven?

Who, for so many a year, has the poet and the philosopher wandered amidst the fragments of Athens or of Rome; and passed with strange and kindling feelings, amidst their broken columns, their mouldering temples, their deserted plains? It is because their day of glory is past; it is because their name is obscured; their power is departed; their influence is lost.

Where are they who taught these stones to grieve; where are the hands that hewed them; and the hearts that reared them?

Hope ye by those to avert oblivion's doom; in grief ambitious, and in ashes vain?

Can we support be offered; can we sources of confidence be named?

Is this the man that made the earth to tremble; that shook the kingdoms; that made the world like a desert; that destroyed the cities?

Faithful inward, will not man awaken; and, springing from the bed of sloth, enjoy the cool, the fragrant, and the silent hour, to meditation due, and sacred song?

But who shall speak before the king when he is troubled; and who shall boast of knowledge when he is distressed by doubt?

What would in such a gloomy state remain longer than nature crimes; and every mark and every blooming pleasure wait without, to bless the wildly drowsy morning walk?

What a glorious monument of human invention, that has thus triumphed over wind and waves; has brought the ends of the earth in commerce, established an intercourse of blessings, pouring into the sterile regions of the north all the luxuries of the south; diffused the light of knowledge and the charities of cultivated life; and has thus bound together those scattered portions of the human race, between which nature seems to have thrown an insurmountable barrier.

Who that bears a human bosom, hath not often felt how dear are all those ties which bind our race in gentleness together; and how sweet their force, let fortune's wayward hand the while be kind or cruel?

VI. THE COLON.

38. The Colon is composed of two periods, placed one above the other.

39. Sometimes the passage ending with a colon is to be read with the voice suspended; but it should generally be read with the falling inflection of the voice.

When reading, be careful to let the pause of the colon be a total cessation of the voice, and three times longer than that indicated by a comma.

Examples.

The smile of gaiety is often assumed while the heart aches within: though folly may laugh, guilt will sting.

There is no mortal truly wise and righteous at the same time: wisdom is the repos of the mind.

Sometimes her image to extricate herself from the consequences of guilt: the gospel reveals the plan of Divine interposition and aid.

NaturO confessed some atonement to be necessary: the gospel discovers that the atonement is made.

Law and order are forgotten: violence and rapine are abroad; the golden age of society is lost.

The temples are profaned: the soldier's curse resounds in the house of God: the marble pavement is trampled by iron hoofs; horses neigh beside the altar.

Blue wreaths of smoke ascend through the trees, and betray the hovel, cottage: the eye contemplates on the wind, and barns bursting with plenty: the pleasant laughs at the approach of winter.

The connection of life are few, and industry secures to every man: it is the elegancies of life that empty the purse: the superfluous of fashion, the gratification of pride, and the indulgences of luxury, make man poor.

My dear children, I give you these trees: you see that they are in good condition. They will thrive as much by your care as they will decline by your negligence: their fruits will reward you in proportion to your labour.

A bee among the flowers in spring is one of the most cheerful objects that can be looked upon. Its life appears to be all enjoyment: so busy and so pleased; yet it is only a specimen of insect life, with which, by reason of the animal being half-domesticated, we happen to be best acquainted.

'Tis a picture in memory distinctly defined, with the strong and unsharpening minds of man: a part of my being beyond my control, beheld on that cloud, and transcribed on my soul.

Yet such is the destiny of all on earth: so flourish and fade again and again.

Let those deplore their doom whose hopes still grovel in this dark sojourn: but lofty souls, who look beyond the tomb, can smile at fate, and wonder why they mourn.

If for my faded brow thy hand prepare some future wreath, let me the gift resign: transfer the rosy garland: let it bloom around the temples of that friend beloved, on whose maternal bosom, even now, I lay my aching head.

Do not flatter yourselves with the hope of perfect happiness: there is not perfection in the world, neither is there a true love.

But when old age has on your temples shed her silver frost, there's no returning sun: swift flies our summer, swift our antumn's fled, when youth, and spring, and golden joys are gone.

A divine legislator, uttering his voice from heaven; an almighty governor, stretching forth his arm to punish or reward: informing us of perpetual rest prepared hereafter for the righteous, and of indignation and wrath awaiting the wicked: these are the considerations which overawe the world, which support integrity, and check guilt.

It is not only in the sacred fane that homage should be paid to the Most High: there is a temple, one not made with hands, the vaulted firmament: far in the woods, almost beyond the sound of city-climate, at intervals heard through the breezeless air.

As we perceive the shadow to have moved along the dial, but did not perceive its moving and it appears that the grass has grown, though nobody ever saw it grow: so the advances we make in knowledge, as they consist of such minute steps, are perceivable only by the distance gone over.

MECHANICS.—IV.

TWISTED POLYGON—FORCES APPLIED TO TWO POINTS—PARALLEL FORCES.

The method given in the last lesson of finding the resultant of several forces holds good, whether they act all in the same plane, or some of them upwards or downwards from it in different directions. For example, five forces, represented by the lines O A, O B, O G, O D, O E, in Fig. 9, are thus applied to a point O of a body on the floor of a room; two of them, O A, O D, along the floor in two different directions; another, O B, pointing to a picture on the left wall; a fourth, O C, to the cross on the top of a steak, seen through the open window, and the fifth and last, O E, obliquely downwards, pressing the body against
the floor. On constructing, in such a case, the polygon of forces, we should have the figure as represented in perspective below, one of whose sides, $O_A$, is on the floor, while the others, $A_R, B_R, E_R, R_E$, and $R_A$, are in the plane of the figure; of this kind is termed a twisted polygon, as though its sides had been all originally in the same plane, but, by a twist, some of them had been pulled from it. You can see that, since such a polygon cannot be drawn on paper, so as to have the magnitudes of its sides and angles there accurately represented, it can be of no practical use in finding resultants. You might make one by fastening five rods of the proper lengths together at the proper angles, but the structure would probably break down before you arrived at your resultant, and at the best the operation would be very troublesome. Calculation alone can help in such cases; but the "twisted polygon" has the educational value of giving the student mechanical ideas.

**Examples for Practice.**

1. Three forces act on a point $O$, equal to 3 pounds, on $O$, and on $O$ to 3. The second lies between the other two, making with $O$ an angle of 30 degrees, and with $O$ 45 degrees. Find the points in the resultant, and the angle it makes with the least force $O$.

2. A roller of a hundred-weight is supported on an incline, the gradient of which is one foot in two, by a force which acts along its slope. Find the magnitude of this force and the pressure of the roller on the plane.

3. From two points on a ceiling, five feet apart, a sixty-pound weight is suspended by two strong cords, which meet at the point of suspension. The lengths of the cords are three and four feet respectively. Find the magnitudes of the forces by which they are strained. These forces of 30 and 40 pounds are attached to three cords, which are knotted together at their other ends. The two cords bearing the lesser weights are thrown over two pulleys fastened at a distance of 10 feet from each other, and at the same height, into a wall, the greatest weight hanging between them. Find the position in which the cords and weights will settle into equilibrium.

You will observe that these problems are to be done by rule and compass, etc. We have not yet come to the more effective method of solving them by calculation. The geometric way, however, of drawing and measuring is the best for giving you accurate ideas of the subject, and therefore indispensable in the first stages. The lines you must carefully lay down, by a ruler, and the angles by a circular protractor, keeping in mind, as to the latter, that in every right angle there are ninety degrees. The distances representing the forces you must take from an ordinary scale; and observe, as to this, that you need not make in every case your drawings so large that a whole inch be given to every pound of force. You may allow a quarter of an inch to each pound, or hundredweight, or ton, or even a tenth, if the numbers be large. All that is necessary is to keep the proportion of your figures right, whether they be on a large, or a small scale, as is done in mapping or drawing plans of buildings. For the above examples a scale of a quarter of an inch for each pound will be quite sufficient. Perhaps for the third example tenths of an inch will best answer.

In the next lesson the answers to these problems will be given. I now proceed to

**Forces Applied to Two Points.**

Three cases present themselves for consideration.

1. When the lines of direction of the two forces meet within the body.

2. When they meet without.

3. When the two forces are parallel to each other.

**First Case.**—This is easily disposed of. When two forces meet within a body, the point of meeting may be taken as the point of application of both forces, which can then be compounded into one; and the case thus becomes that of a single force applied to a single point.

**Second Case.**—Here also the two forces may be reduced to one; but, as their directions meet outside the body, it is necessary to show that their effect is the same as though the point of meeting was a real point of application. This, in a future lesson, we shall prove by two foot proofs; but, in the meantime, the following considerations will satisfy you that it is true.

Let $A$ and $B$ be the two forces applied to the points $A$ and $B$ (as in Fig. 10), and $O$ the outside point in which their directions meet. Also, let $O$ be the direction which their resultant would take were the body extended to $O$ and the forces there applied. Suppose now that, in order to extend it, a round bar of iron of uniform thickness is firmly soldered to it, so as to include the line $OB$ within its substance. The body being thus extended, $O$ may be considered a point of application of both forces, which we may conceive to be transferred to it by two thin but strong wires, $OA, OB$, the mass of which is so small that it may be neglected in comparison with that of the body. The forces $A$ and $B$ are now reduced to one force, acting along $O B$ on rod and body together, and producing the same effect on both as though they acted at $A$ and $B$. But the effect taken separately of the resultant on $O B$, and therefore of $A$ and $B$, is evidently the same—namely, a pressure along its length. Their effects, therefore, on the body itself taken separately must be the same; and, although outside, may be considered a point of application.

The two forces are reducible to one applied to the body at any point on the line $O B$ within the body.

**Two Parallel Forces.**

**Third Case.**—The resultant single force can be determined in this case also by the parallelogram of forces, but the proof given by the greatest mechanic of antiquity—Archimedes of Syracuse—is, with a slight alteration, much preferable, on account of its simplicity. I shall first take two equal parallel forces, which act in the same direction. Let $A$ and $B$ (Fig. 11) be the points of application, and their directions those of the arrow-heads $P$ and $Q$. Suppose, moreover, that in magnitude they are each one pound, or ounce, or ton—say, one pound. Now, in the first place, the resultant, whatever it be, must pass through the middle point of $AB$. The best reason I can give you for this is, that the resultant cannot, since the forces be equal, be nearer to one than to the other. If it were a tenth of an inch nearer to $A$, it should be also a tenth nearer to $B$.

In order to find its magnitude and direction, let us suppose that two other forces, $A C, B D$, each equal to a pound, are applied to the body along the line $AB$ in opposite directions. These being equal, and therefore of themselves balancing each other, can neither add to nor take from the effect of $A P$ and $B Q$, which may consequently be considered equivalent to the four forces $A P, B Q, A C, B D$. Let the two at $A$ be now compounded into one, acting in some direction between them (I care not which), and let the same be done with the two at $B$. Now produce these resultant directions backwards, until they meet at $O$, and transfer the resultants themselves to that point. Now resolve them back into their original components, and you have two pounds, $O C$ and $O D$, acting against each other parallel to $AB$, and two separate pounds pulling from $O$ downwards parallel to $AP$ and $BQ$. The two former cancel each other, and there remain two pounds acting parallel to $AP$. Here we may say:

1. If two equal parallel forces act on a body in the same direction, their resultant is parallel to either, and bisects, or divides equally, the line joining their points of application.

2. The resultant is in magnitude equal to their sum, or to twice either force.

As an example to illustrate, take two equally strong horses pulling a carriage; two equal forces are applied to the splinter-bar, which give one force equal to double the strength of either horse acting at its middle point. When the carriage is backed, these forces are applied in the opposite direction directly to the centre through the pole.

We are now in a position to find the resultant of any two
parallel forces, the first step towards which is to determine the resultant of any number of equal ones applied to a body at equal distances along a line. The number may be either odd or even. We shall consider each separate pair first, take even, and let it be seven, as in Fig. 12. Now, supposing each to be one pound, if we take the middle one, which is evidently at the middle of the line A B, we find that there are three pounds on either side of it acting in pairs at equal distances from m. The resultant of the nearest pair gives, as proved above, two pounds at m; the next pair also gives two, and so does the third. These make six pounds of resultant at m, which, with the single one already there, are seven pounds—the sum of all the forces for resultant. Were the number thirteen the conclusion would be the same. There would be six on either side of the middle one, and you would have a resultant of thirteen pounds; and the same holds good of any other odd number you select, be it large or small.

Now, suppose we have an even number of such forces, say six, as in Fig. 13, counting them from either end towards the middle, there will be no middle pound; and the middle of the line A B will be in the middle of the space between the middle pair of forces. What have we then? The inside pair gives two pounds at m, so does the next outside, and so the next; and there are evidently thus six pounds of resultant on the centre of A B. Take any other even number, and the result is the same; and thus, for both odd and even numbers, we arrive at this conclusion: The resultant of any number of equal parallel forces acting on a body at equal distances along a line, is equal to their sum, and bisects the line joining the points of application of the extreme forces.

An instance of this is the working of a hand fire-engine. Suppose seven men at the lever on either side, that is, fourteen hands on each lever; supposing the men to be equally arranged and of equal strength, this makes fourteen equal forces applied at equal distances, the resultant of which is the muscular power of seven acting at the centre on either side.

Now we shall, without difficulty, find the resultant of two unequal parallel forces. As before, let A and B be their points of application, and let us first suppose that they act in the same direction. Measuring the forces to the right, or in any direction, there are three cases which may occur. The number, say of pounds, in the forces may be both even, or both odd, or one odd and the other even. 1. We shall take "both even" first, and, for simplification sake, let them be six at A and four at B. Divide now the line A B into ten equal parts, that is, into as many parts as four and six together make. Extend also A on either side, as represented (Fig 14) by the dotted lines, and measure off on the extensions any number of portions you please, each equal to one of the subdivisions of A B. Beginning at A, suppose you apply a pound force at the end of the first subdivision to the right, another pound at the end of the third, and so on untill you come to B. You will find then that there will be a resultant at the end of the first division from B. Put pounds now at the end of the first division from A in the dotted line, on the third, and on the fifth, and do the same on the dotted line from B, on the first and third. Count all the pounds you have; they are ten, five inside and five outside. Calling the points occupied by the extreme pounds y and q, the resultant of these ten, so distributed at equal distances, must pass through the middle, x, of y q, and be ten pounds, by the principle last established. But if we take separately the three outside and the three inside A, we make six pounds acting at A. Also the two pair on either side of B makes four pounds at B. The ten pounds at x must therefore produce the same effect on the body as the six at A and the four at B, and therefore must be the resultant of these forces; that is to say, the resultant is the sum of the components.

But count now the number of subdivisions on either side, from x to A and x to B. There are four on the side of A and six on B's side—that is to say, the resultant cuts the line A B in the proportion of 4 and 6, with this peculiarity, however, that the smaller number is on the side of the greater force. This is what we might expect, for the resultant ought naturally to tend towards the greater, on account of its predominance. When a line is cut in this way, the smaller portion being on the side of the greater number of pounds, it is said to be cut inversely as the two numbers—that is, in the contrary order.

2. Now let us take the case of two odd numbers; let them be 9 and 7. It is evident that to put another 9 pounds at A, and 7 at B, the resultant of this second 9 and 7 should in every respect agree and coincide with that of the first, and that the resultant of the four should be the sum of two nines and two sevens. But the double 9 at A is 18 pounds, and the double 7 at B is 14 pounds. The case, therefore, becomes one of even numbers, and the line A B, as proved above, must be cut by the resultant in the inverse proportion of 18 to 14. But to divide a line so that there may be 18 parts one side and 14 on the other becomes, by throwing every two of the subdivisions into one, the same thing as dividing it so that 9 may be on one side and 7 on the other. In this case then, also, A B is divided inversely as the forces.

3. When the numbers are one odd and the other even, say 4 and 7, the result is the same. By doubling each force you get 8 and 14 pounds, both even numbers; the line A B is divided by the resultant inversely as 14 to 8, which is the same as 7 to 4 times the resultant force.

We have supposed in all these cases that the forces contained an exact round number of pounds; but what should we do if there were fractions of a pound in either or in both? I say, reduce the forces to ounces, and work by round numbers in ounces. If there were fractions of ounces, work in grains. You can thus still secure round numbers, and the above proofs will hold good. But what are you to do if there are fractions of grains? Work in tenths, or hundredth, or thousandths of grains, or by even smaller fractions, and you will still have round numbers, and you can say that the resultant cuts A B inversely as these numbers, however great they be, on account of their being as the forces. To trouble you about smaller fractions would only get you into a cloud of metaphysics for no practical purpose.

I have proved this important principle only for particular even numbers, 6 and 4, but you will find that the reasoning will be the same whatever be the even numbers you choose. The rule simply is to divide the line A B into as many equal parts as there are pounds in both forces, and then to distribute all the pounds at A in two batches on either side of that point; and to do the same at B with the pounds there acting, observing to place the pounds as you go from A or B in any direction, at the first, third, fifth, and so forth, points of division.

You are now in a position to find the resultant of three or more parallel forces acting, say, at the points A, B, C, D, as in Fig. 15. First join A with B, and cut it inversely as the forces which are there applied; next join the point X so found with C, and cut the joining line X at Y inversely as the sum of the two first forces to that at C; join this again with D, and cut it inversely as the three first forces to that of D; and so proceed until you have exhausted all the forces.

The point Y last found is that through which the resultant of all passes, and is called the centre of parallel forces. Suppose, for example, that the centre was required in the case of parallel forces of 1, 2, 3, and 4 pounds applied to the four corners of a square board, A, B, C, D (Fig. 16). First divide A C into three parts, and take two next to A and one to C. The point X so found is the parallel centre for these two forces. Join X now with C, and cut X C into six parts (the sum of 1, 2, and 3), and take three next to C and three to X. The centre Y...
so found, which evidently will be the middle of \( c x \), is the centre of the three. Now join \( y \) with \( d \), and divide \( y \) \( d \) into ten parts (the sum of 1, 2, 3, and 4), and take four next \( y \) and six next \( d \). This last point, \( z \), is the centre of all the given forces. Try your own hands now on the following Examples, and in the next lesson we shall have for subject the centre of gravity, which is a centre of parallel forces.

**Examples.**

1. Three equal parallel forces act at the corners of a triangle; find the centre through which their resultant passes.
2. A force of a pound is applied to one end of a beam, of three at the other, and of two at the middle; find the centre of these forces, they being parallel to each other.
3. A weight of one pound and three quarters hangs from one end of a rod which is two feet in length, and of three and a half from the other; find the magnitude of the resultant, and the centre of parallel forces.
4. A door is seven feet high and three feet wide, and the centres of its hinges are distant 25 feet from each other. A force of twenty-three pounds is applied along its upper edge, pulling it off its hinges, and one of thirty-seven along the lower. Find the strains on the hinges.

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**LESSONS IN ARITHMETIC.—VIII.**

**GREATEST COMMON MEASURE.**

1. A composite number, as already defined (see Lesson VI., Art. 2), is one which is produced by multiplying two or more numbers or factors together. A prime number is one which cannot be produced by multiplying two or more numbers together; it cannot, therefore, be exactly divided by any whole number except unity and itself. Thus 1, 2, 3, 5, 17, 31, etc., are prime numbers, or primes, as they are sometimes called.

A measure of any given number is a number which will divide the given number exactly without a remainder. Thus, 3 is a measure of 9, 25 is a measure of 75.

A common measure of two or more numbers is a number which will divide each of them without a remainder. Thus, 2 is a common measure of 6, 8, 12, 18, 30, etc.

The greatest common measure of two or more numbers is the greatest number which will divide all of them without a remainder. Thus, 9 is the greatest common measure (or, as it is sometimes written for shortness, the G. C. M.) of 18, 27, 36, and 45.

2. To find the greatest common measure of two given numbers.

**Rule.**—Divide the greater by the less, then the preceding divisor by the remainder, and so on, until there is no remainder. The last divisor will be the greatest common measure required.

**Example.**—To find the greatest common measure of 532 and 1274.

Arrange the process thus:

\[
\begin{array}{c}
532 \\
\hline
1274 (2) \\
\hline
210 \times 22 \hspace{1cm} 420 \\
\hline
112 \times 20 \hspace{1cm} 112 \\
\hline
98 \times 11 \hspace{1cm} 98 \\
\hline
14 \times 9 \hspace{1cm} 98 \\
\end{array}
\]

Here, in accordance with the rule, we divide 1274 by 532, which gives a remainder 210; then 532 (the preceding divisor) by 210, giving a remainder 112; again 210 (the preceding divisor) by 112, which gives a remainder 98; then 112 (the preceding divisor) by 98, which leaves a remainder 14; and lastly, 98 by 14, which gives no remainder. 14, therefore, according to the rule, is the greatest common measure of 532 and 1274.

3. To find the greatest common measure of three or more given numbers.

**Rule.**—Find the greatest common measure of two of them; then find that of the common measure thus obtained and of the third; then that of this common measure and the fourth, and so on. The last obtained will be the greatest common measure of the given numbers.

**Example.**—Find the greatest common measure of 204, 357, and 935.

First, we find the greatest common measure of 204 and 357 to be 51, by the rule given for two numbers.

\[
\begin{array}{c}
204 \\
\hline
357 (42) \\
\hline
51 \\
\end{array}
\]

Next, we find the greatest common measure of 51 and 935, which we see to be 17.

\[
\begin{array}{c}
51 \\
\hline
935 (53) \\
\hline
17 \\
\end{array}
\]

Hence, according to the rule, 17 is the greatest common measure of 204, 357, and 935.

We do not give the reasons for the truth of the foregoing rules, as they cannot be satisfactorily established without the aid of algebra.

4. The above rules are infallible methods for finding the greatest common measure of two or more numbers. In practice, however, we can frequently dispense with these operations, and determine the greatest common measure by inspection, or by splitting the numbers into their elementary or prime factors.

It is evident that if two or more numbers have a common measure at all, they must be composite numbers, i.e., capable of being separated into factors. If any given numbers be separated into prime factors, the greatest common measure will evidently be the product of all the factors which are common to each of the given numbers.

Thus, 75, 135, and 300, when separated into their prime factors, are respectively

\[3 \times 5 \times 5, 3 \times 5 \times 9, \text{ and } 2 \times 2 \times 3 \times 5 \times 5\]

Now, the factors which are common to all of these are 3 and 5, and therefore \(3 \times 5\) — that is, 15 — is the greatest common measure of 75, 135, and 300.

5. We subjoin a

**Rule for dividing a composite number into its prime factors.**

Divide the given number by the smaller number, which will divide it without a remainder; then divide the quotient in the same way, and continue the operation until the quotient is unity. The divisors will be the prime factors of the given number.

The reason of the truth of the above rule may be thus explained:

Every division of a number, where there is no remainder, resolves it into two factors — namely, the divisor and quotient. But in the above rule the divisors in each case are the smallest numbers which will divide the given number and the successive quotients without a remainder; hence they are all prime numbers, and the division is continued until the quotient is unity. Hence, clearly, the product of all these divisors (which are all prime) will be equal to the original number. In other words, these divisors are the prime factors of the given composite number.

**Example.**—Resolve 16170 into its prime factors. Arrange the process thus:

\[
\begin{array}{c}
16170 \\
\hline
2 \\
\hline
8085 \\
\hline
3 \\
\hline
2695 \\
\hline
5 \\
\hline
539 \\
\hline
7 \\
\hline
77 \\
\hline
11 \\
\hline
11 \\
\hline
1 \\
\end{array}
\]
Hence the prime factors of which 16170 is composed are 2, 3, 5, 7, 11; or, $16170 = 2 \times 3 \times 5 \times 7 \times 11$.

**Exercise 19.**

1. Find the greatest common measure of the following numbers:
   - $285$ and $465$.
   - $382$ and $1274$.
   - $388$ and $2775$.
   - $2145$ and $3471$.

2. Resolve all the composite numbers from 9 to 106 into their prime factors.

3. Resolve into their prime factors $180$, $420$, $714$, $836$, $2986$, $11402$, $1728$, $1492$, $8032$, $71840$, $92552$, $51060$.

4. Find the greatest common measure of the following numbers by resolving them into factors:
   - $36$, $60$, and $108$.
   - $25, 36, 140$, and $163$.
   - $5355, 654, 17037, 3965$, and $91856$.

5. Find the greatest common measure of the following numbers:
   - $105$ and $165$.
   - $198, 136$, and $162$.

6. Find all the divisors common to the following numbers:
   - $15, 18, 24$, and $36$.
   - $14, 28, 42$, and $55$.
   - $10, 25, 50, 75$, and $60$.

7. Resolve the following numbers into their prime factors:
   - $120$ and $144$.
   - $150$ and $420$.
   - $714$ and $836$.
   - $574$ and $2868$.
   - $11402$ and $880$.
   - $650$ and $1728$.

That our readers may have sufficient practice in multipication and division, we give in this lesson upwards of one hundred examples in these rules. The operations should be contracted when practicable, and the correctness of every result should be tested by the methods given in our Lessons on Multiplication and Division.

**Exercise 20.**

1. Find the product $78530700 \times 1250$.

2. Find the product of the following by dividing by successive factors:
   - $42634 \times 63$.

3. Find the product of the following by dividing by successive factors:
   - $16128 + 34$.
   - $2576 \times 56$.

4. Divide $9043$ by $30, 360$, and by $3000$.

5. Divide $339000$ by $17000$.

6. Divide $123456789$ by $290000$.

7. Multiply and also divide:
   - $98734$ by $5$.
   - $53200291$ by $5$.
   - $1256$ by $15$.

8. Work the following examples in multiplication:
   - $85763 \times 999$.
   - $537055 \times 99999$.
   - $3457 \times 22$.
   - $9420 \times 38$.
   - $21064 \times 38$.
   - $14061 \times 52$.

9. Divide one thousand billions by $81$ and $729$.

10. Divide a thousand millions by $111$.

11. Divide a thousand millions of millions by $1111$.

12. Divide $90876070500403010$ by $654291$.

13. Divide $4678132378700$ by the following divisors, separately, $2100, 35050, 8700, 957000, 78700, 1360000, 000000$.

14. If the annual revenue of a nobleman be $237000$, how much is that per day, the year being supposed to be exactly 365 days.

15. What is the nearest number to one thousand billions that can be divided by 1111 without a remainder?

16. How often could $4304721$ be subtracted from $209767932445961$, and at last leave no remainder?

17. How many times does $31614420$ contain $33939$?

18. What number is that which divided by $123456$ would give a quotient of $32451$, and a remainder of $70403$?

19. Work the following examples in multiplication:
   - $49634 \times 63$.
   - $50535 \times 56$.
   - $73150 \times 1000$.
   - $80600 \times 25000$.
   - $42900 \times 49000$.

20. Work the following examples:
   - $1188 + 33$.
   - $3129 + 88$.
   - $2916 + 17$.

21. How long would it take a vessel sailing 100 miles per day to circumnavigate the earth, whose circumference is 25000 miles?

22. The distance of the earth from the sun is 95000000 miles: how long would it take a balloon, going at the rate of 100000 miles a year, to reach the sun?

23. Divide $467000000000$ by $25000000$.

### LESSONS IN BOTANY

**SECTION VI.—LEAVES CONSIDERED AS TO THEIR FUNCTIONS.**

Although leaves have a great variety of uses, yet the principal is that of respiration or breathing. In this manner they become the representatives of lungs in animal beings. But though plants breathe, the vegetable function of respiration in them is considered as an adaptation of that function in animals. On the contrary, it is directly the reverse: the very gas which animals expel from their lungs as useless or injurious, plants receive through the medium of their leaves, take out of it that which is suitable to their wants, then exhale the portion which is refuse to them, but which is necessary to the existence of animals. What a train of reflections does the contemplation of this beautiful provision call forth! Not only are vegetables useful in supplying us with food and timber, not only do they beautify the landscape with their waving branches and picturesque forms, but they are absolutely necessary to the existence of animal life as a means of purifying the atmosphere!

The breathing function of leaves is far too important to admit of being lightly passed over with these few remarks, yet a difficulty occurs in pursuing it further, inasmuch as to understand the precise theory of vegetable respiration the reader must be acquainted with certain facts in chemistry. Some readers, doubtless, acquainted with these chemical facts, others are not; consequently, the best plan will be to present a slight outline of these facts at once.

To begin, then: did the reader ever set fire to a bit of stick or a little charcoal? No doubt he has. What does the reader think becomes of this stick or charcoal? Is it lost, destroyed? Oh no, there is no such thing as destruction in all nature; substances, even when they appear to be destroyed, only change their form. What, then, becomes of a piece of stick or a piece of charcoal when we burn either in the fire? Now, whenever philosophers desire to study the conditions of an experiment, and the choice of more than one set of conditions stands before them, they very properly take the simplest. We have here two sets of conditions; the burning of a stick is one, the burning of a piece of charcoal is the other. The latter being the simpler of the two, we will take it, and use it for our purposes; moreover, wo
will assume the charcoal employed to be absolutely pure. We burn, then, an absolutely pure bit of charcoal in atmospheric air, and it totally disappears; nothing remains; not the smallest trace of ashes; all that, then, has become of the charcoal? This is not a chemical book, therefore we have not space to go into the matter in all its chemical relations. We must, therefore, content ourselves by saying that the charcoal, by burning, is converted into a gas termed the carbonic acid gas. This carboxic acid gas is quite invisible, therefore one might look for it in vain; but it has a smell and a taste, therefore we might be conscious of its existence, even though we had no means of catching it. But we have such means. If this gas comes in contact with lime, or potash, or soda, either of these substances lays hold of it, combines with it, or, if we may be pardoned the expression, licks it up. Therefore, by setting a little quicklime in places where carbonic acid gas exists, we may catch it just as readily as we can catch a mouse in a trap—ay, more readily, because a mouse may at least choose whether he go into the trap or stay out of it; but the carbonic acid gas has no such choice; if it comes in contact with the trap of lime, it must go without fail. Now, what we want to come at is this. Although a piece of charcoal when burnt goes away in an invisible form, it nevertheless only makes a new acquaintance and puts on a mask. We can catch it, can unmask it, and get the charcoal out of it once more.

Carbonic acid gas is a poison, as, we dare say, most of our readers know; hence the danger of sitting near a pan of burning charcoal.

Proceeding with our chemical remarks, we must now go on to say that combustion is far from being the only source of carbonic acid gas: thus it is given off during fermentation, is given off from effervescent wines, such as champagne and sparkling moselle, is given off from ginger beer and soda water, and, what is far more to our purpose, is given off from the lungs of animals by the act of respiration. Indeed, the functions of animal digestion and respiration taken together may be considered as a sort of combustion, and are actually termed combustion by some authors. The similarity is indeed striking, as a little contemplation will serve to demonstrate. Thus, if we throw a lump of coal into a fire-place, heat is given out, and gaseous matter (chiefly carbonic acid) escapes. If we swallow a morsel of food, it is digested, heat is given out, and carbonic acid escapes. In the former case carbonic acid escapes by the chimney, in the latter case by the lungs. One chemical point yet remains to be explained before the student will be in a position to understand the functions of a vegetable leaf. The carbonic acid, of which we have been speaking, is a gaseous compound of charcoal, termed by chemists carbon and something; that something is oxygen, the vital principle of the air. Now, the bulk of vegetable bodies is made up of carbon, otherwise how could we get charcoal in the ordinary way? And this bulk, this carbon, is got out of the air. Yes, the largest tree, whatever its size, is for the most part formed of carbon, and this carbon once existed in the gaseous form. Philosophers have made calculations, from which it appears, that the total amount of carbonic acid thus floating about in the atmosphere amounts to the enormous quantity of many tons, and that tons of carbonic acid hover over each acre of ground, ready to give up its carbon to vegetables which require this substance. Before quitting this subject, we must not forget to direct the reader's attention to the beautiful provision by means of which the amount of carbon necessary to be got rid of from the animal economy is evolved in the particular form of gas. Even supposing no positive injury to result, yet just think how dirty and begrimed we should be if we were always puffing out charcoal dust with every expiration! We do not expire a small quantity either, no less than thirteen ounces of charcoal being evolved during twenty-four hours from each human individual. Had not some provision been adopted for enabling carbon to be thus evolved in a gaseous form, we should all have been blacker than chimney-sweeps. What a miserable state of things would this have been!

Respiration, then, is the chief function of leaves, but it is not the only function; they also serve as evaporative organs, by means of which the plant gets rid of excessive moisture; and in this respect, again, they present a striking analogy to animal lungs. Who amongst us is not aware that our breath contains moisture?

SECTION VII.—ON THE FORM AND MODIFICATIONS OF LEAVES.

Having described the general functions of leaves, we must now proceed to examine their forms, and to learn the terms by which those forms are designated, otherwise we should not be able to describe a plant in such a manner that a person would understand our description. As in many other parts of Botany, the student will here encounter some long names; they are very useful names, nevertheless, and require to be understood.

In the first place, taking a general review of the aspect of leaves, it will be evident to the reader that their form is exceedingly varied, as is also their manner of attachment to the stem, to say nothing of such characteristics as softness, hardness, thickness, thinness, and so forth. As regards their attachment to the vegetable, some leaves grow directly out of the stem, or, in figurative language, may be said to sit upon the stem. Such leaves are termed by botanists sessile, from the Latin word sessum, a part of the verb sedere, to sit. Others are attached to the plant by means of a little stem of their own. Now, this leafstem, or foot-stalk of a leaf, botanists denote a pediole, from the Latin petiolus, a little foot, and leaves thus supplied with a petiole are said to be petiolate. Again, some leaves are attached to the parent stem exactly opposite each other, consequently they are said from this circumstance to be opposite or opposed. Others are alternately attached, from which circumstance the denomination alternate is given to them. All these characteristics are very important, not only in enabling a botanist to describe the configuration of plants in the fewest possible words, but in enabling him at the same time to separate plants into natural groups and alliances.

Again, some leaves are single in themselves, as is the case with those of the apple-tree; whilst others are made up of several little leaflets, as we see, for example, in the ash. Hence arises the very natural distinction of leaves into simple and compound.

The forms which leaves assume are so very numerous, that botanists are accustomed to indicate them by the similarities which they manifest to natural objects or objects to which they may be likened, for which reason they are termed peltiform (Latin, pelta, a shield); others are like hearts, whence they are termed cordate or cordulate (Latin, cor, cordis, a heart). Some resemble feathers, others are jagged like a saw, whence arise the designations penniform (Latin, penne, a feather or wing), serrate or serruliform (Latin, serra, a saw), and so forth; but we shall give in our next lesson a description of the chief varieties of leaves, from an inspection of which the various names respectively applied to them will be rendered more evident.
ANIMAL PHYSIOLOGY.—IV.
THE EAR.
A man who had been blind, when asked what he supposed scarlet was like, replied, "Like the sound of a trumpet." The reply is startling, because it shows how dependent the mind is upon the senses for its ideas. No one who could both see and hear would ever think of comparing sound with light, or tone with colour.

But though the sensations conveyed to the brain by the eye-nervé and the ear-nervé are so different as to be incomparable, there is much resemblance between sound and light. They obey the same laws. Sound can be absorbed, reflected, and refracted at the surface of bodies, as we have seen light is; and, moreover, it is probable that both consist of rapid vibrations, or waves, succeeding one another at regular intervals, like the enlarging circles which follow one another and break upon the banks when a stone is thrown into the middle of a still pond, and disturbs the glassy surface of the water.

Though there are these points of similarity as to the essential nature and qualities of light and sound, there are also great differences. Light travels with a rapidity which, for all appreciable distances—that is, for all earthly objects—is instantaneous; while sound travels, relatively, very slowly, and, when common air carries it, it goes only 1,093 feet during each second of time. Again, while the vibrations of light are so rapid that it is impossible to know them to be vibrations but by reasoning upon its effects, the waves of sound may be often observed by the eye when they are propagated through, or originated from, a solid body, as when we see a cord or glass vessel respond to a musical note, or give out a sound when struck. Sound, too, is the vibration of the substances themselves—which substance we can feel, or see, or know by means of other senses—while light is supposed to be the vibration of some fluid which is imperceptible, or, in other words, has no weight, and of which we know nothing except by the eye.

The waves of sound, then, being closer and more liable to interference than the waves of light, it follows that the ear cannot be so good an indicator of the direction of sound as the eye is of the direction of a luminous object. Indeed, the ear can of itself scarcely give us any idea of direction. If the sound be short and sharp, like the piercing shriek of the bat, or even

I. THE HUMAN EAR. II. SECTION SHOWING THE HOLLOW OF THE COCHLEA. III. MALLEUS. IV. INCUS. V. STAPES.
Reference to Nos. in Fig. I.—1, pinna; 2, lobule; 3, tube; 4, tympanic membrane; 5, incus, or anvil; 6, malleus, or hammer; 7, eustachian tube; 8, semi-circular canals; 9, vestibule; 10, cochlea. —I., II., III., and IV. enlarged.

the cry of the partridge, and it be not repeated so often as to let us try experiments on it, by turning the head this way and that, it is very difficult to tell from whencesoever the sound comes, even to the extent of a whole quadrant of the horizon. Upon this fact ventriloquism depends for its success. The idea of the direction of sound being inferential, and not much dependent upon the same—which, being contrary to the operation of the mind, and not to that of the ear—the ventriloquist has only to direct the mind where to expect the sound, and then to make a sound of just such a pitch of intensity, and just such a tone, as the sound would have if it came from that quarter, to completely impose on the ear of the listener as to the direction from which it comes.

But although the ear is at fault as regards direction, the accuracy of some of its other notifications is wonderful in the extreme. It can note not only the likeness and differences of musical sounds, but of their harmonies when many are sounded together, and a fine ear will detect an erring note when a thousand instruments are sounded. The recognition of slight differences is truly wonderful when we consider that not only can the ear know when the same note is sounded by instruments of different kinds (though physicists are unable to tell us how there can be any difference, the number of vibrations in a second being the same, and the medium identical), but very slight differences in the same kind of instruments, such as whether there is one per cent. more or less of a metal in an alloy of which an organ-pipe is made, or of which a bell is cast, are observed so shrewdly, that these matters have to be attended to with the nicest care. A violin must not only be of a certain shape, but the wood of which it is composed must be of a certain age, to produce the best instrument; and these observed differences are carried to such a nicety that fiddles made in a certain part of Germany, in a certain year, are considered the best, and will command almost fabulous sums. Yet all this depends upon what is called timbre, a word which gives a name to a something which is entirely dependent on the delicacy of our sense of hearing, but which has not received any other explanation.

Though we cannot directly connect these niceties of sense with the intricacies of complication in the organ of hearing, these latter will be seen to be so numerous and peculiar when we describe the ear, that one is not surprised that much con-
nected with sound is unexplained, because there are so many structures connected with the organ which has been given as the interpreter of sound, at the use of which we can hardly guess.

That which is usually called the ear is familiar to every one as the external semi-circular cartilage, closely invested with skin, and ending below in a soft lobe, which is sometimes the support of barbarous pendants. This structure, which, when well formed, has a beauty of its own that needs no supplement of Adornment, is but a remnant of the internal part of the ear. Though it at first collects sound, and protects the orifice which leads down towards, not to the true ear, it is non-essential, and can be dispensed with without much inconvenience; so that some of our poor ancestors, who found that they could not retain both good external ears and good cuisines, like William Prymne in the time of Charles I. and the Star Chamber, suffered less real loss than might have been anticipated.

The external gristy ear is called the pinna, and though flattened as to its general surface, is somewhat folded into ridges and furrows, there being a rim round the outside and a channel within this, which deepens and widens as it runs first upward, along the back part, then downward along the fore part to a central crypt. From this crypt the passage becomes narrower as it runs forward and inward to the pit of the ear. Sound, no doubt, and the idea of sound, forms the principal part of this movement of air, which we have described its course. If the pinna were quite flat, sound would rebound from it; but as it is so shaped, sound is caught and reflected round the canal from point to point, as it is reflected round the Whispering Gallery of St. Paul's, and finally delivered down the tube of the ear.

The tube is an inch and a half deep, and its innermost half enters one of the bones of the skull, is called the temporal bone, and the other parts of the ear are enclosed and protected. At the bottom of the tube is an oval membrane stretched across the passage, and barring the entrance to all external objects. Behind this is a roundish, irregular cavity, filled with air. This stretched fibrous membrane bounding the air cavity, naturally suggests the idea of a drum, shaped like a kettle-drum; and hence the cavity is called the tympanum, from a Latin word denoting a drum, and the parchment-like tissue the membrane of the drum. It differs, however, from a kettle-drum in that several orifices open into it, and it contains structures to be described presently.

On the further side of the drum is the true ear, completely encased in bone, except at two very small holes, which are closed with membrane. The larger and upper aperture is called the oval hole, and the smaller and lower the round hole. From the membrane of the upper part of the oval hole stretches a chain of bones, whose shape is best seen in the engraving. The other one, next the pavement of the drum, is called the hammer. It has three processes, or protrusions, two of which are long; so that, rather than hammer, it might be called a wood-butter's beetle. One of these processes, called the handle, is attached to the centre of the membrane, which it makes tight when pulled inward by a small muscle, and lax when another muscle acts on it.

The former operation is probably the action which we unconsciously cause when we consciously listen. The head of the hammer is applied to another bone called the anvil (incus). It has two processes, one for its suspension to the wall of the tympanic cavity, and the other to connect it with the third or stirrup-bone (stapes). This bone is more like the article it is named after, its curved form and tip being, in fact, a stirrup. It is applied to the oval membrane, which it nearly covers. These bones can move a little in relation to one another, and their actions are limited by small muscles, but they usually act together as if in one piece, playing round an axis which runs through the heads of the hammer and anvil, so that when the tympanic membrane is thrust in and out by vibration, the membrane of the oval hole is made to vibrate correspondingly. The round hole is open to the influence of sound conveyed through the air of the tympanum; but whether this be its function, or merely to allow the fluid of the internal ear to be more readily thrown into vibration in the passage it fills—in other words, whether it be a hole for the entrance or exit of vibrations—seems hard to tell.

The fore-part of the drum cavity is connected with the throat by a passage, which runs forward and downwards to open in the gullet behind the nose and mouth. Through this passage the cavity is kept supplied with renewed air at the same pressure as the external air. The reader may be conscious of the existence of these passages to the ears from the throat by preventing the air from rushing out of the mouth and nose, while he forces it up from his lungs. The cavity of the drum will then be distended with air; hearing will be less perfect, by the unnatural tension of the membranes, and there is a slight singing in the ear. In a little practice, air may be conveyed through the mouth to the drum, with the result that the lungs, and thus the organs, have been applied as remedies to diseases of the ear. But the exclusion of these from the lungs is difficult, and cannot be relied on.

One of our greatest aurists, when pursuing his philanthropic and scientific investigations on the effect of chloroform and prussic acid applied thus, died, because he could not exclude the latter deadly poison from his lungs as he had supposed he could. The proper, or essential ear, consists of a chamber longer than broad, communicating on its upper and outer side with three semi-circular canals, and at its front inner end with a cavity shaped like a small-shell.

The chamber is called the vestibule; this and the semi-circular canals are called together the labyrinth; and the hollow, like that of a small-shell, the cochlea. They are all channelled out of the substance of the skull before being named as the temporal bones; and the upper part of the membrane is so disposed as to be at the base of the brain, and is so strong and thick as to be called the petrous or stony part of the bone. Accurately resembling the bony labyrinth in shape, but a little smaller in its dimensions, so as to allow a little liquid to lie between it and the bone, is a membranous labyrinth. That part of the membrane which is on the floor of the vestibule leaves its bone and is termed the apertures of the shell-bone, and thus forms a horizontal stage across the widest part of the spiral passage, and so mounts round the three whorls of the spire, dividing it into two parts; so that, if we may imagine a small insect exploring these regions, it could mount to the apex of the spire by either of two spiral staircases, the roof of the lower one being the floor of the upper. These circular staircases only communicate with one another at the point of the shell. The lower one, at its foot, communicates with the tympanum by the round hole, while the vestibule communicates with the chain of bones by the oval hole. Hence, if our imaginary insect could gain access to the cochlea through the membrane of the round hole, it must first mount to the top of the lower staircase, and then descend all the way down the upper one, before it could explore the labyrinth.

All the cavities are filled with fluid, by whose agency the vibrations are conveyed along its walls; and in these walls, especially at certain parts, are distributed the nerve-fibres of the nerve of hearing. It would seem, however, as though the vibrations of the liquid are not enough to impress the nerve, and there are found small, hard structures wherever the nerve-threads are most thickly placed, and at two places in the floor of the vestibule are found collections of small, hard, marble stones, held in a mesh of fibres; so that, as the waves sweep over the liquid, these are made to strike and rebound against the nerves. The spiral sheet of membrane which divides the cochlea receives the nerves from a main nerve which runs up the central pillar, and it has in its substance fibrous bars, which radiate outwards at regular intervals, like the key-notes of a piano, and, like these, each is supposed to receive and transmit to the nerve at its root a separate note. Thus the spiral sheet of the cochlea is so contrived that it is capable of appreciating difference in tone, and the labyrinth differences in the amount of sound. The nerves from all parts are collected into one bundle, but, as is usual with nerves wherever they may be found, the strands remain distinct.

To assist the reader in his conception of the ear, we may compare it to a house of business. The pinna is the house-front; the tube is the porch; the drum-membrane the front door (closed); the drum is the hall; a few steps, the corridors, lead to an office, round which are convenient counters, closets, and passages, at which clerks enter business transactions; while, directly communicating with this large office, cognizant of all proceedings, but reserving to himself any special business, sits the general manager, who has also a door direct to the hall; whilst, at the back of the premises, telegraph wires run to the London agent.
LESSONS IN FRENCH.—IX.

SECTION I.—FRENCH PRONUNCIATION (continued).

IV. NAME AND SOUND OF THE CONSONANTS.

50. F, f.—In this commencement and body of words, this letter is usually pronounced as the letter s in the English word for. It is sometimes sounded also in the end of words. There are several exceptions, however, which are best found in the French dictionary. In the French word nef, which means nine, the f is silent when it precedes a word commencing with a consonant, thus—neuf lis, nine letters as pronounced as if printed new lis.

But the striking peculiarity of this letter consists in the fact that it receives the sound of the letter v, as in the English word cow, before another word commencing with a vowel or h mute, and is joined with this word in pronunciation, as if it were its first letter, namely:—

FRENCH.
Neuf animaux
Neuf enfants
Neuf hommes

PROonunciation.
Neun animo
Neun enfan
Neun hoomen

51. G, g.—Before the vowels a, o, and u, and the consonants d, h, t, l, m, and in the commencement of French words, g has the hard sound of the letter g in the English word got, namely:—

FRENCH.
Gateau
Geoler
Aigu
Magdebourg Mag‘d‘boor Magdeburg.

PROonunciation.
Ga-te-o A go
Go-z‘e-ry Throst
Ac-yu Ac-tu
Mag‘d‘boor Mag‘d‘boor Mag‘d‘boor.

The g final of the word boury, a small town, takes the sound of the English K, as this word is pronounced bok. Names of towns ending in boury half the g final, that is, the g is silent, as:—

Augsbourg pronounced O-g‘b’oor.

In the following French words, the initial g has the sound of the letter k in the English word keel, namely:—

FRENCH.
Gangreux
Gaunseer
Gaunseer
Gaunseer
Gaunseer

PROonunciation.
Ga-n‘g‘r‘e-ux
Ga-n‘z‘e-er
Ga-n‘z‘e-er
Ga-n‘z‘e-er
Ga-n‘z‘e-er

Gk final, before a vowel or an h mute, takes the sound of the English k, and is connected with the following word in pronunciation, as if it belonged to that word, namely:—

Rang honorble as if printed Rank combail.
Eau d‘eau
Eau d‘eau

G final, before a word commencing with a consonant or an aspirated h, is in most French words silent, namely:—

Bngh noble is pronounced Bang noble.

Double g has the sound of only a single g, except before the vowels a, o, and u, in which case the first g is hard, like g in the English word go, and the second g has a soft sound represented by the two letters gh, namely:—

Suggest is pronounced Su-zh‘ay-ray, etc. etc.

SECTION XIV.—LIST OF WORDS FOR EXERCISES IN COMPOSITION (continued).

6. LA VILLE, LA MAISON, ETC.—TOWN, HOUSE, ETC.

Antichamber, f., antechamber.
Ardoise, f., slate.
Arsenal, m., arsenal.
Bag, m., bench, seat.
Barrière, f., gate.
Bibliothèque, f., library.
Bourg, m., borough, small town.
Bourse, f., exchange.

Brique, f., brick.
Capitale, f., capital city, metropolis.
Carillon, m., chime of bells.
Caserne, f., barrack.
Cave, f., cellar.
Chambre, f., chamber, room.
Chambre à coucher, f., bedroom.
Chapelle, f., chapel.

Château, m., country house, villa.
Chaumière, f., hut, cottage.
Chaus, f., lime.
Cheminée, f., chimney.
Cimetières, m., burying-ground.
Cigare, f., cigar.
Cloche, f., bell (large), church-bell, etc.
Clocher, m., church-steeple.
Clochette, f., small bell.
Cloître, m., cloister.
Cour, f., yard, court.
Couvent, m., convent.
Cuisine, f., kitchen.
Domi, f., custom-house.
Ecurie, f., stable.
Environs, m. pl., environs, neighborhood.
Escalier, m., stairs.
 Estáge, m., story, floor.
Faubourg, m., suburb.
Ferme, f., farm.
Fontaine, f., fountain, well.
Four, m., oven.
Goutière, f., gutter.
Grand chemin, m., highway.
Goulée, f., tumbler.
Garde, f., guard.
Grenier, m., barrel.
Haie, f., hedge.
Hameau, m., hamlet.
Hôpital, m., hospital.
Hôtel-d‘ville, m., town house, city house, guildhall, city hall, town hall.
Mebble, m., piece of furniture.
Mebles, m. pl., furniture.
Maison, f., house, country house.
Mortier, m., mortar.
Mur, m., murs, f. walls.
Palais, m., palace.

7. MEUBLES.—FURNITURE.

Allumette, f., match.
Allumette chiqué, f., fricition-match.
Aménage, m., fitter, workman.
Armoire, f., cupboard.
Baril, m., cask, barrel.
Bassin, m., basin.
Basson, f., warming-pan.
Bois, m., wood, timber.
Boîte à-tussis, f., trowser-box.
Bougie, f., taper.
Boulloître, f., kettle.
Brique, f., brick.
Cadre, m., frame.
Candélabre, m., chandelier.
Casier, m., drawer.
Cassette, f., box, chest.
Chambolle, f., candle.
Charbon de bois, m., charcoal.
Charbon de terre, m., pit-coal.
Chaudière, f., boiler.
Coffre, m., chest.
Commode, f., chest of drawers.
Corbeille, f., basket.
Cribe, m., sieve.
Cruche, f., pitcher.
Cuvier, m., tub.
Drap, m., sheet.
Écumeoir, f., skimmer.
Étouffoir, m., funnel.
Escalein, m. t., towel.
Écrou, m., screw.
Fournoir, m., poker.
Foyer, m., hearth.
Lanp, f., lamp.
Lanterne, f., lantern.
Lit, m., bed.

8. PLAIS, ETC.—DISHES, ETC.

Bœuf, f., beef.
Bouilli, m., boiled beef, boiled meat.
Bouillon, m., broth.
Confitures, f. pl., preserves.
Coutelet, m., cutlet.
Gâteau, m., cake.
Gigot de mouton, m., leg of mutton.
Jambon, m., ham.

Parcours, f., march.
Pâvé, m., pavement.
Pépiniérie, f., nursery of trees.
Persistance, f., blind, open shutter.
Plafond, m., ceiling.
Planche, f., board.
Plancher, m., floor.
Pêche, m., pear.
Pompe, f., pump.
Porte, f., door.
Porte-faux, m., false door.
Poste, f., post, post-office.
Poutrage, f., beam.
Prairie, f., prairie, meadow.
Prison, f., prison.
Puits, m., well.
Quartier, m., quarter.
Rampe (d‘escalier), balustrades of a staircase.
Rec-de-chaussée, m., ground floor.
Sacristie, f., vestry.
Saloon, m., draw-in-room, hall.
Serre, f., conservatory.
Serre-chapeau, m., closet.
Serrure, f., lock.
Sonnette, f., bell.
Théâtre, m., theatre.
Toit, m., roof.
Tour, f., tower.
Tabou, f., tile.
Verger, m., orchard.
Verrou, m., bolt.
Vestibule, m., hall, entry.
Vigne, f., vineyard.
Village, m., village.
Volet, m., window-sash.
Vouté, f., vault.

Lit du plume, m., feather-bed.
Lumière, f., light.
Lustre, m., chandelier.
Marchepied, m., footstool.
Moucheté, f. pl., saucers.
Mortier, m., mortar.
Moutardier, m., mustard-jar.
Nappe, f., cloth-table.
Nécrologie, f., obituary.
Panier, m., basket.
Paravent, m., screen.
Peinture, f., painting, picture.
Pêche, f., pear.
Pierres, t. pier.
Pierre à fusil, f., flint.
Pinces, f. pl., pongs.
Pois, m., pea.
Porte-faux, f., false door.
Poutrelle, f., beam.
Puit, m., well.
Salleur, f., salt-cellar.
Savon, m., soap.
Seau, m., pail.
Serviette, f., napkin.
Sofa, f., sofa.
Soufflet, m., bellows.
Soûpère, f., soup-tureen.
Soutane, m., surplice.
Tableau, m., picture.
Tablôt, f., shelf.
Tapis, m., carpet.
Théâtre, f., a theater.
Tiroir, m., drawer.
Traversin, m., bolster.
Ustensiles de cuisine, m. pl., kitchen utensils.
Verre, m., glass.

Mouton, m., m. lamb.
Gât, m. egg.
Omnibus, m. omnibus.
Porc, m. pork.
Raffrachissement, m. pl., refreshment.
Roast, m. roast meat.
Saucisse, f., sausage.
7. Before the word onze, the article le or la is not elided [§ 149]—

Nous avons onze de Décembre, We have (it) the eleventh of December.

RéSUMÉ OF EXAMPLES.

L’ouvrier a-t-il les outils que vous avez ?
Has the workman the tools which you have ?

Les maisons que j’ai-sont-elles aussi
bonnes que celles que vous avez ?
Are the houses which I have as good as those which you have ?

Combien de francs avez-vous ?
How many francs have you ?

Je n’ai que dix francs, mais mon
frère en a plus de vingt.
I have only ten francs, but my brother
has more than twenty (of them).

Avez-vous le quinze du mois ?
Is it (have we) the fifteenth day of
the month ?

Non, Monsieur, nous n’avons que
le onze.
No, Sir, it is (we) have only the
eleventh.

Lequel de ces deux volumes avez-vous ?
Which of those two volumes do you have ?

J’ai l’un et l’autre.
I have both.

Avez-vous la première place ou la
deuxième ?
Have you the first or the second
place ?

J’ai la première et mon frère la
deuxième.
I have the first, and my brother has
the second.

VOCABULARY.

Àujourd’hui, to-day.
Février, m., February.

Cannelle, f., cinnamon.
France, m., France.

Centime, m., centime.
Histoire, f., history.

Contenu, m., contenu.
Italien, m., Italian.

Quarte, m., quart.
Kilo, m., kilo.

Combien, how much.
Gramme, m., gram.

Cravate, f., cravat.
Demi, half.

Monseigneur, m., gentleman.

EXERCISE 31.


EXERCISE 32.

1. Is that cinnamon good ? 2. That cinnamon is better than yours and your brother’s. (R. 1) 3. What day of the month is it to-day ? 4. It is the sixth. 5. Has your father twenty francs ? 6. No, Sir, he has only six francs fifty centimes. 7. How many volumes has your work ? 8. It has many, it has fifteen. 9. Has the joiner read (th) the second volume of /Michelet’s “History of France”? 10. Yes, Sir, he has read the second volume of that. 11. Has your friend Molière’s works ? 12. He has only two volumes of them, and my velvet coat ? 13. We have both. 15. We have this and that. 16. How much cinnamon have you ? 17. We have two kilogrammes. 18. How many centimes has the merchant ? 19. He has twenty-six. 20. Have you the third or the fourth place ? 21. I have neither the third nor the fourth, I have the tenth. 22. Are you not ashamed to-day ? 23. No, Sir, I am not. 24. Have you a quart of flour ? 25. No, Sir, but I have a half quart. 26. Is it (have we) the sixth of July ? 27. No, Sir, it is (we) have the fourth of March. 28. Has your uncle six children ? 29. No, Sir, he has only one. 30. Have you ten kilogrammes of meat ? 31. I have only five kilogrammes. 32. Is the butcher’s meat good ? 33. It (elle) is not very good. 34. How many kilogrammes have you (of it) ? 35. I have only two, but my brother has four.
LESSONS IN PENMANSHIP. IX.

The letter p is the first letter that the learner has met with that extends below the line b b, and it will be necessary here to say something about its proportions, as they are given in Copy-slips Nos. 28, 30, and 31.

It will be remembered that in "large text," the distance between the lines a a, b b, that contain what we have called the body of the letter, is, or ought to be, exactly half an inch; and as the line e e is midway between the lines a a, b b, the distance below b b, in order to induce the learner to pay strict attention to the relative proportions of his letters. The importance of this will be seen by any one who is curious enough to extend these letters to a greater or less length above a a, or below b b, than is allotted for their extension in our Copy-slips. The general appearance of handwriting that would otherwise be good, is often completely spoiled by a want of proper proportion in the heads, loops, and tails of the letters. Those who wish to be distinguished for writing a plain and legible hand, must aim at the neatness and beauty of the writing that is found in old deeds, and books copied by the monks who lived before the time of Caxton. The letters of these famous penmen are as regular in their proportions and as sharply and delicately defined as if they had been carefully printed from well-cut type.

On inspecting any copy-slip that has the letter l in it, it will be found that the letter p extends as far below the line b b as the letter l extends above the line a a. That portion of the letter p which extends above the line a a is longer by one-sixteenth of an inch than the distance to which the letter l extends above the same line, or the distance between the top of the bottom-turn of the letter l and the dot above it, as may be seen by examining Copy-slips Nos. 28 and 31.

We have been thus particular in dwelling upon the distances to which letters such as t, l, h, p should extend above a a, or

between each of these lines and the central line, c c, is a quarter of an inch. Now the distance between a a and the line f f, at which the long straight stroke of the letter p is commenced, is also a quarter of an inch, and is equal to the distance between a a and c c, or between b b and c c. The distance between b b and g g, the line at which the long straight stroke terminates, is rather less than half an inch, or, to speak in exact terms, just seven-sixteenths of an inch; that is to say, if an inch were divided into sixteen equal parts, the distance between b b and g g is equal to seven-sixteenths of an inch, while the distances f a, a c, c b, on the straight line f g, are each equal to four-sixteenths of an inch, which is merely another expression for a quarter of an inch, as our learners will find when they have got on far enough in Arithmetic to be working at Vulgar Fractions.
LESSONS IN ARITHMETIC. IX.

LEAST COMMON MULTIPLE.

1. One number is called a multiple of another when it can be divided by the latter without a remainder.

Thus, a measure and a multiple are the converse of each other. If a number divides another without remainder, it is said to be a measure of it, and the latter number is said to be a multiple of the first.

A common multiple of two or more numbers is a number which can be divided by each of them without a remainder. It will clearly be a composite number, of which each of the given numbers must be a factor, for it could not otherwise be divided by them.

The same numbers may clearly have an infinite number of common multiples, for any one common multiple having been found, another may be obtained by multiplying it by any number.

The continued product of two or more numbers will always give a common multiple of those numbers.

The least common multiple of two or more numbers is the least number which can be divided by each of them without a remainder.

Thus, 70 is the least common multiple of 2, 5, and 35.

2. The least common multiple of two or more numbers is evidently composed of the continued product of all the different prime factors which compose the given numbers, each one being repeated as often as the greatest number of times it occurs in any one of the numbers. For if it did not contain all the prime factors of any one of the numbers, it could not be divided by that number.

On the other hand, if any prime factor were employed more times than it is repeated in any one of the given numbers, it would not be the least common multiple.

For the sake of brevity the words "least common multiple" are sometimes written L.C.M.

3. Example.—Find the L. C. M. of 12, 126, and 735.

These are respectively equal to

\[ 2 \times 2 \times 3, \quad 2 \times 3 \times 3 \times 3 \times 3 \times 7, \quad 3 \times 5 \times 5 \times 7 \times 7. \]

Now 2, 3, 5, 7 are all the different prime factors which occur in any of the numbers; and the greatest number of times which 2 occurs is twice—namely, in the first; the greatest number which 3 occurs is twice—namely, in the second; 5 only occurs once—namely, in the third; and the greatest number of times which 7 occurs is twice—namely, in the third. Hence the L. C. M. required will be

\[ 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 7 \times 7, \]

that is, 8820.

4. The process, then, of finding the least common multiple of two or more numbers is reduced to that of splitting up the numbers into their prime factors.

This may be done, however, by a more convenient method of arrangement than splitting each number separately into factors would be, for which we give the following

**Rule for finding the least common multiple of two or more numbers.**

Write down the numbers in a straight line apart from each other. Divide by the least number which is a measure of two or more of them, and set down the quotients and the undivided numbers in a line below. Take again the least number which is a measure of two or more of these numbers last set down, and perform the same operation as before. Continue it until there are no two numbers which can be divided by any number greater than unity. The continued product of all the divisors, and the numbers set down in the last line, will be the least common multiple required.

5. Example.—To find the L. C. M. of 12, 42, 72, and 84.

The process will be sufficiently understood from the following working:

\[
\begin{align*}
2 & \mid 12, 42, 72, 84, \\
6 & \mid 21, 36, 42 \\
3 & \mid 21, 18, 21 \\
7 & \mid 1, 7, 1 \\
1 & \mid 1, 6, 1
\end{align*}
\]

Hence the L. C. M. is \(6 \times 7 \times 3 \times 2 \times 2\); that is 504.

This method of arrangement evidently gives the greatest number of times which each prime factor occurs in any one of the given numbers. Thus 2 occurs three times in 72, 3 occurs twice in 72, and 7 occurs only once—viz., in 42 and 84.

Exercise 21.

1. Find the least common multiple of the following numbers:

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Least Common Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 and 45</td>
<td>135</td>
</tr>
<tr>
<td>63 and 18</td>
<td>189</td>
</tr>
<tr>
<td>6, 9, and 15</td>
<td>90</td>
</tr>
<tr>
<td>8, 16, 18, and 24</td>
<td>72</td>
</tr>
<tr>
<td>6, 9, 15, 18, and 30</td>
<td>90</td>
</tr>
<tr>
<td>171, 18, 20, and 25</td>
<td>210</td>
</tr>
<tr>
<td>36, 35, 20, 72, and 35</td>
<td>840</td>
</tr>
<tr>
<td>9, 27, 54, 81, 14, and 63</td>
<td>756</td>
</tr>
<tr>
<td>72, 120, 180, 24, 36, and 38</td>
<td>756</td>
</tr>
<tr>
<td>11, 375, 850, 3400, and 5085</td>
<td>3400</td>
</tr>
<tr>
<td>12, 7, 11, 13, and 5</td>
<td>3400</td>
</tr>
</tbody>
</table>

LESSONS IN GERMAN.—VIII.

SECTION XVI.—USE OF THE DEFINITE ARTICLE; PROPER NAMES, ETC. ETC.

The plural of Mann is Männer; except in compounds, where it is generally (in)ig (§ XVI. Note), as: Kaufmann, countryman; Kanzler, countrypeople. Zimmermann, carpenter; Zimmer, carpenters. Haushaupt, captain; Hauptric, captains. Kaufmann, merchant; Kaufleuten, merchants.

Walt corresponds mainly to our word people. Unlike this, however, it has different forms for the two numbers, as: Er französischen ein treuherzlicher Walt; the French are a lovely people. Er ährtigen Schwede, mit an Walt lebt; the princes revel, and the people suffer. Alle Walt auf Erden, I Nächte xvin; all the nations of the earth, Genesis xviii. 18.

The word one, as a pronoun, is, in English, often inserted after an adjective, to avoid the repetition of the noun; in German, however, the adjective is in such a case left alone, as: Er hat einen guten Sinn, und ich habe einen Geschmack; he has a good head, and I have a bad (one). Er hat gute Sitten, und er hat Geschmack; I have good habits, and he has bad (ones). Er hat guten Sinn, und ich habe Geschmack, he has good wine, and I have bad (wine).

The adjective and participle preceded by an article are often used substantively, as well in the singular as in the plural, as: Der Schneider (Sect. IX. 2) ist glücklich; the contented (man) is happy. Der Schreiber ist glücklich; the contented (woman) is happy. Die Schreiberin ist glücklich; the contented (man) is happy. Der Schreiberin, die Schreiber, the dying (man), the dying (woman). Die Schreiberin; the living.

1. Adjectives in German are often, by means of the definite article, converted into abstract nouns, as: Der ärmste der Schreiber: he adores the beautiful.

2. The use of the definite article before nouns, taken in a general sense, is much more frequent than in English, as: Der Tiger ist schön; the tiger is agile. Der Diamant ist ein Edelstein; the diamond is a precious stone. Das Bild ist ein edles Gemälde; (the) gold is a precious metal. Der Film ist ein Medium; the air is an element. Der Sänger ist ein Künstler; (the) water is an element. Der Dichter ist unendlich; the soul is immortal. Der Künstler ist ein Schöpfer; (the) man is mortal. Die Zukunft ist ein Vater; (the) idleness is a vice.

The plural is used in the same manner, as: Die Dichter sind schön; (the) tigers are agile.

3. The definite article is sometimes used instead of the possessive pronouns, as: Er hat ein Buch in der Hand; he has a book in the (his) hand. Das Kind ist bei dem Vater; the child is with the (its) father.

4. Proper names and titles are often preceded by the definite article, as: Der Kaiser von Schweden, where is (the) Henry? Der Kaiser von Schweden, the Emperor Henry. Der König von Schweden, (the) King Henry.

The definite article likewise commonly precedes the adjective qualifying a proper name, as: Der schöne Peter; the beautiful Helen. Der arme Paul; (the) poor Richard.

The article is also generally used before the word Schulen, Schule, School, School teacher, etc., as: Ist er in der Schule? he is (in) at (the) school. Ist er in der Schule, he is (in) at (the) church. Ist er auf
LESSONS IN DRAWING.

We cannot urge too strongly on our pupils the necessity of going to work carefully and deliberately. Consider well what you have to do before you begin. Endeavour to make no line or touch that is not to the purpose. If you cannot satisfy yourself on the first trial, be not too restless, try again, and again. Recall to mind the errors you made in the first attempts, which you should keep by you, that you may often refer to them. In your next trial you will do better. You will have advanced a certain step, and onward will be your progress, as surely as you persevere. Never fatigue yourself over your drawing. The moment you work without a will it should be laid aside.

And now—and this is a point of the greatest importance to the learner—most must forth with, he who is working with us by means of these lessons, to endeavor to acquire a good position when drawing. In Fig. 35 the proper position of the paper on which you are drawing, and the copy which you are endeavouring to imitate, is clearly shown. Your paper should be placed before you on a desk, with a slight inclination of about two or three inches in a foot, or on a flat and perfectly level piece of board, to which it may be secured by flat-headed drawing-pins, and which may be supported at the proper inclination on a book or a pile of books, as at b. The drawing which you are copying should be supported as at a, by a light easel or frame with a leg, fastened by a hinge to the upper part of it, by which the inclination of the frame may be regulated at pleasure.

The position in which you sit should be perfectly easy, and in no way painful to the chest. There is no necessity for leaning.

* Metam is the same as the French Madame (my lady), but never spelt with the e as is the French word.

† Remember that in German "the captain" must be rendered "der Mr. Captain," etc.
ing over your work in an ungraceful or painful attitude. The eye should be as nearly as possible directly opposite the centre of your drawing, and the inclination of your paper and copy should be such that a line passing from your eye to either paper or copy, when you are at work, should pass through the centre of the copy at a in Fig. 35, or the centre of the drawing at b, as nearly as possible at right angles to their respective planes.

It is unnecessary to give directions as to the manner of holding your pencil. Your own judgment must direct you in a great measure as to that. It matters little, so that you feel the instrument fit your fingers easily. If proper attention has been bestowed upon the primary instructions that we have given, you have already learned the importance of depending not solely on your fingers, but also on the action of the wrist and arm. The hand should not be suffered to rest upon the paper upon which you are drawing, if it can be avoided, but have a spare piece to lay under it while you are at work. It will serve another purpose—to try the points of your pencils upon, or the points of your pens, crayons, and brushes when not admissible to draw with pen and ink, or to paint in water-colours. Begin at once to preserve your drawings in a portfolio. Even when you have failed in many attempts you should keep them by you. Destroy nothing that you do, and you will soon learn to do nothing that you would desire to destroy. Preserve order in the disposition of all your materials: much time and vexation may be saved by the pupil to look at Fig. 38: ke will observe that the angle of the building, a b, is nearest the eye, whilst the side a b c d retires one way to v p 1, and the side a b f e retires another way to v p 2. Now, when he sees this he will probably say, "Yes, these sides certainly do retire as so stated, but I should like to see informed why these two vanishing points are placed where they are. Is there any rule for so placing them? or is it merely a matter of choice?—in short, can I place them anywhere I please?" These are very fair questions, and we will endeavour to answer them. Of course, the house (Fig. 38) must have a ground-plan, which will be placed with regard to the picture plane as it is shown in Fig. 39, the angle towards us, and the sides retiring. Now let us suppose we are standing at s p (station point), from which place we are to make our drawing; from this place we determine our vanishing points, and the distance these vanishing points are apart will determine whether we are near or at a greater distance from the object. Then to
determine our vanishing points, we must give the following geometrical rule:—"Draw a line from the station point, parallel to the ground plan as far as the plane of the picture, from which draw a perpendicular line to the horizontal line (line of sight); this will give the vanishing point." Let us look at Fig. 39, we shall find that the line a b is drawn from s v 1 to the picture plane, parallel to one of the retiring lines of the ground plan, c d, which gives v p 1; also a c is drawn parallel to f c, the other retiring line of the ground plan which gives us v p 2. But if the station point had been further off, as at s v 2, the line a b would have been from s v 2 to h; therefore at h would then be found v p 1; so on the other side the v p 2 would have been at t. Suppose the station point were placed at s v 3, then the vanishing points would be nearer each other. So it will be seen, the further the vanishing points are apart, the further we are from the object; and the nearer we are to the object the nearer together are the vanishing points. Our object, points: for instance, let him trace out the lines a c and b f in Fig. 33, they will meet at v p 2; and the lines on the other side, a c and b d, will meet at v p 1. In an engraving, the vanishing points for all horizontal retiring lines may be found in this way, and they will determine also the line of sight which runs through these points. If he discovers that these horizontal retiring lines do not meet at the same point, it will be because they are not parallel retiring lines; that is, the objects themselves are not placed in a parallel position with each other. This leads to another observation connected with this last remark; if there are fifty retiring lines, and all parallel, there will be only one vanishing point for them all; but if amongst these fifty there are not two parallel, there will be fifty vanishing points. As the pupil, we hope, will clearly comprehend this interesting feature in perspective drawing, he may apply the rule when he has an engraving before him. We know that the rectangular tops and bottoms of windows and doors are horizontal, and

then, in giving this little explanation, is to account for placing the vanishing points. To carry this rule out by producing a drawing of the elevation of the house from the ground plan, will be considered hereafter.

By this explanation we only undertake to satisfy our pupils that we can make a correct drawing of the building if the vanishing point was at h, b, or t; only observe, that if we approached too near, the angle of sight, w, would be too large, so much so as probably to become as great, or greater than 60°.

(See p. 73.) While writing these remarks on Angular Perspective, we found that it was absolutely necessary to give these geometrical reasons for the positions of the vanishing points, because as many lines in a picture retire and vanish elsewhere than at the point of sight, we felt bound to give these reasons, which need not cause the pupil to imagine there is anything to discourage him, nor of finding them in the picture, as well as when drawing from Nature, is very simple. Here, then, the pupil may ask, "If I have a drawing before me to copy, in which the vanishing points are not marked, how shall I find them?" Let us suppose the copy is an engraving (and the vanishing points are never shown in engravings), let him trace out the retiring lines in the picture—we think there can be no difficulty in recognising them—these lines traced out will give the vanishing

parallel with the caves and horizontal ridges of roofs, the courses of the bricks, etc. Let him trace out as many of these lines as he can, if he understands they are intended, as in the object itself, to go off in the same direction, and he will find them meet at the same vanishing point, and soon discover whether the engraving is correct or not in the grammar. The uneducated eye may not detect small faults in the general appearance of the engraving, and thousands of drawings and paintings by really clever artists pass muster, and are admired, although they may be full of mistakes; just as in speaking, the grammatical errors habitually made by uneducated men are not even known to be such among themselves, but an educated man will notice them, although he may not remark upon them. After the pupil has discovered the vanishing point for the horizontal retiring lines in the engraving, he will then have found the position of the line of sight, then, in making his picture, he must begin by placing this v p on his paper, and proceed by marking in the nearest line to the vanishing point, and so on, line after line, as he has before said. We know from experience the great advantage of this method, and have frequently remarked the rapid progress that has been made by those who have feared that drawing was an art too difficult for them to attain.

The method of drawing Fig. 33 will be as follows:—Draw the
LESSONS IN ENGLISH.—V.

SAXON ELEMENT OF THE ENGLISH LANGUAGE.

Having shown how the constituents of the English language enter into and form simple propositions, I now speak of sentences in relation to the laws of their constitution, and exhibit the manner in which simple sentences may be expanded into compound sentences, and the elements may be reduced to simple ones. But there is much, very much, to be learnt respecting the subject-matter already set forth. For instance, every separate part of speech has to be more minutely investigated. Besides, there are general facts which more or less bear on all the constituent elements of speech. These facts must be set forth, and this investigation must be gone through, before we treat of the formation of compound sentences, because in proceeding in this way I shall conduct the learner onward by easier steps.

Before, then, we formally set about building the house, it may be desirable to consider the materials which we shall have to employ, in order that we may become familiar with their qualities and character. Let us then take what is commonly called "The Lord's Prayer," and look a little closely into the words of which it is made up.

Our Father which art in heaven, hallowed be thy name. Thy kingdom come, Thy will be done, on earth as it is in heaven. Give us this day our daily bread. And forgive us our debts, as we forgive our debtors. And lead us not into temptation; but deliver us from evil. For thine is the kingdom, and the power, and the glory, for ever. Amen.—Matt. vi. 9–13.

Now at the first glance I see that here there are words of diverse origin. Heavenly I recognize as of Saxon birth; Father I know to be a Latin word slightly altered; and amen is the Hebrew term in English letters. Hence, I am led to see that if I would know my mother-tongue I must study it in relation to the diverse materials which enter into its composition.

You are not yet sufficiently advanced to assign each word in the preceding quotation to the family to which it belongs in the great community of languages. I must, therefore, be satisfied at present with a somewhat rough division of these words into the three classes already indicated—namely, words of Saxon origin, words of Latin origin, and words derived from other sources. In all, there are in the Lord's Prayer sixty-six words. Of these sixty-six only eight are from sources that are not Latin. More than seven-eighths of the words in the Lord's Prayer come from the Saxon. You may now judge to what extent the Saxon prevailed in the English tongue. Of the eight words that are not Saxon, six are from the Latin, one from the French, and one from the Hebrew, as shown in this very short list:

Latin. — Name, debts, debtors, temptation, deliver, glory.
French. — Power.
Hebrew. — Amen.

The one French word might be added to the Latin line, for deliver, though it comes into the English directly from the French, is Latin by extraction.

This analysis, however, shows that the materials of the English language may be arranged into two great classes; namely, the Saxon and the Latin. These classes have reference to the origin of the words.

Another view may direct our attention to the condition in which the words are. Some of the words are very short, others are somewhat long. Our has only three letters; kingdom has seven; and temptation has ten letters. Our is a word of one syllable; kingdom is a word of two syllables; and temptation is a word of three syllables. Observing that all the words are Saxon, except the eight specified above, you will see that the Saxon words for the most part are short words, and words of one syllable. Of words, however, having more than one syllable, two kinds must be noticed. Take, as an instance, father and kingdom. Now father, though consisting of two syllables, is a simple word; while kingdom is a compound word. Hence arises another division of words, whether of Saxon or of Latin origin, are either—1, simple; or 2, compound.
the most frequent termination of our adverbs (by), are all Anglo-Saxon. The nouns, too, derived from Latin and Greek, receive the Anglo-Saxon terminations of the genitive and the plural; while the preterites and participles of verbs derived from the same sources, take the Anglo-Saxon inflections. As to the parts of speech, those which occur most frequently in the worls of modern English are also the most expressive. Such are our articles and adjectives generally, as a, an, the; thus, that, those, many, few, some, one, none; the adjectives whose comparative and superlatives are irregularly formed, and which in every language are amongst the most ancient, comprehensive in meaning, and extensively used; the separate words more and most by which we as often express the forms of comparison as by distinct terminations; all our pronouns, personal, possessive, demonstrative, and relative, are amongst the most expressive words of our so-called irregular verbs, including all the auxiliaries have, be, shall, will, may, can, must; all the adverbs most frequently employed; and the prepositions and conjunctions almost without exception.

2. The names of the greater part of the objects of sense—in other words, the terms which occur most frequently in discourse, or which recall the most vivid conceptions—are Anglo-Saxon. Thus, for example, the names of the most striking objects in visible nature, of the chief agencies at work there, of the changes which pass over it, are Anglo-Saxon. This language has given names to the heavenly bodies, sun, moon, stars; to three out of the four elements, earth, fire, water; three out of the four seasons, spring, summer, winter; the natural divisions of time, as day, night, morning, evening, twilight, noon, midday, midnight, sunrise, sunset; some of which are amongst the most poetical associations of the constituent parts or visible qualities for the names of light, heat, cold, frost, rain, snow, hail, steel, thunder, lightning; as well as of almost all those objects which form the component parts of the beautiful in external scenery, as sea and land, hill and dale, wood and stream. The same may be said of all those productions of the animal and vegetable kingdoms which form the most frequent subjects of observation or discourse, or which are invested with the most pleasing and poetical associations, of the constituent parts or visible qualities of organised or unorganised beings, especially of the members of the human body and of the larger animals. Anglo-Saxon has also furnished us with that numerous and always vivid class of words, which denote the cries, postures, and motions of animated existence. These are amongst the most energetic that any language can supply; for the same reason that words expressive of individual objects are always stronger than general terms. It is a sound of universal eloquence, a break in the current of universal rhetoric, that the more abstract the term is, the less vivid; that it was a special mark of the more vivid is the impression. Now, almost all the words which are expressive of these specialities of posture and bodily action, are the purest Saxon; such as, to sit, stand, lie, run, walk, leap, stagger, slip, slide, stride, glide, yawn, gaze, wink, thrust, fly, swim, creep, crawl, spring, spurn. If all this be true, we need not be surprised at the fact that, in the descriptions of external Nature, whether by prose writers or by poets, the most energetic and graphic terms are almost universally Anglo-Saxon. It is a little matter of wonder that in those simple narratives in which genius and wisdom attempt the most difficult of all tasks—that of teaching philosophy without the forms of it, and of exhibiting general truths in facts and examples, leaving the inferences to be drawn by the instinctive sagacity of human nature—the terms are often, almost without exception, Anglo-Saxon. It is thus perhaps with the narratives of the Old Testament—the history of Joseph—indeed, with the narrative part of every history; perhaps, the only compositions in the world that can be translated without losing much in the process, and which, into whatever language translated, at once assume a most idiomatic dress. The same remark holds good to a certain extent of "Robinson Crusoe," "The Vicar of Wakefield," and other works in which the bulk of the words are pure Anglo-Saxon.

3. It is from this language we derive the words which are expressive of a larger, and more complicated, and the strongest and most powerful feelings of our nature, and which are, consequently, invested with our oldest and most complicated associations; their very sound is often a spell for the orator and the poet to conjure with. It is this language which has given us our names for husband, wife, brother, sister, son, daughter, child, home, kindred, friends. It is this also which has furnished us with the greater part of those onomatopoeia and other suggestive expressions, by which we represent to the imagination, and that in a simple word, the reciprocal duties and enjoyments of hospitality, friendship, or love. Such are heart, roof, freind. The chief emotions, too, of which we are susceptible, are expressed in the same language, as love, hope, fear, sorrow, shame; and the names of most of the purest, and the most general of our passions, as well as in common life, the outward signs by which emotion is indicated, are almost all Anglo-Saxon; such are fear, smile, blush, weep, sigh, groan.

4. Most of those objects about which the practical reason of man is employed in common life, receive their names from the Anglo-Saxon. It is the language for the most part of business, of the counting-house, the shop, the market, the street, the farm. The names of the commonest of these, are nearly all our national proverbs, in which, it is truly said, so much of the practical wisdom of a nation resides, and which constitute the manual or rude-mecum ("go with me"); which is the pocket-book, or note-book of "honed-hailed philosophy."

5. A large proportion (and that always the strongest) of the language of invective, humour, satire, and colloquial pleasantness, is Anglo-Saxon; also all the terms and phrases by which we most commonly express contempt, and triumph.

6. It may be stated, as a general truth, that while our most abstract and general terms are derived from the Latin, those which denote the special varieties of objects, qualities, and words of action, are derived from the Anglo-Saxon. Thus, move and motion, very general terms, are of Latin origin; but those terms which express nice varieties of bodily action, are Anglo-Saxon. Bound is perhaps Latin, though it may be Anglo-Saxon; but bound, tie, steal, are Anglo-Saxon. Animal is Latin; but man, cow, sheep, calf, cat, are Anglo-Saxon. Number is immediately French, remotely Latin; but all our cardinal and ordinal numbers are Anglo-Saxon.

With these facts before us we need not wonder that the orator and the poet are recommended to cultivate assiduously the Anglo-Saxon portion of the language. "The common people," it is said, "cannot understand words which are of classical origin." And this is a good reason for the advice. But it is not the only reason. The great object of the orator and the poet is to make their meaning felt; to stimulate the imagination, and thence excite emotion. They therefore seek the most appropriate and most expressive terms. And this is especially the case with all those words which denote actions, to which the word <enonyms> (two Latin words meaning "other things being equal") most vividly recall the objects or feelings they represent, are those which have been earliest, longest, and most frequently used, which are consequently covered with the strongest associations, the sign and the thing signified having become so inseparably blended that the one is never suggested without the other. And thus it is that of two synonyms (words having nearly the same meaning) derived respectively from Latin and the Anglo-Saxon, both equally well understood, the one shall impart the most vivid, and the other the most tame conception of the meaning. It is precisely for the same reason that the feelings with which we read beautiful passages in foreign poets are so faint and languid, compared with those which are exerted by parallel passages in Shakespeare, Milton, or Burns.

When our readers meet with any word that they do not understand in the course of a discursiveness, and practice for them to write it down at once and turn to an English dictionary for its meaning. If possible, the dictionary used should be an "Etymological Dictionary," that is, one which shows the sources, whether Latin, Greek, French, or otherwise, from which English words are derived. We append an example of the plan that may be adopted in tabulating words that are difficult to understand at first sight in the following, which are selected from this page:

**Word.**

**Comprehensive.**

**Meaning.**

**Description.**

**Latin,** cos, with; *prehensum,* caught, or laid hold of.

**Greek,** grapheo, I write.

**Stud.** I pricked or good.

**Narrative.** I relate.
LESSONS IN GEOGRAPHY.—V.

THE GEOGRAPHICAL DISCOVERIES OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

The new information gained by the Old World through the discovery of America, and the voyage of Vasco de Gama, required a long period for its regulation and systematic arrangement. The ignorance which still prevailed among the ablest navigators and geographers, at the end of the fifteenth century, was such that when Christopher Columbus, in his third voyage, discovered the mainland of America, the violence of the billows, and the agitation of the sea at the mouth of the Orinoco, led him to believe that he was in the highest part of the globe, and consequently in the region of Paradise! But the discovery of the New World revived and re-invigorated the desire for voyages to the north, and set them on a better footing. It appears, indeed, that previous to his grand discovery, Columbus had himself performed a voyage in the northern seas, and had even visited Iceland. This voyage, according to a note of the event found in his own handwriting, took place in 1497.

John and Sebastian Cabot, who were employed in the expedition by Henry VII. of England, discovered Labrador, as we have shown in our last lesson, and are said to have visited the island of Newfound-
land, and sailed along a considerable extent of the coast of North America. France, desirous of having share of the spoil, fitted out an expedition under Jacques Cartier, who sailed from Dieppe in 1534; discovered Canada, and took possession of it in the name of his government. The grand object of these voyages in the northern seas, was the discovery of a north-west passage to India. The question of a communication between the two great oceans at the north, which were the mind of geographers and navigators at that period, as much as it has done in the present century. How singular that this infatuation has so much occupied the public mind! Even on the supposition that such a passage actually existed, and had been actually discovered, and put in evidence by the reappearance of Franklin in Europe from the East, of what use would such a frightful and dangerous passage be to the mercantile interests of the world? Surely it would still be better to pursue the ordinary-route to India, either by sea or land, than to run the danger and risk of losing ships, property, and men, by sailing through floating masses of ice, unknown rocks, and uninhabited and inhospitable coasts.

The voyage of Willoughby in 1553, although it ended in a sad shipwreck on the eastern coast of Lapland, added to geographical knowledge, by the discovery of Nova Zembla. Frobisher, under Queen Elizabeth, was more fortunate; his three voyages, performed between 1576 and 1578, ended in some discoveries, among which was the Strait which bears his name, situated between Hudson Strait and Cumberland Sound. John Davis, in the same reign, in his exploratory voyages performed in 1585, 1586, and 1587, threw a clearer light on the geography of the circumpolar regions of the north. In 1596 the Dutch discovered Spitzbergen; and eleven years afterwards it was re-discovered by Hudson, who made four voyages, from 1607 to 1611, in order to find the passage to India either across the North Pole or by the north-west route. In the fourth, he discovered the bay which bears his name. In the following year Thomas Button, penetrating into this northern Mediterranean Sea, reached the mouth of the river Nelson. William Baffin enjoyed still greater success. In his second exploratory voyage, in 1616, he successively discovered and gave name to the following places in the arctic regions—Cape Dudley Digges, in latitude 78° 25′ N. ; Whaler's Bay ; The Bay of Whales, in latitude 77° 30′ N. ; Hakluyt Island ; Smith Bay, so called from Sir Thomas Smith, in latitude 78° N. ; The Capey Islands, and Lancaster Sound. In this expedition, he explored the bay which has immortalized his name, and determined the geographical position of a great number of points.

During the sixteenth century, while discoveries were multiplied and expeditions became fruitful and productive, geographical science still remained in its infantile state, and as yet received little advantage from their progress. Light was breaking in upon all sides, but this science was immersed in darkness. A glance at the curious maps which preceded the glorious era of the Reformation, will show how profound was the ignorance of the geographers of that period. Our readers will find a good specimen of one of these maps in the face-simile of the map of Africa belonging to the pilot of Christopher Columbus. In such maps of the world, the principal cities are denoted by little houses or castles. Lisbon occupies the centre of the globe; the supposed site of Paradise is surrounded with an impenetrable enclosure of verdant foliage; and the geographical illustrations are the most whimsical that can be imagined. The winds are represented by fabulous divinities, as sitting all round the world upon leathern bottles, whose sides they are pressing to force out the air; Western Africa is made to terminate at Cape Nain, then at Cape Bojador; the celebrated statue of the Canaries is seen flourishing his club at the top of a high tower; the coasts of the adjacent continent are lengthened in proportion to the discoveries of the Portuguese; Abyssinia figures with its monarch Prester John, having on his head a brilliant mitre; the other kingdoms of Africa are denoted by their kings in crowns, crowned with gold and silver mythology; this combination, long unknown, is represented as peopled with strange animals and black men; there are groups of giraffes and elephants; Portuguese camps are indicated by coloured tents; and light cavalry, splendidly capri-
soned, are making the tour of this myste-
rious country. Lastly, the specimens of cartographical art are the faithful expression of the science of the Middle Ages. The pilot's map, already alluded to, will furnish the reader with examples of the proceeding details.

The period preceding the Reformation was the era of legendary and popular tales, and the story of the fabulous age as well as its antiquity; only the fantastic notions of the Middle Ages were less marked by ingenuity and variety. Prester John has been mentioned. This was one of their most widely-spread myths. The name of this personage first appeared about the middle of the twelfth century. It was the general and popular belief that there existed a fabulous monarch, dwelling in a world of prodigies, over which he reigned as omnipotent master!

The vain tradition of El Dorado, or the Land of Gold, was no less believed at the period under review. This fiction, which travelled to America under the name which has given celebrity to it, in the first half of the sixteenth century, was applied to a country that previously existed only in the imagination of the inhabitants of Europe. In the narrative of the so-called El Dorado, which was first placed in the New World, in the country of Santa Fé, in those regions of South America watered by the mighty streams of the Amazonas, and which were scarcely known to Europeans. The name El Dorado sufficiently indicates the nature of the imaginary country to which it was applied. It was the country of riches; there were to be seen cities glittering with gold; there, so common was this metal, that a man was said even in the most common household utensils. How unfortunate for ages were the adventurers in search of this golden dream! How many victims have been deceived by this dangerous tradition!
Is this El Dorado to be at last realised in our own day? Are California and Australia to give actual existence to the fables of the Middle Ages? Modern appliances are great; chemistry and geology have done wonders; and human industry has encountered what at the beginning of the present century were deemed impossibilities. But let us not be too sanguine now as to the realities of our colonial possessions. Even gold itself may become a drug; and how sad that state of society would be when this most precious of metals, having made all equally rich, would fail to purchase that human labour from which our comforts flow!

There has been also the fable of the kingdom of Paëtit, a sort of counterpart of El Dorado, another garden of the Hesperides, where inexhaustible treasures awaited the happy mortal sufficiently well instructed to follow the track. This kingdom or empire was supposed to be situated in the fertile plains of the Maranon, and to have been founded by the Incas of Peru, whose descendants knew how to conceal them from the view of the Spaniards by powerful enchantments! By degrees this myth was embellished with a thousand wonders, and the Catholic missionaries themselves contributed not a little to propagate the conviction that this imaginary kingdom was a reality. This state of things continued even in the second half of the seventeenth century. The close of the Middle Ages, therefore, had its mythical or fabulous geography, notwithstanding the real and ultimate progress made by the voyages of discovery. True science had not yet made its appearance.

The name "El Dorado" is intimately associated with the memory of the Devonshire knight, Sir Walter Raleigh, who introduced the potato and tobacco into England in the reign of Queen Elizabeth. Raleigh was one of her most favourite courtiers, and took an active part in the destruction of the Spanish Armada in 1588. From this time until the death of Elizabeth he was employed in various expeditions against the Spaniards, and in 1595 he sailed to Guiana, and destroyed the capital of Trinidad. The island of Trinidad lies like a huge breakwater across the mouth of the Gulf of Paria, and in the south-west corner of this gulf is the Bay of Guanipa, into which flows the river of the Red Cross, the stream that bounds the western side of the great delta of the Orinoco. Leaving his vessel in the Bay of Guanipa, Raleigh made his way in a canoe up this river as far as the main channel of the Orinoco, and at last reached the point where it is joined by the river Caroni. In the angle formed by the east bank of the Caroni and the south bank of the Orinoco, at the extremity of the Mountains of Emeria, a mountain range stretching from east to west, from British Guiana into the interior, lies a hilly tract of country, now the Venezuelan province of Arromais, and here Sir Walter Raleigh placed his "Land of Gold," and declared that gold mines existed there in which more wealth lay buried than in any other part of the world. In 1615 he sailed to Guiana once more, in an expedition to reach these mines. The expedition was a failure; he returned home to meet his fate; and men said that the mines and their contents existed only in Raleigh's imagination. But subsequent discoveries have proved that Raleigh was right in saying that there was gold in Guiana, if not in such immense quantities as he supposed, for, at the present time, in the pro-
vience of Arromaisy, the very spot where Raleigh placed his "El Dorado," not far from the town of Puerto, on the Orinoco, is a colony of 10,000 Germans, who are chiefly employed in digging gold, and who send large quantities yearly to Paris, on the coast, for exportation to Europe.

The year 1616, having closed with the two greatest geographical events of modern times, the discovery of the New World, and the circumnavigation of the African continent, the sixteenth century beheld the extension and success of European enterprise in distant seas. The Pacific Ocean, which Magellan had opened up to the fleets of Christendom, was navigated and explored by daring mariners. Sorens discovered the Maldives Islands; another Portuguese, the Moluccas; Willem Barents proposed to make part of the Philippine Islands; Juan Fernandez, the small island that bears his name, and celebrated as the foundation of the history of "Robinson Crusoe." To the latter, also, has been ascribed the discovery of New Zealand. In 1567 Alvaro de Mendana first landed on the Solomon Isles, the Isle of Santa Cruz, and others. Nearly thirty years later the same navigator discovered the Marquesas Islands, and the archipelago which was afterwards called by Cartier the Queen Charlotte's Islands. Francis Drake, the Dutchman Van Noort; Quiros, who discovered Tahiti, and the Archipelago of the New Hebrides (the Great Cyclades of Bougainville); Torres, who discovered New Guinea, and the strait which separates this large island from Australia—all began to clear up the navigation of the Pacific Ocean. In the interval, Schauls de Weort, fellow-navigator with Van Noort, had recognised the Moluccas or Falkland Islands, discovered by John Davis. Two of his countrymen, Lemaire and Schouten, discovered, in 1615, part of the island of Tierra del Fuego, and Cape Horn, which forms the southern extremity of the American continent. A new passage was thenceforward open to navigators bound for the Pacific Ocean, who were desirous of avoiding the difficulties and storms which were to be dreaded in the Strait of Magellan. The honour of having first landed on New Zealand is claimed by the Dutch, Spanish, and English. Dirk Hartog, who attached to the part of this continent, which he had discovered, the name of the vessel he commanded, by calling it Endracht's Land. Zöchlen, in 1813; Edels, in 1819; De Nuyts, in 1827; and after these De Witt, Carpenter, and Pelsart completed this grand discovery.

It is not positively known whether the Spanish and the Portuguese had not visited the coasts of Australia nearly a century before the Dutch, as two chartographical documents of that date would lead us to believe. Neither is it more certain that the Portuguese Meneses and the Spaniard Sauavedra had discovered New Guinea, the one in 1527, and the other in the following year. The memorable voyage of Abel Tasman produced rapid and striking progress in the geography of Oceania, or Australasia and Polynesia. This able navigator, sailing from Batavia in 1642, discovered Van Diemen's Land, now called, after its discoverer, Tasmania. The circumnavigation of Australia was then completed, and the assurance was gained that this continent did not extend indefinitely towards the south pole. Shortly after, the expedition landed on New Zealand; then it discovered the Friendly Islands, and that of Tongataboo. Lastly, after a successful expedition of nine months from the latter island to the Gilbert Islands, and discovered several islands to the north of it and of the island of New Britain, the Dutch refitted their vessels in the port of Batavia, the capital of Java. It was only in 1865 that the name of Nova Hollandia, or New Holland, was given to the western part of Australia by a decree of the States-General of the parent country.

LESSONS IN LATIN.—V.

NOUNS—CONCORD OF SUBSTANTIVE AND ADJECTIVE—CASES OF NOUNS—CASE-ENDINGS.

By the statements and explanations given in our last lesson, you are taught that in both nouns and adjectives, case, number, and gender are in Latin indicated by divers terminations. It is an easy inference that if a change is made to turn a singular noun into a plural form, a corresponding change must be made in the adjective which accompanies it; that is to say, if the noun is plural, the adjective must be singular; if the noun is singular, the adjective must be singular; thus, bonus iuuer becomes in the plural bonus iuueri. In the ordinary phrasemology of Latin gram- mars, this correspondence in form between the noun and the adjective is called concord. Here you are to consider the first concord to require that the noun and adjective should agree in number, that is, both must in form be either singular or plural, and not one singular while the other is plural. The second concord requires the noun and the adjective to be in the same gender, so that if you have to say good bridgewarm, you use the words, bonus sponsus, but if you wish to speak of a good bride, you change the us into a, and say bona sponsa. A third concord is found in agreement in case between the adjective and noun, so that if the noun is in the nominative case, the adjective must be also; if the noun is in the objective case, the adjective in the accusative case, in the same case must the adjective be. Putting these three instances of concord or agreement together, we say that—

Adjectives must agree with their substantives in gender, number, and case.

This general statement we call a rule; and all such general statements or rules you should commit to memory. Case, you see, is denoted by a change at the end of a noun or adjective. In our English nouns we have something of a similar nature. In the words, father's book, father's is in what is called the possessive case. The condition of the noun is called the possessive case, because possession is thereby signified. But why is it called case? Case is a Latin term, signifying fall. And as the different terminations are gone down successively, as you will shortly learn by experience—gone down or declined one after another, we will call the last letter, or mark, the case. Thus, in father's book, the nominative case of the noun is the case, or cases, that is, falls, that is, falls of the voice. The cases then in Latin are the changes which the noun undergoes conformably to variations in the meaning. Thus, as in English father becomes father's when used with book, as father's book, so in Latin, pater (father) becomes patris, when used in dependence on libro, book. Notice that I say, "when used in dependence on," for the possessive (or genitive) case does not denote connection or dependence. In father's book, the form father's is necessitated by the dependence of the word on book. Such dependence is denoted in the diction of Latin grammars by the word govern-ment: thus, we should say that patris was governed in the genitive case by the word libro. Here again arises a general statement or rule; namely, that—

One noun governs another in the genitive case.

This rule simply means that of two nouns which are connected with each other by a relation of dependence, the noun which is dependent on the other noun must be put in the genitive (or possessive) case.

In Latin there are six cases: 1, the nominative; 2, the genitive; 3, the dative; 4, the accusative; 5, the vocative; 6, the ablative. These six cases are different forms of the noun, whereby are indicated differences of meaning. The case to which a word belongs corresponds to the subject, and the accusative corresponds to the object, of a proposition. You may find the nominative by asking the question who? or what? You may find the accusative by asking the question whom? or what? You may ascertain the genitive by asking the question whose? You may ascertain the dative by asking the question for whom? or for what? You may ascertain the ablative by asking the question by whom? or by what? The vocative is indicated by the word, O father! and is employed in addresses or invitations. In strictness of speech the nominative can hardly be termed a case, because as the nouns are commonly given in dictionaries, it seems to have no fall or case. The nominative, however, is a case, for it is not the primitive state of the noun. The primitive state of the noun, as the primitive state of the verb, is found in the stem. Thus, the stem or form on which the cases of pater are formed is the nominative singular. The stem patr is the nominative case.

Requesting you to call these changes in the terminations of nouns and adjectives case-endings, I add that these case-endings are to be termed the Latin signs of the cases. For these Latin signs there are corresponding English signs; the English signs give (in part) the meaning of the Latin signs. Thus, s is the English sign and meaning of the Latin genitive; t or th is the English sign and meaning of the Latin dative; o by, with, the English sign and meaning of the Latin ablative o. Now as in Latin the o of the dative is not in form distinguished
from the of the ablative case, some difficulty arises in learning Latin. This difficulty grows by practice, and eventually disappears, for the sense points out in each instance what it is that is to be found; and so the case is intended by the author. Something similar exists in English; for since, as I have shown you previously, the nominative and the objective, or the subject and the object, are in our nouns the same in form, we learn only by the sense which of the two is meant. With us, however, there is no difficulty, because the sense is determined by the position, for in English, in general, the subject precedes the object, or follows, the verb. In Latin, however, there is no change in becoming the object, and inasmuch as no proposition goes before either subject or object, so have we no natural English sign for the Latin nominative or the Latin accusative, and consequently are forced to indicate the former by the word subject, and the latter by the word object. Finally, the English sign of the vocative is O; the corresponding Latin sign is in some nouns e, in others the form in the vocative is the same as the form in the nominative.

Having given you some explanations, I shall use once the case-endings of a noun in Latin, with the corresponding English signs:

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<th>Latin</th>
<th>English</th>
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<tbody>
<tr>
<td>CASE-ENDINGS</td>
<td>SIGNS.</td>
</tr>
<tr>
<td>Nominative</td>
<td>us</td>
</tr>
<tr>
<td>Genitive</td>
<td>o</td>
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<tr>
<td>Dativo</td>
<td>e</td>
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<tr>
<td>Accusativo</td>
<td>e</td>
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<tr>
<td>Vocativo</td>
<td>o</td>
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<tr>
<td>Ablativo</td>
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You thus see that in Latin the case-endings of the singular are different from the case-endings of the plural. For the sake of comparison, we commonly use a contraction for the names of the cases; thus, N. or Nom. for nominative, G. or Gen. for genitive, and so on with the rest. The case-endings which I have just set before you are not the case-endings of all the Latin nouns. I have given these because they are the most distinct. Others, however, must not be omitted. I will exhibit them to you first in succession, and then in order. In order to do so, I must set before you what are called the declensions. The declensions, or methods in which the falls of the cases take place, are five in number. To express the same thing differently, in order to assist you in understanding what I mean, I add that all the Latin nouns have by grammarians been arranged into five classes. In this classification regard has been had to the termination of the genitive case singular. Thus, in the first declension we find the genitive case of the singular number ends in a diphthong, pronounced like our o; in the second declension the genitive ends in s; in the third, in s; in the fourth, in s: in the fifth, in e, pronounced o-e. These endings are termed the signs of the declensions, and may be thus presented:

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<tr>
<th>Declensions</th>
<th>1st</th>
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<th>3rd</th>
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<td>Signs</td>
<td>o</td>
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The sign of the fourth declension has a circumflex accent (a) over it, in order to distinguish it from other cases, namely, the nominative us, and the accusative us. In the same way, over the ablative case of the first declension, we put a circumflex accent thus, 3, as in feminine, or from a female— in order to distinguish the ablative case or form from the nominative feminine, a female. You may be here informed that adjectives are for the most part declined—that is, form their cases—in the same manner as the nouns which correspond with them in form; for instance, bonus, ending in us, is declined like dominus, which also ends in us; and bona, ending in a, is declined like femina, which also ends in a.

The Latin language is without an article. Neither the definite article the, nor the indefinite article en, is found in Latin. Consequently, we cannot from the form tell whether femina should be translated female, a female, or the female. In this particular there is, in construing or translating from the Latin, no other guide than the sense as it may be gathered from the general import of the sentence or the narrative; and you will also now be aware that female, a female, or the female, are equally to be put into Latin by femina.
The leaping may be practised either from the standing position, or with a previous run of a few paces. In performing the standing leap, let the preliminary movements be as described in the first jumping exercise; at the moment of passing over, throw the head and the arms well forward, and be careful to alight according to the instructions which have been already given.

A short run before the leap gives some impetus to the leaper to attain a greater height. Practise a run of two or three paces at first, and afterwards of six to eight paces, which is quite as much as should be taken. Let the rise into the air take place, as nearly as possible, at a distance from the poles equal to about half the height of the rope from the ground. Practise the upward spring, according to the directions given in our introductory remarks on "Jumping and Leaping," from either the right or the left foot, or from both, until you can leap equally well either way. About four feet high is an average leap; five feet is very good; and for a man to leap his own height is considered the perfection of proficiency in athletic pastime.

**THE LONG LEAP.**

In practising this leap, go gradually, as before, from distances which can be accomplished with ease, to lengths which test all your powers. The distances should be indicated on the ground by chalk marks, or otherwise. Spring, as before, from the balls of the toes, and incline the body forward, but do not jump too high, for this will diminish the distance. At the same time a moderate height will be necessary in the spring, or you will not be able to clear so much ground. In a long leap without a run, eight or ten feet is very good. With a run of about twelve paces, five or six feet more may be accomplished without much difficulty.

The downward leap may be practised with advantage, but a leap from a height of more than six feet should not be attempted by the beginner. The proficient may accomplish ten or twelve feet with safety. In this, as in all other leaps, remember the elementary rule—to alight on the balls of the feet, and to bend the knees on alighting, to break the force of concussion with the ground.

Vaulting is another kind of leap, in which the hands are momentarily rested on some firm object, over which the body passes. Vaulting-horses, or blocks of wood roughly shaped like the body of a horse, are sometimes employed for this purpose; or the same end may be served by a piece of stout timber transversely placed on two supports fixed firmly in the ground. This exercise is of use in enabling the gymnast to clear any obstacle, such as a gate or stile, that he may meet when walking in the country, with ease and quickness.

**LEAPING WITH THE POLE.**

The pole used for this purpose should be of stout but light wood, from seven to ten feet long, and about an inch and a half in thickness. It should be pointed at one end, and the point shod with iron, to secure a firmer hold of the ground. With an implement thus fashioned, both long and high leaps may be accomplished in a light and graceful manner, and without the amount of physical exertion necessary without such an appliance. But proficiency in the exercise requires a knack, which can only be attained by practice.

In the moderate leaps which are best suited to the practice of the beginner, the pole should be held in the manner represented in the illustration (Fig. 11), the left hand being placed below, and the right hand above. The position of the body in this cut is that assumed at the moment before taking the spring; the pole having previously been planted at a convenient distance in front of the leaper. Now rock the right leg once or twice, and, by a spring from the ball of the left foot, impel the body forward beyond the pole to the spot it is desired to reach. In the performance of the leap the body takes the position shown in Fig. 12. It is necessary to the proper execution of the leap that the original starting-point, the spot on which the pole is rested before leaping, and the position which is attained by the leap, should all be in a straight line with each other.

In performing longer leaps, when some degree of familiarity with the use of the pole is acquired, it is desirable to place the hands nearer to each other than is shown in these engravings; the precise height at which the pole should be grasped depending on the leap to be performed, and the amount of assistance required from the pole by the leaper.

High leaps with the pole should be practised with great care, and only in successive gradations from a point that may be leaped by the beginner with ease. They should not be tried, indeed, until the learner is familiar with the use of the pole in the long leap, and has acquired confidence in his own power to employ the implement with advantage.

In the high leaps it is necessary that the pole should be held with both hands higher than the rope or bar it is intended to leap over; and at the moment when the body is passing over the rope, the hold upon the pole must be relinquished, and the pole pushed backward by a slight movement of the uppermost hand, so that it may not fall upon the leaper. A failure of nerve or confidence in passing over the rope will do more than anything else to prevent success in the movement. It is especially needful in these leaps to bend the knees on reaching the ground, as before explained.
In order to fix in the memory yet more distinctly the real structure of the scale, it may be well to notice that it is divisible into two similar sets of four notes, each set including two tones, crowned by a tetrachord. If the replicates of the key-note is included, you will have DoH, Ray, Me, FaH for the first tetrachord, and SoH, La, Te, DoH for the second. These are called disjunct tetrachords, because the tone between FaH and SoH separates them. If the key-note is made the highest note of the one and the lowest of the other tetrachord, SoH, La, Te, DoH, will form the first, and DoH (repeated), Ray, Me, FaH, the second. These are called the conjunct tetrachords, because they are joined in the key-note. Take coins or counters to represent the notes, and arrange them on the table, first with the disjunct, and then with the conjunct tetrachords—thus:

TETRACHORD. TETRACHORD.

* * *

TETRACHORD. TETRACHORD.

* * *

Learn to do this from memory, and, having done it, to name the notes you have arranged. Some scale-makers, beginning upon Ray and ascending to the upper Ray, suppose they have got hold of a different scale, because the tetrachords (semi-tones) are between the second and third and sixth and seventh notes from Ray, while they were between the third and fourth and seventh and eighth from DoH! In the same way, they begin upon Me, and ascending to the upper Me, suppose they have discovered another new scale, with its tetrachords differently placed! And so on, making every note of the scale the beginning of what they strangely fancy to be a new scale! You will be saved from this delusion by simply observing that, whatever note you begin on, the tetrachords are divided by two tones on the one hand, and by three on the other. Then the best appear by your placing the notes in the form of a circle, thus:

Fah * Me * SoH

Lah * DoH * Te

Our pupil will not blame us for having so long drawn his attention to this foundation scale of all music, when he comes to see the importance in his after progress of thus thoroughly comprehending its structure. He will now be prepared to understand the "Modulator, or pointing board for teaching tunes." The middle column represents the seven notes of the scale in their proper order and at their proper distances. The replicates (octave notes) are added, both above and below, with the figures attached to them as already described. It will be seen that, with the exception of the middle octave (eight notes), the initial letters of the sol-fa syllables alone are used. The side columns (which are but repetitions of the same thing at different heights in pitch) and the additional notes given in these columns, namely, Ta, pronounced taw, and Fa, need not be attended to at present. They are only printed here for the sake of completeness. The scale is sometimes called the "common mode" (the common mode in which notes are arranged for a tune), and the word modulate means properly to sing "in mode," or, in other words, to sing correctly "in tune." The use of the modulator are the following:

1. It supplies the learner with a perfect pictorial representation of the notes he is singing, and thus enables him, as he sings and "points," to measure to the eye the exact intervals which the voice is taking. This cannot be done on the staff of five lines, for there is nothing there to indicate pictorially the place of the tetrachords (semi-tones) and it is not easy for the learner to know at all times from that staff what part of the scale he is in—a knowledge which every true singer should carry with him, and which the learner cannot escape possessing if he faithfully and constantly uses the modulator. Let him steadily do this for the next twenty or thirty singing lessons, and he will find that the modulator has become a ready interpreter of the "staff," and a clear, sure, light, guiding him through all the maze of flats and sharps, and clefs and keys, and whatever difficulties may be crowded upon it.

2. It gives to the learner a simple and uniform "language of interval," for DoH being always the key-note, the intervals remain always the same, to whatever pitch the scale may be raised or lowered. Thus, the tetrachords are always between Me FaH, and Te DoH, and the pupil is so accustomed to sing those syllables to that interval, that he would find it difficult to sing them wrongly. This constant use of the syllables in connection always with the same intervals, helps the mind to recall those intervals with great ease. We all acknowledge the power of this mental association of syllable and interval. When we wish to remember some favourite tune, for instance, how frequently do we ask ourselves in the aid of memory "What are the words we usually sing it to?" and immediately that, we think of the words we remember the tune. How is this? It is plain that the first syllables of the hymn or song had so often co-existed in our minds along with the first intervals of the tune, that the one had gained a power to suggest the other. This power of "association," proved to be occasionally so useful, we systematise and make the constant use. Several persons, recently made acquainted with this method of teaching to sing, have written to us in this manner: "I was reckoned a very fair sight-singer before I became acquainted with this method, but I frequently, in preparing for our choral meetings, met with passages which I could not conquer without the help of an instrument. Now, however, simply trace out such passages on the modulator, translate them into this accurate and unchanging language of interval, and then it becomes really difficult to sing them wrongly."

3. It facilitates the practice of teaching by pattern. This is of great importance. The teacher sings, softly and distinctly, a short phrase of the tune to be taught. To this vocal pattern the pupil follows the additional notes (which so far co-existed in our minds along with the first intervals of the tune) and traces the same pattern afterwards. There are two mental processes in learning to sing a note. The first is an effort (if we may so speak) of perception in seeking to appreciate clearly the note to be imitated. The second is an effort of will, commanding the organs of voice to reproduce the notes thus clearly perceived. The "pattern" cultivates each of these distinctly. It stimulates the pupil to a strong mental effort in endeavouring to bring the ear and the voice to do the mind's bidding. In this mental effort alone consists the real work of learning to sing. That method is the best, therefore, which requires the most of it. One hour's training of this kind is far more effective than five spent in singing with a leader. The teacher also, not singing with his pupils, is better able to criticise and patiently correct their
mistakes. The pupil who has to teach himself, with only an occasional pattern from some voice or instrument, must make himself thoroughly perfect in pointing on the modulator, and sing in those tunes in which he has had the advantage of a pattern, and they will help him to the rest. The first sign of intelligence in a learner is that he knows when he sings wrong. Let him always, in that case, go back to the key-note and chord, and "try again." Many persons have taught themselves to sing in this way, often making mistakes of which they were ignorant for a while, but discovering their error and the means of curing those in their efforts to sing some following exercise. A teacher always by our side will, doubtless, save us from many misunderstandings and blunders; but he who cannot enjoy this advantage, may work on steadily and hopefully without one. Let him remember that his first business is to use the modulator so constantly that it shall become "printed" in the eye of memory.

This introduces as our next topic that simple way of writing vocal music which we intend to use as the companion and interpreter of the more difficult and complex "old notation," of which we hope finally to make you master. It is the invention of an excellent and intelligent lady—Miss Glover, of Norwich—and has been modified and adapted to popular purposes by Mr. Curwen, in his "Grammar of Vocal Music," "Tonic-Solfa Edition of the People's Service of Song," and other works. It consists of the "first letters of the solfa syllables, which we have in our hands in learning a tune from the modulator, written down. And if you have used the modulator till you are able to carry on "in your mind's eye," this simple notation answers the purpose of pointing out the notes on that mental scale. But let it be remembered that this notation should never be used apart from a perfect modulator either on paper before the learner, or clearly seen in his mind's eye. When we remember that no teacher can tell his pupil the proper position of seven notes, the effort does not appear a difficult one; yet, so inscrutable is laziness in some people, that we have found many who go on using the solfa syllables to no advantage for years, without taking the trouble to learn this little ten minutes' lesson, which would make those syllables, in connection with the power of association just described, clear interpreters of music to them. You will perceive, then, that these notes of the table, which do not appear to our own pupils as they would to others, only on one horizontal line, but seem, as they sing them, to rise or fall to their proper places in the scale. Some persons have objected to this marking of the notes by the solfa syllables, saying, "If the old notation must be learnt at last, however difficult it is, because it contains all the stores of classical music, then why not begin with that at once? why teach two notations, thereupon?" It is, however, only by this means that we can teach the solfa notation; we have seen children in an infants' school use it before they had learnt to read. It was to them, as we have described it, simply the letters from the modulator "written down." Secondly, because the old notation presents such difficulties to the learner as to make it impossible to teach music in any short time by its means alone. Many of the best systems make use of some simpler notation to interpret the old. Mr. Goll, of Edinburgh, Mr. Waile, and some others, make use of a notation by figures. Dr. Bryce, of Belfast, uses both the figures and the solfa syllables. And we have lately learnt that a sort of solfa notation was printed under the notes with some of the very earliest English psalm-songs, it consisted of the initial letters of the solfa syllables placed under the notes much as we shall use them. Thirdly, because the use of some such marks makes it possible for the learner to get a clear real command of the old. Already, by the method which we are now developing, many children in day-schools, in addition to a large number of adults, have learnt to sing "at sight" from the old notation.

It is of small consequence what syllables are used for this purpose. A great variety have been used at different times. We have chosen the one given above because they are best known, only changing Si into Do for the sake of having the initial letter from Sol. We have given the English spelling of the syllables instead of the Italian, as we have nothing to do with the Italian language in these lessons.

It may be easily noticed that, at certain distances throughout a tune, the voice is delivered with increased distinctness and force. This combination of distinctness and force is called "accent." Close observation will enable you to distinguish three degrees of accent thus produced—the louder (or stronger), the softer (or weaker), and the medium. Listen to a well-tuned tune more closely still, and you will find that the accents recur in regular order, and at equal distances of time. Take care to verify all these assertions by singing some well-known tune yourself, or by listening to another. Then remember that—the distance of time between any accent and the next is called a MeASURE. (It is sometimes inaccurately called a bar.) The distance of time between any accent and the next is called an ALIquot, or equal part, of the measure. It may also be called a "pulse" of the voice. There are four sorts of measure in common use.

The Binary or Two-Pulse Measure consists of two aliquots, one having the louder and the other the softer accent. We use an upright bar to represent the louder accent, and two dots to represent the softer. The binary measure may, therefore, be represented thus:—

\[ \begin{align*}
1 & : 2 \\
1 & : 2 \\
\end{align*} \]

The Trinary or Three-Pulse Measure consists of three aliquots, one of which has the louder and the other two the softer accent. It may be represented thus:

\[ \begin{align*}
1 & : 2 : 3 \\
1 & : 2 : 3 \\
\end{align*} \]

The Quadrinary or Four-Pulse Measure is formed from the binary by changing every alternate louder accent into one of medium force. We represent the medium accent by a shorter bar than that used for the louder accent. This measure may, then, be thus represented:

\[ \begin{align*}
1 & : 2 : 3 : 4 \\
1 & : 2 : 3 : 4 \\
\end{align*} \]

The Senary or Six-Pulse Measure is formed from the trinary by changing every alternate louder accent into a medium accent, and may be represented thus:

\[ \begin{align*}
1 & : 2 : 3 : 4 : 5 : 6 \\
1 & : 2 : 3 : 4 : 5 : 6 \\
\end{align*} \]

You perceive that these measures often begin on the softer or medium accents, but the imperfect measure is always completed at the end of a tune. Much of the delicacy and expressiveness of music depends on this proper recurrence of accent, sometimes called rhythm. By neglect of this a properly beautiful tune is often made dull, heavy, and unmeaning, while careful attention to it will give beauty to some of the plainest melodies. Many of our most popular tunes owe their effect almost entirely to the simple expedient of a regular recurrence of such instruments as the drum and the tambourine. It makes even the regulated step of the soldier and the dancer akin to music. The philosophy of the origin of our sense of rhythm is treated very admirably in the appendix to Dr. Bryce's "Rational Introduction to Music." He shows its connection with the pulsations of the heart, which are multiples of the respirations of the lungs. About the commencement of each expiration of the breath, there is one moment at which the effect, whether muscular or elastic, is stronger than at any other time in the whole breathing. This is most apparent in a person sleeping soundly, when the mechanism of the body, not being controlled by the mind, follows unconscionably its own laws. Between the expiration and inspiration there seems to intervene a pause, during which the lungs are at rest; but during immediately after great bodily exertion—running for instance—this pause disappears, and expiration succeeds inspiration immediately, or with a very brief period of rest. The same happens when the breathing is impeded by disease. Hence, a respiration may be divided into two (Binary) or into three (Trinary) parts. If into three parts they will be—1st expiration, 2nd pause, 3rd inspiration. If into two—1st expiration, 2nd inspiration.

Rhythm in its fullest sense has a wide range and more delicate connection than is exhibited within the boundaries of a single measure. General Thompson (Westminster Review, Oct., 1832), very beautifully describes it thus:—"Whoever has been rocked in a boat upon what in plain prose may be called 'the ocean waves' will have been conscious that besides the petty lurch from which the heeled and stern alternately in a time approaching to the vibrations of a church pulpit, there was
LESSONS IN FRENCH.

SECTION I.—FRENCH PRONUNCIATION (continued).

IV. NAME AND SOUND OF THE CONSONANTS.

52. H, h.—This letter is used in the French language in two ways, usually styled mute and aspirate—a definition perfectly intelligible to natives of France, but not equally so to others, that is, foreigners. Let us explain. When we say h is mute, everyone knows what is meant; but when we say h is aspirate in the French language, we do not mean that it ever has the same sound as h in the English words have, high, hold, and hull, that is, a forcible breathing, or emission of the voice at the commencement of a word. There seems to be a misapprehension of this matter with many writers and teachers, not natives of France. It is believed that the true theory is this, namely—the French never sound the h. It is with them, virtually, always mute. But, besides being mute, it has a particular duty to do, to speak. But when we say h is aspirate, we only mean that the vowel immediately following partakes so much of the property of a consonant, as to prevent elision with the preceding vowel. The following examples will illustrate our meaning very clearly, viz.:

First, of the h mute.

Habit is pronounced Ab-bec.
Honne, Om, etc.

In these words there is no sound whatever of the h.

Secondly, of the h aspirate.

Heros is pronounced Ay-ro;
not Hay-ro, as an Englishman would pronounce it, with a strong gutural articulation. But to add to the force and office of the aspirate h in the word Heros, let the article le be placed before it, thus—le Heros. Now, if the h were mute, these two words would become one in pronunciation, viz.—Heros. The h not being mute in this word heros, but aspirate, what is its office? It enables the following letter c or e to prevent elision with the e of the word preceding it, and consequently, the two words must be pronounced as if printed le-cors.

Thus it will be seen, that one particular use of the aspirated h is to prevent elision of the two vowels between which it may chance to be placed, in being the initial of a word. If aspirate is best determined by consulting a French dictionary, because no particular and definite rule can be given for distinguishing it from h mute, it must be granted that this whole matter is now considered debatable ground among orthoepists. One side affirms that the h aspirate is never sounded, any more than h mute is, but serves the sole purpose of preventing elision. The other side affirms that the aspiration is very slight, which, in common conversation, amounts to nothing, but is barely observable only in serious reading, and the use of devotional language. One thing, however, is quite certain—that a native Frenchman never aspirates the h of his own language as we do in pronouncing the words have, high, hold, and hull.

53. J, j.—This letter has the sound of the two English letters th. In the two English words, glaive and asserre, the s has the same sound. Thus, for example, the glaive is pronounced glave in French, and asserre is pronounced aaserre.

54. K, k.—This letter has the sound of the English k in all situations.

55. L, l.—This letter has the sound of the English l in nearly all situations, except when used with the vowel i, as a liquid. In a few words, l is final is silent. The dictionary will best determine which these are.

56. M, m.—When initial, the letter m has only the sound of the English m. It is used in nasal combinations like the following, viz.:

am, vm, um;
and in old French:

om,

which sounds will be illustrated at the proper place. It is also silent in the body of some words. Refer to the dictionary to determine when.

57. N, n.—When initial, the letter n has only the sound of the English n. It is used in nasal combinations mostly, namely:

an, in, un;
and in old French:

en, on, un,

which sounds will be illustrated in the proper place.

After m and n in the end of words, final consonants are usually silent, viz.:

French as if printed Preu, and pronounced Pranh.
Rompe " Rom, " Romh.
Temps " Tem, " Tahb.

When n is final before another word beginning with a vowel or h mute, it requires, besides being pronounced with a nasal sound, that another n should be added in pronunciation to the beginning of the next word, namely:

Ancien ami as if printed Ancien-nammea.
Bonhomme " Bon-nomme.
Mon amo " Mon-nahm.
Mon ami " Mon-namm.

SECTION XIV.—LIST OF WORDS FOR EXERCISES IN COMPOSITION (continued).

11. ARBRES FRUITEURS, FRUITS.—FRUIT TREES, FRUITS.

Abricot, m., apricot.
Abricotier, m., apricot-tree.
Amande, f., almond.
Amandier, m., almond-tree.
Amandes, f., almonds.
Amure, f., mulberry.
Nèfle, f., medlar.
Noisette, f., hazel-nut.
Orage, f., storm.
Orange, f., orange.
Pêche, f., peach.
Poire, f., pear.
Poirier, m., pear-tree.
Pomme, f., apple.
Pommier, m., apple-tree.
Prune, f., plum.
Prunier, m., plum-tree.
Raisin, m., grape.
Vigne, f., vine.

12. ARBRES FORESTIERS, ETC.—FOREST TREES, ETC.

Bouleau, m., birch.
Chêne, m., oak.
Ecorce, f., bark.
Erable, m., maple.
Épinette, f., fir.
Hêtre, m., beech.
Mêlée, m., larch.
Orme, m., elm.

13. OISEAUX.—BIRDS.

Aigle, m., eagle.
Allo, f., wing.
Alouette, f., lark.
Aurore, m., hawk.
Autruche, f., ostrich.
Bec, m., beak.
Bécasse, f., woodcock.
Bècasseau, f., woodcock.
Bébête, f., snipe.
Callo, f., quail.
Canard, m., duck.
Canari, m., canary-bird.
Charbonier, m., cold-fish.

Chaus-souris, m., bat.
Cigale, f., cricket.
Colombe, f., dove.
Corbeau, m., raven.
Cornelle, f., crow.
Concor, m., cuckoo.
Cygne, m., swan.
Dindon, m., turkey.
Falais, m., pheasant.
Gazelle, m., gazelle.
Grive, f., thrush.
Héron, m., heron.
Hirondelle, m., swallow.
1. Your bean-frère est-il plus âgé que le vôtre? 2. He is fifty years old.


5. Is your son twenty-five years old? 6. No, Madam, he is only sixteen.

7. What day of the month is it (have we) to-day? 8. It is (we have) the twentieth.

9. Have you the twentieth volume of Chateaubriand's works? 10. No, Madam, we have the eleventh.

11. What o'clock is it, Sir? 12. It is only twelve o'clock.

13. Is it later? 14. It wants a quarter of one. 15. It is a quarter after six.
LESSONS IN PENMANSHIP.—X.

With the three copy-slips on this page the learner will finish the series of copies that is based on letters or combinations of letters formed of the bottom-turn, top-turn, top-and-bottom-turn, and straight stroke. In our next lesson we shall give the self-teacher a new letter, which is in itself an elementary form that enters into the composition of the majority of the letters that he has yet to learn to write.

If any of those who are endeavoring to acquire a knowledge of the art of Penmanship from our lessons will now take the trouble to glance over the thirty-four copy-slips that we have placed before them, they will see by how gentle and easy a gradation we have led them on from the first simple stroke, known as the bottom-turn, to words involving combinations of all the four elementary strokes that have hitherto been brought before their notice. The words in Copy-slips Nos. 32 and 34 will bear efficient witness to the truth and propriety of the statement we made in our last lesson, that unless due attention be paid to the relative proportion of the strokes of letters that extend above or below the lines that contain the body of any letter, the appearance of any handwriting will be far from pleasing, as it will be wanting in that harmony that is so absolutely necessary to satisfy the eye. Suppose, for instance, that in Copy-slip No. 33 the letter I in the word hilt had been carried no higher than the t, how unsatisfactory would have been its aspect: or, again, if the letter t in the same word had been carried as high as the I, what trouble would the reader have to determine whether the writer meant what he had written to be the word that means the “handle of a sword,” or that by which “rising ground” is denoted. Then, also, in Copy-slip No. 34, if the straight stroke of the p in pull were not carried down to its proper extent, but allowed to terminate a little below the lower of the lines that contain the letter u, what doubt would arise in a reader’s mind as to whether the writer meant to write the word which means “to draw,” or “to move it. How the notion has arisen it is difficult to say; but, to hazard a guess, it is fair to suppose that it originated in an idea that to be engaged in trade and commerce was low, and that as people in business generally wrote legibly and plainly, it was the stamp of a commercial hustling spirit to go and do likewise. Happily, in our times legible handwriting is not thought unworthy of a man of education and good social position, while, indeed, it is one of the principal qualifications that is insisted on in those who aspire to the Civil Service and employment in Government offices. To write a good hand is one of the first steps towards the attainment of that liberal education which stamps a man as a gentleman without any of the adventitious claims that arise out of a man’s descent and social standing, and it is now as absurd for any man to sneer at another because he can write legibly as it was for Jack Cade to dub the clerk of Chatham a villain because he was taken setting of boy’s copies,” and to hang him as a traitor, with his pen and ink-horn about his neck, because he could write his own name, and had not a mark to himself, like, in Cade’s estimate, “an honest, plain-dealing man.”
LESSONS IN GERMAN.—IX.

SECTION XVII.—PERSONAL PRONOUNS; VERBS OF THE NEW CONJUGATION, ETC.

In English the relation of property or possession is denoted by means of personal pronouns in the possessive case, while in German the same relation is shown by means of a distinct class of words (Sect. X.), called possessive pronouns; and these are used not merely in the corresponding case (i.e., the genitive), but in all the cases. The German personal pronoun, therefore, is rarely used in the genitive like our personal pronoun in the possessive.

DECLARATION OF THE PERSONAL PRONOUNS.

Masculine. Feminine. Neuter.

I. M, ich; 
   me, me, 
   thee, 
   thou; 
   thee; 
   thee; 
   thee.

II. W., wir, 
   you, 
   you; 
   you; 
   you; 
   you; 
   you.

III. S., sie, 
   we, 
   you, 
   you, 
   you, 
   you, 
   you.

Singular.

Plural.

I. Er, er; 
   his, his, 
   his.

II. Sie, 
   their.

III. Ihm, 
   them.


1. The personal pronouns (in the 1st and 2nd persons) are often used reflexively; and are to be rendered by our compounds, myself, yourself, ourselves, etc. — As: I lie, myself, I praise myself. To lie, thou praisest thyself. Lie, we praise ourselves.

2. The reflexive form of the personal pronouns in the third person singular and plural is ich, etc. (Latin, se), and answers to our object himself, herself, itself, themselves; its gender and number being determined by the subject of the verb, as,— Er, er, I; er, he allows (to) himself. Sie, sie, she allows (to) herself. Er, er, er, the boy praises himself; Er, er, we praise ourselves. (See § 60. 4.)

3. A personal pronoun of one gender is frequently translated by one of another, as: — Der, der, if gun, aber er if nicht gym, the table is good, but it is not large. Die Nixe, ich, aber er if nicht flussig, the girl is beautiful, but she is not industrious. Dies after if gun, if gun, if gun, if gun, this pen does not write well, it is too soft (limber).

Ours.—This respects merely the translation. If, for instance, we were to translate the last German sentence according to the English idiom, the English for it would be, "This pen does not write well, she is too soft." Now such a rendering would be contrary to the English idiom, and therefore on translating German into English, we try to come as near the English idiom as possible; although it ought to be remembered that the different of gender, as referring to the same noun, does not take place in German.

DECLINATION OF PRONOUNS (with examples of each case).

I. R., richter, nobody (§ 59. 3). Richten, if he, nobody is here. Richten, but if he, nobody's hat is here.

II. Richten, to nobody. Es ist Richten nichts, it is profitable to nobody.

4. Verbs of the New Conjugation (See § 70. 1. 2) form the Imperfect by adding to the root the suffix t, for the first and for the third person singular; the corresponding parts in the plural being made by the addition of the letter n. The second person singular is formed by adding to the root the letters t t; the plural of the same person taking t t.

The root is found by removing the letters r from the form of the present infinitive: thus, from ften (to praise), take r, and you get ift, which is the root.

The Present Participle is made by adding to the root the syllable en; as, ften-ten, praising.

The Perfect Participle is produced by prefixing to the root the augment ge (§ 69. 2. 4), and suffixing the letter t (sometimes c): thus, ge-lten, praised.

The Perfect tense is formed by combining the perfect participle with the present indicative of the auxiliary haben or sein, to have or to be: as, ift habe geßen, I have praised.

The First Future is formed by adding to the present of the infinitive, the present indicative of the auxiliary werden, to become: as, ift werde geßen, I shall praise.

The Second Future is formed by adding to the perfect of the infinitive, the present indicative of the auxiliary werden: as, ift werde geßen, I shall have praised.

CONJUGATION OF THE REGULAR VERB ABEN IN THE INDICATIVE.

Infinitive. Participle.

Pres. ften, to praise. PRES. ften-ten, praising. Perf. Geßen geßen, to have praised. PERF. Geßen, praised.

Present Tense.

Sing. 

Plur.

1st. Ich habe, I praise. Ich ften, we praise. Ich habe geßen, I have praised.

2nd. Du hast, thou praisest. Du ften, you praise. Du habe geßen, you have praised.

3rd. Er, er, he praises. Er, er, he praises. Er habe geßen, he has praised.

Perfect Tense.

Sing. 

Plur.

1st. Ich habe geßen, I have praised. Ich habe geßen, we have praised. Ich habe geßen, you have praised.

2nd. Du hast geßen, thou hast praised. Du habt geßen, you have praised. Du habe geßen, you have praised.

3rd. Er, er, he has praised. Er, er, he has praised. Er habe geßen, he has praised.

Pluperfect Tense.

Sing. 

Plur.

1st. Ich habe geßen, he had praised. Ich habe geßen, we had praised. Ich habe geßen, you had praised.

2nd. Du hast geßen, thou hadst praised. Du habt geßen, you had praised. Du habe geßen, you had praised.

3rd. Er, er, he had praised. Er, er, he had praised. Er habe geßen, they had praised.

First Future Tense.

Sing. 

Plur.

1st. Ich werde geßen, I shall praise. Ich werde geßen, we shall praise. Ich werde geßen, you shall praise.

2nd. Du wirst geßen, thou wilt praise. Du wirst geßen, you will praise. Du wirst geßen, you will praise.

3rd. Er, er, he will praise. Er, er, he will praise. Er wirst geßen, they will praise.

Second Future Tense.

Sing. 

Plur.

1st. Ich werde geßen, I shall have praised. Ich werde geßen, we shall have praised. Ich werde geßen, you shall have praised.

2nd. Du wirst geßen, thou wilt have praised. Du wirst geßen, you will have praised. Du wirst geßen, you will have praised.

3rd. Er, er, he will have praised. Er, er, he will have praised. Er wirst geßen, they will have praised.

Imperative.

Sing. 

Plur.

Sei tu, praise thou. Sei tu, let him praise. Sei tu, let them praise.

The preceding paragraph must be well understood and the verb thoroughly mastered, before proceeding any further. The pupil will derive much benefit from working out other verbs after the above model. The vocabularies will furnish sufficient examples.

5. In compound tenses, the participle or infinitive is put at the end of the sentence, whether affirmative or interrogative, as: — Bist du un Brief geßtst, I had praised the letter; Bist du in Brief geßtst? had I praised the letter? Wirst du in Brief geßtst? whom will you praise? Wirst du in Brief geßtst? will you have praised him?

6. In English we have three forms for the present tense; he praises, he does praise, he is praising. The German has for all
LESSONS IN BOTANY.

Exercise 24.
1. The teacher presented a beautiful book to the [ten] scholar [s2-fater]. 2. She had received her [junct] friend. 3. The children have [See 9 of this section] retrieved the [ten] old father. 4. An ill-bred child grieves [the] father and [the] mother. 5. I have heard thy voice [thene] in the room. 6. He has probably tested the messenger before he sent him to [the] [ten] friend [frere]. 7. The pleasant has covered his house with [mit] straw. 8. This misfortune has probably taught him to be cautious.

9. I have supposed [written] many [side] lines in the river. 10. A cool draught strengthened him in [ten] summer after the Loe. As [mit] the dow [the] [side] wheat of the field. 11. (The) pain loves the moon as [mit] a [rime] comforter, (the) solitude loves it as a [rime] companion, and (the) piety as the [ten] residence of a pure soul.

LESSONS IN BOTANY.—V.

SECTION VIII.—ON THE NERVATION OR VENATION OF LEAVES; AND THE FORMS OF LEAVES.

Animal anatomists understand by veins and nerves two widely different portions of the human frame; not so botanists, in whose language veins and nerves mean the same thing; being applied to those cord-like ribs which ramify upon, or rather under, the surface of leaves. The manner in which these nerves or veins are distributed requires careful study, as it serves to distinguish different divisions of plants. The students, examined with reference to the manner in which their leaves are veined, admit of being separated into two great divisions: the parallel-veined, and the meshed or reticulated.

For example, in Fig. 19 is given the representation of the leaves of an iris plant, while Fig. 20 is a drawing of a leaf of a melon. How great is the difference between the general aspect of these leaves we need not say. In the former the veins or nerves are almost always united to each other, or converge at either extremity of the leaf by a very imperceptible gradation, and never in any part of the leaf combine or interlace together.

In the second example, the melon leaf, this parallelism is totally wanting, and in place of it we find the intermingling of nerves to be so frequent that a complete network results, hence this leaf and all like it are said to be reticulated. The word reticulated is derived from the Latin retic, a net.

Does not the reader remember that we have already established the existence of two grand natural divisions amongst flowering plants, as determined by the sectional aspect of their stems? Does he not remember that, from a consideration of this difference of appearance, we have already agreed to divide flowering plants into the exogenous and endogenous? Does he not also remember our promise to tell him other means of distinguishing an endogenous from an exogenous plant by another sign than the sectional aspect of the stem? One means is this. The leaves of endogenous plants are straight-veined, while the leaves of exogenous are reticulated. Hence, referring to the iris, we know at once that it is an endogenous, or within-growing plant, and we know by the same kind of examination that the melon is an exogenous or without-growing plant. What can be more simple than this mode of discrimination?

Botanists distinguish the various forms that the leaves of plants assume by different names, and that our readers may be able to recognize these forms at sight, and understand the attached meanings, we have given below the greater part of them in our illustrations of leaves in the following pages, and will now proceed to describe their peculiarities, and give the derivations of the botanical names by which they are known.

Pedate Leaf (Fig. 21).—A leaf of three or five or more divisions. Called a pedate or pedate leaf, from the Latin pes, a foot, because the outer divisions are parted into several segments.

Peltate Leaves (Fig. 22).—Leaves like those of the garden nasturtium, a name improperly applied to some species of Tropaeolum or Indian cress. This kind of leaf is called peltate from its fancied resemblance to the pelta, or circular buckler of the ancients, which was held by a thong fastened to the underside. The chief peculiarity of the peltate leaf is that it is attached to its petiole at some part of the under side, and not at the margin, as leaves usually are.

[Note: The text contains numerous errors and omissions, making it difficult to understand. The content appears to discuss various types of leaves and their classifications, along with some historical and etymological notes on botanical terms.]
Pinnate Leaf (Fig. 23).—A leaf cut like a feather, from the Latin penna, a wing or feather. The leaf figured consists of pairs of leaflets, without foot-stalks, ranged along a common petiole with a single leaflet at its extremity. The points at which the pairs of leaflets join the petiole are not exactly opposite each other.

Alternate Leaves (Fig. 24).—Leaves are said to be alternate when they grow from different points of the stem one above another—first on one side and then on the other.

Palmate Leaf (Fig. 25).—Leaves divided about half way down into several lobes, like the leaves of the sycamore, are called palmate or palmifid, from their resemblance to the palm and fingers of the hand when extended. The word is derived from the Latin palma, the hand, and findo, to cleave or split.

Fasciculate Leaves (Fig. 26).—Leaves issuing from a common point, and arranged in the form of bundles, from the Latin fasciculus, a little bundle. This peculiar arrangement of the foliage is found in some of the coniferæ, or trees of the pine tribe.
Sagittate Leaf (Fig. 27).—A leaf shaped like the head of an arrow, from the Latin sagitta, an arrow, triangular in form, with pointed lobes at the base extending backwards. A variety of this form is called hastate, or spear-shaped, from the Latin haste, a spear.

Spatulate Leaf (Fig. 28).—A leaf formed something like a spatula (Latin, spatula), a broad flat knife used by chemists for spreading pastes. It is broad and rounded at the end, but tapers gradually towards the stalk.

Verticillate Leaves (Fig. 29).—When more than two leaves grow on the same level, they are termed verticillate, from the Latin verticillus, the whirl of a spindle, derived from vertere, to turn. Leaves growing in this manner, in a ring round the stem, are also said to be whorled.

Pinnate Leaf, with Tendril (Fig. 30).—Here we have two opposite leaflets, with a tendril issuing from the point of junction between them. Found in the leaf of the everlasting pea.

Cordate Leaf (Fig. 31).—A leaf, such as the leaf of the lime-tree, so called from being shaped like a heart, from the Latin...
cor, cordis, the heart. A cordate leaf is broad at the base, where it is attached to the petiole, and pointed at the extremity. When a leaf is narrow or pointed at the base and broad at the end, or shaped somewhat like the figure presented by the section of a pear, it is called obovate.

Oblanceolate Leaves (Fig. 33).—In this type, which are joined together, or which surround the stem in such a way that it appears to pass through the centre of them; from the Latin con, together, and flos, to flow. Leaves of this kind are more often called perfoliate.

Lanceolate Leaf (Fig. 33).—A leaf formed like the head of a lance, oblong, narrow, and tapering from the broadest part in the middle towards the base and extremity.

Oblanceolate Leaf (Fig. 34).—A leaf circular in outline, from the Latin orbiculus, the diminutive of orbis, a globe or sphere. Leaves of this kind resemble petalate leaves in shape, but differ from them in being clef at as far as the point of junction with the petiole. A good example may be found in the leaf of the common shallow.

Lanceolate Leaf (Fig. 35).—When the edge of a leaf is notched or indented, it is said to be dentate, from the Latin dente, a tooth. When the margin of the leaf is unbroken, as is the leaf of the myrtle, or nasturtium, it is said to be entire.

Deltoid Leaf (Fig. 36).—A leaf with a broad base and triangular in form, so called from its resemblance to the Greek letter Δ, or capitate, a globe.

Acute Composite Leaf (Fig. 37).—A leaf divided into a great number of leaflets, as in the illustration, in which leaflets are attached on either side to the branches which issue from the petiole. It should be noted that the meaning of this term is very different from decomposition, which means a state of decay or disintegration, the word decomposing being derived from the Latin component, to put together, with de prefixed to increase the force of its signification, and indicating a composition of things already compounded, the leaflets of the compound leaf being also themselves compounded.

Reniform Leaf (Fig. 38).—A leaf shaped like a kidney, and so called from the Latin ren, a kidney.

Pinnatifid Leaf (Fig. 39).—A leaf indented along the margin with deep irregular notches extending about half way into the midrib, and indicated by the Latin penna, a feather, and fido, to spit.

Palmate Leaf (Fig. 40).—A leaf consisting of five leaflets attached to a common petiole, so called from its resemblance to the extended fingers of the hand, from the Latin pata, a hand. Leaves of this kind are sometimes termed quinates.

Decussated Leaves (Fig. 41).—A leaf consisting of several leaflets, or lobes proceeding from the same point of a common leaf-stalk, so called from the Latin decussis, a finger, the lobes being extended like the fingers of a hand. An example may be found in the leaf of the horse-chestnut. Scarcey differs from the last.

Capillary Leaf (Fig. 42).—A leaf branching out in all directions in narrow hair-like divisions, so called from the Latin capillus, hair. Examples of this kind of leaf are found in some of the tribes of umbelliferae.

Sympodial Leaf (Fig. 43).—A leaf with spines or sharp points projecting at intervals round the margin, like the leaf of the holly, so called from the Latin spinis, a thorn.

Sessile Leaves (Fig. 44).—When leaves are attached to the stem, in the shape of a leaf without any petiole or leaf-stalk, they are termed sessile, from the Latin seu, a seat, because the leaves are closely attached to the stem as if sitting on it.

Ciliate Leaf (Fig. 45).—When a leaf is bordered or edged with short hair-like appendages it is termed ciliate, from the Latin ciliis, eyelashes.

Scutellate Leaf (Fig. 46).—When the margin of a leaf is toothed sharply, like the teeth of a saw, or obliquely, as in the rose leaf, it is termed serrate, from the Latin serva, a saw.

Oval Leaf (Fig. 47).—A leaf longer than it is broad, but equally rounded at the base and extremity, so called from the Latin ovum, an egg.

Pinnate Leaf (Fig. 48).—Consisting of pairs of leaflets ranged along a common petiole opposite to each other, and attached to the common petiole by leaf-stalks; so called from the Latin penas, a wing, the attachment of each pair being like the wings of a bird, or the small feathers that branch out on either side of the mid-rib of a complete feather.

Bipinnate Leaf (Fig. 49).—A leaf consisting of pairs of pinnate leaves arranged along a common petiole opposite to each other; the leaf, in other words, being pinnately branched, and each branch pinnate with leaflets. Leaves are tri-pinnate, or three times pinnate, when the mid-rib is pinnately branched, the branches again pinnately branched, and these last furnished with leaflets pinnately arranged.

Distichous Leaves (Fig. 50).—Leaves springing from alternate points in two rows, one on the right of the stem, and the other on the left, from the Greek distichos (pronounced dis-tick-es) a couplet.

Aculite Leaves (Fig. 51).—Narrow leaves terminating in a sharp point, from the Latin cuspis, a sharp point.

The above list includes the principal terms applied to leaves. Sometimes, however, to describe a leaf correctly, it is necessary to apply two or three of these terms; as, for example, when a leaf is long, narrow, and pointed at either end, fringed with hair-like appendages, and notched with small regular indentations along the margin projecting forwards, it is described as lanceolate ciliate serrate.

READING AND ELOCUTION—V.

PUNCTUATION (continued).

VII. THE PARENTHESIS, CROCHETS, AND BRACKETS.

Examples:

I asked my eldest son (a boy who never was guilty of a falsehood) to give me a correct account of the matter.

The master told me that the lesson (which was a very difficult one) was not quite correctly read in the class.

When they were both turned of forty (an age in which, according to Mr. Cowley, there is no dallying with life), they determined to retire, and pass the remainder of their days in the country.

Notwithstanding all this care of Cicero, history informs us that Marcus proved a more blockhead; and that Nature (who, it seems, was even with the son for her prodigality to the father) rendered him incapable of improving, by all the rules of eloquence, the precepts of philosophy, his own endeavours, and the most refined conversation in his own day.

Natural historians observe (for whilst I am in the country I must fetch my allusions from thence) that only the male birds have voices; that their songs begin a little before breeding time, and end a little after.
48. **The Dash** is a short straight line which occurs in reading, and which is placed between the sentences in such a manner as to be parallel to the top or the bottom of the page.

49. The dash is sometimes used to express a sudden stop, or change in the subject.

50. The dash requires a pause sometimes as short as that of a comma, and sometimes one as long as, if not longer than, that of a period.

51. The dash is frequently used instead of colons or brackets, and a parenthesis is thus placed between two clauses.

52. The dash is sometimes used to precede something unexpected; as when a sentence beginning seriously ends humorously.

53. In the following examples, the dash is used to express a sudden stop, or change of the subject.

Examples.

If you will give me your attention, I will show you—must stop, I do not know that you wish to see.

Hat! that folly and falsehood should be so hard to grapple with—but he that hopes to make mankind the wisest for his labours, must not be soon tired.

"Please your honours," quoth Trin, "the inscription in the vest—" *Fribbie, spare thy description, Trin; I into the very name of it," said my father.

The fierce wolf prowls around thee—there he stands listening—not fearful, for he knows nothing.

The wild stag hears the falling waters' sound, and tremulouslyheece forwards—over his back he bends the hangers, less ground his hurried feet impress not—and his track is lost amidst the tumult of the brook, and the leaves falling from the quaking trees.

The wild horse these approaches in his turn. His mane stands up erect, his nostrils burn—he snorts—he pricks his ears and start aside.

There was silence—not a word was said—their meal was before them—God had been thanked, and they began to eat.

They hear not—see not—know not—for their eyes are covered with black sadness—they will sit silent.

And ye like fuding autumn leaves will fall; your throne but dust—your empire but a grave—your martial pomp a black funeral pall—your palace trampled by your meanest slave.

To-day is thine—improve, to-day, nor trust to-morrow's distant ray.

For some time the struggle was most amazing—the fish pulling, and the bird screaming with all its might—the one attempting to fly, and the other to swim from its invisible enemy—the yander at one moment losing and the next regaining its centre of gravity.

34. The dash is sometimes to be read as a period, with the falling inflection of the voice.

Examples.

The favoured child of Nature, who combines in herself these united perfections, may justly be considered as the most perfect image of the Divinity here below.

Now launch the boat upon the wave—the wind is blowing off the shore—I will not live a conserving slave, in these polluted islands more.

The wind is blowing off the shore, and out to sea the steamer's fly—my music is the dashing rock, my canopy the stainless sky—it bends above, so fair a blue, that heaven seems opening to my view.

He had stopped soon after beginning the tale—he had lost the frigid expression among his papers, and had never looked at it again.

The exaltation of his soul left him—he sank down—and his misery went over him like a flood.

Mr. Playfair was too indulgent, in truth, and favourable to his friends—and made a kind of liberal allowance for the faults of all men, except only faults of baseness or of cruelty; against which he never failed to manifest the most open scorn and detestation.

Towards women he had the most chivalrous feelings of regard and attention, and was, beyond almost all men, acceptable and agreeable in their society—though without the least levity or pretention unbecoming his age or condition.

55. The dash is sometimes to be read like a comma, with the voice suspended.

Examples.

"I have always felt that I could meet death with composure; but I did not know," she said, with a tremulous voice, her lips quivering—"I did not know how hard a thing it would be to leave my children, till now that the hour is come.

And Babylon shall become—she that was the beauty of kingdoms, the glory of the pride of the Chaldeans—as the overthrow of Sodom and Gomorrah by the hand of God.

Our land—the first garden of liberty's tree—it has been, and shall yet be, the land of the free.

They shall find that the name which they have dared to prescribe—that the name of Mac Gregor is a spell.
LESSONS IN GEOMETRY. V.
SIMPLE GEOMETRICAL THEOREMS.

Before entering on the consideration of problems in geometry which will be found to be practically useful to all who are engaged in any mechanical art, it will be necessary for the learner to become acquainted with a few simple statements or facts in geometry, the truth of which is so clear and plain that they require but little proof. These are called theorems, or self-evident propositions, from the Greek θεωρημα (theorēma), literally a sight, or something which can be seen, in contradistinction to problems, or propositions which require something to be done in order to effect their solution. The word "problem" is derived from the Greek προβλῆμα (problēma), which is derived in its turn from προ (pro) before, and βλῆμα (blema), to see, to place. Hence the meaning of the words "problem" and "proposition" is precisely the same, namely, something that is placed before you to be done or solved.

1. When one straight line intersects another straight line, the vertical or opposite angles are equal to one another.

Let the straight line DE intersect the straight line AB in the point D. Now, by the intersection of these two straight lines, four angles are formed, namely, CEA, AED, DEB, and BDC. Of these the vertical or opposite angles are equal, namely, CEA to DEB, and AED to BDC.

The truth of this may be shown in a very simple and practical manner by copying the figure on a piece of paper, and then cutting out the angles and placing them on each other, the greater on the greater and the less on the less. This mode of proof will frequently be found useful in similar cases.

Opposite angles are also called vertical angles, because the top vertex of each angle is directly opposite to the vertex of the other.

2. When a straight line intersects two parallel straight lines, the alternate angles are equal.

Let the straight line EF intersect the parallel straight lines AB, CD, in the points G and H. The angles ACH, CHG, HDG, are alternate angles, and CHG, HDG, are also alternate and equal.

There are eight angles formed by the intersection of the straight lines AB, CD, EF, as shown in Fig. 2. Of these the reader will find that there are two sets of four angles that are equal to each other—namely, ACH = CHG = HDG = DPF, and EGB = ACH = CHG = HDG = CHF. Let him demonstrate the truth of this practically by drawing the figure on paper, cutting out one of the greater angles and one of the less, and placing them on the remaining angles in each set of four.

3. The adjacent angles which are formed when one straight line stands on another straight line, are together equal to two right angles.

In Fig. 3 the adjacent angles ABC, ABD, which are formed by the straight line AB standing on the straight line CD, are equal to two right angles. The truth of this is evident when we consider that each of the angles DCE, DBE is a right angle, the straight line BE being at right angles to the straight line CD, and making the adjacent angles DCE, EBC equal to one another. The pupil will remember that the measure of an angle is the extent of the opening of the lines or legs of which the angle is formed. Thus, the sum of the angles of the triangles ABC, ABD, or the sum of the openings of the three angles CBA, ABE, EBB is equal to the sum of the openings of the angles CEB, EBD.

Thus we learn that if any number of straight lines meet in a point in another straight line on one side of it, the sum of the angles which they make with this straight line and with each other are equal to two right angles. If any number of straight lines meet on the other side of it, the angles thus made are also equal to two right angles. Hence the angles made by any number of lines meeting together in the same point are together equal to four right angles.

As a familiar illustration of this, the spokes of a wheel may be taken, which radiate from the nave as a common centre. If a chalk line were drawn down the middle of each spoke, those in the same opening or the same opening and in the same opening as any other of the spokes, would be equal to two right angles.

4. Any angle drawn in a semicircle is a right angle.

An angle drawn in a semicircle is one which has its top or vertex in the arc, while its legs pass through the extremities of the diameter at its points of contact with the semicircle. Thus, the angle ADB in the semicircle ABC is a right angle. The truth of this may be shown by constructing a right-angled triangle and applying it to a semicircle. If large enough, it will be found that the legs of the right angle will pass through the ends of the diameter of the semicircle, no matter at what point on the arc of the semicircle the vertex of the right angle may be placed.

5. The greatest side of every triangle is opposite the greatest angle.

In the triangle ABC in Fig. 5, of the three angles ABC, BCA, CAB, ABC is manifestly the greatest; while of the three straight lines AB, BC, CA, which form its sides, the greatest is AC. Thus, the angle ADB in the semicircle ABC is a right angle. The truth of this may be shown by constructing a right-angled triangle and applying it to a semicircle. If large enough, it will be found that the legs of the right angle will pass through the ends of the diameter of the semicircle, no matter at what point on the arc of the semicircle the vertex of the right angle may be placed.

6. If one side of a triangle be produced, the outer or exterior angle is equal to the two interior and opposite angles of the triangle.

In the figure that accompanies the preceding theorem, let the side AC be produced to E, the triangle BAC; and let the exterior angle BCD be equal to the two interior and opposite angles CBA, BAC. For if at the point C in the straight line AD the straight line CE be drawn parallel to AB, then the alternate angles ECD, CEK are equal to one another, and by Theorem 2, the angle DCE is equal to the angle CAB; but the angles DCE, CEB together make up the angle DCB, which is therefore equal to the angles CAB, BAC. 

7. The three interior angles of every triangle are together equal to two right angles.

In Fig. 5 the angle BCD has been shown to be equal to the angles CBA, BAC; to each of these equals add the angle BCA. Now, by Theorem 3 the angles DCE, CBA are equal to two right angles, and CBA, BAC, ADB, the three interior angles of the triangle ABC, which are added to these two angles, must therefore be equal to two right angles.

PROBLEMS IN PRACTICAL GEOMETRY.

Problem 1.—To bisect a given straight line—that is, to divide it into two equal parts.
Let \( AB \) (Fig. 6) be the straight line to be bisected. From the two extremities \( A \) and \( B \), with a radius of any length greater than half of the line, describe or draw arcs of circles, intersecting or crossing each other at the point \( C \), above the straight line \( AB \), and at the point \( D \), below it. Then, from the point of intersection \( C \), draw a straight line to the point of intersection \( D \); and the straight line \( AB \) will be bisected by the straight line \( CD \), at the point \( E \); that is, \( AB \) is divided into two equal parts, \( AE \), \( EB \), at the point \( E \).

By this method of construction, a straight line may be divided into any number of equal parts, denoted by the series 2, 4, 8, 16, 32, 64, 128, etc.

It is not necessary in the above construction that the two arcs at \( D \) be drawn with the same radius as the two arcs at \( C \); but it is necessary that each pair be drawn with the same radius; that is, practically speaking, without shifting the legs of the compasses.

It is self-evident that in Fig. 6 the straight line \( CD \) is bisected by the straight line \( AB \) at the point \( E \); and that \( AB \) and \( CD \) intersect each other at right angles. The problem therefore teaches how to draw two straight lines at right angles to each other.

**Problem II.** — To draw a perpendicular to a straight line from a point in it.

Let \( AP \) (Fig. 7) be the straight line to which the perpendicular is to be drawn, and \( B \) the point in it. From the point \( B \), with any convenient radius, less than \( BA \) or \( Bp \), cut off, or measure off equal parts of the straight lines \( BA \), \( Bp \) — namely, \( BC \), \( BE \); and from the points \( C \), \( E \), with any radius greater than \( CB \) or \( BE \), describe arcs of circles intersecting each other at the point \( D \). Then join \( DB \), that is, draw a straight line from the point \( B \) to the point \( D \), and \( BD \) will be perpendicular to \( AB \), as required.

**Problem III.** — To draw a perpendicular to a straight line from one of its extremities.

Let \( AB \) (Fig. 8) be the straight line, and \( B \) one of its extremities, from which the perpendicular is to be drawn. Take any point \( C \), at a convenient distance from \( B \), and nearly over the middle of the straight line \( AB \); then with \( C \) as a centre, at the distance \( CB \) as radius, describe the arc \( DE \), so that it shall be greater than a semicircle; from the point \( D \), draw through the point \( C \), the straight line \( DC \), to meet the arc in the point \( E \); and join \( BE \), that is, draw a straight line from the point \( B \) to the point \( E \), and \( BE \) will be perpendicular to \( AB \), at the extremity of \( B \), as required.

The demonstration of this proposition is founded on the fact that the angle contained in a semicircle is a right angle. This fact, indeed, is well known to intelligent workmen, who are accustomed to make use of the \( F \) or the \( T \) square; for they try the accuracy of that instrument by this property of the circle. Thus, if in Fig. 9, were an angle drawn by means of an \( F \) or \( T \) square, in order to test its accuracy, and consequently that of the instrument, they join any two points in the legs of the angle, say \( DC \), by drawing the straight line \( DC \); they bisect it in \( E \) by means of the great shown in the first or on either side of the straight line \( CD \), and drawn by the method explained in the problem I; and then, with radius \( EC \) or \( ED \), they describe the semicircle \( EDC \); if the arc of this semicircle passes exactly through the point \( E \), the angle and the instrument are correct; if not, they are incorrect, and the instrument must be adjusted.

**Problem IV.** — To draw a perpendicular to a straight line from a point without it.

Let \( AB \) (Fig. 10) be the straight line, and \( C \) the point from which the perpendicular is to be drawn. From the point \( C \) as a centre, with any radius sufficient to extend beyond the straight line \( AB \), describe an arc of a circle \( DE \), intersecting the straight line \( AB \) in the points \( E \), \( F \); then, from these points as centres, with any radius greater than half the straight line \( DE \), describe arcs intersecting each other in the point \( P \); then join \( PC \); that is, draw a straight line from \( C \) to \( P \), cutting \( AB \) in the point \( G \); then \( CG \) is perpendicular to \( AB \), and is drawn from the point \( C \), as required.

**Problem V.** — To draw a perpendicular to a straight line at one of its extremities, from a point without it.

Let \( A \) (Fig. 9) be the straight line, \( A \) one of its extremities, and \( C \) the point without it, from which the perpendicular is to be drawn. Take any point \( D \) in \( A \), and join \( DC \); bisect it in \( E \); and from the point \( E \), as a centre, with radius \( ED \) or \( EC \), describe the semicircle \( DE \); then join \( CE \), and it will be perpendicular to \( AC \). It is evident, from the remarks made on Problem III, that \( CG \) is perpendicular to \( AB \), and it is drawn from the point \( C \), as required.

Observe, that unless the point happens to be exactly in the vertical line above the point \( G \), the semicircle will not pass exactly through \( G \), but will pass through a point either nearer to or farther from the point \( A \). In the latter case, the straight line \( AG \) must be produced till it meets the arc of the semicircle. This problem is considered as merely a case of the preceding problem, although the construction be different.

**HISTORIC SKETCHES. — V.**

**The Rising of the Labourers Under Richard II.**

On Whitsunday, 1382, Sir Simon Burley, who is called by one historian "a favourite of King Richard II.," and by another, "a Knight of the King's Household," rode into Gravesend, and seeing one of the townsmen, claimed him as his slave. There was great dissatisfaction and open murmuring among the people, with whom the man was a favourite, and they protested against his removal. The townsman himself loudly declared that he never was slave to any one, to Sir Simon or another, and seeing the sympathy the crowd had with him, he appealed to them for help. Sir Simon claimed the man as the son of one of his fellow-servants, and the crowd, disregarding the earnest entreaty of the crowd, would not abate his claim unless he was paid three hundred pounds of silver—a price he well knew the friends of the bondman could not possibly raise. Some disorder ensuing, Sir Simon, who was attended by two sergeants of law and a following of armed men, pushed on through the crowd, and gave orders that the prisoner should be taken to Rochester Castle.

As soon as the great man's train had left, the awe inspired by its presence died away, and the people, whom the seizure of their fellow had taken completely by surprise, and had also deprived of their power to act, recovered their self-possession, and began to cry out with one voice, "Down with the tyrant! Let us go to Rochester! Let us join our brethren of Essex!"

The Essex men had already risen in arms, and were vowing vengeance on all the lords and consorts of law, and especially against lawyers, whom they hated as the ministers of the law that crushed them. Norfolk, Suffolk, Cambridgeshire, and some of the other home counties, had been infected with the same spirit. In them the bubbles of rebellion were beginning to rise to the surface and to break, though as yet there was nothing like united action. The above-mentioned claim of Sir Simon Burley, made in spite of the fact which was going on only on the opposite bank of the river, was the spark which fired the train of the Kentish men's anger.
people of the county, which not only caused them to make common cause at once with the men of the Eastern Counties, but drew to the front men of a certain kind of ability—such as Wat Tyler and the priest John Ball—who marshalled the malcontents into something like order, and put them under leadership.

This second cause of offence is well known by tradition to almost every one. A poll-tax, that is to say, a tax of so much a head—in this case it was fourpence—had been ordered to be levied on all persons above the age of fifteen. The tax was very unpopular in itself, but the manner in which it was raised rendered it almost unbearable. To begin with, it was not committed to the royal officers to collect the money, but men of influence about the Court gave the king a certain sum in lieu of the business. Thus permission to take money was given to the very fellows who could get out of the tax-gathering itself. Under these circumstances it is no wonder the tax was hated; the farmers of it naturally strove to make the yield as large as possible, and they instructed their agents to see that no one who was liable to the tax—every man and woman above fifteen years of age was liable—escaped payment.

One of these agents came to Dartford, in Kent, and began to pursue his business. The household of John of Dartford, a heller or tiler, consisted of himself, his wife, his daughter, and two other persons. John himself was from home, at his work roofing a house, when the tax-gatherer came and demanded the dues. John's wife paid for herself, her husband, and the two servants or apprentices, but claimed exemption for her daughter, aged fifteen. The tax-gatherer would not have it. The woman's statement about her daughter, who, he averred, must be quite fifteen, and to this he held, demanding the tax for her, in spite of her mother's statement, which was supported by the witness of all her neighbours. High words followed, the tiler's wife refusing to submit to an injustice, and the collector, pretending on his position and his authority, seized John's hammer. At the end of the street a friend ran off to where John was working, and told him what was going on at home, and probably exaggerated the true state of the case, after the manner of rumour-bearers. Anyhow, John, no sooner heard his neighbour's words than he jumped down from the work he was engaged upon, and snatching up his heavy helving hammer, ran away home. Arrived at his own door, he found a crowd assembled, the taxman still insisting on the poll-tax for the maiden, and in the very act of taking an indecent liberty, for the purpose, as he said, of ascertaining whether she was of full age or not.

The same practice, it seems, had been pursued in other places, where the people had not had the strength or the spirit to resist it; but Dartford was not the place in which to try such a thing. The drunken tiler left the spot and found his way home. A friend off him. The scoundrel collector had barely time to drop his hammer, which was all too useless as a guard, when the enraged father attacked him. No fence, however well sustained, could ward off the tiler's blow. Quick as the hammer rose in the air, swung by clumsy arms; more quickly still it descended, cleaved a way through the idle guard, which it shivered and tore, and falling with tremendous force on the skull of the collector, dashed out his brains to the adjacent wall. Without a struggle or a groan the man fell dead, and the people stood around wondering at what was done. Yet no man laid hands on the tiler, no man regarded him as a murderer; and when he broke the silence, and told them in a few short words how that his cause was theirs, that this act for which the collector had died was of a piece with the rest of the treatment the people had been subjected to, these actions were not received like a shout of approval, and proposed to march at once to Canterbury and join their brethren who were already under arms.

John the Tiler was a working man, and the people he addressed were of the same class. 'To that class also belonged the brethren,' who were in rebellion, all over the Eastern Counties: agricultural labourers, fishermen, and some artisans called the 'men of the sea.' They too composed the army—if it can be called an army—which Wat Tyler and John Ball led, and their followers, the hellers, the smiths, the ploughmen, the bakers, the butchers, the tailors, the woodcutters, the shoemakers, the cooperers, the tanners, the weavers, and many others. They were not a body of men drawn together by some competition in an open market, but by regulations made by those who employed them. Thus, in the reign of Edward I. (A.D. 1272), the wages of carpenters, tilers, masons, and plasterers, in London, where the terms were probably more liberal than in the provinces, were fixed at fourpence a day. As time went on, the number of free men increased, both in town
and country, chiefly through the medium of the Church, which irrevocably constituted a large number of those whom it claimed as its subjects.

In the reign of Edward III., however, another cause operated to enlarge their ranks. A dreadful disease, known as the Black Death, which appears to have originated in China, in which country thirteen millions of men, women, and children are said to have died, swept across Europe from the East, and coming to England, finished the reign of this king. Villagers were left without masters, masters without villeins, and death in numbers caused a great equalizing of high and low. After the Black Death went away, the number of workmen was found to be much reduced; the price of their labour, therefore, ought to have been much higher, in accordance with the law of supply and demand, since the demand had increased while the supply had diminished. In the country, where the ravages of the plague had been desolating, there was a cry for more wages, and the number of men who were hired by their owners' death from bondage made the number of wage-takers formidable. The men would not work without "outrageous and excessive hire," as the employers said; so a Parliament, consisting wholly of employers, passed a law, called The Statute of Labourers, by which the wages of agriculturists were fixed at the price they had been before the plague. No wages were to exceed sixpence an hour for a farm bailiff, thirteen shillings and fourpence, and a shepherd, ten shillings a year, and clothing; and no man was to quit his work without leave, under pain of being put in the stocks.

An ordinance, made about the year 1370, ordered that saddle-bags, skinner's, and tanners should be "chastised for charging excessively.

They find that among the principal causes of the rising of the labouring classes in 1382, were the practice of villeinage, which was not yet extinct, the unfair and oppressive regulations about wages, the dearness of living, and the demands, barbarously made, and frequently brutally enforced, for taxes out of the people, notwithstanding.

As has been said, the people got little at the moment by their rebellion, the disastrous conduct and termination of which left them with the more severe groups firmly on their necks. A fresh and more stringent Statute of Labourers was passed, and the poor people in country places suffered on for many years.

In towns the workmen were better off—better able to defend themselves—and the interests of the employers could not there exist without a corresponding advantage to the men. Society, under Henry VII. (1485–1509) and Henry VIII. (1509–1547), was divided into two classes. The greater part of the population, proved to be abortive, and things remained on the old basis till 1536, when a law was passed, which remained unrecalled till 1619, though it must have become impotent in many places before that date. This was, perhaps, one of the most exceptional laws ever put on the statute roll. Justice of the peace in the country, and the mayor, sheriffs, or other authority, and so removed in every respect from his prototype, as he existed in the days of King Richard II., as the freeman is from the slave.

This will be noticed that the word "anti-pope" is added to the names of two of the Popes of Rome above. The anti-pope was a pope chosen by the will of some king, or the intrigues of a party hostile to the reigning pope, who had been elected by the College of Cardinals. Urban VIII., for instance, had been chosen by the cardinals to please the people of Rome, who wished for an Italian pope, who would reside in the Eternal City, and not at Avignon or elsewhere, as some of the popes who preceded him had done. On his election the French and Spanish cardinals retired to Provence, and chose Robert of Geneva to occupy the papal chair. This ecclesiastic assumed the title of Clement VII., and as soon as his election was made known Christendom was riven asunder, and presented the appearance of a house divided against itself, France, Spain, Scotland, and Savoy declaring for Clement VII., while Italy, Germany, England, the Low Countries, parts of England acknowledged Henry VIII. as the visible head of the Church. As a matter of course, these rivals for the enjoyment and management of the temporalities of the "Vicar of Christ," as the bishops of Rome delight to style themselves, utterly ignored the "new commandment" of the meek and gentle Master whom they professed to follow. They solemnly cursed each other by bell, book, and candle, and each called his opponent a "seducer, accursed, and excommunicated." Those who gave the matter thoughtful consideration soon began to see that the dogma of the infallibility of the popes must be a mistake, and the quarrel of the angry claimants for the chair of St. Peter, in the persons of the popes and antipopes, kindled the spark that smouldered till the sixteenth century, and then suddenly broke forth into the glorious blaze of the Reformation.

LESSONS IN ARITHMETIC.—X.

FRACTIONS.

1. When a number or thing is divided into two equal parts, each of these parts is called one half; if the number or thing be divided into three equal parts, each is called one third; if it is divided into four equal parts, each of the parts is called one fourth, or one quarter; and so universally when a number or thing is divided into any number of equal parts, the parts take their name from the number of parts into which the thing or number is divided.
One of these parts, or a collection containing any number of them, is called a fraction of the original number or thing. Thus, if a straight line be divided into seven parts, each part is one-seventh of the line, and any number of the parts—as, for instance, five of them, i.e., five-sevenths of the whole—is a fraction of the whole line. The number of parts into which the unit or whole is divided is called the denominator, because it indicates or denominates the number of parts into which the whole is divided.

The particular number of these parts taken to form any fraction of the whole is called the numerator, because it expresses the number of parts taken.

Thus, in the case given above, 7 is the denominator, because the line is divided into seven parts, and 5 is the numerator of the fraction.

Fractions are expressed by writing the numerator above the denominator, and drawing a line between them. Thus the above fraction would be written \( \frac{5}{7} \), one half would be written \( \frac{1}{2} \), eight-ninths, \( \frac{8}{9} \), and so on.

The word fraction, which means a part or portion broken from any integer or whole, is derived from fracutre, broken, a part of the Latin word frangere, to break. The word integer is simply a Latin adjective meaning fresh, entire, or unbroken, which has been adopted into the English language.

2. A proper fraction is one whose numerator is less than its denominator, as \( \frac{1}{7}, \frac{2}{9} \), and so on. An improper fraction is one whose numerator is not less than its denominator, as \( \frac{7}{5}, \frac{9}{4} \), etc.

A mixed number consists of a whole number and a fraction expressed together; for example, 3 and \( \frac{1}{2} \). This is generally written thus, 3\( \frac{1}{2} \); similarly, 4\( \frac{2}{3} \) and 7\( \frac{1}{3} \), etc.

Fractions in which the denominators are 10, or any power of 10 (Lesson VI, Art. 5), are called Decimal Fractions, or Decimals. All other fractions are called Vulgar Fractions. A compound fraction is a fraction of a fraction, as \( \frac{3}{4} \) of \( \frac{1}{2} \); for any fractional part of a unit may be regarded as a new unit. This fractional part may itself be divided into any number of equal parts, and a certain number of them may be taken.

A complex, or mixed fraction, is one which has a fraction in its numerator or denominator, or in both, as, for instance—

\[ \frac{\frac{3}{4}}{2}, \frac{\frac{1}{2}}{\frac{2}{7}} \]

Every whole number may be looked upon as a fraction, of which the denominator is unity; thus 5 is \( \frac{5}{1} \).

3. Fractions, it will readily be seen, are expressions of unsupplied division, the numerator being the dividend, and the denominator the divisor. Take, for example, \( \frac{5}{7} \). We are supposed to have things to be divided, and dividing it into 9 equal parts, to take 4 of them. But it will be the same thing if we take 4 such units, and dividing this collection into 9 equal parts, take one of these parts. This gives the same fraction of the original unit as before; but, looked at in this light, it expresses the quotient which results from dividing the numerator by the denominator.

4. To multiply a fraction by a whole number.

Multiply the numerator by the whole number. For instance, to multiply \( \frac{3}{4} \) by 4. Here the unit is divided into 9 parts, two of which are taken; four times as many of these parts will give eight parts, or \( \frac{8}{9} \); therefore \( 4 \times \frac{3}{4} = \frac{8}{9} \).

5. To divide a fraction by a whole number.

Either divide the numerator or multiply the denominator by the whole number. Thus, \( \frac{5}{7} \div 2 = \frac{5}{7} \times \frac{1}{2} \); or, for the unit being divided into 7 parts, 6 are taken, halving which gives 3 parts, or \( \frac{3}{7} \). Again, \( \frac{5}{7} \div 2 = \frac{5}{7} \times \frac{1}{2} \). In the unit is divided into 7 parts, 5 of which are taken. In \( \frac{7}{2} \) the unit is divided into 14 parts, 6 of which are taken. But each of these latter 14 parts is equal to each of the former 7 parts divided by 2, and therefore five of the latter will be equal to five of the former divided by 2, or \( \frac{5}{7} = \frac{5}{2} \).

6. From the above reasoning we see that it produces exactly the same result whether we divide the numerator or multiply the denominator by any number. Hence, if we multiply both numerator and denominator by the same quantity, the value of the fraction remains unaltered. Multiplying the denominator divides the unit into so many more parts, and multiplying the numerator takes exactly so many times more of them. Similarly it follows, that if we divide both the numerator and the denominator by the same quantity, the value of the fraction remains unaltered.

7. To reduce a fraction to its lowest terms.

The numerator and denominator of a fraction are sometimes called the terms of the fraction. If both the numerator and denominator of a fraction can be divided by the same number (an operation which we have just seen does not alter its value), it is said not to be in its lowest terms. A fraction, then, may be defined to be in its lowest terms when the numerator and denominator have no common factors. Hence to reduce a fraction to its lowest terms, we must first find the greatest common measure of the numerator and denominator, and then divide them both by it.

Example.—Reduce \( \frac{28}{32} \) to its lowest terms.

The greatest common measure of 27 and 36 is 9, and therefore dividing numerator and denominator by 9 we get the fraction expressed in its lowest terms. It is not \( \frac{28}{32} = \frac{3 \times 9}{4 \times 9} = \frac{3}{4} \) necessary always to find the G. C. M. of the numerator and denominator, but it is often more convenient in practice to divide the numerator and denominator by numbers which are seen to be factors common to both until we arrive at the lowest terms. Thus,

\[ \frac{28}{32} = \frac{2 \times 14}{4 \times 8} = \frac{14}{16} = \frac{7}{8} \]

the fraction in its lowest terms.

Exercise 22.

1. Reduce the following fractions to their lowest terms:

- \( \frac{4}{8} \)
- \( \frac{6}{9} \)
- \( \frac{7}{14} \)
- \( \frac{8}{16} \)

2. In a joint-stock company which was divided into 10,000 shares, what part of the whole concern belongs to the individual who holds 4,050 shares?

3. A ship is worth £21,600; what fraction of the ship belongs to him who contributed to this sum no less than £12,960?

8. To reduce an improper fraction to a whole or mixed number.

Divide the numerator by the denominator. If there is no remainder, the quotient will be the equivalent whole number. If there is a remainder, the improper fraction is equivalent to a mixed number, of which the quotient is the whole number (or, as it is called, the integral part), and the remainder the numerator of the fractional part, which will evidently have the same denominator as the original improper fraction. Thus, \( \frac{3}{7} \) is a whole number; \( \frac{1}{7} = \frac{3}{21} \). Since 7 sevenths make one whole unit, 23 sevenths will make as many whole units as 7 is contained in 23, i.e., 3 whole units, and 2 sevenths over. Hence \( \frac{23}{7} = \frac{3}{1} \).

9. To convert a mixed number into an improper fraction.

Multiply the integral part by the denominator of the fractional part, to which product add the numerator of the fractional part. This sum will be the numerator, and the denominator of the fractional part will be the required denominator. Thus, \( \frac{3}{7} \) to \( \frac{4}{7} = \frac{3 \times 7 + 4}{7} = \frac{25}{7} \), and 23 sevenths and 6 sevenths make 34 sevenths, or \( \frac{34}{7} \).

Exercise 23.

1. Reduce the following improper fractions to whole or mixed numbers:

- \( \frac{11}{4} \)
- \( \frac{3}{6} \)
- \( \frac{7}{11} \)
- \( \frac{9}{13} \)

2. Reduce the following mixed numbers to improper fractions:

- \( 1 \frac{1}{2} \)
- \( 2 \frac{1}{3} \)
- \( 3 \frac{1}{4} \)

3. Reduce \( \frac{4}{5} \) to tenths, fourteenths, seventeenths, and thirds.

4. Reduce \( \frac{5}{6} \) to eighths, twelfths, eighteenth, and fourths.

5. Reduce \( \frac{3}{8} \) to hundredths, fifteenths, and thirty-fifths.
ANIMAL PHYSIOLOGY.—V.

THE EAR (continued).

The external ear of brutes is often so marked a feature in the outline of their bodies, it adds so much grace and finish to the whole, its movements give such animation to the gestures, and it is itself an organ so ornamental, that it is almost superfluous to remind the reader that its form and foldings are very various throughout the class Mammalia. Every one who is alive to the beauties of animated nature—and there are few who are dead to their attractions—must have looked with delight on the ear of the squirrel, with its tassel of soft brown hair. That universal favourite, the feline, the dainty little fennec fox, and even the fallow deer, despite the excelling majesty of its horns, would all cut but sorry figures without the external ear.

Among the strangest forms of ears, we may mention that of the African elephant, which makes him look like a warrior armed with a double shield. So flat and ample are these ears that Sir Samuel Baker cut a tolerably good mattress out of one of them. The membranous and delicate ear of our larger

English hat is proportionately as monstrous, but instead of being flat, its foldings are so decided, that it looks like an ear within an ear. The long trumpet-shaped ear of ruminants and horses, capable of being turned in any direction, is admirably suited by its shape, and by the fringe of hair which encircles it, and partially extends across its orifice, to accomplish the double purpose of receiving aerial waves, and excluding any small particles of dust, rain, or hail, which would otherwise get down to the sensitive tympanum. This office of protection is, indeed, by no means unimportant, as any foreign body on the drum membrane causes exquisite annoyance, and the steadiest horse will become restive when thus troubled. In the setter and spaniel dogs, the function of protection seems paramount to that of collection of sounds, so that the thick matted ear hangs down, when at rest, right over the orifice of the ear. In the above cases the ear is not only an organ of definite utility, but of conspicuous beauty, and, indeed, it is a fine exemplification of how use and beauty go hand in hand throughout all God's works. Why stupidity should, in popular estimation, be especially associated with the ears of the ass, is even more inexplicable than why it should be considered as the special attribute of that much-abused animal. The fairy Titania, when "enamoured of an ass," showed a discriminating appreciation of good points when she kissed the "fair large ears" of her "gentle joy."

In the whale and his tribe, it is not only absent, but the very forenoon which leads to the internal ear in this enormous animal will scarcely admit a pin. Indeed, this entrance to the ear seems to be retained only to establish or strengthen the affinity between the whale and the land mammals, for the impressions of sound are probably conveyed to the internal ear through the substance of the animal's body, as in the case of fish. The tympanic cavity, however, is kept supplied with air by an internal tube that communicates with the passage which runs to the blow-hole near that orifice; so that when the monster discharges the air from the reservoir of its lungs with so forcible a jet that it carries the sea-water before it like a fountain, the air of the tympanic cavity is, at the same time, partially renewed; and when he plunges once more unseen into the depths, this cavity is in communication with the air he carries with him. This arrangement, whereby, it is said, which has been conveyed from the exterior through the solid structures of the body, is made afterwards to traverse, or to be regenerated in, an internal air cavity, is not uncommon among the denizens of the water, and sometimes it is effected by such singular contrivances, as we shall find when we describe the ear of some fish, that we are almost justified in supposing that there is some quality in the vibrations of an elastic fluid, like the air, which makes it a better medium for transmitting sound to the nerve fitted to
receive such impressions, than those inelastic or solid media in which its vibrations are more energetic. This is the more singular, because in no case is air or gas the last substance through which sound passes to the sentient nervous system, and it seems that it should be on that line in the chain of conveying sounds. It is difficult to conceive how the message should be made more distinct by the fact, that air carries it for onestage in the central part of its course, yet such seems to be the case.

In the case of the whale, the bony sheath of the tympanum is not embedded in the substance of the ear-bone, as in other animals, but hangs below it, and is shaped like a shell, or like the shell of a volute, or bulla, with a very thick column or inner central part, and a very thin outer lip. By this thin outer margin of the scroll it is attached to the remainder of the ear-bone, but the attachment is so slight that in the dry skull it is easily broken off. In some geological strata this part of the ear-bone is found commonly, while the rest of the animal, drifted to shore, and being subject to the influence of the atmosphere, has left no other mark behind to attest the presence of these whales in the ancient seas.

We have dwelt thus long on the outer courts of the ear, in the animals that give suck to their young, because the variety displayed in these non-essential parts of the ear is not shown in the parts of the internal or essential ear. All the parts of the internal ear, the semi-circular canals, the vestibule of it, the inner ear, the cochlea, are always present in all mammals. There are, however, some slight differences in the proportion of the parts; thus the so-called circular staircase which mount the cochlea have three and a-half turns, or whirs, in the guinea-pig and porcupine, and only one and a-half in the whale, and in this last it can scarcely be called a staircase at all, as it does nothing but run upwards on the outside of it, like the hollow of the shell of the nautilus, instead of that of the trochus, or top-shell. There is some variation also in the little chain of bones which suspends the drum from the membrane to the oval hole; thus the hammer and anvil bones are fused together in the pouched animals. These slight differences, however, do not invalidate the statement that the ears of all mammals are made on the same general pattern; and if the writer has the patience to accomplish the by no means easy task of dissecting out from its bony case the ear of any such animal, while referring to the description of the human ear, given in the first article on the ear, he will be able to identify the several parts, or if he fail to do so, he may search again, for they are all there, though minute and difficult to trace.

On the shores of Roman British is a matter of notoriety. Whoever has had the opportunity of watching a herd of wild animals, while unobserved by them, will have been struck with the vigilance with which each unaccommodated sound is remarked. The electric shock, by which every individual of the community is thrown at once into an attitude of attention and preparation for a hasty flight, is a beautiful sight. When we reach animals in their home, we find such, as the bear, and moose, and the Anthropoid apes, many find their home in dense tangled forests, and also how necessary it is that dispersed members of a gregarious tribe, the sexes of wandering species, the helpless young, and protecting dams, should be able to find each other, it is not surprising that this sense is made so wonderfully acute. So much is this sense relied upon for the above-named purposes, that the crafty woodman finds no better expedient for alluring shy game to within reach of his rifle than by imitating the call of the species; yet so discriminating are the wild animals, that the slightest error in the intonation, or even the frequency, of the try, will send them scamppering away from the ambush.

It would seem as though man, who employs this organ so generally in the higher uses of the mind and soul, necessarily sacrifices to these some of the more acute senses of more sober sound of which the ear is capable. The savage starts like the bruto when a sound, such as the European would scarcely be aware of, reaches him from the distant hill; but civilised man, who passes his life amidst the hum of crowded cities, striving rather to abstract his thoughts from intrusive noises, and directing his attention, even when most attentive, to the thoughts that sounds embody rather than to the sounds themselves, is at a disadvantage when brought into contact with the unthinking brute, and he will sometimes pass through scenes teeming with life, and think them inanimate solitudes, because he, the object of dread, has no corresponding acuteness of observation to detect the animals which hide themselves at his approach. Yet, as we have seen, his organ is as delicate and complicated as any of theirs, and the disadvantage arises rather from neglect than deficiency, and when the kind of impression comes which strikes the mind, the sense is found to be wonderfully watchful. Many will remember the thrilling anecdot of the Scotch woman, who, when besieged at Delhi, expecting with all the Europeans nothing but cruel massacre, for no earthly help seemed available, started up, and said, "I hear them; they are playing "The Campbells are coming." And those who then thought her mad rejoiced with her on the same day, for a regiment of Scottish soldiers had marched to their relief.

LESSONS IN GERMAN.—X.

SECTION XVIII.—DIFFERENCE BETWEEN VERBS OF THE OLD AND NEW CONJUGATIONS.

Verbs of the Old Conjugation (commonly called irregular verbs) differ from those of the New, not only in respect to terminational variations, but also in regard to changes of the radical vowels, as:—3d fem., I come; 3d mas., I came; 3d fprect., I write, 3d fprect. I wrote; 3d fprect., I saw; 3d fe., I see. (See § 77; also list of irregular verbs, § 75.1.) The form of the past participle, in verbs of the Old Conjugation, frequently differs from that of the infinitive only by the augment ge, as:—Infinitive, fennen. Past participle, fennen.

Infinitive.

Sellen, to fall.
Geten, to give.
Sicken, to go.
Femen, to come.
Verzagen, to speak.
Vragen, to spring.
Greiben, to write.
Eigen, to sing.
Fthren, to see.

Present.

Ich fall, I fall.
Ich gebe, I give.
Ich gehe, I go.
Ich komme, I come.
Ich spreche, I speak.
Ich springe, I spring.
Ich schreibe, I write.
Ich singe, I sing.
Ich sehe, I see.

Imperfect.

Ich fiel, I fell.
Ich gab, I gave.
Ich ging, I went.
Ich kam, I came.
Ich sprach, I spoke.
Ich sprang, I sprang.
Ich schrieb, I wrote.
Ich sang, I sang.
Ich sah, I saw.

Past Participle.

Geten, fallen.
Geten, given.
Gegeben, gone.
Gegangen, gone.
Gehemmen, come.
Gesprochen, spoken.
Geschrieben, written.
Gegangen, sung.
Gesehen, seen.

1. The present tense of some verbs of the Old Conjugation is irregular in the second and third persons singular, as:—

Sellen, to fall.
Sellen, to fall.
Sellen, to fall.
Sellen, to fall.
Sellen, to fall.
Sellen, to see.
Sellen, to speak.
Sellen, to speak.
Sellen, to speak.
Sellen, to speak.
Sellen, to speak.

2. In the imperfect tense of verbs of the Old Conjugation, as well as of the New, the second and third persons are regularly formed from the first person singular in the following manner as:—

Gegen.
Gegen, I went.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Du gingst, thou wentest.
Gebern.
Ich habe ihn gehegen.
Du hast ihn gehegen.
Er hat ihn gehegen.
WIR GEBERN.
Wir haben ihn gehegen.
Ihr habt ihn gehegen.
Sie haben ihn gehegen.

 Geben.
Ich gabe, ich gab;
Du gabst, du gabst;
Er gab, er gab;
WIR GEBEN.
Wir geben, wir gaben;
Ihr gabet, ihr gabet;
Sie geben, sie gaben.

Conjugation of the Irregular Verb "haben" in the Indicative.

Infinitive.
PREP. Geben, to have.
PERF. Gegeben, to have had.

Singular.
Ich habe, I have;
Du hast, thou hast;
Er hat, he has;
Wir haben, we have;
Ihr habt, you have;
Sie haben, they have.

Plural.
Wir haben, we have;
Ihr habt, you have;
Sie haben, they have.

PRESENT TENSE.
Ich habe, I have;
Du hast, thou hast;
Er hat, he has.

PERFECT TENSE.
Ich habe geben, I have given;
Du hast geben, thou hast given;
Er hat geben, he has given.

IMPERFECT TENSE.
Ich hatte, I had;
Du hattest, thou hadst;
Er hatte, he had;
Wir hadden, we had;
Ihr hadden, you had;
Sie hatten, they had.

SECTION XIX.—Demonstrative and Substantive Pronouns.
Which? whose? which? (which?) as interrogative, is declined precisely like dieser, dieser, die/s.
The genitive is seldom used.

DECLINATION OF THE DEMONSTRATIVE PRONOUN, dieser, dieser, die/s.

SINGULAR.
Mas. Fem. Neut.
R. Dieser, dieser, dieser, this.
S. Dieser, dieser, this.
Plural.
All genders.
R. Dieser, dieser, this.
S. Dieser, dieser, these.

Dér, der, das frequently stand independently; i.e., not belonging to a noun. When so used, it is called a substantive pronoun, and answers to our demonstrative pronoun that. Its inflection, as seen in the Declension following, differs from that of the article, and it is likewise commonly pronounced with a stronger emphasis.

DECLINATION OF THE SUBSTANTIVE PRONOUN der, das.

SINGULAR.
Mas. Fem. Neut.
R. Der, der, that.
S. Der, that.
Plural.
All genders.
R. Der, the, that.
S. Der, those.

Examples of the use of the Substantive Pronouns.

Erin Mantel ist schwarz, und der His coat is black, and that of
sein Bruder ist blond. his brother is blond.

Die Äffe meiner Brüder ist groß, und das der watch of my father is
wie frisches Brot ist klein, wie frisches Brot is small.

Das Aar der Schuhmacher ist der leather of the shoemaker
schwarz, und das des Wattsers is black, and that of the
der is yellow.

Erin Gänse sind grau, und die His geese are grey, and those of
sein Nachbar sind weiß. his neighbour are white.

Kerze, dein Garten und der was I have and that of my
sein Freund. his friend.

Sie hat ihre Zügel und die sieher. She has her pen and that of her
Freundin.

* Such elliptical form as "His coat is black and his brother's
is blond." (Erin Mantel ist schwarz, and sein Bruder ist blond) is very
seldom employed in German.
The first errors that a pupil will make will be in the arrange-
ment of his subject; he will find them out the second time
he looks it over before he begins to draw it. We advise
him then only to "faint" them, not to obliterate them; they
are useful by pointing out to him where he is not to draw his
line, and if he may be seen how to choose between several
ways of drawing a dangerous
}

Here is their advantage:

when mistakes are totally effaced, it is as likely as
not that the same errors may be repeated, or, what is equally
bad, a fresh fault may be committed by drawing the line in an
opposite extreme. It is a common thing to hear those who are
struggling with their difficulties say, "It's all wrong, but where
I cannot tell." The work may be all wrong, it is true; but
that learners may be the better able to tell where the errors
are, and how to correct them, it is necessary that teachers
should take care to set up guide-posts in the shape of the
rules and principles of the art, so that the safest and most
direct path may be pointed out, and to put up warnings marked
"dangerous," by which the inexperienced may be cautioned
when they attempt to pursue what may appear to be shorter
ways, but which lead only to discouragement and failure.
We have often heard pupils say, "I have tried to draw this so many
times, and I cannot do it." Of course not; leave off the
drawing, and try the arrangement first. After what has been
now said we resume our instructions with greater confidence,
feeling sure that our pupils, knowing where they are likely to
fall into error, will act accordingly to the course of procedure we
have marked out for them.

We turn now to objects of a uniform character—viz., bottles,
wine-glasses, vases, etc. We will first consider only their profile
form—that is, the outward line when presented horizontally
before the eye; afterwards we will exhibit them with their
retiring parts. Fig. 45 is a bottle. Draw a, b, a perpendicular
distance; the neck of the bottle is the neck of a cylinder, and
the bottom. In drawing objects of this class we advise the
pupil always first to draw this perpendicular line, because from
this line each way he may mark in the distances of the several
parts as they approach or depart from it. The characteristic
points of the outline are c, d, e, f, g, h, marked on both sides of
the central straight line with a corresponding equidistance from
it; and those points which carry the objects to their

distance from each other, and from the centre, there will be
very little difficulty in drawing through them the continued
outline which will represent the object.

The wine-glass, Fig. 46, is another subject requiring the
same mode of treatment; and the method we have given for
drawing the bottle will apply here also.

Fig. 47 illustrates another example; the letters are not
repeated here, simply because we wish the pupil to apply the
above method of drawing it without our assistance; he will
easily recognise the characteristic points and angles for himself.

We propose now to draw these objects with their retiring parts,
and, as they are for the most part circular at their extremities,
we must first explain the geometrical method of drawing a circle
in perspective. Many suppose that a circle in perspective is a
true ellipse; such is not the case. If the pupil will examine
Fig. 48, he will see that the portion above the central line ef is
much smaller than the portion below ef, owing, as we have
before stated, to the diminishing appearance of objects in

To draw Fig. 48, he must make use of parallel rules and
circle. Begin, then, by rolling the plane of the picture, or
represented by a line, between the planes of the picture being
always considered in an upright position, the plan of that
plane or surface would be a line. This will be fully explained
when we enter into geometrical perspective. Draw the line of
sight, h t, anywhere above, and parallel to, the plane of the
picture; place the point of sight, r s, and draw the line r s o
perpendicularly, or at right angles with the h t and picture
plane; from a, as a centre, draw a semicircle a f b c e; about
describe the rectangle a d e c; draw r o d and o e; and through
the points where these last lines cut the semicircle draw h g and

h. From a h o h and c respectively, draw lines to the r s.
Place on each side of r s on the h t two points, p 1 and p 2.
These are called distance points, and represent the distance of
the eye from the picture plane—in this case, also, from the
object, as the circle touches the picture plane. From c and
draw the diagonal lines e c and I t towards the distance

LESSONS IN DRAWING.—VI.

Before proceeding with the more practical part of our instruc-
tions upon drawing, we wish to offer a few words of advice
respecting the advantages of the errors the pupil may frequently
make, and to persuade him, that although errors must naturally
occur, there is no reason for discouragement, so long as he
understands them and can feel his way out of his difficulties in
correcting them. All beginners are liable to make many and
great mistakes; but it is not their number that ought to dis-
courage; it is the not seeing them, which in the first place
disheartens the master, and then when pointed out disheartens
the pupil, if he has not the courage and capability to correct
and avoid them for the future. In the practice of drawing,
errors, when seen and understood, are quite as valuable as those
portions of the drawing that are right; we know them as well
what we ought not to do, as what we ought to do, and it is this
knowledge of right and wrong that keeps us in the true path.

| 1. Which umbrella [Regensfürm] have you? | 2. I have that of my brother, the sculptor. |
| 3. When did you buy [Kaufe Sir] this pink-coloured dress? | 4. I bought it yesterday from my cousin, the draper [Zuimpantier]. |
| 5. Will [werfen] you give this book to this man or that? | 6. I will not give it to either [Stein]. |
points, $D P 1$, $D P 2$. Join $l m$; $l m c a$ will be a square in perspective, within which we draw the circle by hand as follows:—The point $n$, where the diagonals $l c$ and $a m$ intersect each other, is the centre of $l m c a$ (see p. 138); through this centre $n$ draw the line $t k$ parallel to $a c$. Now observe where the lines from $h h$ cut the diagonals in $s, s, s$; through these points, and also through $r t o k$, draw by hand the perspective circle as in the figure. We recommend the pupil to draw this figure several times, as it requires much practice to draw the perspective circle properly.

When this difficulty has been overcome, he may try to draw the circle without the geometrical perspective lines, as follows:

(see Fig. 49):—First draw $a b$, according to the required width or diameter of circle, say the top of a wine-glass; through $o$, the centre of $a b$, draw the perpendicular $c d$, mark the point $e$ from $o$ (if the pupil has a glass before him, let him stretch a piece of thread over the top of the glass to represent $a b$; he will then perceive that the distance $o e$ must be regulated accordingly to the view the object presents to the eye); make $o h$ equal to $o c$, and divide $o h$ into three equal parts, add one of these parts from $h$ to $f$; then through $a e b f$ draw, by hand, the perspective view of the circle as in the copy. This, we allow, is an approximation, but sufficiently near for practical purposes.

To complete the wine-glass, Fig. 50, continue the line $e f$ to $m$ any length; mark $f l$ for the depth of the glass, and $l k$ for the length of the stem. If the pupil will place a wine-glass before him on the table, he will notice that the circular base, being more underneath the eye than the top, he has a more enlarged view of the base; through $h$ draw $p r$, the diameter of the base, equal to the diameter $a b$ of the top, and mark the distance $k n$, which, from its being lower to the eye than the distance $o c$ of the upper circle, the line $k n$ will be somewhat longer. (Now here, again, we should like to prove this by another geometrical drawing, but we decline it at present for reasons already stated; but the pupil may very easily, for his own satisfaction, draw again Fig. 48, placing the $h l$ double the height from the plane of the picture as therein shown, keeping $D P 1$ and $D P 2$ the same distance from $r s$ as before; the result will show him that, when the circle is placed lower, the eye looks more upon it.) Proceed with $k m$ and the divisions as before, and draw by hand the circle through the points $p n r m$. There is scarcely anything more difficult for a beginner than the circle, under any conditions; therefore we earnestly recommend him to practise it well from the foregoing instructions. Our reason for giving the above simple geometrical problem for constructing the perspective view of a circle is to satisfy the mind of the pupil upon the proportions and changes of its retiring dimensions, according as it is seen nearer to or further below the level of the eye.

Let him raise the glass until the top is on a level with the eye; the top will then present a straight line; let him lower it gradually, and he will see that the retiring diameter of the circle seems to expand, until, when it is exactly under his eye (looking down upon it), it then presents the true circle.
LESSONS IN LATIN.—VI.

NOUNS, SUBSTANTIVE AND ADJECTIVE.—THE FIRST DECLENSION.

We now pass on to the several declensions. By declension, you know, is meant the manner of forming the cases of a noun.

**FIRST DECLENSION.**

Sign *e* in the Genitive Singular.

**CASE-ENDINGS WITH THE ENGLISH SIGNS.**

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases. Latin</td>
<td>English</td>
</tr>
<tr>
<td>-ae</td>
<td>-e</td>
</tr>
</tbody>
</table>

Mensa, a, 1, fem., a table.

Here you may remark that in the singular two case-endings are the same—namely, those of the nominative and the vocative, both being *e*; and that in the plural taken with the singular, four case-endings are the same—namely, in the plural those of the nominative and the vocative; in the singular, the genitive and the dative. This undoubtedly is a defect in the language. By practice only can you learn in reading to ascertain which, in any particular instance, the writer intended; the difficulty, however, is not so great as you might imagine.

**EXAMPLE.**

Mensa, or, 1, fem., a table.

<table>
<thead>
<tr>
<th>Cases.</th>
<th>Cases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singular</td>
<td>Plural</td>
</tr>
<tr>
<td>Nom.</td>
<td>Mensa, a table.</td>
</tr>
<tr>
<td>Dat.</td>
<td>Menso, to a table.</td>
</tr>
<tr>
<td>Voc.</td>
<td>Mensa, 0 table;</td>
</tr>
<tr>
<td>Abl.</td>
<td>Mensi, by a table.</td>
</tr>
</tbody>
</table>

Mensa is thus seen to consist of two parts. These two parts are the stem mens and the case-endings or the several case-endings. Thus, if to mensa you join am, you obtain the accussative singular; and if to mensa you add orum, you obtain the genitive plural; and so on with the rest.

Before you proceed further, you should make yourself perfectly master of the case-endings and the example. Exercise yourself in giving from memory any case-endings you may please to require; also in giving the corresponding English sign.

**Exercise.**

Observe that in the example, after the word mensa, a, stand 1 and fem. Here I with a noun denotes the first declension, as afterwards 2 with a noun will denote the second declension, 3 with a noun the third declension, and so on; f. or fem. denotes the feminine gender, and in feminine nouns a noun is a noun of the feminine gender. It may appear strange to you that a thing which in English is of the neuter "gender," as being without sex, should in the Latin be of the feminine gender. So, however, it is. In Latin, one way of determining gender is by the termination. Thus, all nouns ending in or (with an exception which will be pointed out by-and-by), are of the feminine gender. And as all nouns ending in a are of the first declension, so all nouns of the first declension, generally speaking, are of the feminine gender.

Decline the following nouns like mensa:—

| Alaba, a bark. | Columbus, a canoe. |
| Aquila, an eagle. | Puebla, a girl. |

Ours. These nouns should be written out like the example mensa, from memory, distinguishing the case-endings and sub-joining the English to each case of each noun.

**VOCABULARY.**

| A (prop.) by. | Gigno, I produce. | Procilla, a storm. |
| Aquam, water. | Herba, a herb. | Quam (adv.), how! |
| Ciconia, a stork. | Neco, 1, I injure. | Ramo, a fog. |
| Coaxo, 1, I croak. | Planta, a plant. | Suppe (adv.), often. |
| Copia, abundance. | Praeda, prey. | Terra, the earth. |

Note that the preposition a becomes ab, for the sake of sound, before a vowel or a silent h.

**EXERCISE 15.—LATIN-ENGLISH.**


On this exercise I must give a few words of explanation. In the sentence Ciconia nocet ranam, you have the object in the dative case. Generally the object is in the accusative case, but since one of the verbs which govern their object in the dative instead of in the accusative case, as will be more fully set forth hereafter.

After the passive verb turbatur, you have the instrument rana with the proposition a; whereas after the passive verb vestitur, you have copia without the proposition. The reason is that, in Latin, when the instrument is a person or living creature, the proposition a is usual; but it is not used when, as in the second case, the instrument is a thing, that is, something without life.

Vestituri is not given in the vocabulary to this declension, because it has been given before. Here, as in other instances, words, the English of which has been previously stated, are repeated without the English, in order to secure attention and to aid in retaining the memory.

As the English sign of the dative is to or for, so you must use the one or the other as the sense requires. And as the English sign of the ablative is by, with, or from, so must you use either by, or with, or from, according as the English idiom requires.

**EXERCISE 16.—ENGLISH-LATIN.**

1. The plants flourish. 2. The storm injures the plant. 3. Plants are injured by the storm. 4. Frogs are swallowed by the storm. 5. The earth produces plants. 6. Plants are produced by the earth. 7. O plants, how beautiful are you produced by the earth! 8. I praise abundance of water. 9. The storm moves the waters. 10. The waters are moved by the storm.

After having learnt each vocabulary, you will do well to try to ascertain what words it have representatives in English. These English representatives (denoted by the initials E.R.) are words in English derived more or less directly from the corresponding Latin words. Thus, from aqua we have E. R. aquaticus; from copia, we have E. R. copiosa; from herba we have E. R. herb; from praeda we have E. R. prey; from terra we have E. R. terrae, etc. You will soon acquire skill in discovering the E. R. in all cases, and in the discovery you will gain an aid to memory, as well as an insight into the exact original meaning of many English words. Indeed, you should never allow a Latin word to pass you without endeavouring to ascertain whether it has any E. R., and if any, whether one or more, what they are, and what their signification.

Adjectives in the feminine gender are declined like mensa. This you see exemplified in the following example:—

**DECLENSION OF SUBSTANTIVE AND ADJECTIVE.**

<table>
<thead>
<tr>
<th>Cases.</th>
<th>Singular</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>bona puelea, a good girl.</td>
</tr>
<tr>
<td>G.</td>
<td>bona pueleae, of a good girl.</td>
</tr>
<tr>
<td>D.</td>
<td>bona puele, to a good girl.</td>
</tr>
<tr>
<td>A.</td>
<td>bona puele, of a good girl.</td>
</tr>
<tr>
<td>V.</td>
<td>bona puele, a good girl!</td>
</tr>
<tr>
<td>Abl.</td>
<td>bona puele, by a good girl.</td>
</tr>
</tbody>
</table>

**EXERCISE.**—After the same manner write out and learn by heart—

| Alba rosa, a white rose. | Pulchra columba, a beautiful pigeon. |
| Magna praeda, a great beauty. | Quadrata mensa, a square table. |

**VOCABULARY.**

| Ancilla, a maid-servant. | Est tibi, thou hast. |
| Augusta, sacred. | Magna, great. |
| Est mihi, I have. | Tibi, to thee. |

Ours. The Latin word *ne* is employed in asking a question, and is placed after a word and joined to the word it follows; the Latin word *an* is employed in asking a question, and is placed before a word or sentence; *nonne* asks a question with not included, as, nonne vituperas? dicas nonne vituperas? The Latin word *ne* is employed in asking a question, and is placed after a word and joined to the word it follows; the Latin word *an* is employed in asking a question, and is placed before a word or sentence; *nonne* asks a question with not included, as, nonne vituperas? dicas nonne vituperas?

**EXERCISE 17.—LATIN-ENGLISH.**

LESSONS IN GEOGRAPHY.—VI.

DISCOVERIES OF THE EIGHTEENTH CENTURY.

In 1768 Dampier, at this time celebrated for his buccaneer (piratical) expeditions, discovered some new islands, which he named after himself, to New Guinea, or Papua. Wood Rogers sailed round the world in three years and three months; and encouraged by his successful expedition, the maritime powers proceeded to attempt similar enterprises, hitherto considered as extremely dangerous. Towards the end of the preceding century, France had also made expeditions into the Southern Ocean. Her first vessel which appeared in the Pacific Ocean was commanded by one

Lafaille and ; but the voyage, which took place in 1667, produced no new discovery.

The discoveries of the Russians in the north of Asia must be noticed. At the beginning of the seventeenth century they occupied a part of the coast of Siberia beyond the Yenisey. War and conquests laid open to the emperors the way to this immense region. In the space of less than a century, the whole of Northern Asia, from the frontiers of China to the Frozen Ocean, was brought under the dominion of Russia. Geography was benefited by this annexation, which gave to the Russians new facilities for performing useful explorations in those inadmissible countries. In 1729 Bering made the important discovery of the strait which separates Asia from America, and rendered the peopling of the New World no longer a question of difficulty or doubt.

The northern circumpolar regions had not been the theatre of any important expedition, from that of Baslin, above mentioned, until the middle of the eighteenth century. The era of scientific expeditions was now begun. Geography, so long retarded in her progress to perfection, proceeded with a sure and rapid step. This was the most brilliant period of the history of navigation from the time of the great discoveries of the sixteenth century. It was particularly remarkable for the positive character of its results. Bougainville, who had gained renown in the wars of Canada, anticipated that which he gained as a navigator, by an expedition to the Malouine or Falkland Islands, which he was then about to perform. He left France in 1758, circumnavigated the world by Commodore Byron, also began in the same year, produced very important results; and so did the voyages of Wallis and Carteret, in clearing up some practical questions relating to the geography of Oceania. Carteret, in particular, determined the geographical positions (that is, the latitudes and longitudes) of several islands in the direction of New Britain; his voyage was immediately followed by that of Banks, which had touched at the island of Christmas.

Three years after his first voyage, in 1767, Bougainville undertook his second expedition to circumnavigate the globe. After a short stay in the river La Plata, he was detained in the Strait of Magellan no less than fifty-two days. He then entered the South Pacific Ocean, or South Sea, as it was then called, and discovered the islands of Pomoton, which he called the Dan-

navigated the Pacific, and which he had entered the archipelago of the same name, and discovered the islands of New Caledonia, which he named after his own name. These islands were of less importance, which had been seen by other navigators; and having visited New Ireland, discovered by Carteret, he arrived at Batavia; whence he sailed to Europe by the Cape of Good Hope. This expedition was well received in France and in Europe; it had made several important discoveries, and had been marked with interesting episodes which were related with spirit and talent; and created a still greater desire for circumnavigating expeditions.

The greatest navigator of modern times is acknowledged to be Captain James Cook. His first voyage to the Pacific had for its grand object the observation of the transit of Venus, that is, the passage of this planet in its orbit over the disc of the sun, a phenomenon alike important in astronomy, navigation, and geography. Having received his promotion from the rank of midshipman to that of lieutenant, he was put in command of the Endeavour, a small ship of 370 tons, in which he left England in August, 1768. After touching at Rio de Janeiro, he proceeded to the Strait of Lemaire, in order to double Cape Horn. Tierra del Fuego did not present to him such a dreadful aspect as it did to Wallis; the naturalists of the expedition, Sir Joseph Banks and his friend Dr. Solander, a naturalist, were much struck by the variety of the inhabitants of that country, and collected there some plants and animals. One of their excursions, however, nearly proved fatal to them. Having ascended a mountain whose vegetable products they wished to examine, they were overtaken by the shades of evening and the coldness of a severe frost. Dr. Solander was on the point of perishing under its influence, when the wise importunity, or rather prudence, of his companions saved his life, by hindering him from
-strait, which now bears the name of Cook; but they durst not examine the interior of the country, as it would have been too dangerous to have ventured into the midst of a race of cannibals, whose savage habits were very soon observed by the expedition. Cook left the shores of New Zealand on the 31st of March, 1770, and in twenty days afterwards beheld those of New Holland, or Australia, where he discovered Botany Bay, an inlet on which stands Sydney, the metropolis of our Australian colonies, and one of the most important of our colonial settlements. Proceeding northward, he was nearly shipwrecked in latitude 16° S. by the vessel striking on a coral rock. The *Endeavour* was providentially saved, and enabled to reach a small harbour where she was repaired, and put into a condition to resume her homeward voyage, which she completed without meeting any further disaster.

The second voyage of Captain Cook, undertaken in July, 1772, had for its object the discovery of that great southern land which had been for ages supposed by navigators and geographers to exist in the southern part of the Great Pacific Ocean, and which Abel Tasman fancied he had seen when he landed on New Zealand. Two vessels called the *Resolution* and the *Adventure* were put under the command of Captain Cook. The expedition proceeded directly southward; but in latitude 67° 13′ S. it met with rocks which appeared to be impassable. No attempt was made to get beyond this obstacle, and the expedition returned northward to the nearest cape, under the conviction that if any southern continent existed, it could only be at a very great distance, and quite in the vicinity of the south pole. The two vessels, which were separated from each other among the ice, proceeded to New Zealand, where they again met. After useless explorations to the east of this island, as far as the 46th parallel of latitude, Captain Cook made for the Society Islands, where he remained until the health of the expedition was recruited.

A second attempt to discover the southern continent soon brought the expedition to latitude 71° S., but here again the passage to the south was blocked up by ice, and it was obliged to return northwards. In a new exploration of the seas of Oceania, Captain Cook re-discovered Easter Island, which Commodore Byron, Carteret, and Bougainville had searched for in vain; he also discovered some new islands belonging to the Marquesas group, returned to Tahiti, and re-visited Tongataboo and the Friendly Islands, where he discovered Savage Island, and Batoa or Turtle Island, belonging to the group of the Fuegia Islands; he then re-established several points of New Guinea, and discovered Tanna, Erromango, and several other islands of the group called the New Hebrides, as well as New Caledonia and Norfolk Island. The point of departure for a third exploration of the Antarctic or Southern Seas was New Zealand. Captain Cook endeavoured to reach the south pole in a more easterly direction than formerly. Having arrived at latitude 55° 49′ S., he sailed towards Cape Horn, and continued his route towards the east. In this route he discovered the island of South Georgia, to the east of Tierra del Fuego; and south-east of the former a group of islands which he called Sandwich Land. Here he terminated his voyage toward the southern circumpolar regions. He had circumnavigated the globe in high southern latitudes, and had demonstrated that no southern continent existed in the immense zone which he had explored. The hypothesis of its existence was thrown many degrees nearer the south pole; and the illusion of this problematic continent, so richly endowed by nature, was dissipated for ever!

In this remarkable expedition Captain Cook was absent from
England more than three years; and he arrived at Portsmouth on the 13th of July, 1775. In the interval, some other voyages were made in the South Seas; and the islands of Marion and Crozet, as well as that called Kerguelen Land, were discovered by the navigators whose name they bear. Again the indefatigable Cook resumed his voyages of discovery. This time he intended to search for the north-west passage to India, by passing through Behring Strait. He left England on the 12th of July, 1776, with the ships Resolution and Discovery under his command. He first visited the islands above mentioned, and then touched at Van Diemen’s Land and New Zealand. Soon after he discovered the central Polynesian group Toubouai, the archipelago of Hervey Islands or Mounia group, and the islands of Watchoo and Otakootai, in the same seas. Sailing to the north of Tahiti, he arrived at the Sandwich Islands, where he was taken for a superior being, and as such received by the natives. On the 1st of January, 1778, he made the discovery of this important group. Captain Cook then prepared for the accomplishment of the principal object of the expedition. He sailed along the north-western coast of the New World, until he reached a point of land which he called Icy Cape, in latitude 70° 27’. Here a solid mass of ice, ten feet thick, extending to the opposite coast of Asia, presented to him an insuperable barrier. He returned to the Sandwich Islands, where, alas! his fate awaited him. On the island in this archipelago called Owhyhee, he fell by the hands of a savage; and thus, unfortu-
nately, ended the life of the greatest navigator of modern times. Captain Clerk, who was second in command, took charge of the expedition, and sailed to the north-east in search of the passage to the Atlantic; but this he visited, rectified numerous errors in the maps and charts of the century in which he flourished, and accelerated the progress of the science to which these remarks form our introduction, in a degree hitherto unknown. Mathematical geography has, since this time, taken her place among the exact sciences.

In concluding this lesson, we may remark that Cook lifted the veil of darkness which hung over the extremities of the Pacific Ocean, and the junction of the continents of Asia and America. His last voyage, by disclosing the vast breadth of America at the latitude of Behring Strait, mado the hopes of discovering the north-western passage darker than ever. That continent had, previous to the time of the English navigator, been considered as terminating to the north in a point or cape, after passing which, the navigator would find himself at once in the South Seas, and in full sail to China or Japan. But the discovery of Cook showed that there was found intervening a space of land of nearly three thousand miles in breadth, a very large portion of the circumference of the globe. Hence, geographers viewing the coast running northward from Behring Strait, Hudson Bay, and Baillie Bay, all enclosed by land, received the impression, and constructed their maps accordingly, that an unbroken mass of land reached onwards to the pole, and that all these boundaries were for ever barred against the enterprising navigator.

LESSONS IN ARITHMETIC.—XI.

FRACTIONS (continued).

10. To reduce fractions to equivalent fractions having the same denominator.

Rule.—Find the least common multiple of all the denominators. Multiply the numerator and denominator of each fraction by the quotient obtained from dividing the least common multiple by that denominator.

Example.—Reduce \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) to a common denominator. 1260 is the least common multiple of 9, 7, 10, 12 (see page 134), and the quotients of 1260 by these respectively are 140, 180, 105. Multiplying each numerator and each denominator by these numbers respectively, we get \(\frac{2 \times 140}{3}, \frac{5 \times 180}{6}, \frac{7 \times 105}{9}\), which are fractions equivalent to the given ones, and all of which have the same denominator.

It may be observed that the common denominator found in this case is the least. Any common multiple of the denominator of the original fractions would have given fractions with the same common denominator; but the least common multiple gives, of course, the least common denominator.

11. Fractions may also often conveniently be made to have the same denominator by the following method:—Multiply each numerator into all the denominators except its own for a new numerator, and all the denominators together for a common denominator. The reason of this will be clearly seen from an example.

Example.—Reduce \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) to fractions having the same common denominator.

Following the rule, we get for the first fraction—

\[\frac{2 \times 6 \times 9}{3 \times 6 \times 9} = \frac{2 \times 6 \times 9}{3 \times 6 \times 9} = \frac{2 \times 6 \times 9}{3 \times 6 \times 9}\]

where we have multiplied the numerator 2, and denominator 3, by 6 \(\times\) 5 \(\times\) 9, the product of the denominators of the other fractions. The fractions will therefore be—

\[\frac{2 \times 6 \times 9}{3 \times 6 \times 9} = \frac{5 \times 3 \times 5 \times 9}{3 \times 6 \times 9} = \frac{3 \times 3 \times 6 \times 9}{3 \times 6 \times 9} = \frac{7 \times 3 \times 6 \times 9}{3 \times 6 \times 9}\]

Or,

\[\frac{540}{540}, \frac{675}{540}, \frac{435}{540}, \frac{630}{540}\]

Here, evidently, the common denominator is not the least, inasmuch as \(3 \times 6 \times 5 \times 9 = 270\), but \(2 \times 3 \times 3 \times 5 \times 9 = 270\), the common multiple of 3, 6, 5, and 9, which we have taken, is not the least common multiple.

12. We are enabled by this means to find which of two fractions is the greater. For instance, if we wished to know which of the four fractions given in Art. 11 is the greatest, having reduced them to a common denominator, 810, we are able to say that the second fraction, is the greatest, because it contains the greatest number of the 810 parts into which the unit is divided, viz. 675; and in the same way we see that the order of magnitude of the four fractions is \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\).

EXERCISE 24.

Place in order of magnitude the following sets of fractions:

| 1. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 6. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 2. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 4. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 3. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 5. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |

13. Addition of Fractions. Required to add \(\frac{2}{3}\) and \(\frac{5}{6}\) together. Reducing the fractions to a common denominator, \(\frac{10}{15}\), and \(\frac{15}{15}\), and adding them, we get \(\frac{25}{15}\) or \(\frac{5}{3}\).

Therefore \(\frac{2}{3} + \frac{5}{6} = \frac{5}{3}\).

or, as it could be written, \(\frac{2}{3} + \frac{5}{6} = \frac{5}{3}\).

In the same method will apply to any other two or more fractions. Hence we are able to enumerate the following.

Rule for the Addition of Fractions.

Reduce the fractions to a common denominator, add the new numerators so formed for each numerator, and take the common denominator for a denominator. The single fraction so formed will be the sum of the given fractions.

Obs.—It will generally be most convenient to reduce each fraction, before commencing the operation, to its lowest terms, if it is not already in them, and then to take the least common denominator.

EXERCISE 25.

Add together the following sets of fractions:

| 1. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 6. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 2. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 4. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 3. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 5. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 11. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |

14. Subtraction of fractions. The operation of subtracting one fraction from another will evidently be effected in the same manner. Thus, to subtract \(\frac{2}{3}\) from \(\frac{5}{3}\), we have, as above,

\(\frac{5}{3} - \frac{2}{3} = \frac{3}{3} = 1\).

Hence the following.

Rule for the Subtraction of Fractions.

Reduce the two fractions to a common denominator, subtract the less numerator from the greater for a numerator, and take the common denominator for a denominator. The fraction so formed will be the difference of the given fractions.

The same observation with respect to the least common denominator, which was made with reference to the rule for Addition, evidently applies equally to that for Subtraction.

N.B.—In all cases a whole number must be treated as a fraction having a denominator unity. For instance, to subtract \(\frac{2}{3}\) from \(\frac{2}{3}\), \(\frac{2}{3} \div \frac{2}{3} = \frac{1}{3}\).

Therefore \(2 - \frac{2}{3} = \frac{2}{3} - \frac{2}{3} = 1\).

EXERCISE 26.

1. Find the difference between:

| 1. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 5. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 2. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 6. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 3. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 8. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 4. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 9. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 10. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |

2. Simplify the following expressions:

| 1. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 5. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 2. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 6. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 3. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 11. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
| 4. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) | 12. \(\frac{2}{3}, \frac{5}{6}, \frac{7}{9}\) |
LESSONS IN ENGLISH.—VI.

Exercises in Parsing.

It is a miserable thing to live in suspense. To live in suspense, is to live the life of a spider. No wise man ever wished to be younger.

An idle reason lessens the weight of good reasons. Complaint is the largest tribute paid to heaven. Complaint is the sincerest part of our desires.

Praise is the daughter of present power. Everyone desires to live long. No man is willing to be old. Kings are said to have long hands. Kings ought to have long ears. Vision is the art of seeing things invisible. Good manners are the art of making associates easy.

A true gentleman has both wit and learning. Come into the garden, Maud. He gave me half-a-crown for my trouble. The king's crown is made of solid gold.

The reader may exercise his ingenuity, as well as his grammar, while he discovers the explanation of a riddle of the learned Dean, which is appropriate to his subject:

"We are all little airies, creatures, All of different voices and features; One of us is glass, and will shatter, One of you'll find is yet; To other you may see in tin, And a fourth a box within; If the fifth you should purse, It can never fly from you."

An excellent practice in composition is letter-writing. I shall therefore give, in this lesson, some specimens of epistolary correspondence. And I advise my pupils to accustom themselves to express their thoughts in the form of letters. Let the letters be real; I mean, let them be written, not as exercises in composition, but on some business, and to some friend or acquaintance. Your chief want at first, as I have before intimated, is the want of matter. "I don't know what to say," is a complaint with young composers no less true than embarrassing. You will find something to say if you take your pen in hand, and sit down to address a few lines to an absent friend. Only do not attempt anything great or fine. Be simple. Consult your heart, if your head is silent. Just say what occurs to you, without being anxious whether it is very wise or very foolish; whether it is trivial or important. Specially would I advise my pupils to correspond once with another. For instance, say that a young man in Exeter writes a letter to a former companion who has gone to reside at Bristol. Let him say to his friend A. at Exeter, the two continue to interchange letters. If they have nothing else to write about, they may write about these lessons. Let them endeavour to give each other aid in their study of the English language. Let them freely and kindly criticise each other's letters. Let them ask and give explanations. Let A. correct B.'s exercises, and let B. do the same for A. Let them make the letters they will both read, with a view to make in writing and submit to each other remarks on the composition. For this purpose I would suggest to them the Spectator, in which they will find many papers by Addison and other eminent writers.

In this counsel I have mentioned young men, by no means intending to exclude young women. Most desirous am I that young women should receive a good education. Most necessary to them, as being the future mothers of our land, is a good education. A far better education ought they to receive than the best which they do receive. But to be well-educated they must be self-educated. Let young women then consider themselves specially addressed in the lessons I supply, and the advice I give.

LETTER I.

FROM DEAN SWIFT TO THE REV. WILLIAM DRAPER.

To the Rev. Mr. William Draper,
Dean, near Bungisslake, Hampshire.

London, April 13, 1713.

Sir,—I am ashamed to tell you how ill a philosopher I am, and that a very ill situation of my affairs for three weeks past made me utterly incapable of answering your obliging letter, and thanking you for your most agreeable copy of verses. The prints will tell you that I am condemned again to live in Ireland; and all that the court and ministry did for me, was to let me choose my situation in the country where I am banished. I could not forbear showing both your letter and verses to our great men, as well as to the men of wit of my acquaintance; and they were highly approved of by all. I am altogether a stranger to your friend Opilian, and am a little angry when those who have a genius lay it out in translations. I question whether "Res angusta domi!" (narrow means) be not one of your motives. Perhaps you want such a bridle as translation, for your genius is too fruitful, and appears by the fragments; and this employment may teach you to write like a modest man, as Shakespeare expresses it.

I have been minding my Lord Bolingbroke, Mr. Harcourt, and Sir William Wartham, to give you a living; as a business which belongs to our society, who assume the title of warders of merit. They are very well disposed, and I shall not fail to negotiate for you while I stay in England, which will not be above six weeks; but I hope to return in October, and if you are not then provided for, I will move heaven and earth that something may be done for you. Our society has not met of late; else I would have moved to have two of us sent in form to request a living for you from my lord chancellor, and if you have any way to employ my services, I desire you will let me know it; and believe me to be very sincerely,

Sir,
Your most faithful, humble servant,

Jonathan Swift.
LETTER II.

FROM CHARLES LAMB TO SAMUEL TAYLOR COLERIDGE.

[Giving a detailed account of the death of his mother, who was stabbed by his sister, in a fit of delirium.]

October 3rd, 1796.

My dearest Friend,—Your letter was an inestimable treasure to me. It will be a comfort to you, I know, to know that our prospects are somewhat brighter. My poor dear, dearest sister, the unhappy and unfortunate instrument of this most frightful misfortune, is, for a time, restored to her senses; to a dreadful sense and recollection of what has passed, awful to her mind and impressive (as it must be to the end of life), but tempered with religious resignation, and the resonances of a sound judgment, which, in this early stage, shows how to distinguish between a deed committed in a transient fit of frenzy, and the terrible guilt of a mother’s murder. I have seen her. I found her, this morning, calm and serene; far, very far from an indiscreet, inconsiderate, instrument of the like, as directly evil as what had caused it. I have seen for what has happened. Indeed, from the beginning, frightful and hopeless as her disorder seemed, I had confidence enough in her strength of mind and religious principle, to look forward to a time when even she might recover tranquillity.

God be praised, Coleridge, wonderful as it is to tell, I have never once been otherwise than collected and calm; even on the dreadful day, and in the midst of the terrible scene, I preserved a tranquillity which bystanders may have construed into indifference—a tranquillity not of despair. I felt, I know, that it was a religious principle that most supported me. I allow much to other favourable circumstances. I felt that I had something else to do than to regret. On the first evening (September 22nd), my aunt was laying insensible, to all appearances like one dying; my father, with his poor forebodings, plastered over, from a wound he had received from a daughter dearly loved by him, and who loved him no less dearly,—my mother, a dead and murdered corpse in the next room,—yet I was wonderfully supported. I closed not my eyes in sleep that night, but lay without tears and without despair. I have lost no sleep since. I have been long used not to rest in things of sense,—had endeavoured after a comprehension of mind, unsatisfied with the ‘ignorant present time,’ and this kept me up. I had the whole weight of the family thrown on me; for my brother, Little抵御, speaking not without tenderness, had left it. I have read to him, played at cribbage with him (for so short is the old man’s recollection, that he was playing at cards as though nothing had happened, while the coroner’s inquest was sitting over the way)! I have been his confidant, and his mind, and brought him comfort. All the people I ever saw or heard of, my poor sister was most and thoroughly devoid of the least tincture of selfishness. I will enlarge upon her qualities, poor dear, dear soul, in a future letter, for my own comfort, for I understand her thoroughly; and, if I missed anything different, I am speaking not with sufficient duration of that he will be found (I speak for him) at any time to take care of old age and infirmities, had now, with his bad leg, an exemption from such duties, and I was now left alone.

I mention these things because I hate concealment, and love to give a faithful journal of what passes within me. Our friends are very good. Sam Le Grice, who was then in town, was with me the first three or four days, and was as a brother to me. He gave up every hour of his time, to the very hurting of his health and spirits, in constant attendance and humouring my poor father; talked with him, read to him, played at cribbage with him (for so short is the old man’s recollection, that he was playing at cards as though nothing had happened, while the coroner’s inquest was sitting over the way)! Of all the people I ever saw or heard of, my poor sister was most and thoroughly devoid of the least tincture of selfishness. I will enlarge upon her qualities, poor dear, dear soul, in a future letter, for my own comfort, for I understand her thoroughly; and, if I missed anything different, I am speaking not with sufficient duration of that he will be found (I speak for him) at any time to take care of old age and infirmities, had now, with his bad leg, an exemption from such duties, and I was now left alone.

C. LAMB.

LETTER III.

FROM LADY MARY WORTLEY MONTAGU TO HER SISTER, THE COUNTESS OF MAR.

[Giving a brief description of her journey from Ratisbon to Vienna, and some account of the last-named city.]

Vienna, September 8th, 1716.

I am now, my dear sister, safely arrived at Vienna; and, I thank God, have not at all suffered in my health, nor (what is dearer to me) in that of my child, by all our fatigues.

We travelled by water from Ratisbon, a journey perfectly agreeable, down the Danube, where those ocean vessels are so fine that they very properly call wooden houses, having in them almost all the comforts of a palace—stoves in the chambers, etc. They are rowed by twelve men each, and move with an incredible swiftness, that in the same way you have the pleasure of a vast variety of prospects; and, within a few hours’ space of time, one has the different delight of seeing a populous city adorned with magnificent palaces, and the most romantic solitudes, which appear distant from the commerce of mankind, and as if the hands of beings diversely diversified with woods, rocks, mountains covered with vines, large cities, and ruins of ancient castles. I saw the great town of Passau and Lintz, famous for the retreat of the Imperial Court when Vienna was besieged.

This town, which has the honour of being the Emperor’s residence, did not at all answer my idea of it, being much less than I expected to find it; the streets are very close, and so narrow one cannot observe the fine fronts of the palaces, though many of them very well deserve observation, being truly magnificent, all built of fine white stone, and excessively high. The tall towers of the churches being so narrow, the lower rooms are extremely dark, and what is an inconvenience much more intolerable, in my opinion, there is no house that has so few as five of six families in it. The apartments of the greatest ladies, and even of the sires of state, are divided by a partition from that of a tailor or a shoemaker. And I know nobody that has above two floors in any house, one for their own use, and one higher for their servants. Those who have houses of their own, let out the rest of them to whoever will take them; thus the great stairs (which are all of stone) are so near the partitions, that people who are not made known by some particular pleasure in communicating them to my dear sister.

EXERCISES IN COMPOSITION.

1. Form sentences, each having in it one of the following words:

- Debts; light; sing; come; health; water; sky; home; day; night; lark; rose; Victoria; Mary; Henry; mother; bread; England; wife; buttercup; linen; daisy; stone.

2. Give brief descriptions of the following objects and places:

- A chair; a wheel of a coach; a kite; a waterpot; an oak-tree; the room in which you write; and the place where you work.

3. Write historical themes on the following subjects:

- 1. The patriarch Abraham’s visit to Egypt.
- 2. The battle of Hastings.
- 3. The conversion of St. Paul.
- 4. The murder of Thomas a Becket.

4. Write letters on the following subjects:

- 1. A letter of confidence to an intimate friend on the death of a near relation.
- 2. A letter to a friend in town, inviting him to pay you a visit in the country, and describing the scenery of the neighbourhood in which you live.
- 3. A letter of thanks to a gentleman who has enabled you to obtain a situation in a house of business by his recommendation.
LESSONS IN PENMANSHIP.—XI.

Due attention to the instructions that have been given in the preceding lessons in the art of Penmanship, and assiduous practice for about an hour a day, will have rendered any one, who is endeavouring to learn to write from our copy-slips, a tolerable proficient in making letters, composed of right or straight lines, or lines that are commenced, or finished, or commenced and finished, as in the case of the top-and-bottom-turn, with a hook or turn.

A great number of copies, consisting of letters of this kind, have been supplied to give the learner a sufficient variety in the words or combinations of letters that he is copying, and to give him confidence in his power to make the four strokes which enter into the formation of by far the greater part of the letters of the writing alphabet, before he begins to make the remaining elementary strokes, which are of less frequent occurrence. The practice that he has now had, and the knowledge and amount of skill in writing that he has already acquired, will enable him to advance more rapidly, and we shall proceed as quickly as possible to the end of our elementary lessons in the formation of the small letters of the writing alphabet, as exhibited in large text, giving fewer copies than we have hitherto done, for the sake of affording practice in the formation of each particular letter in combination with others.

In Copy-slip No. 35 the learner’s attention is directed to the letter 0, which is a complete and perfect letter in itself, while, at the same time, it may be considered as a simple elementary form, since it enters into the composition of the letters a, d, and q. It also influences the formation of many other letters of the alphabet, as the learner will see hereafter; but for the present it will be sufficient to deal with those into whose formation it enters without any alteration or modification whatever.

The letter 0 is purely a curved letter, for no portion of it consists of a perfectly straight stroke, as the other letters which have already been brought under the reader’s notice. It may be commenced on the straight line c c, but it is better to begin and end the letter at the point x, a little above the line, and it is from this point that a fine hair-line is carried to the right, when it is necessary to connect the letter 0 with any letter that may follow it, as the learner will see in Copy-slip No. 40. Commencing, then, at the point x, the hair-line, of which the right side of the letter consists, is carried upwards to the line a a, and then turned to the left and brought downwards. By a gradual pressure on the pen the hair-line is now turned into a thick stroke, which attains its broadest part at the line c c, when the pressure of the pen is relaxed, and the thick down-stroke is gradually narrowed again into a hair-line, which is turned upwards towards the right and joined to the hair-line with which the letter was commenced at the point x. The learner will notice that the upper part of the letter 0, which lies above the line c c, is the only portion of the letter that is really new to him, for the lower part of the letter is very nearly the same as that portion of the bottom-turn or top-and-bottom-turn which is below the line c c.

In Copy-slip No. 36 the letter 0 and the bottom-turn are given. These strokes, in combination from the letter a, as in Copy-slip 37, the bottom-turn being appended to the letter 0 in such a manner that the point where the hair-line forming the right side of the letter cuts the line c c lies in a line passing along the centre of the thick down-stroke of the bottom-turn. The letters d and q are formed by adding modifications of the bottom-turn to the letter 0, as shown in Copy-slips 38 and 39.
LESSONS IN FRENCH.—XL

SECTION I.—FRENCH PRONUNCIATION.

IV. NAME AND SOUND OF THE CONSONANTS.

58. P, p.—When initial, and in the body of words, p is usually sounded; and then it has the sound of p in English. When final, it is generally silent. Exceptions will best be found out by consulting a French dictionary.

59. Q, q.—Q is pronounced like the English k.

60. R, r.—The sound of this letter is somewhat peculiar, having a rolling or jarring sound, produced by vibrating the tip of the tongue against the roof of the mouth, near the upper front teeth. It is never sounded in the French words messieurs and monsieur.

Its sound in other respects is that of English r. It is often dropped, or nearly so, in the body of a word, but especially in the last syllable, in common conversation, namely:

- Notre as if printed Nôtre.
- Vôtre " Vôtre."

But in solemn and dignified reading or speaking it is sounded very distinctly (when at all), with the rolling sound.

61. S, s.—S has two distinct sounds, which are determined by its position, viz.—the sharp, hissing sound of s in the English words discover and kiss, and the soft sound of s in the English word nose, equivalent to the English letter r. It has the sharp and hissing sound whenever it is initial.

It has the soft sound whenever it occurs between two vowels, namely:

- French: Pronunciation. English:
  - Baptiser Ba-tee-zay To baptise.
  - Basrer Bah-zay To base (upon).

There are, however, a few exceptions to the above rule. S final, before another word commencing with a vowel or h mute, has the sound of the English s, and is connected with the following word in pronunciation, as if its were its first letter, namely:

- Après avoir diné as if printed Apray zavoir dîné.
- Dîs à mon frère de venir, " Dîs à mon frère de venir.
- Pas excusable, " Pas zexusable.
- Vous avez, " You avez.
- Vous étonnez, " Vous zétomnez.

S final, under other circumstances, is usually silent, namely:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avis A-vee Advertise-</td>
<td>Adver-</td>
</tr>
<tr>
<td>Dés Daz From</td>
<td>From</td>
</tr>
<tr>
<td>Divers De-vair Various</td>
<td>Various</td>
</tr>
<tr>
<td>Jacques Zhahk James</td>
<td>James</td>
</tr>
<tr>
<td>Judas Zhu-da Judas</td>
<td>Judas</td>
</tr>
</tbody>
</table>

In a few words s final is sounded. Refer to the dictionary for these.

62. T, t.—T, or in the body of a word, is usually pronounced like English t. Sometimes, however, both in the body and in the last syllable of words, it has the sound of English s in the word see, namely:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution Ko-soon</td>
<td>Caution</td>
</tr>
<tr>
<td>Démocratie Day-mo-kra-see</td>
<td>Democracy</td>
</tr>
<tr>
<td>Inertie E-say-see (first syll. short)</td>
<td>Folly</td>
</tr>
<tr>
<td>Inertie E-say-see (first syll. short)</td>
<td>Inertity</td>
</tr>
<tr>
<td>Minuitte Mn-noo-see</td>
<td>Frîse</td>
</tr>
<tr>
<td>Patience Pa-so-nahs</td>
<td>Patience</td>
</tr>
<tr>
<td>Primaire Pr-moe-see</td>
<td>Primacy</td>
</tr>
<tr>
<td>Prophétie Pr-fay-see</td>
<td>Prophecy</td>
</tr>
<tr>
<td>Satisfité Sa-so-see-tay</td>
<td>Society</td>
</tr>
</tbody>
</table>

In a few other words, the t in the last syllable of the and toer has the common sound of English t. Refer to the French dictionary for their pronunciation.

T final is usually silent, and is seldom carried to the next word in pronunciation.

63. Z, z.—In all situations, z has the sound of English v.

64. W, v.—W is not properly a French letter. It is not found in the French alphabet, though it is sometimes used in foreign words, names of persons, places, and things. When thus used it has the sound of English v. The proper name Newton, however, is printed in French Newton; and, with the exception of the last syllable, which has the nasal sound, the pronunciation of the whole word does not differ from its English pronunciation.

65. X, x.—This letter has different sounds in the French language, as in English. It has five different sounds, namely:

1. Like the English letter k, in the following words:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excès Ek-sey</td>
<td>Excess</td>
</tr>
<tr>
<td>Exception Ek-seep-soonesh</td>
<td>Exception</td>
</tr>
<tr>
<td>Excédé Ek-see-tay</td>
<td>Exceed.</td>
</tr>
</tbody>
</table>

2. Like the English letters ks, in the following words:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axe Ak</td>
<td>Axe</td>
</tr>
<tr>
<td>Axionne Ak-so-one</td>
<td>Axion</td>
</tr>
<tr>
<td>Axiomètre Ak-so-o-maiz</td>
<td>Tell-tale (naval term)</td>
</tr>
<tr>
<td>Expédier Eks-pay-day</td>
<td>To dispatch</td>
</tr>
<tr>
<td>Expérimenter Eks-pro-may</td>
<td>To press out</td>
</tr>
<tr>
<td>Extase Eks-tahz</td>
<td>Euphony</td>
</tr>
<tr>
<td>Extérit Eks-tray</td>
<td>Extract.</td>
</tr>
<tr>
<td>Luxe Luks (short u)</td>
<td>Luxury</td>
</tr>
</tbody>
</table>

Ex, before a consonant, has the sound of cks, as in the foregoing examples.

3. Like the English letters gr, in the following words:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excrèce Eg-zaekt</td>
<td>Corrosion</td>
</tr>
<tr>
<td>Exagérer Eg-za-zhay-ray</td>
<td>To exaggerate.</td>
</tr>
<tr>
<td>Exalter Eg-zal-tay</td>
<td>To exalt.</td>
</tr>
<tr>
<td>Exécuable Eg-zay-krab</td>
<td>Executable.</td>
</tr>
<tr>
<td>Exode Eg-zod</td>
<td>Exodus</td>
</tr>
<tr>
<td>Exode Eg-zord</td>
<td>Beginning.</td>
</tr>
</tbody>
</table>

4. Like English ss, in the following words, when alone, or when preceding a word beginning with a vowel or h mute:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dix Doss</td>
<td>Ten</td>
</tr>
<tr>
<td>Six Sesse</td>
<td>Six</td>
</tr>
<tr>
<td>Soixante S-wah-saht</td>
<td>Sixty</td>
</tr>
</tbody>
</table>

5. Like English z, in the following words:

<table>
<thead>
<tr>
<th>FRENCH. PRONUN.</th>
<th>ENGLISH.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deuxième Doo-see-yam</td>
<td>Second</td>
</tr>
<tr>
<td>Dix-huit Dee-zew-eight</td>
<td>Eighteen.</td>
</tr>
<tr>
<td>Dixième Dee-zee-yam</td>
<td>Tenth.</td>
</tr>
</tbody>
</table>

X final is silent in many words, except proper names.

X final, when carried to the next word in pronunciation, has the sound of English z, namely:

- Aux hommes as if printed Auz hommes.
- Doux et " Doux et.
- Jalous et " Jalous et.
- Voix en " Voiz en.

66. Z, z.—Z is usually sounded like English s.

Z final, before a word commencing with a consonant, is silent.

Z final, before a word commencing with a vowel or h mute, is carried to the next word in pronunciation, as if it were its first letter, namely:

- Essayez en as if printed Essayez-zen.
- Lisez-un " Lisez-un.
- Songez à " Songez-à, etc.

SECTION XIV.—LIST OF WORDS FOR EXERCISES IN COMPOSITION (concluded).

17. TOOLS—TOOLS.

<table>
<thead>
<tr>
<th>French.</th>
<th>English.</th>
</tr>
</thead>
</table>
| Aline, f. av. | Adven-
| Balance, f. scale | ture. |
| Béche, f. spade | Adver-
| Bouce, f. brush | ture. |
| Branche, f. eabbarrow | eabbarrow. |
| Cachet, m. scent | Clair, f. wax. |
| Carabine, f. rifle | Climax, f. climax |
| Charrue, f. plough | Cognec, f. hatchet. |
| Chevalet, m. cænzel | Colle, f. glue. |
| Cire, f. wax. | Compas, m. compasses |
| Cognec, f. hatchet. | Schaffuagage, m. m. scurfolding |
| Colle, f. glue. | Schelle, f. ladder. |
| Compas, m. compasses | Endarme, f. cænzel. |
| Schaffuagage, m. m. scurfolding | Etan, m. wic. |
| Endarme, f. cænzel. | Pincelle, f. sketch. |
| Etan, m. wic. | Pincerts, f. pl. pinsces. |
| Pincelle, f. sketch. | Trousse, f. travel. |
| Pincerts, f. pl. pinsces. | Vis, f. screw. |
19. Thémes Précieuses.—Précieuses Stones.

Ptéryx, f., agate.
Amphitrite, f., amethyst.
Cornall, m., coral.
Cornaline, f., carnelian.
Diamant, m., diamond.
Emeraude, f., emerald.
Bancrboche, f., carbuncle.
Grenat, m., garnet.

18. Minéraux et Métaux, etc.—Minerals and Metals, etc.

Acier, m., steel.
Aimant, m., lodestone, magnet.
Aluminium, m., bronze.
Alum, m., alum.
Antimoine, m., antimony.
Argent, m., silver.
Arsenic, m., arsenic.
Brome, m., bromine.
Chaux, f., lime.
Craie, f., chalk.
Cuivre, m., copper.
Étain, m., tin.
For, m., iron.

SECTION XX.—The Four Conjugations of Verbs.

1. The four classes, or conjugations, into which the French verbs are divided, are distinguished by the endings of the present of the infinitive [§ 44]. The first conjugation ends in -er, as chanter, to sing; donner, to give; parler, to speak; chercher, to seek.

The second conjugation ends in -ir, as désirer, to desire; punir, to punish; munir, to provide with, to furnish, to finish.

The termination of the infinitive of the regular verbs of the third conjugation is -oir, as, devoir, to owe; recevoir, to receive; that of the irregular verb is -ir, as, valoir, to be worth.

The fourth conjugation ends in -er, as render, to render; tendre, to stretch; tendre, to stretch.

2. A verb preceded by another verb (other than the auxiliaries avoir and être), or by a proposition (other than en), is put in the present of the infinitive—

Il va travailler à l'écriture.

He is going to work or to read.

3. In French, verbs are often connected with others by prepositions not answering literally to English, which accompany the same verbs in English. They also often come together without prepositions. The student will find, in § 129, and the following Sections of Part II. of these Lessons, lists of verbs, with the prepositions which they require after them.

4. The following idioms are followed by the proposition de when they come before a verb [§ 132]:—

Avoir besoin, to want.
Avoir coutume, to be accustomed.
Avoir besoin, to need, to desire.
Avoir envie, to have a wish, a desire.
Avoir honte, to be ashamed.
Avoir intention, or the Intention, to intend.
Avoir le courage, to have courage.

5. The following are examples of the use of the proposition after the above idioms:—

Cet enfant a besoin de dormir.
Vous avez honte de courir.

RÉSUMÉ DE VERBES

Avez-vous quelque chose à dire?
Je n'ai pas de lettre.
Votre père n'a-t-il rien à écrire?
Elle a une lettre à écrire.
A-t-il le temps de les écrire?
Elle n'a pas de temps.
Avez-vous de la peine à écrire?
Je n'ai pas de peine.
Votre cousin a raison de sortir.
N'avez-vous pas de quoi écrire?
Avez-vous le courage d'aller à la guerre?

EXEMPLES.

Avez-vous quelque chose à dire?
Je n'ai pas de lettre.
Votre père n'a-t-il rien à écrire?
Elle a une lettre à écrire.
A-t-il le temps de les écrire?
Elle n'a pas de temps.
Avez-vous de la peine à écrire?
Je n'ai pas de peine.
Votre cousin a raison de sortir.
N'avez-vous pas de quoi écrire?
Avez-vous le courage d'aller à la guerre?
sirable—kicking forwards, backwards, or in a straddling position; raising the knees and then extending the legs downward, and so on. The position of the hands may be changed, the bar being held with the grasp reversed, or the arms crossed while the same movements are practised. And the learner should include the hanging by either hand alternately among these elementary exercises, to which it is necessary to be perfectly accustomed before attempting the higher rack movements.

The position taken by the body in Fig. 13 is called hanging sideways. To hang crossways the gymnast must, in starting, turn his back to one of the supports, and grasp the bar either hand over hand, or one hand before the other, while he has the length of the bar in front of him. This distinction between sideways and crossways it will be necessary to bear in mind. While hanging crossways, practise such of the movements previously mentioned as are suited to the altered position.

2. When familiar with the preliminary exercises, the learner will proceed to the more difficult, commencing with the rising and sinking movement, and practising it until he is sufficiently expert to be able to bring the body above the bar, to rest upon the hands while the bar is level with the thighs. This is called rising into the rest, or resting position. A jerk and a spring of the legs will at first be required in the progress upward, and it will be facilitated by passing in an intermediate position, known as the drop rest. This is reached when the bar is level with the pit of the stomach, the arms being bent upward, ready for the completion of the rise. Or the rest may be attained by the help of a swinging movement, first backwards and forwards two or three times, and then taking advantage of the next backwards spring upwards towards the resting position. The rise may also be practised with the bar behind the gymnast, but this is a more difficult feat.

3. Circling the bar should be performed with the bar at the height of the chest or shoulders. It consists, as will probably be understood from the name, in turning a summersault completely over the bar, and is not difficult when the swinging and rising movements have been well practised. Grasping the bar firmly, the gymnast starts from the ground with a spring, throws the legs upwards, and bending the arms, turns by the impetus which the spring and the throw give to the body. He may next turn from the swinging position, without touching the ground, and should practise both the forward and the backward circle.

4. The circling movement is defined by the dotted line in our next illustration (Fig. 14), which also shows one method of practising the next series of exercises, namely, hanging by the arms. The gymnast may hang either by the armpits, as in the cut, or by the elbow joints; but in the latter case he will lack the necessary purchase for the performance of such feats as the circle. He should, however, practise each method, in order to strengthen all the muscles of the arm alike.

5. At present, in holding the bar we have exercised the arms exclusively. But the legs also may be employed for this purpose. Commence by hanging crossways with the hands, then swing one leg over the bar, so that it is held firmly in the hook. If it is intended to place the right leg over the bar, the right hand should be held foremost, and vice versa. After one leg has been hooked on, the hands may be brought nearer together, and the other leg passed over the bar. Travel, then, along the bar from end to end.

6. Hang crossways with the right hand in front, and bring over the right leg; then advance the left hand nearer to the right, and remove the right hand to the other side of the leg. The position is then sideways to the bar, with one leg over it, and the knee between the hands. This is a convenient position for a variety of movements—swinging, twirling, etc.

7. From the resting posture, performed release the left hand, holding firmly on with right arm and leg, and pass the left leg over; then bring up the left hand. The position will then be sideways, both hands and both legs over the bar, and the knees between the hands. From this you may easily rise to the sitting position on the bar, sinking again and again, until you have practised the movement sufficiently.

8. From the sitting posture, perform twists both backward and forward; for the backward twist grasping the bar in the ordinary manner, with the knuckles forward; and for the forward twist, holding it with the grasp reversed.

9. When both legs are over the bar, as described in No. 7, release the hold of the hands, first one and then the other, and hang by the hooks, with the head downwards. Recover from this position by a swing to and fro, to give an impetus, grasping the bar as the body rises. This exercise should only be attempted by the learner who has attained some degree of proficiency in the foregoing movements, and has become familiar with this form of "practice at the bar." general.

10. The lower exercises upon the bar are accomplished in the following manner:
Grasping the bar firmly, with the hands in the position known as the drop-rest, and throwing all the weight upon the arms, gradually raise the body until it extends in a horizontal position between the bars. You may then move the body from side to side, as upon a pivot, but being careful to keep the legs close together and fully extended.

11. After the learner can perform the last exercise, resting upon both arms, he may attempt one described next, called stretching forward on the same level as the rest of the body. These exercises will try the wrists, but may be safely attempted by the learner who has gone through the preliminary movements.

12. It is an easy matter to descend from the last position described to that known as lying upon the bar. In this the stomach alone must rest upon the bar, the body being properly balanced and fully extended, somewhat as if in the act of swimming. But lying with the back upon the bar is much more difficult, and it is well not to attempt this feat unless, as in a properly-conducted gymnastic school, some one or two persons are left to prevent your falling in case of failure. But, with caution, there is very little hazard of injury, and in practising movements of this kind for the first time it is well to have the bar fixed at a moderate height only from the ground.

Very expert gymnasts—more expert than our readers are likely to desire to be, or, perhaps, than it is advisable they should become—are able, from the last named positions, to twirl a summersault, alighting easily upon the feet. But no useful end can be served by the practice of hazardous experiments of this kind, and therefore we wish to be understood as in no way recommending them to our readers, although we include them in this list of exercises, the accomplishment of which may occasionally be witnessed.

We have now described the principal varieties of the exercises on the horizontal bar; but, to the learner who is partial to practice with this contrivance—and it is a general favourite—many other movements will suggest themselves. Those which are simple in character are frequently the best, for, in increasing the difficulty of the performance, there is not necessarily a proportionate advantage in physical development and the acquisition of bodily strength.

We come next to the Parallel Bars, reserving these exercises for another paper.
which this principle was vindicated in England was in 1401, and the man who was the first martyr to the cause of free conscience in England was William Sautrè, a harmless, inoffensive man, the rector or curato of St. Osyth's Church, London.

William Sautrè was one of a numerous body who had been stirred to the very bottom of their hearts by the teaching of John Wycliffe or Wickliffe, and his followers. Wycliffe had taught with such boldness as ability—his enemies said with more—that certain doctrines inculcated by the clergy of the day were erroneous, and contrary to the teachings of our Lord and his apostles; he taught that the Bible was the only standard by which men might measure the truth or falsity of their creeds; and he denounced in emphatic and somewhat rough language, the vices and corruptions which had infected the clergy, especially the clergy in monasteries. Upon these topics Wycliffe preached with considerable effect at Oxford, where he was a professor, and in many other places. Attempts were made to silence him, but he spoke on and spoke out, and, strong in the protection of John of Gaunt, the Duke of Lancaster, brother to the Black Prince, and uncle to King Richard II., managed to weather the several storms which his opinions brought upon him. He was arraigned more than once before spiritual tribunals, and many of his opinions were declared to be erroneous, and many more were condemned as heretical, by an assembly of Church magnates. Ecclesiastical censures, however, were the only weapons with which the spiritual courts could enforce their decrees, and Wycliffe was suffered to die a natural death at his rectory of Lutterworth, in Leicestershire, whither he retired after a life of unceasing toil and labour in aid of what he deemed to be the truth.

After the death of Wycliffe, the spirit which had animated him passed into the breasts of his disciples, "the poor preachers," who went about with the English Bible (a new and forbidden article) in their hands, and preached so convincingly and cheerfully that, as was seen in the ministry of our Lord, "the common people heard them gladly." The attention of the Church authorities was soon drawn to them, and letters called bulls (on account of the bull, or lead seals, which were attached to them) were sent from the Court of Rome, addressed to the Archbishop of Canterbury and the English bishops, to the University of Oxford, and to the king, commanding them each and all to help in suppressing the heretics, and in uprooting the tares (the Latin word for tare is Allenum, from which the nickname "Lollard" was afterwards derived and affixed to the reformers), which, while men slept, the enemy had sown in the garden of the Lord.

Edward III., who died in 1377, was not the king to busy
himself overmuch in such matters, unless the reformers in religion loved to meddle themselves to be reformers in the State also; but Richard, his grandson, these exhortations of the Pope appeared in the light of a duty. Richard agreed to a law which was passed through a Parliament of which the Upper Chamber was at that time far more powerful than the Lower, and was composed of more spiritual than lay peers, by which it was ordered that preachers of heresy should be apprehended and imprisoned till they will justify them according to the law and reason of Holy Church." No other punishment of a penal nature was permitted during this reign (1377-1399); but when Henry IV. in 1399 usurped the throne, and wanted the support of the clergy to back his bad title, he consented, as the price of their assistance, to a law called the Statute of Hiresse, which was intended to crush, or rather to strangle, the Wycliffites, who had numbered in numbers and audacity during the late king's reign, and were leading many out of the fold of the Catholic Church. The Wycliffites no more wanted to go out of the Catholic Church than John Wesley wanted to go out of the Church of England; but the Catholic Church said to them as the Church of England in effect said to him, "Holding opinions such as these, you are not of us, and we will have nothing to do with you while you continue to hold them."

Had the Catholic Church stopped there, no one could have complained. Perfect liberty of conscience requires that men shall be free to choose what tenets they will embrace and what reject, but it forbids them to go farther and say to those who escape the rule of God's laws, "Think as we do, or we will not see you any more." The Church of the day would not act upon the advice given by Gamaliel to the Jews, who wished to persecute the apostles: it could not bear the idea that any one should presume to differ from what almost all Christendom accepted as true. Believing firmly that acceptance of all that the Church taught, and in the system of government which the Church established, was absolutely necessary, she was grieved beyond measure at the sight of her children going astray, and deemed any means, however violent, to be more than justified by the laudable end of bringing back the wanderers. She hoped to make such an example as would deter fresh truants, and she hoped even for the offenders that God would accept the sufferings she inflicted upon them as an atonement for the sins they had committed against Him, supposing Him to be represented by the Pope and the Roman Church.

How easily does fanaticism of any kind cheat itself into the belief that its cause is God's cause, and that to persecute its own opponents is to do God service. The Church accordingly pronounced from the king in the year 1400 his assent to a law passed by a body of his especial friends, Walsingham, chronicler, he was aware beyond measure of the sufferings of the children of God, and he permitted, though he did not approve, that persons who refused to renounce their so-called errors, or relapsing after they had so renounced them, were to be given over by the spiritual authorities to the sheriff, who "the same persons after such sentence promulgate shall receive, and them before the people in a high place see to be burned, that such punishment might strike fear into the minds of others, whereby no such wicked doctrine, and heretical and erroneous opinions, nor their authors, nor factotus (an old English word meaning favourites) in this realm and dominions against the Catholick faith, Christ's law, and determination of Holy Church be sustaine or in any wise sufferd." This infamous and dreadful law was the price paid by Henry for the support of the clergy, and the clergy, as has been suggested, believed they were only doing their duty when they procured the king's signature to the act. For awhile the new power remained like a sword in its sheath; the clergy were almost afraid to handle the new weapon, till taking it out and looking at it with curious and admiring eyes, they perceived that they themselves were not called upon to do any of the direct work. They were merely to find guilty or not guilty; upon the sheriff dorsal the invincibility of the facts which grew bolder, and the year following that in which the act was passed, the Convocation of the province of Canterbury—an assembly of which all the bishops and abbots were members, and in which the inferior clergy appeared by their representatives—determined to draw the sword against those who distanced from their religious opinions.

Some persons who were brought before them were so terrified at the danger of standing firm that they renounced and renounced their belief rather than to go to the stake. Let no man mock them for their weakness, but rather pity them, as men who might excusably fear lest they should be doing wrong in departing from the faith as delivered to them and as taught by the existing Church, which was presumed to have the Holy Ghost for its guide, and as men—many of them fathers and husbands—who feared to wrench asunder the ties which bound them to this world, who looked in their children's faces, and who listened to the entreaty of their wives, and then failed to pronounce the words which would make the children fatherless and the wives widows. Others there were, cast in another mould, who by their nature could not accept life as the price of their creed, who looked upon the offer with scorn, and asked if that were all they were to have in exchange for their souls. Equally enthusiastic with their persecutors, though in another direction, they made this matter "very stuff o' the conscience," and resolutely refused to abjure. Not among the physically strong only were these men found; indeed, the delicate and sensitive, and the men with highly strung nerves, were the boldest and most courageous professors of their faith. Such esteemed the claims of wife and child, of kindred and friends, as merely so many temptations, strong temptations no doubt, which must be overcome, and they pointed for their justification to the words of the Saviour, where He declared that the man who loved wife and children and friends more than Him, was not worthy of Him, and they clung exultingly to the assurance, "There is no man that hath left house, or parents, or brethren, or wife, or children, for my sake, and the gospel's, but he shall receive a hundredfold now in this present time, and in the world to come life everlasting!"

Of this class was William Sautyre, priest of St. Otth's. It is not told us if he was a married man (the rule by which celibacy was the appointed lot of the clergy was not yet of universal application)—indeed, the chroniclers of the time speak very little about it. The man for whom William Sautyre was a monk of St. Alban's, merely mentioning that "a certain false priest was burnt in Smithfield in the sight of many people." But married or not, he seems to have been a very good and honest man, bold to speak and preach the truth, according to his vision of it, in his parish church of St. Otth, Wood Street, in the City of London. His character, as far as we know it, or can judge of it from his behaviour before his judges and at his execution, would seem to have been not unlike that of the "poor parson of a town," of whom Chaucer wrote in 1380.

"To draw folk to heaven by fairness,
By good example was his business.

... A better priest I know there nowhere none is.
He waited every man's hour to do what was right.

No made him a spiced conscience,
But Christ's love and His apostles' worth
He taught, and first he followed it himself."

His opinions, however, openly expressed, were in direct opposition to what the Church authorities permitted, and were in strict accordance with the teaching of Wycliffe. He was cited to appear before his bishop, the Bishop of London, and was ordered to renounce his error; but this proceeding proving ineffectual, and his preaching continuing to attract many, he was summoned before the Convocation of the province of Canterbury, and put upon his trial for heresy, as in a court of justice.

Earnestly the charge was pressed, and boldly was it met, till agreeable to the defence he was accused of writing with invective the prosecution, and the prisoner stood unaided with obliquity. This, however, was not hard for a man like Sautyre to bear; the most difficult and trying part for him, the real temptation, lay in the entreaties of his friends—and they were many—and the friendly prayers even of his judges, that he would be converted and live. But even against such mighty leaders the man's mind was proof. "Whether his right hand or left hand, or the name of God, or his heart, unto you more than unto God, judge ye," was the answer he gave back, and nothing could persuade him but that he spoke by the inspiration of God.

Faithful as his friends called him, obstinate heretic as his enemies called him, William Sautyre was ready to die, if need were, for his religion. Horrible to relate, that sacrifice was required of him. The men who were supposed to represent to
LESSONS IN GERMAN.

LESSONS IN GERMAN.—XI.

SECTION XX.—POSSESSIVE PRONOUNS.

The possessive pronouns mein, sein, etc., as already seen (sect. XIV.), are rendered absolute possessives by means of the characteristic endings er, etc. (§ 58. 4).

1. The possessive pronouns are likewise converted into absolute possessives by prefixing to them the definite article, and suffixing the terminations er, etc., as:—Mein Haus ist mir, mein trinken ist für mich; my hat is white, and thine is black. Ihr — ist rechts, und sein ist links = ihr; her ribbon is red, and his is blue.

The termination is more common.  

Observe, that the absolute possessives mein, etc., are inflected like an adjective of

THE OLD DECISION; AS,

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Feminine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Min-er</td>
<td>mein-er</td>
<td>mein-er</td>
</tr>
<tr>
<td>G. Min-oer</td>
<td>mein-oer</td>
<td>mein-oer</td>
</tr>
<tr>
<td>D. Min-em</td>
<td>mein-em</td>
<td>mein-em</td>
</tr>
<tr>
<td>A. Min-en</td>
<td>mein-en</td>
<td>mein-en</td>
</tr>
</tbody>
</table>

Note, also, that those preceded by the definite article, as, in respect to terminational inflection, varied like adjectives (sect. IX. 2) in the same situation; that is, according to

THE NEW DECISION; AS,

<table>
<thead>
<tr>
<th>Masculine</th>
<th>Feminine</th>
<th>Neuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Art min-iger</td>
<td>tier min-iger</td>
<td>dei min-iger</td>
</tr>
<tr>
<td>G. Art min-iern</td>
<td>tier min-iern</td>
<td>dei min-iern</td>
</tr>
<tr>
<td>D. Art min-em</td>
<td>tier min-em</td>
<td>dei min-em</td>
</tr>
<tr>
<td>A. Art min-en</td>
<td>tier min-en</td>
<td>dei min-en</td>
</tr>
</tbody>
</table>

Absolutely possessives as inflected in all genders of

THE PLURAL.

After the Old Declension. After the New Declension.

| R. Min-er | tier min-iern, mine |
| G. Min-oer | tier min-oer, mine |
| D. Min-em | tier min-em, mine |
| A. Min-en | tier min-en, mine |

2. When the absolute possessive pronouns do not relate to some noun previously mentioned, they refer, in the plural, to one’s relatives or family; and in the neuter singular, to one’s property, as:—Das Seine or das Seinig, my property; das Deine or das Deinig, thy property; das Seine or das Seinig, his property; das Ihre or das Ihre, your property, or your relatives; das Ihre or das Ihre, my family, etc. = die Deinen or die Deinig, thy family, etc.; die Seinen or die Seinig, his family, etc.

VOCABULARY.


Evangel. f., pœnulat. Father, m. mistake, error. Father, m. mistake, error. General, m. general.

Got. m. God. General, m. general.

Kant. f. hand. General, m. general.

RéSUMÉ OF EXAMPLES.

Woh MARTIN, etc. Sie, etc. Sie. Wie, etc. Sie. Wie, etc. Sie.


In the same way are treated Dirin, Deine, Dein, thine, and Dein, Deine, Dein, his.

They may likewise refer (when the connection makes the application evident) to dependents, as servants, soldiers, subjects, etc.
LESSONS IN PENMANSHIP.—XII.

In Copy-slip No. 40 the learner will see how the letter o is joined to any letter that follows it, namely, by carrying a hair-stroke to the right from the point a little above the central line, in which point the letter is completed, and a junction effected between the hair-strokes with which the letter is commenced and ended. The position of this point is shown in Copy-slip No. 35 by the letter v, a little above the line c c, to the right of the letter o. There are different modes of beginning the hair-stroke by which the letter o is joined to the letter that comes after it. Sometimes a dot like a period or full-stop is made at that part of the right side of the letter from which the hair-stroke turns off towards the next letter; sometimes the pen is turned round to form a small curved line, open in the centre, like the line which is called the circumference of a circle, or resembling in general appearance the outline of a comma placed thus, c; while in some cases the hair-line is carried on from the letter o without any dot or curved line whatever.

The hair-stroke that is used to connect the letter o with any letter that follows it, influences in some measure the commencement of the formation of letters that begin with the top-turn or top-and-bottom-turn, such as m and n, and some other letters as v and y, which have not yet been brought under the reader’s notice. In our copy-slip we have shown the present lesson, letters commencing with the top-turn have always been begun from the central line that, in all cases we have found it necessary to designate it by letters, has been marked c c, but when they follow the letter o it is manifestly impracticable to commence them at or on this line, and the connecting hair-stroke must be carried to the right and turned with a graceful curve into the hair-stroke of the top-turn about midway between c c and the line immediately above it, which we have always marked a a in copy-slip to which small italic letters have been appended for the sake of explanation. This will be found to be the case whenever letters beginning with the top-turn are joined to letters such as b, f, o, r, s, w, and y, which do not end in a bottom-turn or anything resembling in formation the lower portions of these turns.

The learner may now begin to test his recollection of the forms of the letters he has hitherto been copying from our copy-slip, by selecting words from the Popular Educator, into whose composition those letters only enter with which he has already been made acquainted. There are some that he may select even from the lesson that is now before him, such as top, not, that, dot, and, etc.; although they are not many in number, they are apt sufficient to test his skill in copying words in type, without having the writing alphabet before his eyes.
LESSONS IN FRENCH.—XII.

SECTION I.—FRENCH PRONUNCIATION (continued).

V.—Compound Vowels.

67. There are seven compound vowels, whose different sounds we now proceed to illustrate, viz.:—æ, ou, eau, ci, eu, æ, ou.

A1.—Name, oy; sound, like the letters ay in the English word day.

Ay How. Aye.
Aimer Ay-may To love.
Aumit O-ray Would.

When the last letter of the compound vowel æ is under the circumflex accent, thus, æ, the character of its sound is materially changed from that illustrated above; it is merely prolonged.

A1.—Name, o; sound, like the letter o in the English word no.

O-prai Near. Aupi.
O-see Also. Aussi.
Pauvre Pov' (long) Poor.
Raque Roke Roar.
Saum So Jump.

AAU.—Name, o; sound, like the letters ay in the English word day.

Aimer Ay-may To love.
Aumit O-ray Would.

When e and i stand together, and the e is accented thus, e, they are no longer a compound vowel, but each letter has its own distinct vowel sound.

SECTION XXI.—idioms followed by the preposition de.

1. The expressions avoir besoin, to want; avoir soin, to take care; avoir honte, to be ashamed; avoir peur, to be afraid, require also the preposition de before a noun. These idioms mean literally to have need, to have care, etc. —

Avez-vous besoin de votre frère? Do you want your brother? J'ai besoin de mes effets. I take care of my things. Il a honte de sa conduite. He is ashamed of his conduct. Elle a peur du chien. She is afraid of the dog.

These expressions require the preposition de before their object, they will, of course, require the same preposition before the pronoun representing that object—


3. When the object is not a person, and has been mentioned before, the pronoun en takes the place of the preposition de, and that of the pronoun representing the object—

Avez-vous besoin de votre cheval? Do you want your horse? J'en ai besoin, I want it.

4. The expressions être fâché, to be sorry; être étonné, to be astonished; être content, to be satisfied, require the preposition de before a noun. [§ 89]

Je suis fâché de son malheur. I am sorry for his misfortunes. Je suis étonné de sa conduite. I am astonished at his conduct. Je suis content de lui. I am pleased with him.

5. Être fâché, in the sense of to be angry, requires the preposition contre—

Vous êtes fâché contre moi, You are angry with me.

6. For rules on the government of adjectives, see § 87, and following sections.

Résumé of Examples.


VOCABULARY.


EXERCISE 37.


EXERCISE 38.

1. Do you want your servant? 2. Yes, Sir, I want him. 3. Does your brother-in-law want you? 4. He wants me and my brother. 5. Does he not want money? 6. He does not want money, he has enough. 7. Is your brother sorry for his conduct? 8. He is very sorry for his conduct, and very angry with you. 9. Does he take good (well) care of his books? 10. He takes good care of them. 11. How many volumes has he? 12. He has more than you, he has more than twenty. 13. What does the young man want? 14. He wants his clothes. 15. Do you want to rest (you repose)? 16. Is not your brother astonished at this? 17. He is astonished at it. 18. Have you a wish to read your brother's books? 19. I have a wish to read them, but I have no time. 20. Have you time to work? 21. I have time to work, but I have no time to read. 22. Does the younger brother take care of his things? 23. He takes good care of them. 24. Is that little boy afraid of the dog? 25. He is not afraid of the dog, he is afraid of the horse. 26. Do you want bread? 27. I do not want any. 28. Are you pleased with your brother's conduct? 29. I am pleased with it. 30. Has your brother a wish to read a book? 31. He has no desire to read your book, he is weary. 32. Is that young man angry with you or with his friends? 33. He is angry neither with me nor with his friends. 34. Do you want my dictionary? 35. I want your dictionary and your brother's.
SECTION XXII.—STEMS AND TERMINATIONS OF THE REGULAR VERBS.—PRESENT INDICATIVE.

1. If the ending or distinguishing characteristic of the conjugation of a verb, in the present of the infinitive, be removed, the part remaining will be the stem of the verb:

Chantant Fin-ir Recevoir Recevoir.

To that stem are added, in the different simple tenses of a regular verb, the terminations proper to the conjugation to which it belongs [§ 60].

3. PARTICIPLE PRESENT.

Chantant Fin-isant Recevoir Recevant Répond.

Singing

Finishing Receiving

Recevend. Receiving.

FIN.

4. PARTICIPLE PAST.

Chanté Fin-é Receuv-

Vous

Sung.

Reçu Rendu.

Finished Received Rendered.

5. TERMINATION OF THE PRESENT OF THE INDICATIVE.

SINGULAR.

Je chant o sing

Chant o die, to sing, to be fond of.

Tu parle o speak

Tu parle o sing, to be fond of.

Il dit o speak

Il dit o sing, to be fond of.

6. The present of the indicative has but one form in French, therefore je chante may be rendered in English by I sing, I do sing, or I am singing.

7. The plural of the present of the indicative may be formed from the participle present by changing 1'h into ous, es, ons, Ex.: Chantant, nous chantons; finissant, nous finissons; recevant, nous recevions; rendant, nous rendons.

8. This rule holds good not only in all the regular, but in almost all the irregular verbs.

9. Verbs may be conjugated interrogatively in French (except in the first person singular of the present of the indicative) [§ 98 (4) (5)], by placing the pronoun after the verb in all the simple tenses, and between the auxiliary and the participle in the compound tenses.

Chantez-vous bien? Do you sing well? Avez-vous bien chanté?

Non, je ne chante pas bien. I do not sing well.

Vos père parle-t-il bien? (Sect. II, 6, Sect. IV, 4.)

10. The verb porter means to carry. It means also to wear, in speaking of garments. Apporter means to bring, and emporter to carry away; aimer means to love, to like, to be fond of, and takes the preposition à before another verb.

Quel habit portez-vous? What cloth do you wear?

Je porte un habit de drap noir. I wear a coat of black cloth.

Votre frère qu'apporte-t-il? (Sect. II, 6.)

Il apporte de l'argent à son ami. He brings money to his friend.

11. A noun used in a general sense [§ 77 (1)] takes the article le, la, l', or les.

Aimez-vous le beau ou le moquet? Do you like beef or mutton?

Je n'aime ni le boeuf ni le moquet. I like neither beef nor mutton.

Chantez-vous une chanson ita-

RÉSUMÉ DES EXEMPLES.

lienne? Nous chantons des chants allemands.

Portez-vous ce livre à l'homme? Non, je le porte à mon frère.

Emportez-vous tout votre argent? Do you carry away all your money?

Finissez-vous votre leçon aujourd'hui? Nous la finissons ce matin.

We sing German songs.

Do you carry this book to the man?

No, I carry it to my brother.

Do you carry away all your money?

I carry away only a part of it.

Do you finish your lesson today?

We finish it this morning.

N'aimez-vous pas les enfants attentifs? Do you not like attentive children?

Je les ains beaucoup. I like them much.

Aimez-vous pas beaucoup de lettres? Do you not receive many letters?

Nous en recevons beaucoup. We receive many letters.

Vendez-vous beaucoup du marchand? Do you sell many goods?

Nous en vendons beaucoup. We sell many.
The fact is, they are totally without leaves, the leaf-like portions being merely flattened stems which fulfil the functions of leaves. What would the reader think as regards many of the cactus tribe? Would he not think these curious plants were all leaves?

The appended diagram (Fig. 54) will render the peculiar condition more evident.

Botanists denominate an enlarged and flattened organ of this kind by the term *phyllodium*, a word derived from the Greek *φυλλος* (pronounced *full-los*), a leaf, and *εις* (*eis*), form, and which therefore means having the form or semblance of a leaf.

One example more of a portion of a plant resembling a leaf, but which is not a leaf, and we have done. It might have been mentioned whilst we were treating of the cactus, to the condition of which the phenomenon about to be mentioned is similar. Perhaps the student has occasionally seen growing in the hedges the shrub called the butcher's-broom, *Ruscus aculeatus*. Like the cactus, this plant seems to present the curious appearance of flowers springing from the surface of a leaf. Flowers, however, never grow in that position. The part resembling a leaf is no leaf at all, but only a flattened branch. The accompanying diagram (Fig. 55) represents a sprig of butcher's-broom, in which this peculiar conformation is very evident.

SECTION X.—METAMORPHOSES OR CHANGES TO WHICH LEAVES ARE SUBJECT.

Just as certain parts of vegetables not leaves may assume the general appearance of leaves, so, on the other hand, leaves occasionally lose their own specific appearance, and look like things they are not.

For example, who at first glance would think that the prickles on common furze were leaves? Nevertheless, they are; the ordinary flat leaf-like appearance being lost.

Again, many of those tendrils which shoot from slender plants, enabling them to lay hold of neighbouring objects and derive support, are nothing more than modified leaves. This is the case with the plant *Lathyrus Aphaca*, a representation of which we give above (Fig. 55).

The student is not, however, to imagine that all tendrils are
modified leaves. In certain plants—for example, the cucumber—stipules undergo this metamorphosis, in others it is the petals or the branches themselves which change; such for example, are the tendrils of the vine (Fig. 56).

But the most curious modification of the leaf is seen in the pitcher-plants, some of which are represented in the diagram (Fig. 57). In one of these the leaf tapers into a stalk, at the extremity of which the pitcher is situated, the arrangement being such that the pitcher shall always retain its upright position. The pitcher is covered by a well-fitting lid.

In another kind, also figured in our plate, the pitcher is made up of the whole leaf, and there is no lid, so that the orifice is constantly wide open, and there are also other varieties.

We must not quit the subject of leaves without devoting a passing word to the gigantic leaf of the Victoria regia, one of the tribe of Nymphaeaceae, or water-lilies, and a native of Central America. A specimen of this truly wonderful plant is now flourishing in great vigour at Kew Gardens. Its leaves are from fifteen to eighteen foot in diameter, its flowers and capsule, or seed-case, proportionately large. Fig. 58 is an engraving of this wonderful plant. A child is represented standing on one of its floating leaves, which, on account of its size, sets the part of a boat, and supports the child on the surface of the water.

While we are calling attention to the enormous leaves and beautiful flowers of the Victoria regia, we may direct the student to another giant flower, the largest indeed known, Rafflesia Arnoldi (Fig. 58b), which was discovered by the botanist of renown, Dr. Arnold, in 1818, when on an excursion into the interior of Sumatra with Sir Thomas Stamford Raffles and some other friends. The following is Dr. Arnold's account of the discovery of this monster plant and the general appearance of its blossoms. The plant was found on the banks of the Manna river, not far from Pulo Leb-an:

"Here," says Dr. Arnold in a letter to a friend, "I rejoice to tell you I happened to meet with what I consider as the greatest prodigy of the vegetable world. I had ventured some way from the party, when one of the Malay servants came running to me with wonder in his eyes, and said, 'Come with me, sir, come! a flower, very large, beautiful, wonderful!' I immediately went with the man about a hundred yards into the jungle, and he pointed to a flower growing close to the ground, under the bushes, which was truly astonishing. My first impulse was to cut it up and carry it to the hut. I therefore seized the Malay's parang (a sort of instrument like a woodman's chopping-hook), and finding that it sprang from a small root which ran horizontally (about as large as two fingers or a little more). I soon detached it and removed it to our hut. To tell you the truth, I had been alone and had there been no witnesses, I should, I think, have been fearful of mentioning the dimensions of this flower, so much does it exceed every flower I have ever heard of; but I had Sir Stamford and Lady Raffles with me, and Mr. Palgrave, a respectable man resident at Manna, who, though all of them are equally astonished with myself, was able to testify to the truth.

"The whole flower was of a very thick substance, the petals and nectary being in but few places less than a quarter of an inch thick, and in some places three-quarters of an inch; the substance of it was very succulent. When I first saw it a swarm of flies was hovering over the mouth of the nectary, and apparatus and organs in the substance of it. It had precisely the smell of tainted beef. The calyx consisted of several roundish, dark-brown, concave leaves, which seemed to be indefinite in number, and were unequal in size. There were five petals attached to the nectary, which was covered with protuberances of a yellowish-white, varying in size, the interstices being of a brick-red colour. The nectarium was cyathiform (cup-shaped), becoming narrower towards the top. The centre of the nectarium gave rise to a large pistil, which I can hardly describe, at the top of which were about twenty processes, somewhat curved, and sharp at the end, resembling a cow's horn; there were as many smaller, very short processes. A little more than half-way down, a brown cord, about the size of common whipping cord, but quite smooth, surrounded what perhaps is the germen, and a little below it was another cord, somewhat moniliform (shaped like a necklace).

"Now for the dimensions, which are the most astonishing part of the flower. It measures a full yard across; the petals,
15. Multiplication of Fractions.

To multiply \( \frac{a}{b} \) by \( \frac{c}{d} \).

This means to take four-fifths of the fraction \( \frac{5}{8} \); that is, it is the same thing as finding the value of the complex fraction \( \frac{5}{8} \) of \( \frac{5}{8} \).

Now, if \( \frac{5}{8} \) be divided into five equal parts, i.e., if \( \frac{5}{8} \) be divided by 5, we get \( \frac{1}{8} \); because, to divide a fraction by a whole number, we multiply the denominator by that number (Art. 6); and taking four of these fifth parts of \( \frac{5}{8} \), four times \( \frac{1}{8} \)—we get as the required result \( \frac{1}{2} \).

This result is plainly got by multiplying the numerators together and the denominators together of \( \frac{a}{b} \) and \( \frac{c}{d} \) to form a numerator and denominator respectively. The same method would evidently apply to any other two or more fractions. Hence the following

**Rule for the Multiplication of Fractions.**

Multiply together all the numerators for a numerator, and all the denominators for a denominator.

*Observe.*—In multiplying fractions we can often simplify the operation by striking out or cancelling factors (as we are at liberty to do, Art. 6) which are common to the numerator and denominator of the fraction formed by multiplying the numerators and denominators together.

**Example.**—Multiply together \( \frac{3}{4}, \frac{5}{6}, \frac{1}{2} \). Their product is equal to—

\[
\frac{2 \times 5 \times 1 \times 5}{3 \times 8 \times 11 \times 108} = \frac{100}{36720} = \frac{1}{367.2}
\]

And \( \frac{2}{3} \) occurs twice in both numerator and denominator.

\[
\frac{11}{12} \quad \text{once} \quad \quad \quad \frac{3}{4} \quad \text{once} \quad \quad \quad \frac{1}{2} \quad \text{once}
\]

Therefore the product is \( \frac{5 \times 5 \times 100}{2 \times 108 \times 108} = \frac{5}{108} = \frac{5}{216} \).

16. Division of Fractions.

To divide \( \frac{a}{b} \) by \( \frac{c}{d} \).

Dividing by a whole number is finding how many times the divisor is contained in the dividend. Now, a seventh is contained in unity 7 times, and therefore a seventh is contained in \( \frac{5}{8} \times 7 \) times; 5 sevenths will be contained therefore in \( \frac{5}{8} \) one-fifth of this number of times, and therefore the quotient of \( \frac{5}{8} \) by \( \frac{1}{5} \) is \( \frac{5}{8} \times \frac{1}{5} \), that is, \( \frac{5}{40} \), and the same method will be true for any other two fractions. Hence the following

**Rule for the Division of Fractions.**

Invert the divisor, and then proceed as in multiplication, i.e., multiply the numerators together for a numerator, and the denominators for a denominator.

*Observe.*—In performing the process, the Obs. of Art. 15, with reference to cancelling factors which are common to both numerator and denominator, must be attended to.

17. By this and the foregoing rules we are able to simplify complex fractions.

**Example.**—To \( \frac{3}{10} \div \frac{5}{12} \), add \( \frac{3}{10} \), and multiply the result by \( \frac{5}{12} \).

In a case like this it will be better to simplify each portion separately before performing the operation indicated. Now—

\[
\begin{align*}
\frac{1}{120} - \frac{1}{120} &= \frac{239 - 239}{239 \times 239} = \frac{1}{239} \\
\frac{11}{24} - \frac{5}{24} &= \frac{11 \times 6 - 5 \times 7}{120} = \frac{17}{60} \\
\frac{1}{24} &= \frac{1}{120} \\
\frac{10}{60} &= \frac{17}{120} \\
Hence \quad \frac{13}{17} + \frac{6}{12} &= \frac{112}{112} + \frac{6 \times 17}{112} = \frac{110}{112} = \frac{105}{112} \\
\text{And} \quad \frac{7}{10} \div \frac{10}{12} &= \frac{112}{17}
\end{align*}
\]

And therefore the required result will be given by the following—

\[
\frac{7}{10} \div \frac{10}{12} = \frac{112}{17} \times \frac{17}{10} = \frac{1141}{170} = 1141 \div 170
\]
DECIMALS.

1. Fractions, the denominators of which are 10 or any power of 10, are called Decimal Fractions; or, more shortly, Decimals. Thus, \( \frac{1}{10} \), \( \frac{2}{10} \), \( \frac{3}{10} \), are Decimal Fractions.

Such fractions are represented by a method of notation which is an extension of that employed for whole numbers.

In whole numbers the figures increase in a tenfold ratio from right to left; or, what is the same thing, decrease in a tenfold ratio from left to right. If we extend this method of representation towards the right beyond the units' place, any figure one place to the right of the units' place will be one-tenth of what it would be if it were in the units' place, and will thus really denote a decimal fraction; any figure two places to the right of the units' place will be one-hundredth of what its value would be if it were in the units' place; and so on for any number of figures and places.

Hence, if we choose some means of indicating the point in any row of figures at which the units' place occurs, we can write down any decimal fraction without the trouble of expressing the decimal denominators. This is done by putting a dot, or decimal point, as it is generally called, between the figure in the units' place and the figure in the place to the right of it, which we may call the tenths' place. Thus, 1\( \frac{4}{10} \) would mean 1 + \( \frac{4}{10} \); 3 would mean \( \frac{3}{10} \); 9\( \frac{1}{4} \) would mean \( \frac{9}{10} + \frac{1}{4} \).\( \frac{3}{10} \).

2. We generally speak of any figure in a decimal as being in such a place of decimals. Thus, for example, in the number 5.23, we should say that the 5 is in the first place of decimals, the 2 in the second place, and the 3 in the third place.

Observe that the denominator of the fraction corresponding to the figure in any decimal place is unity followed by the same number of ciphers as the decimal place; or, what is the same thing, that the power of 10, which is the denominator, is the same as the number of the decimal place.

3. The figures 1, 2, 3, 4, 5, 6, 7, 8, 9 in a decimal are sometimes called significant figures, or digits. Thus in such a decimal as 0.002350, we should say that 2 is the first significant digit, because it is the first figure which indicates a number, the ciphers only serving to fix the place in which the 2 occurs.

4. To express a Decimal as a Vulgar Fraction.

\[ \frac{2}{10} = \frac{2}{10} \]

Or (reducing the fractions to a common denominator, 1000)

\[ = \frac{200}{1000} = \frac{1}{5} \] 0.027 = \( \frac{27}{100} \)

Or (reducing the fractions to a common denominator, 10000)

\[ = \frac{90000}{100000} = \frac{9}{10} \]

43\( \frac{230}{500} \) = \( \frac{43}{500} + \frac{230}{500} \)

Or (reducing the fractions to a common denominator, 100000)

\[ = \frac{432000}{100000} = \frac{432}{1000} \]

Hence we see the truth of the following

Rule for expressing a Decimal as a Vulgar Fraction.

Write down the figures which compose the decimal (both integral and decimal part, if there is an integral part) for the numerator, omitting the decimal point; and for the denominator put 1, followed by as many ciphers as there are decimal places in the given decimal.

5. Conversely, if we have a fraction with any power of 10 for its denominator, we can express it as a decimal by placing a decimal point before as many right-hand figures in the numerator as there are ciphers in the denominator. Thus—

\[ \frac{1}{10} = 0.1 \]

\[ \frac{1}{100} = 0.01 \]

If the figures in the numerator be fewer than the ciphers in the denominator, we must place before the left-hand figure of the numerator ciphers equal in number to the excess of the number of ciphers in the denominator over the number of figures in the numerator, and then prefix the decimal point. For example—

\[ \frac{1}{1000} = 0.001 \]

Ob. It will be perceived from the foregoing remarks that placing ciphers on the right of a decimal does not alter its value, for this does not alter the place of any of the significant figures. Thus, 23, 230, 2300 are all equal in value, for, expressed as fractions, they are respectively \( \frac{23}{100} \), \( \frac{230}{100} \), \( \frac{2300}{100} \). But prefixing ciphers between the decimal point and the first significant figure does alter the value of the decimal, because this alters the places of the significant digits. Thus, 23, 230, 2300 have all different values, being respectively equal to \( \frac{23}{10} \), \( \frac{230}{10} \), \( \frac{2300}{10} \).

MECHANICS.—V.

PARALLEL FORCES.—CENTRE OF GRAVITY.

Before proceeding to the subject of the Centre of Gravity, I must direct your attention to two consequences which flow directly from the principles established in the last lesson, and furnish the basis on which the properties of that centre rest.

You have seen there that the centre of a system of parallel forces is found by cutting in succession certain lines which join certain points in certain definite proportions, namely, inversely as the forces acting at their extremities. Now, such cutting can give for each line, and therefore for all, as final result, only one point. For example, the centre of two parallel forces of six and four pounds acting at two points, A, B, of a body, as in the last lesson, is got by dividing A into ten parts, and counting off four parts next to A, or six to B, and the result evidently can be only one point. If we now suppose a third parallel force of five pounds added, acting at some other point, C, of the body, and join the point last found with C, and divide the joining line into fifteen parts, taking ten next to C, here again only one point is the result. And so on for any number of forces it can be shown that there is but one centre.

But, lest it should be thought possible that, on cutting these lines in a different order of the points, A, B, C, etc., a second centre should turn up, let us think that possible, and apply forces at these points parallel to each other, but not parallel to the line joining these two centres. Their resultant then passes through both of these points, and therefore must act in the line joining them, which is impossible; since, as I have proved, it must be parallel to its components.

Furthermore, you will observe that all these lines are cut only in reference to the magnitudes of the forces; no account is taken of their direction. Whether they pull upwards or downwards, or obliquely to left or right, so long as the magnitudes remain the same, or even keep the same proportion—say that of six, four, and five—the centre cannot move. Of course, the points are supposed not to change. Whatever be the number of points and forces this is true; as for three, so for any other number. And mark, moreover, that it makes no difference how this change of direction is produced, whether, leaving the body in one fixed position, you make the forces change directions as at a and b (Fig. 17), or, preserving the direction, you turn the body round, as from c to c in the same Fig. In neither case does the centre change. These results may be summed up in the two following propositions:

1. A System of Parallel Forces acting at given points in a body, has one Centre of Parallel Forces, and only one.

2. The Centre of Parallel Forces does not change its position when the direction of the forces is changed in reference to the body.

THE CENTRE OF GRAVITY.

The centre of gravity is the particular case of the centre we have been last considering, in which the forces are those by which bodies on the earth's surface are drawn by attraction towards the earth, the centre being the point on the earth, or on, from which, is drawn in proportion to its mass, equally with the largest; and it is to the tendency of these bodies so to move downwards in obedience to this attraction, that we give the name of "weight." The term "gravity," carries a similar meaning, being derived from the Latin gravitas, heavy.

Now, since every particle of matter is thus drawn to the earth's centre, it is evident that the weight of all large masses, such as of a block of marble, beam of timber, or girder of iron, is the joint effect, or the resultant, of the attractions of the separate atoms. But these attractions are all so many parallel forces; for, pulling, as they do, towards the earth's centre, which is nearly 4000 miles away down in the ground, they incline, even in the largest objects, so little towards one another that practically they may be considered not to meet, that is, to be parallel. Hence you see that all the principles we have proved about parallel forces hold good of the earth's attraction of these atoms, and that we may affirm that—
1. A body has one Centre of Gravity, and only one.
2. The Centre of Gravity is not changed by the body being turned round after any manner in any direction.

It thus appears that the weights of all the separate atoms of any mass of matter are equal to a single weight supposed to act at some point within that mass, or, as sometimes happens (and we shall see), even without, equal to their sum. There is great advantage in this simplification; for, instead of having to consider millions of diminutive forces acting at all its points, we direct our attention to only one force, acting at only one point.

You can now understand how it is that a piece of card or thin board may be supported on the point of a rod, wire, or needle. All that is necessary is to bring the point under the centre of gravity of the board; then, the resultant of all the forces by which its several parts are pulled downwards passing through that centre, will be resisted by the rod, and there will be equilibrium; the card will be balanced.

Another consequence follows. Let the body be of any shape, regular or irregular; and suppose that, having determined its centre of gravity, we fix or support that point in some way so that the body may freely turn round it, as on a pivot, in every direction. Then, since, as I have shown, the centre of gravity cannot change as the body turns round, whatever position I place it in, the centre remains supported, and the resultant weight, $O_{P}$, passing through it, will be resisted by its supports, and the body will be in equilibrium, as in Fig. 18, where $O$ is the supported centre of gravity.

Now suppose that instead of this centre we make the body pivot round some other one of its points, $O$ (as in Fig. 19). Then, if I place it so in the position $O_{A}B$, that the centre of gravity, $O$, may lie exactly under $O$, as a plumb-line would hang; the weight acting along the line, $O_{A}O$, may be taken to have $O$ for its point of application, by which, as it is fixed, it will be resisted. In such case there will be equilibrium, $O$ being under $O$.

Endnotes:

1. If a body be suspended by or supported at its centre of gravity, it will be at rest, whatever be the position in which it is placed.
2. If the body be supported by or supported at any other point, it will be at rest when the centre of gravity is in its highest or lowest possible position on the vertical line through the point of suspension or support.

Fig. 18.

Fig. 19.

0. And so, also, if $O$ were exactly above $O$, as in $O_{C}D$, in the vertical line produced upwards, the weight would press downwards on $O$, and be there resisted. But if I put it in any other position, $O_{E}F$, where $O$ will not be either above or below $O$, the weight acting downwards, in the direction $O_{F}$, will not be opposite to the line $O_{G}$ of resistance of $O$, and there cannot be equilibrium. There are thus two positions in which the body may be at rest, both on the vertical line through $O$; but one in the lowest position it can attain and the other in the highest.

We thus learn that—

1. If a body be suspended by or supported at its centre of gravity, it will be at rest, whatever be the position in which it is placed.
2. If the body be supported by or supported at any other point, it will be at rest when the centre of gravity is in its highest or lowest possible position on the vertical line through the point of suspension or support.

If two points, $A, B$ (Fig. 20), are fixed, all the points of the line $A_{B}$ are fixed, but the body is free to turn round that line; and if in that case the centre of gravity is somewhere on $A_{B}$, as $O$, it also is fixed, and the weight there concentrated will be borne by the two points of support, $A, B$, divided between them in two portions inversely proportional to their distances, $A_{O}, B_{O}$, from the centre of gravity. The body will, therefore, be in equilibrium in every position into which it can be turned round the line $A_{B}$. But if, when two points are fixed, this centre is not on the line $A_{B}$, it is free to move round it. There are, therefore, two positions, $O_{1}, O_{2}$, in a plane vertically passing through this line—one below, the other above, in which it may rest, and the result is similar to that stated in the above propositions. Familiar examples of this are furnished by all pieces of machinery in which bodies move round fixed axes, such as the fly-wheel of a steam-engine, or the smaller wheels round which the bands pass, which set the printing presses at work in the machine-room—all the points along the line which runs down the centre of the axe are at rest. A trap-door, which opens both downwards and upwards, is another instance; in that case the centre of gravity is under or above the axe-line of the hinges when the door hangs open.

But bodies may be kept in equilibrium in other ways than that of fixing points within their substance. A horse poised in the air, as it is about to be lifted into a transport ship, by a rope which descends from the top of a crane and is attached to a boat which goes round his body, is an instance. Here the centre of gravity of the lifted animal is under the point of suspension and on the line of direction of the rope which transmits its weight to the crane above. But observe, in this case, there is only one position of equilibrium—namely, the lowest. The rope not being rigid, you cannot wheel the horse half round, heels up in the air (Fig. 21) until he reaches the highest position the chain would allow him to reach, and make his weight thence press downwards on the crane. To do this a rigid bar should take the place of the rope.

But bodies are most commonly kept at rest by being supported from below by the earth, either on the ground itself, or on some floor, table, etc. What conditions will secure a steady equilibrium? First, there must be some base or bottom to the body on which it may rest, such as the bottom of a teapot or candlestick. Secondly, it must be broad enough to keep the body steady, to prevent its upsetting or rocking. A candlestick resting on the socket into which the candle is put, would soon overturn, and the slightest touch would set an egg rocking.

Now, in order to ascertain the equilibrium and stability of bodies so placed, let us suppose two of the forms in Fig. 22 to rest on a level table, touching it on the two perfectly flat bases $x, y, z, x_{1}, y_{1}, z_{1}$, there represented. Let $O$ be the centre of gravity of that to the right, and $O_{F}$ the perpendicular to the table through that point. Let, moreover, $O_{1}, O_{2}, O_{3}$ be the
The Steam Crane.—Mechanics.
corresponding centre and perpendicular of the body to the left. Now, since the table, by its resistance distributed equally over the base \(xyz\) of the first body, prevents its moving downwards, and this resistance at every point is perpendicular to the floor, these resistances, taken together, are a system of parallel forces, and have a parallel centre somewhere in that base. Let this centre be \(o\). Join now \(or\); and, as the same reasoning holds good of the body to the left, let \(o, r\) be the corresponding line in it. Moreover, let \(x, x\) be the points in which the lines \(o, r, o, r\) cut the circumference, or boundary of the bases \(xyz, x'y'z'\). The body to the right is thus acted on by two forces; the resistance at \(o\) upwards supporting it, and the weight at \(o\) pulling downwards. But, as the point \(r\) falls, in this case, outside the base \(xyz\), there is nothing to prevent the body obeying it by turning over on its edge at \(x\).

But, in the other case, where \(r\) is within the base, the weight at \(o\) tends to make the body fall inwards, turning on its edge at \(x\). But then, there is the resistance of the table at \(o\), acting upwards to prevent that motion; and consequently the body remains at rest, or is in equilibrium.

And this statement holds equally good when the plane on which the body rests is sloped or inclined to the horizontal plane; as is evident from Fig. 23, where the cylindrical body on the plane \(axy\) must upset if \(o, r\) falls outside the base \(xyz\).

We may, therefore, conclude generally both as to horizontal and inclined planes that a body will rest in equilibrium on a plane, if the vertical line, passing through its centre of gravity, meets the plane within the base. If it meets it outside the base, the body will overturn.

Between these two, it should be observed that there is an intermediate case, in which the perpendicular meets the plane neither within nor without the base, but on its circumference. When this happens, the body is equally disposed to stand or upset; but, in fact, it will overturn; for in such an unsteady position the slightest touch or shake would send it over. It is a case of unstable equilibrium.

In interpreting and applying this principle to practice, you must be on your guard as to the meaning of the term 'base.' Else you may imagine some day you have discovered that a body does not upset when the vertical from the centre of gravity falls outside the base. Suppose the base to be bent inwards into a horse-shoe form, as in the cone, \(a\) (Fig. 24), or into the form of the semi-circular wall, \(b\), in which latter case the centre of gravity is without the substance of the body; then the point \(r\) is on the floor, outside the spaces along which the bodies are in contact with it. Still, neither body will upset; for the advanced spur of the bases at \(y\) and \(z\) will act as if the base were there. The centre of gravity will then no longer be at the centre of the ball, but to one side, let it be at \(o\) (in \(a\), Fig. 26).

Put the ball now on the incline, with the leaded side looking up the slope; the perpendicular \(o, r\) will meet the incline above \(o\), and the ball will roll upwards until \(o\) comes over the point of support.

This experiment may be tried in another form without the use of the lead, by simply scooping a hollow on one side, or as in the following example:—Get a round cylinder of cork—

---

**Fig. 22.**

**Fig. 23.**

**Fig. 24.**

**Fig. 25.**

**Fig. 26.**
common bottle cork—and scoop out its substance on one side, as represented at b, Fig. 26, preserving carefully the roundness of the two circular faces at its ends. Put this cylinder on the incline, with the scooped part facing down the slope, and you will find that it will also run upwards, as did the ball. The reason of this you will easily discover, but be careful, in making the experiment, that the incline be not great. The following are other common instances which you can try, as

**EXAMPLES FOR PRACTICE.**

1. A man walking up a hill stoops forward; why? And why, also, when coming down, does he lean backward?
2. A person rising from a chair leans his body forwards, and draws his feet close to the chair; why?
3. Carrying a bucket of water, he leans to the side opposite.
4. Why does a crucified person generally hold his head up and throw his shoulders backward?
5. A horse and rider are more apt to fall coming down a hill than on the level road; why?

An omnibus, or coach, is safer for travelling when it is well filled inside, than when outside.

**ANSWERS TO THE QUESTIONS IN LESSON IV.**

**Polygon of Forces.**

1. The resultant is a little over 13 lbs., and makes an angle of nearly 53 degrees with the force a o.
2. The force which supports the roller on the slope is 56 lbs., and the pressure 57 lbs. nearly.
3. The strain on the three-foot cord is 48 lbs., and on the four-foot cord 39 lbs.
4. The point of meeting of the three cords is below the pulleys, at the distance of six feet from the top of that over which the 4th, weight hangs, and of 8 feet from the top of the other pulley.

**Parallel Forces.**

1. The required parallel centre in this case is on the line joining any vertex of the triangle with the middle point of the side opposite, at a distance of two-thirds of that line from the vertex, or one-third from the side.
2. The required centre is distant one-third of the length of the beam from the end at which the three-pound force acts.
3. The required distance is 3 inches distant from the end of the rod at which the three and a half pound weight acts.
4. The strain on the upper hinge is 23 lbs. 3 oz., nearly, and on the lower 39 lbs. 13 oz. In doing this question the student must first find the centre of parallel forces for the 23 lbs. and 37 lbs. This point will be found by cutting the 7 feet of height of door into 69 parts (the sum of 23 and 37), and counting off 23 of these from the bottom. The resultant then acts at the end of the 23rd subdivision. But as the hinges bear the drag of the force, it is divided between them in the inverse proportion of the distances from this point. Divide then the 69 lbs. into two parts, which have this proportion, and the above strains will be found. It is better to do this question by arithmetically calculating the position of the point and magnitudes of strains. The strain caused by the weight of the door is not here taken into consideration.

**READING AND ELOCUTION.—VI.**

**PUNCTUATION (continued).**

IX. THE DASH (continued).

56. The dash sometimes precedes something unexpected; as when a sentence beginning seriously ends humorously.

**Examples.**

Good people all, with one accord, lamented for Madam Blasie; who never wanted a good word—from those who spoke her praise. The needy seldom passed her door, and always found her kind; she creely lent to all the poor—who left a pledge behind.

She strove the neighbourhood to please, with manner wondrous winning, and never followed wicked ways—except when she was sinning.

At church, in silk and satin new, with hoop of monstrous size; she never slumbered in her pew—but when she shut her eyes.

Her look sometimes, I do aver, by twenty beams; and more; the king himself has followed her, when she has spoke her grace. But now her wealth and finery filed, her hinges on cut short all; her doctors found, when she was dead—her last disorder mortal.

Let us lament, in sorrow sore; for Kent Street well may say, that had she lived a twelvemonth more—she had not died to-day.

57. The dash is sometimes used with other pauses to lengthen them.

**Examples.**

God, whom you see me daily worship, whom I daily call upon to bless you and me and all mankind; whose wondrous works are recorded in those Scriptures which you constantly read,—God, who created the heavens and the earth; who appointed his Son Jesus Christ to redeem mankind,—God, who has done all these great things, who has created so many millions of men, with whom the spirits of the good will live and be happy for ever,—this great God, the Creator of worlds, of angels, and of men, is your Father and Friend.

It is, therefore, the use of the innocent amusements of life which is dangerous, but the abuse of them;—it is not when they are occasionally, but when they are constantly pursued; when the love of amusement degenerates into a passion; and when, from being an occasional indulgence, it has become a constant desire.

In every pursuit, whatever gives strength and energy to the mind of man, experience teaches to be favourable to the interests of piety, of knowledge, and of virtue;—in every pursuit, on the contrary, whatever enfeebles or limits the powers of the mind, the same expedients ever shows to be hostile to the best interests of human nature.

From the first hour of existence to the last,—from the cradle of the infant, beside which the mother watches with unshimmering eye, to the grave of the aged, where the son pours his bitter tears upon the bier of his father,—in all that intermediate time, every day calls for exertion and activity, and moral honours can only be won by the steadfast magnanimity of pious duty.

They say they have bought it.—Bought it! Yes;—of whom?—Of the poor, who sell themselves, who know that refusal would be vain; and who strove to make a merit of necessity, by seeming to yield with grace, what they knew they had not the power to retain.

It is not the lifeless mass of matter, he will then feel, that he is existing,—it is the mighty machine of Eternal Wisdom: the workmanship of Him, in whom everything lives, and moves, and has its being.

When suffering the inconveniences of the ruder parts of the year, we may be tempted to wonder why this rotation is necessary;—why we could not be constantly gratified with social bloom and fragrance, or summer beauty and profusion.

Then a spirit passed before my face; the hair of my flesh stood up; it stood still, but I could not discern the form thereof: an image was before mine eyes.—Before mine eyes was silence, and I heard a voice—Shall mortal man be more just than God?

53. The dash is sometimes to be read as a note of interroga-

**Examples.**

Is it not enough to see our friends die, and part with them for the remainder of our days—to reflect that we shall hear their voices no more, and that they will never look on us again—to see that turning to corruption, which was but just now alive, and eloquent, and beautiful with all the sensations of the soul? Where are the reins of life? He hears the ravens cry; and shall he not hear, and will he not avenge, the wrongs that his noblest animals suffer—wrongs that cry out against man from youth to age, in the city and in the field, by the way and by the free side?

Can we view their bloody edicts against us—their hanging, beheading, burning, and hunting down an ancient and honourable name—as deserving better treatment than that which enemies give to enemies?

Are these the pompous tidings ye proclaim, lights of the world, and demi-gods of fame? Is this your triumph—this your proud applause, children of truth, and champions of her cause?

Was there ever a bolister captain of a more valiant band? Was there ever—but I am on a burst.

And what if thou shalt fall unnoticed by the living—and no friend take note of thy departure?

Seest thou young lovely cottage in the grove—with little garden nose and bed—before—its roof deep-slabbed by the elm above, moss-grown, and decked with violet verdure o’er?

What shall we call them?—piles of crystal light—a glorious company of golden streams—springs of celestial ever burning bright—sun's lighting systems with their joyous beams.

59. The dash is sometimes to be read like a note of exclamation.

**Examples.**

What dreadful pleasure! there to stand sublime, like shipwrecked mariners on desert coast, and see the enormous waste of vapour, tossed in billows infernal to the horizon round, now swooped in gulf, with mountains now encompassed—and hear the voice of mirth and song rebound, flocks, herds, and waterfalls, along the hoar profound!

The chain of being is complete in me; in me is matter’s last gradation lost, and the next step is spirit—Deity! I can command the lightning, and can dust!
placid in clumps their snowy scale, and throne eternity in icy forms of cold sublimity, where forms and falls the avalanche—the birth of snow!

How has expectation darkened into anxiety—into dread—and dreads into despair? Alas! not one moment shall ever return for love to cherish. All that shall ever be known is, that she sailed from her port, and was never heard of more.

A measure of corn would barely suffice me for a month's provisions, and this rises to above six score bushels: and many hoggesheads of wine and other liquors have passed through this body of wine—this wretched strainer of meat and drink! And what have I done all this time for God and man? What a vast profusion of good things upon a useless life and a worthless liver!

X. THE HYPHEN.

60. The hyphen is a mark resembling a dash, but not so long.

61. The hyphen is used to separate the syllables of a word; or to make one word of two; as, semi-circle, semi-water.

62. When there is not room enough in the line for the whole of a word, some of its syllables are put into the line with a hyphen, and the remainder are put into the next line.

63. When a hyphen is placed over the vowels, it shows that they have their long sound.

Examples.


XI. THE ELLIPSE.

64. Ellipsis means an omission of some word or words. Sometimes a sentence is unfinished, or some parts of it are purposely omitted; and the mark which indicates an ellipse is put in the place of that which is left out.

65. An ellipse is sometimes indicated by a long straight line, thus, ——, which resembles a lengthened dash.

66. Sometimes the ellipse is denoted by asterisks, or stars, thus, * * * * *

67. Sometimes the ellipse is marked by small dots, or periods, thus, . . . . . . .

68. Sometimes the ellipse is indicated by hyphens, thus, ——————

69. The ellipse sometimes so closely resembles a dash in its effects, that it is scarcely distinguishable from it.

70. The voice is generally suspended at an ellipse; but the falling inflection is frequently used when the ellipse follows a question or exclamation. In some of the following examples the dash and ellipse are both used.

Examples.

Hast thou ——— But how shall I ask a question which must bring tears into many eyes!
The air breathes invitation; easy is the walk to the lake's margin, where a lost lone moor beneath her sheltering tree.—

Forth we went, and down the valley, on the streamlet's bank, pursued our way, a broken company, mute or conversing, single or in pairs.

What man is there so vile, that will not love his country? If any, let him speak; for him have I offended,—I pause for a reply ———— None! then none have I offended.

It is in vain to explain—the time it would take to reveal to you, to satisfy my curiosity in writing to you.

Indeed he is very ill, sir,—Can't help it. We are very distressed,—Can't help it. Our poor children, too,—Can't help that, neither.

Now, if he had married a woman with money, you know, why, then ———— The suppliant turned pale, and would have fainted.

I have been, my dear S. ———— on an excursion through the counties which lie along the eastern side of the Blue Ridge.

You have my answer: ———— let my actions speak.

No, no, Dionysus; remember that it was I alone who displeased thee; Damon could not ————

If he were all ———— Remember haughty Henry, the nephew of his wife, whose word could speed a veteran army to his kinman's aid.

I would not wound thee, Douglas, well thou knowest; but thus to hazard on a desperate cast thy golden fortunes ————

Still must I wonder; for so dark a cloud ———— Oh, deeper than thou think'st! I've read thy heart.

Your grace will pardon me for obeying ———— Say no more, my child; you are yet too raw to make proper distinctions.

Let them ———— or suppose I address myself to some particular subject—there is something more confidential in that manner of communicating one's ideas—as Moore says, Heart speaks to heart—I say, then, take especial care to write by candle-light.

That sparens manual labour—this would relieve from mental drudgery, and thousands yet unborn . . . . . . . . But hold! I am not so sure that the female sex in general may quite enter into my views on the subject.

LESSONS IN GEOMETRY.—VI.

Problem VI.—To bisect a rectilinear angle, that is, to divide it into two equal parts.

Let A B C (Fig. 11), be the rectilinear angle to be bisected. From B as centre, with any convenient radius B A, describe the arc A C, and from the points A, C, as centres, describe arcs intersecting each other in D; then join B D, and it will bisect the angle A B C, that is, it will divide it into the two equal angles A B D, C B D, as required.

By this method of construction an angle may be divided into any number of equal parts denoted by the series 2, 4, 5, 16, 32, 64, 128, etc.

Problem VII.—To draw an angle equal to a given rectilinear angle, at a point in a given straight line.

Let A B C (Fig. 12) be the given rectilinear angle, D F the given straight line, and B the point in it. From the point B as a centre, with any convenient radius B A, describe the arc A C; from the point D, in the straight line D F, draw the indefinite arc F E, with the same radius; and from the point F as a centre, with radius equal to the distance A C, describe an arc intersecting the arc F E, in the point E; then, through the points D, E, draw the straight line D E; the angle E D F will be equal to the given angle A B C.

If any of our students should not see the preceding construction clearly, we add the following one. Let K L I (Fig. 13), be the given angle, A B the given straight line, and A the point in it. From the point K as a centre, with any radius K L, describe the arc L I; from the point A as a centre, with the same radius, describe an arc intersecting the arc B D; draw the chord L I, and with the point B as a centre, with radius equal to the chord L I, describe an arc intersecting the arc B D in the point C; then join A C, and the angle A B C is the angle required; that is, it is equal to the given angle L K I.

If the chord B C be drawn, then the two triangles L K I, C A B are two equal isosceles triangles. Hence, if an isosceles triangle L K I be given, this construction shows how to make an isosceles triangle D A B equal to the given one.

Problem VIII.—To draw a triangle equal to a given triangle, or in other words, to describe a triangle of which the three sides are given.

Let A B C be the given triangle. A triangle is to be drawn, having its three sides equal to the three straight lines A B, B C,
c A, the sides of the given triangle ABC. Draw a straight line DE equal to AB, and from the points D, E, as centres, with radii respectively equal to the straight lines A C, B C, describe arcs intersecting each other in the point F; then join F E, F D; and the triangle DEF is the triangle required; that is, it has its three sides equal to the three sides A B, B C, C A of the given triangle ABC; or it is equal to the triangle ABC.

The mode of construction is the same if it be required to draw a triangle having its sides equal to three given straight lines such as the straight lines A, B, C, in Fig. 14.

Let BC (Fig. 15), be the given straight line, and A the given point, through which a straight line parallel to BC is to be drawn. Take any point E in the straight line BC, join EA; and from the point E, as centre, with the radius EA, draw the arc AB, cutting BC in F. Then from the point A, as a centre with radius AE, draw the indefinite arc E O; and from the point E as centre, with radius ED equal to the distance AF, describe an arc cutting the arc E O, in the point D; then join AD, and it will be parallel to BC, as required.

Another way.—Another mode of constructing this problem may be inserted here. Let A B (Fig. 16) be the given straight line, and C the given point through which a straight line parallel to AB is to be drawn. Take any point O, at a convenient distance from the straight line AB, but nearer to it than to the point C; join O C, and from O as centre, with radius O C, describe the circle C D E G, intersecting the straight line A B, in the points D, E; join O D, and from O as centre, with radius O D, describe the circle O C, F, intersecting the straight line A B, in the points O, C; and through the points O, C, F draw the straight line C F. The straight line C F is parallel to the given straight line A B, and it is drawn through the given point C, as required.

There are various other ways of drawing a straight line parallel to a given straight line, by means of the single ruler and compasses; but these are about the easiest. But parallel straight lines are most easily drawn by means of the parallel rulers described in a former lesson. Such instruments, however, are not always at hand; hence the utility of knowing how to work the preceding problem.

The only exercises or questions that could be given on the preceding problems, would be simply to desire the student to draw all the figures above described according to the rules of construction laid down in the different problems, which we earnestly advise our self-educating students to do accordingly, by means of the single ruler and compasses.

PROBLEM X.—To draw a straight line parallel to a given straight line at a given distance from it.

Let AB be the given straight line, and C the given distance at which it is required to draw a straight line parallel to AB. Take any two points, D and E, in the line AB, and from these points as centres, with a radius equal to the given distance C, describe the arcs F G, H, K, L, M. Draw G L touching these arcs, but not cutting them. The straight line G L is parallel to the given straight line AB.

Another way.—From any two points D, E, in the straight line AB, draw the straight lines D F, E L, perpendicular to AB; from the same points as centres, with a radius equal to the given distance C, draw the arcs F G, K, L, M, cutting the perpendiculars D G, E L, in the points G and L. Join G L, and produce it as far as may be required at either end. The straight line G L is parallel to AB.

PROBLEM XI.—To trisect a right angle, or to divide a right angle into three equal parts.

Let B A C be the right angle that is to be divided into three equal parts. Take any point D in AB, and from the centre A at the distance A D, describe the arc E F, cutting A C in E. Then from the points D, E, as centres, with the radius D A or E A, draw arcs, cutting the arc DE in F. Join A F, A G. The right angle B A C is divided into three equal parts by the straight lines A F, A G.

If the angles B A F, F A G, G A B be bisected by Problem VI, the right angle B A C will be divided into six equal parts, and by continued bisection it may be divided into any number of equal parts denoted by the series 6, 12, 24, 48, 96, etc.

PROBLEM XII.—To divide a given straight line into any number of equal parts.

Let A B be the given straight line. From its extremity A draw the straight line A C, forming with A B the angle C A B, and from the extremity B draw B D parallel to A C, and forming with it the angle D A B, which is equal to the angle A C B. Set off along the straight line A C as many equal parts, less one, as the number of parts into which A B is to be divided: that is to say, if A B is to be divided into six equal parts, set off five equal parts, A E, E F, F G, G H, H K along the straight line A C, and the same number of equal parts, B L, L M, M N, N O, O P, along the straight line B D. Join the straight lines E F, F G, G H, H K, M N, N O, O P, and through the points Q, R, S, T, U, V, W draw the straight line A B, which is thus divided, are equal to one another, and the straight line A B is divided into the number of equal parts required.

PROBLEM XIII.—To find a mean proportional between two given straight lines.

Let a and b be the two given straight lines to which it is required to find a mean proportional—that is to say, if a be the shorter of the two lines, a line to which a bears the same proportion as the line required bears to b. Draw the straight line a x, and on a x set off CD equal to a, and DE equal to b; bisect C D in G, and from the centre O at the distance O G describe the semicircle G F E. From D draw the straight line D F perpendicular to C E, and cutting the semicircle G F E in F, the straight line D F is a mean proportional to A and B—that is, a is to D F as D F is to b.

If we know the length of a and b we can find the mean proportional to them by multiplying the numbers representing the length of the lines together and extracting the square root of the product. Thus, if a measure three feet, and b measure twelve feet, the mean proportional to a and b measures six feet, for $3 \times 12 = 36$; and the square root of 36, or the number which when multiplied by itself gives 36, is 6.
LES LONS IN GEOGRAPHY.—VII.

DISCOVERIES OF THE EIGHTEENTH AND NINETEENTH CENTURIES.

France, desirous of taking her share in the progress of marine discovery, fitted out, in 1786, a new expedition under the command of La Perouse, an able and intrepid officer. The principal theatre of the explorations of this little French squadron was the north-west coast of America and the shores of Tartary and Japan. Their vessels, La Boussole and L’Astrolabe, visited Easter Island, then the Sandwich Isles, and reached latitude 59° N. on the north-west coast of America. The expedition explored with great care a large extent of this line of coast. During their hydrographical operations, a sad accident befell them, which cost twenty-one persons their lives, while making an attempt to land. These operations being finished, they traversed the Pacific, determined on their way the position of the Ladrone Islands, and arrived at Macao on the 2nd of January, 1787. At the outset of his second expedition, La Perouse went along the coast of Corea, and discovered Cape Nota on the coast of Japan. The officers of the expedition applied themselves particularly to the determination of the latitudes and longitudes of the places which they visited. In latitude 45° N., they discovered a harbour which they called the Bay of Ternay. They next discovered the strait which separates the island of Jesso from Tchokha or Saghalien, and which is called the Strait of La Perouse. The expedition then sailed for Kamtschatka, where it was hospitably received. At this point M. Losseps, who had accompanied La Perouse as interpreter of the Russian language, was sent overland to France. This intrepid young man, to whom had been entrusted the journals and charts of the voyage, traversed the old continent through its whole extent from east to west, and happily arrived at Paris with the valuable observations which had been made during the expedition. La Perouse returned to Oceania, to meet severe trials. At Macoma, one of the Navigators’ Islands, his companion, De Langle, the captain of L’Astrolabe, and twenty of his attendants, were cruelly murdered by the natives. Lamanon, the naturalist of the expedition, perished in this attack. After a short stay at Botany Bay, on the east coast of New Holland, now called Australia, La Perouse prepared for his third and last expedition. In this new voyage of discovery, which ended so disastrously, he purposed to explore the Tonga Isles, the south part of New Caledonia, the Louisiade Archipelago, New Guinea and other islands, the Gulf of Carpentaria, and the coast of Australia from this gulf to Van Diemen’s Land. He left the shores of New Holland full of hope and enterprise; but his task, so courageously self-imposed, was left unfinished; his career came to a close. From that moment he was never more heard of; for two years, expectation was kept on the stretch, looking for news of the squadron. La Perouse and his companions were lost to their country. The cruel uncertainty which remained in France regarding the fate of the expedition, caused the National Assembly to pass a decree in February, 1791, by which it treated the king, Louis XVI., to solicit the assistance of the other sovereigns of Europe in the search for La Perouse. This decree also directed the organisation of an expedition, which had the double object of endeavouring to find some trace of the unfortunate navigator, and of completing the discoveries which had been left unachieved. This expedition took place under the command of Admiral D’Entrecasteaux, but without success. It was almost as unfortunate as that of La Perouse, although it was useful in making those coasts better known which had been carefully explored in search of him. The place of his shipwreck, in fact, was not discovered till 1827, by Captain Dillon, who ascertained that he and his unfortunate companions were lost on the rocks of one of the Feejee Islands, and found the remains of the vessel and part of the articles that belonged to him. The singular voyage of Captain Bligh, who, owing to the mutiny of his crew, was obliged to traverse an immense extent of ocean in an open boat, led to the discovery, in 1789, of some of the southern islands of the Feejee Archipelago. The surprising explorations, also, of Captain Flinders and Surgeon Bass, who attempted to effect the circumnavigation of New Holland, in a sorry boat; ended in the discovery of the strait which separates that continent from Tasmania, then called Van Diemen’s Land, and which still retains the name of Bass; and, at the same time, in the delineation of an immense line of coast on the same continent. Flinders especially has a right to the remembrance of geographers, for the steadiness with which he pursued, during many years, his difficult and dangerous labours, almost always in an open boat or frail skiff which the smallest storm would have foundered in a moment. To him we owe the discovery of Kangaroo Island, the hydrography of Van
Diemen's Land, the exploration of the southern and eastern coasts of New Holland, and the determination of numerous points in Torres Strait and the Gulf of Carpentaria, was productive of little utility in a geographical point of view, after the labours of Flinders.

The voyage of Vancouver preceded the French expedition above mentioned, and added to the knowledge of the Australian continent. He discovered the harbour of King George in the southernmost extremity of New Holland, and after completing the labour of the latter, Captain Baudin, commander of the tender, discovered Chatham Island, and the expedition proceeded to Tahiti to prepare for exploring the north-west coast of America. Vancouver, in company with a Spanish expedition, which he met, under the command of Captain Quadra, discovered the island which for some time was called Vancouver and Quadra Island, in commemoration of its discoverers, and which is now known only as Vancouver Island, and is the most important of our colonies on the west coast of North America. He then explored the river Columbia as far as the expedition could ascend its streams. A rest at the Sandwich Islands, and new expeditions on the American coasts detained Vancouver till the winter of 1794, when he returned to the same archipelago. Having, in a new hydrographic survey, explored another part of the coast of the New World, including Cook's Inlet, Vancouver returned to England, laden with geographical information, and signified by not a few discoveries. These regions were scarcely re-visited until the voyage of Kotzebue, which took place in 1815-1818. This Russian navigator discovered to the north of Behring Strait, between latitudes 67° and 68° N., and in longitude 165° 37' W., a great bay or sound to which he gave the name of the Atlantic, and to ascertain first whether Icy Cape was an island; but illness prevented him from carrying his designs into execution. He discovered several uninhabited islands in the Pacific, particularly the eastern part of the Caroline group.

As to the northern passage between the Atlantic and the Pacific, it seemed to clade all the skill and vigilance of navigators. Captain Phillips, in 1778, attempted to find a passage from the Atlantic to the Pacific from the south side; Captain Cook, as we have seen, attempted it from the Pacific side; Fickesgill and Young succeeded no better by sailing through Baffin's Bay; and Lowenorn, Egelo, and Rothe, in 1786-1787, attempted, but without success, to explore the eastern shore of Greenland, which is said to be unapproachable in consequence of the accumulation of ice since the early part of the fifteenth century. At the beginning of the winter, northern expeditions were revived; and they have been pursued with more or less ardour till the present day. In 1818 two expeditions were fitted out for the north. The one was placed under the command of Captain Ross, who sailed from England towards the end of April of that year, accompanied by Lieutenant Parry, who commanded under his direction the ship Alexander. Between latitudes 76° and 77° 40' N., they sailed, and an island whom they called Van Diemen's Land. This country occupied a space of 120 miles in the north-east corner of Baffin's Bay. On the 30th of August they reached the entrance of Lancaster Sound, and as it was fifty miles broad from north to south, and as the soundings were 750 fathoms, they fancied they had discovered the north-west passage; but they soon perceived their mistake by observing land in their course, and the discovery of this affixed the labour of the sound. Having reached latitude 70° N., the expedition returned and explored the coasts as far as Cape Walsingham, in Cumberland Island, whence it sailed for England. The other expedition to the north was undertaken by Captain Buchan and Lieutenant Franklin; but it was productive of no new discovery, as they were compelled to return when they had reached Spitsbergen, gelid to escape the alarming dangers of sailing in the midst of floating icebergs. Captain Ross, on the other hand, continued the exploration begun by Captain Ross. In a new expedition, he discovered a passage called Prince Regent Inlet, south of Lancaster Sound, Wellington Inlet, farther north in the same sound, and the islands of Cornwallis, Griffith, Bathurst, Byam Martin, Melville, and others, all included under the name of the North Georgian Islands. He also discovered Banks Land, south of Melville Island, and North Somerset, which forms the northeeast part of Prince Regent Inlet, and wintered, in 1819-1820,
profes, and suffixes. Suffixes are sometimes called offases (ad, to; and figo, I fes). They may also be designated terminations, especially when they are not so much fragments of words as letter-endings, or additions forming the specific parts of speech in each case. Thus right becomes righteous, and righteousness becomes righteousness, and righteously; wheres none, ness, and are terminations; the first modifying the subjective, the third converting the adjective into an adverb, and the second changing the adjective into a noun.

Of these three classes, the roots are by far the most numerous. The roots also undergo various modifications from the prefixes and the suffixes. On these accounts, it seems desirable to study the prefixes and suffixes before we study the roots.

Before entering into the requisite details, I wish to make another distinction. Take the word truthfulness. Analyse the word. Obviously it consists of three elements: 1, truth; 2, full; 3, ness. Truth is the primitive word. By the addition of full (or ful), truth becomes truthful, an adjective; and the adjective truthful is made into a noun by the annexation of the syllable ness. Instead of a noun, I might have formed an adverb by subjoining ly; thus, truthfully. I have said that truth is the primitive word. Primitives are here used in opposition to the word derivative. In relation to its derivatives truthful, truthfully, and truthfulness, the word truth is a primitive word, for it is the source. It is another question whether truth may not be reduced to a simpler form. In the same way, truthfulness is a primitive term when viewed in relation to its derivative truthfully. As with human beings, each word is in truth child and parent. Still there must be a common stock. But genealogies in language are scarcely less obscure than other genealogies. In linguistic genealogies, authority must receive great deference. Now the word truth can be reduced to a simpler form, and yet remain a word. From truth take th, and you have true—that is, true. So from strength take th, and you have strong, an old form of strong. But fool is not a derivative word, because you cannot reduce it to another word in a simpler form; for, if you remove the th, the remainder is no word at all. Words, then, which appear to be primitive, may be derivatives; and the rule by which to ascertain whether a noun is primitive or derivative is this: words which, on the removal of one or more of their letters, have a distinct meaning, are derivatives; and words which, on the removal of one or more of their letters, have no distinct meaning, are primitives. By the application of this rule, we learn that bishop is a derivative, and addition a derivative; while pen, head, are primitives.

The prefixes and the affixes in the English language are numerous. Without a correct acquaintance with their import, the exact force of words can scarcely be understood. But these prefixes and affixes are of Latin and of Saxon origin. Consequently, in our attempt to ascertain their meaning, we must borrow aid from the Latin and from the Saxon. A few prefixes come from the Greek, the signification of which is to be found in the Greek. I shall treat first of prefixes, and, for the sake of facility of reference, take them up in alphabetical order.

PREFIXES IN THE ENGLISH LANGUAGE.

A (an), of Saxon origin, has the force of in or on; as along, alongside, knock, shock, aded. In this sense it is used in connection with present participles, as a hunting; that is, in or at hunting. The form occurs in our common version of the Scriptures, in John xxi. 3, being a relic of the language in its older state, such as in part it is now found in colloquial diction. The phrase may be exemplified, and its meaning shown by comparing together the renderings of different versions of this passage.—


Cramer (1530). Simon Peter saith unto them, I will go a fishing.

Geneva (1557). Simon Peter saith unto them, I go a fishing.

Rheims (1550). Simon Peter saith to them, I go to fish.

Authorized (1611). Simon Peter saith unto them, I go a fishing.

Not only are these instances curious as exhibiting varieties of spelling, but they seem to show how thoroughly a part of the language is this prefix in the sense now illustrated. Yet in the usage disallowed, and by some regarded as a vulgarism. I trust that the useful sympathies of the people will do something to restore the original idioms of the English tongue.

A, of Saxon origin, is also used as an intensive. An intensive (in, on, and, and, I stretch) is that which increases the force of a word, expanding, as it were, its essential power. A, as an intensive, is of frequent use, and is exemplified in those words, ashamed, afraid, afraid; arise, remain (a and macOS, to be able; maich, power, in the German; compare the Latin magnus, great). Thus Dryden—

"She said; her blemish eyes that ready stood, And only wanted will to weep a flood, Released their wat'ry store, and poured again, Like clouds, low-hung, a sober show'r of rain."

A, of Latin origin, meaning from, is found in the forms a, ab, abs—e.g., abatement (French, abatir, to beat down), a beating from or down; abbreviation (Latin, abrevia, short), a shortening; abstraction (Latin, traho, I draw, a draught from, or away.

"But man the absent

Of all perfection which the workmanship
Of Heaven hath modelled, in himself contains
Passions of several qualities."—Ford.

A, of Greek origin, found chiefly in scientific words, has a negative or primitive force; that is, it reverses the meaning, or denies what is implied in the term, as dacephalous (Greek, ἀκεφάλος, pronounced kef-a-los, head), without head; a term applied in anatomy to the young of any animal born, from original defect of organisation, without a head. To avoid a hiatus (Latin, hiatus, gap, a break or hole), there was an before a vowel; as anarchy, the absence of government; government in Greek being ἀρχή, pronounced ar-key.

Ad, of Latin origin, to, passes into the forms ac, af, ag, al, an, ep, ar, as, at—that is, the terminating consonant of the prefix is, for the sake of ease in pronunciation, changed into the initial (Latin, initium, beginning) consonant of the noun; e.g.—

"An adjournment is no more than a continuance of the session from one day to another, as the word (jour, French, day) itself signifies."—Milton.

Ac. "The greatness of sins is by extension and accumulation."

Jeremy Taylor.

Af. "The most true

That musing meditation most effects
The passive secrecy of desert-cell
Far from the cheerful haunts of man and herbs."—Milton.

Ag. "Corporations aggregate consist of many persons united together into one society, and are kept up by a perpetual succession of members, so as to continue for ever."—Blackstone.

Ah. "Then by liberal (libelus, a little book), or by articles drawn out in a formal allegation, set forth the complainant's ground of complaint."—Blackstone.

An. "This god-like act

Annulls thy doom."—Milton.

Ap. "God desires that in his church, knowledge and piety, peace and charity, and good order should grow and flourish; to which purposes he hath appointed teachers to instruct and governors to watch over his people."—Barrow.

Ar. "Arrogant is he who thinketh he hath those beauties in him that he hath not."—Chaucer.

As. "Are you discontent

With laws to which you gave your own consent?"—Pope.

At. "The most wise God hath so tempered the blood and bodies of fishes, that a small degree of heat is sufficient to preserve their due consistency and motion, and to maintain life."—Ray.

Amb, of Latin origin or rather Greek origin, found in the Greek αμβα (pronounced am'-ba), around, and in the Latin ambo, both, signifies on both sides, as ambidextrous (Latin, dexter, the right hand), literally, having a right hand on both sides; that is, one who uses his left hand equally well with the right.

"Should I that am a man of law.

Not of such a calling, to fly the claw,

In London or in Exeter;

And be of both sides, as you were,

People would count me then, I fear,

A knarvil ambidexter.—Dawes.

Amb is found in the form of amphi, as amphitheatre, a theatre of two sides or circus; amphibious, double-lived, that is, living on land and in water.

An, of Greek origin, up, back, as in anachronism (Greek, ἀνάκρονος, pronounced kron'-o, time), an error in date by which an
event is placed too high up or too far back; generally a deviation from the order of time.

"The dresses and buildings of the time are preserved, though by frequent anachronisms."—Walpole.

The one is found also in anagram (Greek, ἀνάγραμμα, pronounced gram'-ma), which is a word produced by the transposition of its letters, having a meaning different from the original.

"And see where Juno, whose great name
Is Unio in the anagram,
Displays her glittering state and chair."—Ben Jonson.

Ante, of Latin origin, before, as antedate, to date before time, to anticipate—

"Andromache, my soul's far better part,
Why with untimely sorrows heaves thy heart?
No hostile hand can antedate my doom,
Till fate condemns me to the silent tomb."— Pope's Homer.

Anti, of Greek origin (ἀντί, pronounced an'-ti, against), in opposition to, as in antichrist, opposed to Christ—

"If once that antichristian crew,
Be crush'd and overthrown,
We'll teach the nobles how to crouch,
And keep the gentry down."—Quarles.

In theology, antitype stands correlatively over against type, as the counter-pattern to the pattern, the corresponding and completing form.

"The Mosaic law was intended for a single people only, who were to be shut in, as it were, from the rest of the world, by a fence of legal rites and typical ceremonies; and to be kept by that means separate and unmixed until the great antitype, the Messiah, should appear, and break down this fence and lay open this inclosure."—Arminius.

The i in anti is sometimes dropped before a vowel, as in antarctic, which means opposite to or over against the north.

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LESIONS IN PENMANSHIP.—XIII.

In Copy-slip No. 43 the learner is shown how the letter q is connected with the letter t, which may be justly termed its inseparable companion, as there is no word in the English language in which q appears without being immediately followed by t. It is just possible, however, to give a word which forms an exception to this rule; and to satisfy those who may be curious on the point, and to make some slight addition to their stock of geographical knowledge, we may at once tell our readers that if they will take the trouble to search the map of France, they will find it in the name of a little country town called Aups or Ax, which is situated in the department of Alpes, near the foot of the Pyrenees, and noted for the hot springs that are found in its neighbourhood. In writing the word quill, the learner will find a useful exercise in carrying letters above and below the lines a a, b b, in the same word, the practice afforded being similar to that which was given by the words put and pull in Copy-slips 30 and 34.

In a former lesson (see page 173) it was remarked that there were some letters of the writing alphabet whose form is based on that of the letter o. These letters, which are c, x, o, and s, may be fairly termed modifications of the letter o, in the same way that we have the letters t and l as modifications of the pot-hook or bottom-turn. The first of them, the letter c, is commenced about the same distance above the line c c as the letter o, but instead of beginning with a hair-line, a dot is first formed from which a hair-line is carried round to the left, and the rest of the letter is formed in the same way as the letter o, with this exception, that the fine turn at the bottom of the letter is carried to the right and joined to the letter that follows it, as may be seen in Copy-slip No. 45. The dot with which the letter c is commenced is made (the self-teacher must carefully note this), not exactly in the same spot in which the letter o is usually commenced, but about a hair's breadth to the left of it, and the hair-line is carried on from the bottom of the dot, and not from the top of it, in a direction which turns first to the right and then upwards, after which the letter is completed as described above.
LESSONS IN GERMAN.—XII.

SECTION XXI.—THE VERB TO BE, ETC.

sein, like the corresponding English verb, is very irregular in conjugation; its different parts having been derived from words now obsolete.

It is used as the auxiliary to many active intransitive verbs, such as kommen, gehen, etc., where haben (like have been in English) is substituted, as: 3. Ich ist, he is come. 4. Ich ist, he is gone. § 71. 3. 4. 5.

sein is employed as the auxiliary in its own conjugation, as: — Ich bin gegeben, I have been; literally, I am been. For complete conjugation, see § 72. 2.

CONJUGATION OF THE PERFECT TENSE OF sein, kommen, and gehen.

1. Ich bin gegeben, I have been; wir sind geben, we have been.

Du bist gegeben, thou hast been; ihr seid gegeben, you have been.

Er ist gegeben, he has been; sie sind gegeben, they have been.

2. Ich bin gekommen, I have come; wir sind gekommen, we have come.

Du bist gekommen, thou hast come; ihr seid gekommen, you have come.

Er ist gekommen, he has come; sie sind gekommen, they have come.

3. Ich bin gegangen, I have gone; wir sind gegangen, we have gone.

Du bist gegangen, thou hast gone; ihr seid gegangen, you have gone.

Er ist gegangen, he has gone; sie sind gegangen, they have gone.

VOCABULARY.

Berlin, i. Berlin.

Bleiben, to remain.

Bringen, to bring.

Draußen, a. Outside.

Dresten, n. Dresden.

Fliegen, to fly.

Freiderick, m. Frederick.

Glauben, to believe.

Haus, m. House.

Inhaber, n. Owner.

Jemand, somebody, anybody.

Sächs. m. cago. s. Saxon.

Schneiden, m. Snow.

Sieben, to know, to
come acquainted with.

Gespräch, m. conversation.

Wohnen, to speak.

Welt, m. World.

Wetter, n. Weather.

Wissen, to know.

Xanten, m. Prussia.

Schneiden, m. Snow.

Zimmer, m. Room.

Tief, m. Deep.

Tief, m. Deep.

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Tief, m. Deep.
LESSONS IN ARITHMETIC.—XIII.

DECIMALS (continued).

6. It is evident, also, from the explanations given in Lesson XII, that to multiply a decimal by any power of 10, we need only move the decimal point as many places to the right as there are ciphers in the multiplier. For example:

\[ 34.567 \times 10 = 345.67 \]

\[ 345.67 \times 100 = 34567 \]

Similarly, to divide a decimal by any power of 10, we must move the decimal point as many places to the left as there are ciphers in the divisor. If there are more ciphers in the divisor than there are places in the decimal, we must prefix a sufficient number of ciphers (Art. 5).

Exercise 29.

1. Express as decimals:
   1. \( \frac{3}{10} \), \( \frac{3}{100} \), \( \frac{3}{1000} \).
   2. \( 2.57 \), \( 4.63 \), \( 9.256 \).
   3. \( 7.234, 4.3124, 3.431243, 9.23412341 \).

2. Express as fractions, or mixed numbers—

\[ \frac{32}{100} = 0.32 \]
\[ \frac{329}{1000} = 0.329 \]
\[ \frac{329}{1000} = 0.00329 \]

Here, in order to move the decimal point two places to the left, we must place two ciphers before 3, the first significant digit of the dividend.

Exercise 30.

1. Find the sum of the following decimals:

\[ 1.237, 5.359, 23.006, \text{ and } 37.145. \]
\[ 2.0102, 1.701, 3.257, 2.0731, \text{ and } 5.000701. \]
\[ 1.6041, 6.728341, 5.7418, \text{ and } 4.723314. \]
\[ 4.6273004, 2.8724596, 8.98200041, \text{ and } 2.782341. \]
\[ 329.00724, 89.000081, 29.36754, 294.00639, \text{ and } 72.390269. \]
\[ 691.01, 81.298, 3624.8103, 650.40263, \text{ and } 5121629.300023. \]
\[ 36.358, 2.0675, 38.2435, \text{ and } 7.3056. \]
\[ 52.754, 572, 16.0007, \text{ and } 49.3041. \]
\[ 4.295, 2.023, 4.613, 8.397, 3.038, 3.248, \text{ and } 1.92. \]
\[ 25.7603, 47.0076, 129.65, 100.007, \text{ and } 20.53. \]
\[ 21.634, 8087.9, 29.861, 1765.6, \text{ and } 3.84. \]
\[ 45.903, 189.2319, 279.3456, 52.81456, \text{ and } 324.00407. \]
\[ 1324.302, 3.000482, 9.760146, 3.000000, \text{ and } 7.920089. \]

2. Add together the following, after writing them as decimals:

1. 45 thousandths, 6 millionths, 9 tenths, and 11 ten millionths.
2. 25 hundredths, 8 tenths, 65 thousandths, 16 hundredths, and 39 hundredths.
3. 9 tenths, 92 hundredths, 42 thousandths, 899 thousandths, and 92 millionths.
4. 29 hundredths, 7 millionths, 62 thousandths, and 1267 ten millionths.
5. 92 thousandths, 61 millionths, 6 tenths, 11 hundredths, and 265 hundred thousandths.
6. 1 tenth, 2 hundredths, 16 thousandths, 7 millionths, 26 thousandths, 85 millionths, and 7 ten thousandths.
7. 92 hundred thousandths, 72 millionths, 45 hundredths, and 7 tenths.

8. Subtraction of Decimals.

It is evident, from the remarks we have made with respect to the addition of decimals, that the process of subtraction will be performed in exactly the same way as in simple subtraction. Thus, to subtract 3.275 from 6.14, we write the decimal points under each other, in the margin, adding a cipher to 6.14 for convenience, to make the number of decimal places correspond with that of the number to be subtracted. We then subtract borrowing 1 (really \( \frac{1}{10} \) or \( \frac{1}{100} \)) from the next highest order of figures, as in simple addition—5 from 10 leaves 5, then 8 from 14 leaves 6, and so on, the decimal point in the row of figures obtained falling under the other decimal points.

We may also exhibit the process as follows:

\[ 6.14 - 3.275 = 2.865. \]

Obs.—The methods of simple addition and subtraction apply to decimals, because the only condition upon which their truth depends is, that the places of figures should increase in value in a tenfold ratio from right to left, which is the case with decimals.
ESSAYS ON LIFE AND DUTY.—II.

JUSTICE.

There is a sense of accountability in every human breast. Savage and civilized races alike manifest its existence. The degree of its intensity, as a power, may differ, but it is as much an integral part of the moral nature of man, as the eye and the car are parts of his physical economy. All injustice is contrary to our moral sense. It may be indulged to gratify passion, pride, ambition, covetousness; but it is condemned by the high court of judicature within, and sooner or later injustice brings its terrible penalty with it. Naboeh's vineyard may be justly occupied by covetous pillage, but neither the groves nor the grapes can minister lasting happiness: the gnawing sense of wrong will be awakened. That which a man sows he is sure to reap. This fine and delicate sense, it is admitted, may be dimmed by ignorance, darkened by superstition, and sometimes, by long neglect, it may but slumber in the breast; but it never dies out. All nations have more or less honoured the God-given sentiment of justice. The Greeks had their Justitia, called Asuras and Themis; the Romans had a goddess, which was at one time an abstraction rather than a deity possessing personality. The coins, however, that have been preserved, represent Justice as a maiden wearing a diadem, holding a sword and scales. Sometimes she is represented as holding in the one hand a cup, and in the other a sceptre. Nor can we forget that in the earlier ages of history, three years before Xerxes invaded Greece, the Athenians hastened to call to their political counsels, and to the command of their armies, one who had before received the memorable cognomen of Aristides the Just. It need scarcely be said that the Scriptures also are full of honours paid to the just.

Nothing is so mean as injustice. Lacking the element of justice in character, no other qualification will be of much avail. Generosity is only a misnomer where justice is set at naught. It may be paid to someone whilst we are defrauding others, we are not generous but merciless. Injustice, however, does not merely relate to our dealings in material commodities. It appertains to our estimates of each other, to our expressions concerning each other, and to all the aspects of our common life. We may do the very greatest injustice to others even by the supressio veri, or the mere keeping back of truth concerning them. Justice is of immense importance to nations. The preservation of treaties, the payment of bonds and interests on national loans is of the highest moment to the reputation of any people, and the infraction of just principles is sure to work out national punishment in the loss of credit and prestige. As it is with nations, so it is with individuals. Men come to shrink with disdain from the wilfully unjust, and the old proverb receives its fulfilment in human history, "When God loadeth wrong, men come presently to load it too."

Justice in the administration of the law is a glory to any people. It is well known that in the degenerate days of Rome the judges were in the guilty habit of receiving bribes, and it is needless to say that at this period the national character had degenerated, when other things beside the amine of justice were dragged in the dust. English law is above suspicion for purity and honour in its administration. Trial by jury answers to a very large extent the high ends of justice, whilst the Courts of Equity, now so much more used than in olden days, save the cause of truth from being lost by mere legal quibbles and technicalities.

Justice in commercial life is the very cement of society. When it is infringed upon by wrong-doing, depression settles down on trade and commerce, and for this single reason, that in civilized states of society all bartering and exchanging is carried on upon credit, which is only another word for confidence: if, therefore, that be damaged, it is easy to see how all the interests of the nation must suffer with it. Then only are we safe from paltry jobbery and trickery, when we can honestly say, "I hate oppression and robbery."

We are not to be just only because it will be rewarded here and hereafter: we are to do right because it is right. At the same time we cannot conceal from ourselves the fact that in the system of things in which we live there are rewards accompanying an upright life such as no wealth can purchase. To be looked upon as unimpeachable for integrity, and unquestionable concerning justice, is to have that atmosphere of respect around us which can only be ensured by persistent continuance in well-doing.

Injustice, whatever form it assumes, apart from its inner penalties, will bring coldness and suspicion with it, and we shall appeal to the system of life—the sense of an approving conscience, and the good name which, we are told on the highest authority, is rather to be chosen than silver or gold.

Only quibblers ask, "What is justice?" They try to set aside its claims by casuistical questions concerning its nature. Justice is, in a word, the practice of those essentially Christian maxims, doing unto others as we would they should do unto us, and loving our neighbour as ourselves. We have treated of an approving conscience, and the good name which, we are told on the highest authority, is rather to be chosen than silver or gold.

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LESSONS IN LATIN.—VII.

The second declension is known by the ending of the genitive singular in ĭ. The terminations of the nominative are us, or, ir, and um; of these terminations us, or, ir, are masculine, and um is neuter; that is, nouns ending in us, or, ir, are of the masculine gender, and nouns ending in um are of the neuter gender.

SECOND DECLENSION.

Sign i in the Genitive Singular.

CASE-ENDINGS.

<table>
<thead>
<tr>
<th>LATIN</th>
<th>ENGLISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. ăs, ēs, ērum, (subject)</td>
<td>N. ēs, ēs, ēs, (subject)</td>
</tr>
<tr>
<td>G. ĭ of</td>
<td>G. ērum, of</td>
</tr>
<tr>
<td>D. ĭ, to or for.</td>
<td>D. ēs, to or for.</td>
</tr>
<tr>
<td>Acc. ēs, (object)</td>
<td>Acc. ēs, (object)</td>
</tr>
<tr>
<td>V. ēs, ērum, ēs, (of)</td>
<td>V. ēs, ēs, ēs, (of)</td>
</tr>
<tr>
<td>Abl. ēs, by, etc.</td>
<td>Abl. ēs, by, with or from.</td>
</tr>
</tbody>
</table>

A few remarks will make the meaning of the above table clear. First, let us speak of the singular. In the nominative there are four terminations. The arrangement is meant to show that of all these four î is the genitive-ending, and o the dative-ending. In the nominative plural, there are two terminations. The arrangement is meant to show that of both these orum is the genitive-ending, and is the dative-ending. The dative-ending and the ablative-ending is the same, being in the singular or and in the plural ľs. In both the singular and the plural, three cases are alike in nouns ending in um. These three cases are the nominative, the accusative, and the vocative, which in the singular end in um, and in the plural in ľs.

I subjoin an instance of each of the four terminations, thus:—

horses, a garden, has the first termination; purer, a boy, the second; vir, a man, the third; bellum, war, the fourth.

EXAMPLES IN THE SECOND DECLENSION.

<table>
<thead>
<tr>
<th>Cases.</th>
<th>Singular.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>hortus, a garden.</td>
</tr>
<tr>
<td></td>
<td>purer, a boy.</td>
</tr>
<tr>
<td>Ac.</td>
<td>hortum, of garden.</td>
</tr>
<tr>
<td>D.</td>
<td>horti, to a garden.</td>
</tr>
<tr>
<td>V.</td>
<td>horti, ľs, to garden.</td>
</tr>
<tr>
<td>Ab.</td>
<td>horti, by a garden.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cases.</th>
<th>Plural.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>horti, gardens.</td>
</tr>
<tr>
<td>G.</td>
<td>hortorum, of gardens.</td>
</tr>
<tr>
<td>D.</td>
<td>horti, to gardens.</td>
</tr>
<tr>
<td>Ac.</td>
<td>hortes, gardens.</td>
</tr>
<tr>
<td>V.</td>
<td>horti, ľs, to gardens.</td>
</tr>
<tr>
<td>Ab.</td>
<td>horti, by gardens.</td>
</tr>
</tbody>
</table>

In a, a field, and some other nouns, the ľ is rejected in all the cases except the nominative and vocative singular. Thus, ager makes in the genitive singular agri:—

<table>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>bonus hortus, a good garden.</td>
<td>N.</td>
<td>horti, gardens.</td>
</tr>
<tr>
<td>G.</td>
<td>boni horti, of a good garden.</td>
<td>G.</td>
<td>hortorum, of gardens.</td>
</tr>
<tr>
<td>D.</td>
<td>bonus horti, to a good garden.</td>
<td>D.</td>
<td>horti, to gardens.</td>
</tr>
<tr>
<td>Ac.</td>
<td>bonus, of a garden.</td>
<td>Ac.</td>
<td>hortes, gardens.</td>
</tr>
<tr>
<td>V.</td>
<td>bonus hortum, a good garden.</td>
<td>V.</td>
<td>hortum, of garden.</td>
</tr>
<tr>
<td>Ab.</td>
<td>bonus, by a garden.</td>
<td>Ab.</td>
<td>horti, by gardens.</td>
</tr>
</tbody>
</table>

Adjectives have terminations similar to the nouns of the first and second declension. Thus, bonus, good, is declined like hortus, a garden, in the following manner:—

<table>
<thead>
<tr>
<th>Cases.</th>
<th>Singular.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>bonus, good.</td>
</tr>
<tr>
<td>G.</td>
<td>boni, of good.</td>
</tr>
<tr>
<td>D.</td>
<td>bono, to good.</td>
</tr>
<tr>
<td>Ac.</td>
<td>bonus, a good.</td>
</tr>
<tr>
<td>V.</td>
<td>hortum, of garden.</td>
</tr>
<tr>
<td>Ab.</td>
<td>horti, by garden.</td>
</tr>
</tbody>
</table>

Write out the following adjectives and nouns according to these models:—

<table>
<thead>
<tr>
<th>Bonus</th>
<th>ager.</th>
<th>ľnductus puer.</th>
<th>Magnus hortus.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctus</td>
<td>vir.</td>
<td>-----------------</td>
<td>Malum bellum.</td>
</tr>
</tbody>
</table>

VOCABULARY.

Amico, -ā, -a, -um, friend.
Eplatho, -ēs, -ā, -um, a letter.
Furnam, -īs, -ās, -ōrum, a bank.
Perigrenus, -īs, -ās, a stranger.
Aper, āgri, a bear. In (with the ablative case), is on (with the accusative), into.
Agrigum, -īs, -ās, a garden.
Regnum, -īs, -ās, a kingdom.
Capri, -ārii, -āri, a goat.
Discipulus, -īs, -āri, a disciple.
Magister, -īs, -āri, a master.
Schola, -īs, -āri, school.

EXERCISE 21.—LATIN-ENGLISH.


EXERCISE 22.—ENGLISH-LATIN.

1. I love good scholars. 2. Good scholars are loved by good men. 3. Doest thou love a friend? 4. I have a boar. 5. Thou hast a goat. 6. The goats are on the river's bank. 7. A great and deadly war is in the island 8. Many fields are in Britain. 9. Boars are often deadly. 10. O men, do you love the boys? 11. My friends do not love strangers. 12. Boys love play. 13. Do boys love play? 14. Have you a female friend? 15. I have not a large boar. 16. The letter of my female friend is in the garden.

We are now in a condition to decline and study adjectives of which are called three terminations; as, amplus, amplus, amplus, large or spacious. Amplus, you see, is like hortus; amplus is like mensa; and amplus is like bellum. In fact, amplus is of
the masculine gender, and is declined like a noun masculine of the second declension; and is of the feminine gender, and is declined like a noun feminine of the first declension; and as of the neuter gender, and is declined like a noun neuter of the second declension. I subjoin the full declension of amplus, a, um. Like it are declined all adjectives ending in us, a, um; which are said to have three terminations from the fact that such three terminations, us, a, um, etc., they really have.

ADJECTIVES OF TERRA TERMINATIONS OF THE FIRST AND SECOND DECLENSION.

**Example.** Amplus, m.; ampla, f.; amplum, n.; large.

<table>
<thead>
<tr>
<th>M</th>
<th>P.</th>
<th>N.</th>
<th>M.</th>
<th>P.</th>
<th>N.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>amplus</td>
<td>ampla</td>
<td>amplus</td>
<td>ampla</td>
<td>ampla</td>
</tr>
<tr>
<td>G.</td>
<td>ampli</td>
<td>ampli</td>
<td>ampli</td>
<td>ampli</td>
<td>ampli</td>
</tr>
<tr>
<td>D.</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
</tr>
<tr>
<td>Ac.</td>
<td>amplum</td>
<td>amplum</td>
<td>amplum</td>
<td>amplum</td>
<td>amplum</td>
</tr>
<tr>
<td>V.</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
</tr>
<tr>
<td>Ab.</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
<td>ampla</td>
</tr>
</tbody>
</table>

This form and other similar forms I advise you to learn by heart in three ways; first, vertically, that is, from top to bottom; you will thus see the identity in form of the adjective with the corresponding noun. Then learn it from the left hand to the right; thus, amplus, ampla, amplum: learning the singular first, and then the plural. Finally, learn the case-endings in the same two ways; thus:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>us, i, o, um, e, o,</td>
<td>us, i, o, um, e, o,</td>
<td>us, i, o, um, e, o,</td>
</tr>
</tbody>
</table>

You cannot bestow too much pains in making yourself perfectly familiar with each declension, each example, each form, as you go forward. There is a good Latin maxim which says, "feste lente," literally, hasten slowly, or as the English proverb says, "slow, but sure." In grammatical studies the observance of the proverb is very serviceable.

The adjective liber, free, is declined like the noun puere. The adjective pulcher, fair or beautiful, is declined like the noun aeg. Liber in the feminine gender is libera, and libera is declined like mensa. In the neuter gender, it is liberum, and liberum is declined like bellum. I will give you the forms in full of both liber, libera, liberum, and pulcher, pulchra, pulchrum.

**ADJECTIVES OF THREE TERMINATIONS.**

**Example.** Liber, free.

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| N. pulcher | pulchra | pulchrum | pulchri | pulchrum | pulchri |
| G. pulcher | pulchri | pulchri  | pulchri | pulchri  | pulchri |
| D. pulcher | pulchrum| pulchrum | pulchrum| pulchrum | pulchrum|
| Ac. pulcher| pulchrum| pulchrum | pulchrum| pulchrum | pulchrum|
| V. pulcher | pulchri | pulchri  | pulchri | pulchri  | pulchri |
| Ab. pulcher| pulchri | pulchri  | pulchri | pulchri  | pulchri |

Oms.—The ch is pronounced like k, thus, pulker, pulkra, pulcrum, etc.

Form, according to the models just given—

Ager fecundus, a fruitful field.

Exemplum bonum, a good example.

Pomina bona, a good woman.

Liber puere, a free boy.

Ovm magnum, a large egg.

Pulcher hortus, a beautiful garden.

Scriba bonus, a good writer.

Vir magnus, a great man.

Filius, a son, makes in the vocative singular fili, and mens in the vocative singular mens, as, O mi fili! O my son! but filia, a daughter, makes in the vocative singular filia, and mens in the neuter makes mensae, as, O mi filia! O my daughter! O meum officium! O my duty!

Proper names ending in us have i in the vocative singular, as, Tellius, O Telli; Virgilius, O Virgillus; Mercuros, O Mercurii; Antonius, O Antoni.

Dona, God, has in the vocative singular deus; in the plural

it is thus declined: N. dii, G. deorum, D. die, Ac. deos, V. dii, Ab. dii.

**Exercise 23.—Latin-English.**


**Exercise 24.—English-Latin.**

1. The field is fruitful. 2. Are the fields fruitful? 3. Wars are not fruitful. 4. Fields are cultivated. 5. You honour (worship) the gods. 6. The gods are honoured by Tully (Tullia). 7. The horse and the mare are guided by the man. 8. Boas run swiftly. 9. Do gods (are there) flies? 10. The earth is clothed with a multitudinousness of plants. 11. Thou intrustest the horse to the field. 12. Good scholars are honoured. 13. Of my son, temples are intrusted to the gods and goddesses. 14. O Antony, the gods and goddesses are worshipped in temples. 15. O good God! thou art worshipped in the fruitful fields. 16. Good men are honoured by their sons and their daughters.

**KEY TO EXERCISES IN LESSONS IN LATIN.**

**VI.**

**Exercise 15.—Latin-English.**

1. The frog croaks. 2. The frog is often (asper) the prey of the stork. 3. A stork injures a frog; or, the stork injures the frog. 4. The stork devours the frog. 5. O frog, thou croakest. 6. The water is disturbed by the frog: 7. Planta (or the plants) flourish. 8. The earth is clothed with an abundance of plants. 9. Storms injure (nocent) plants. 10. The earth produces plants. 11. O plants, how beautifully you adorn the earth! 12. The earth is clothed with plants.

**Exercise 16.—English-Latin.**


**Exercise 17.—Latin-English.**


**Exercise 18.—English-Latin.**


**Exercise 19.—Latin-English.**

1. I have a desceter of Jugurtha. 2. Thou hast a bad desceter. 3. I praise a good poet. 4. A good poet is praised. 5. The mare is praised by the charioteer. 6. The sailors sail to the island. 7. Good sailors praise their country. 8. The eagle is often praised by poets. 9. Husbandman greatly delight in plants. 10. Thou erectest, O sailiard! 11. I have the sadness of good poets. 12. I greatly love the shades of the groves. 13. The husbandman ride through the wood.

**Exercise 20.—English-Latin.**

THE POPULAR EDUCATOR.

ANIMAL PHYSIOLOGY.—VI.

We have to search for the orifice of the ear of birds beneath the feathers. In a few cases, as in the owl and wild turkey, a circle of feathers surrounds the ear-hole; but generally there is no external indication of an ear. On examination, however, a zone of fine feathers with peculiarly fine barbs, through which the air passes readily, is found round of the side of the head. The air is perhaps conveyed by these, and the ear may be said to be the inner end orifice of the air-tube, which begins at the nostrils, passes into the throat, and continues to the tympanic cavity.

THE EAR (concluded).

No one can doubt that the sense of hearing in birds is keen and appreciative. Indeed, if the correlation between the capability of producing a variety of sounds and the appreciation of the same be as close as we should naturally suppose it to be, the sense of hearing in our song birds is most exquisite. If the hen nightingale experiences a corresponding happiness in listening to the song of her mate to that which he evidently feels when it is sung to it, the bird could feel, with the ear and mind, the true feeling of the message conveyed by the varied music, ranging as they do from a sweet melancholy to a thrilling joy, then these little summer visitants have an avenue to a constant pleasure, and by the possession of this they make a nearer approach to us than we have been disposed to admit as possible to any of the lower animals.

The organ is firm and compact, and is situated at the top of the head, and is not divided into two parts, as in the case of mammals, or soft chalk, as in the internal ears of frogs, but dense, hard, pearly bodies, one of which is of large size, and is presented in the middle with the hair on the other side towards the observer, this side being upward when in its natural position.

In illustration of what has been said concerning the advantage of causing the sound waves to be reverberated in air, a peculiar connection between the labyrinth and the inner cavity of the ear in birds is not improbable to some minds; yet it is certain that the ossicles are a necessary and indispensable part of the organ. It is only just to mention that our greatest naturalists hold it as a principle that a species is endowed with no habit or instinct, no product or power, which is solely for the benefit of other species—in fact, that the primary use of such an endowment is for the advantage of the species which possesses it; and in the great harmony of Nature other species benefit from it, this is incidental, though not accidental. The finch makes honey for its own comfort, though men use the honey in their own stock, the sheep grazes on grass, though man can make good use of the grass, and so on.

The sense of hearing produces a thrill in the bird, and is associated with the sense of sight, so that the crocodile appears to have a close resemblance in some respects to a human being. As in the case of the eye, the ear of a typical reptile cannot be described as the ear of the class, because there are such great differences in this organ. Thus, the ear of the crocodile is almost precisely like that of a bird, and it is only in the means of letting the air into the tympanic cavity that there is much difference. The crocodile, while it lives in the water, breathes air, and it is provided with a means of drawing the air into its body, while it is itself inhaling the air. This is effected by the channels of the nostrils being carried far back before they communicate with the throat, while a double valve in front of the communication closes and cuts off the throat from the mouth. By holding the prey crossovers, and far back against the corners of its widely-gaping jaws, it keeps it under water while retaining in its own lungs enough air to sustain the oxygenating it.

The tympanic cavity must be supplied with air, and water must be excluded from it; hence the Eustachian tube, or rather complicated system of tubes, is carried backward instead of forward, and opened by a single orifice, behind the hind opening of the nostrils, into the throat, and therefore behind the valve, and the opening is on a projection and closed by a half-moon-shaped valve. Every precaution is thus supplied to exclude the water from, and include the air in, the tympanic cavity. Lizards, turtles, and also frogs, have a drum and drum-membrane; but in this case the air passes into the tympanic cavity from the air bladder or the lungs, and enters the ear by the air tube, which is somewhat hollow.

In tracing the organ, then, throughout this class, we have gradually lost all the outer courts of the ear, and also what remnant of a cochlea was left.

In the bony fishes all these parts are wanting, as might be supposed; but the ear, instead of being brought to the surface, is walled up by the bones of the large skull. If the roof of the skull of a fish be separated, a central compartment will be seen, much too large for the small size of the fish. This is joined to the back part, a large chamber, which communicates with the central one, and in which the main portion of the ear is lodged; while the three semi-circular canals springing from this part by dilated bags run, two of them upward into tubular hollows of the skull-bones, and then unite to run into the same vestibular sack by a more central communication, while the third is horizontal and only communicates with the main cavity through several compartments which sometimes communicate with it only by narrow constricted necks, and in these are found the otolites, or ear-stones, which are suspended over the parts to which the strands of the ear nerve are most largely distributed. These ear-stones are no longer fragmentary particles, as in the case of mammals, or soft chalk, as in the internal ears of frogs, but dense, hard, pearly bodies, one of which is of large size, and is presented in the middle with the hair on the other side towards the observer, this side being upward when in its natural position.}

The ears of birds are of different forms and situationsaster. Some have them quite exposed, as in the mole, the skylark, and in some birds; others have them entirely concealed, as in the woodpecker, and in many others that breed in trees. Some have them covered with feathers, as in the pheasant, the capercaillie, and in many other birds; while in many the skin is highly developed, and is covered with feathers, as in the vulture, the eagle, and the vireo. In the latter, the skin is much fleshed over, and is covered with hairs, as in the vulture, the eagle, and the vireo. In the latter, the skin is much fleshed over, and is covered with hairs, as in the vulture, the eagle, and the vireo.
hearing would be wanting to them. Yet, strange to say, while the ears of the cuttle-fish and the slug have been satisfactorily detected, the seat of hearing in insects is still undetermined. The antenna, or jointed appendages of the head, have been usually looked upon as the seat of the sense of hearing, but whether it be in the basal joint or the terminal one is a matter of dispute; and in one instance it was supposed to have been found in the hip joint of the front pair of legs—a singular position, it must be confessed. To show the difficulty of determining these matters, we have given a sketch of the external orifices of two supposed organs of sense in the common lobster. The little conical protuberance, with a hole through the shell at the summit, which is closed by a membrane, beneath which is a little bag of fluid with a nerve running to it, which is found on

problems may be thus propounded:—What structures, in the fish, are the representatives of the osseous of the tympanum called the hammer (malleus) and anvil (incus) in the mammal? To this question an answer is given by some of our best anatomists which is almost startling from its strangeness, but which, on further examination, has much to support it. These anatomists affirm that the two bones, which form the joint of the lower jaw in the fish, are the representatives of the hammer and anvil, taken out, so to speak, of the ear-drum, much enlarged and applied to quite a different purpose. Such questions as these require much research to determine them, and are only mentioned here to give a slight insight into the difficulties found in unravelling the plan of Nature, though there is undoubtedly a plan in all her works.

I. Bone containing the ear of a rabbit. II. Ear-bone of the whalebone whale, one-fourth natural size. III. Internal ear of a bird. IV. Ear of a cod. V. Ear-stone of cod. VI. Under side of long antenna of a lobster. VII. Upper side of short antenna of a lobster.

Ref. to Nos. in Figs.——II. 1, tympanic bone; 2, its point of attachment to the skull. III. IV. 1, cochlea; 2, vestibule; 3, oval hole; 4, 5, semi-circular canals; 7, back of ear-stone. VI., VII. 1, organs of sense.

the under side of the first joint of the first, or long, pair of antennæ, has been long considered the organ of hearing. Now, however, the opinion seems to prevail that this is an organ of smell, while that found opening on the upper side of the first joint of the second, or short, pair of antennæ, is now thought to be the true ear. In searching for the ear, the presence of hard bodies suspended by threads in a sack containing liquid, and capable of striking upon a nerve filament, is considered as characteristic and indicative of an ear, just as the expansion of a nerve in front of black pigment and behind a transparent membrane is thought to denote an eye. The first-named structure is found in the organ of the lobster last described, but not in the other. It will be seen that much remains to be made out about the ear, and the subject is extremely difficult to study. Indeed, some of the most perplexing problems of the comparative anatomist seem to be associated with the ear. One of the

The temporal bones—which, in man, lodge the internal and support the external ears, and besides these functions, close in the brain-case at the sides, send out strong buttresses forward to strengthen the bones of the face, and others to lodge the throat bones upon, and also give attachment to the lower jaw—are the most difficult bones in the body to describe and remember. Many vessels and nerves enter them by numerous holes, and these subdivide and find their way out in such strange ways, that many a poor medical student has trembled when, in an examination, a temporal bone has been placed in his hand. These bones are no doubt composed of many elements which are distinct in reptiles, birds, and fish; but, to make confusion worse confounded, the student of comparative anatomy finds on the one hand that Professor Owen divides the bone into at least nine elements, and gives them names according to his theory; on the other Professor Huxley transposes all the relations, and christens them by new names.
LESSONS IN FRENCH.—XIII.

SECTION I.—FRENCH PRONUNCIATION (continued).

v. COMPOUND VOWELS (continued).

ETT.

Name, uli; sound, like the e mute or unaccented, which has been already explained, except when it is a verb, or commences a verb, in which latter case it has the sound of French u, which also has been explained.

FRENCH. PRONUN. ENGLISH.

Demure D'muhr Residence. Leur Lurh Their.

Eux Uh Them. Milieu Me-le-uh Middle.


Heureux Uh-rah Happy. Plusieur Pluh-yoor Many.

Heure Uhr Hour. Veuve Vuh Widow.

Jeune Zhuhn Young.

Sometimes the u of this combination is under a circumflex accent, thus, ê, in which case the sound of the compound vowel is prolonged.

The correct sound of this compound vowel is no more difficult to be acquired than is the correct sound of e mute or unaccented. It often happens that the letter, or combination of letters, which immediately follows it, adds vastly to the difficulty of pronouncing it. Bring the lips nearly together, orally, in speaking this compound vowel. Practice patiently and thoroughly upon the above and other examples, until you are satisfied you have mastered the difficulty.

OU.—Name, ooh, or wah; sound, like the letters ooh of the proper name Noah. Do not give this compound vowel the sound of oo, or oo-ah, as is too commonly done.

VI.—DIPHTHONGS.

69. There are six diphthongs, namely:—io, ie, io, oo, ui, wi, whose sounds we now proceed to illustrate.

But do not suppose that these combinations of vowels are always diphthongs, in whatever place they are situated. If followed by two consonants, the first of which is m or n, the last vowel forms with the m or n a nasal, unless the m or n be doubled.

Sometimes, again, these vowels which now appear as diphthongs are but parts of syllables of a word, and must be pronounced only as distinct vowels.

IA.—Name, ia; sound, like the letters i in the English word fig, and a in the word fat, pronounced as one syllable. The sounds of both, however, must be distinctly heard without any hiatus between them.

SECTION XIII.—IRREGULAR VERBS: THEIR PRESENT INDICATIVE.

1. There are in French, as in other languages, verbs which are called irregular, because they are not conjugated according to the rule, or model verb of the conjugation to which they belong [§ 62].

2. Many irregular verbs have tenses which are conjugated regularly.

3. The singular of the present of the indicative of the irregular verbs is almost always irregular.

4. In verbs ending in yer, the y is changed to i before an e mute [§ 49].

5. PRESENT OF THE INDICATIVE OF THE IRREGULAR VERBS.

ALLER, 1, to go. Envoyer, 1, to send.

Je vais, I go, do go. J'envoie (î, 4) I send, or am going.

Tu vas. Tu'envoies. [ing].

Il va. Il envole.

Nous allons. Nous voyons.

Vous allez. Vous voyez.

Leur vont. Ils viennent.

6. All verbs ending in air are conjugated like venir.

7. The student will find in § 62 the irregular verbs alphabetically arranged. He should always consult that table when he meets with an irregular verb.

8. The expression à la maison is used for the English at home, at his or her house, etc.

Le chirurgien est-il à la maison? Is the surgeon at home? Mon frère est à la maison, My brother is at home.

9. The preposition chez, placed before a noun or pronoun, answers to the English at the house of, with (meaning at the residence of), among, etc. [§ 142 (6)].

Chez moi, chez lui, chez elle, At my house, at his house, at her house.

Chez nous, chez vous, chez eux, m., At our house, at your house, at their house.

That is, literally, at the house of me, at the house of him, etc. Chez mon père, chez mon mère, At my father's, at my mother's.

10. The word avec answers to the English with, meaning merely in the company of.

Venez avec nous, ou avec lui, Come with us, or with him.

11. The word y means to it, at it, at that place, there. It is generally placed before the verb, and refers always to something mentioned [§ 39, § 103, § 104].

Votre soror est-elle chez vous? Is your sister at your house?

Oui, Monseigneur, elle y est, Yes, Sir, she is there.

12. In French, an answer cannot, as in English, consist merely of an auxiliary or a verb preceded by a nominative pronoun; as, Do you come to my house to-day? I do. Have you books? I have. The sentence in French must be complete; as, je go
Our Holiday.

When the frost of winter have hardened the ground, and the air is keen and bracing, outdoor amusements, to be at once enjoyable and beneficial, must be active and exhilarating in their nature. Hence the popularity in the winter season of such sports as football and Hockey, their new competitor, La Crosse, of which we gave a description in No. 1 of the Popular Educator, which seemed destined to attract general favour on the same grounds, only survived a few seasons. A new game is a now source of harmless pleasure to hundreds, and perhaps to thousands or tens of thousands, and therefore it was all the more to be regretted that this game was so soon entirely abandoned. The great and almost sudden popularity of Croquet shows how welcome is a suitable addition to the list of popular amusements, and we therefore spare a passing word to comment upon the reception given to the Indian game which was the subject of our first paper.

Of Football we have also treated; and we have now to describe the game of Hockey, which, under the names of Shinty in Scotland and hurling in Ireland, is popular throughout the United Kingdom.

Hockey consists in driving a ball from one point to another by means of a hooked stick, and is believed to derive its name from the shape of the latter implement, sometimes called a hooky. No precise rule is laid down as to the form this stick should take. It is simply a weapon with a bent knob or hook at the end, large or small, thick or thin, according to the option of the player, and used for the purpose of striking the ball, or perhaps catching of it on the point for a throw towards the goal. Hockey-sticks, therefore, are of all shapes, sometimes simply in the form of a stout walking-stick with a crook at the end.

The Hockey ball must be one fitted to receive hard and frequent blows. Anything in the nature of a cricket-ball is found to be ill-adapted for this peculiar game, as the leather soon bursts, through the effects of the knobs received from all kinds of rugged-pointed sticks. A large bung, strongly tied and quilted over with string, is a favourite and an inexpensive ball for the purpose; and the best of all is perhaps a solid India-rubber one, or the larger part of a thick India-rubber bottle, firmly closed at the end from which the neck has been cut.

Now for the game itself, which in its principle bears a great resemblance to Football, and contains at least the germ of the Canadian La Crosse. The players are divided into two parties, each of which has its goal, the goals being fixed towards either end of the field. Two rings thrown by two Upright posts, about six feet apart, but the cross-poles is almost invariably employed at Hockey, and is usually placed at a height of about four feet from the ground. Through these goals the ball has to be driven; and the space through which it has to pass at either end, before the game is won, is therefore a space of about six feet by four.

In commencing, the two parties meet midway between the goals, and are arranged in lines from their opponents' goal, and their right directed to their own. The ball is thrown up into the air by one of the party winning the toss, by which toss also the choice of position for the goal is determined. As the ball falls, it is the object of both sides to strike it towards the goal of the enemy, or at least to prevent it from being struck in the direction of their own. Two goal-keepers are stationed at each end to beat back the ball, and if not large enough, it is usual to place two of the opposite side near the respective goal-keepers, in order that their defensive efforts may be rendered unavailing.

It may well be imagined that on the fall of the ball an exciting scene ensues. In the attempt to strike it, the hockey-sticks are crossed in mimic warfare, and as it reaches the ground both sides surround it in a general "scrammage," while it is pushed, thrust, or struck by the hockey-sticks, according to the chance which the various players may get of aiming at it. The hockey-stick properly should never be raised much higher than
the ground, for a dexterous shove at the ball may sometimes be quite as effective in serving the purpose of your side at a critical moment as a swinging blow, the opportunity for which may, indeed, very rarely occur. If the ball receives a good hit, and flies forward to the goal, a general rush is made in pursuit, one side seeming to follow up the advantage, and the other to overtake the ball first and restore the balance of the game.

It will be apparent that in a rush and struggle of this description a fall or a hard knock is exceedingly likely to occur, and that Hockey is therefore not a game suited to weakly or timid players. But there are rules by which it is sought to avoid, even in the heat of the conflict, any chance of more than a comparatively slight injury to the players, and to confine that result purely to the effects of accident. It is forbidden, in the first place, to raise the head of the stick higher than the shoulder, under the penalty of a blow on the shins from the hockey-stick of one of the opposite side; and thus a check is given to the reckless and promiscuous flourishing about of the player’s stick, to the imminent hazard both of his friends and opponents. Moreover, any player proved wilfully to have struck another is at once excluded from the play. Besides these rules, the following are generally accepted:

1. A player must not cross to the side of his opponents before a rush or scrimmage has commenced.

2. The ball must be fairly struck through the goal, and not thrown or kicked.

3. It is forbidden to kick or throw the ball during the general game, but the ball may be stopped by any part of the person of a player who may intervene between it and the goal.

4. If the ball be struck beyond but not through the goal, and if it be passed through the goal otherwise than by a fair hit, the youngest player of the side owning that goal shall return it by a gentle throw towards the centre of the ground.

These, with the two rules given before, comprise all that it is necessary to observe in playing the game of Hockey, except the general rules of good temper and forbearance, which are required in all games alike.

The Scottish form of the game, known as Shinty, calls for no special remark, more than that the goals are called “hails,” and that the game itself owe its name either to the frequent danger to the player’s shins, or to the shinty which characterises the culminating struggle. “Hurley,” the Irish variation of the game, also differs but little from that here described; but in Ireland the game has been, perhaps, a more general favourite, and played occasionally on a larger scale, than in either of the sister kingdoms. We borrow from Mr. and Mrs. S. C. Hall’s “Ireland” an amusing anecdote in illustration of this fact. “About half a century ago,” we are told, “there was a great match played in the Phoenix Park, Dublin, between the Munster men and the men of Leinster. It was got up by the then lord-lieutenant and other sporting noblemen, and was attended by all the nobility and gentry belonging to the vice-regal court, and the beauty and fashion of the Irish capital and its vicinity. The victory was contested for a long time with varied success; and at last it was decided in favour of the Munster men, by one of that party running with the ball on the point of his hurley and striking it through the open window of the vice-regal carriage, and by that manoeuvre baffling the vigilance of the Leinster goalmen, and driving it in triumph through the goal.”

There is no record of matches on quite so extensive a scale having been played in the sister kingdoms; but we learn on the authority just quoted that, in the last generation, several good matches at hurley were played on Kennington Common between the Irish residents of St. Giles’s and those of the eastern portions of the metropolis, the affair being got up by some of the sporting noblemen of the day. Besides Kennington Common, several of the other open spaces around London were once noted as favourite spots for the exhibition in perfection of the game of hockey, and especially, in the last century, the extensive fields which then lay at the back of the British Museum. The amusement is not so frequently seen now, having yielded somewhat before the rival attractions of football and cricket, but it is a favourite still in many parts of the country.
LESSONS IN GEOMETRY.—VII.

Problem XIV.—To find a third proportional to two given straight lines.

Let \( A \) and \( B \) be the two given straight lines to which it is required to find a third proportional. Draw two straight lines \( CQ \), forming with each other a small angle \( FQC \), on \( CF \) set off \( CD \) equal to \( A \), and \( DF \) equal to \( B \), and on \( CQ \) set off \( CD \) equal to \( B \). Join \( DE \), and through the point \( P \) draw \( FG \) parallel to \( DE \), and cutting \( CQ \) in \( G \); the straight line \( E \) is a third proportional to \( A \) and \( B \); that is, \( A \) is to \( B \) as \( A \) is to \( E \).

If we know the length of \( A \) and \( B \), we can find the third proportional to them by dividing the square of the length \( B \) by the length of \( A \). Thus, if \( A \) be three feet, and \( B \) be six feet, the third proportional to \( A \) and \( B \) measures twelve feet, for the square of \( 6 \) divided by \( 3 \), or \( 36 - 3 = 12 \).

Problem XV.—To find a fourth proportional to three given straight lines.

Let \( A \), \( B \), and \( C \) be the three given straight lines to which it is required to find a fourth proportional. Draw two straight lines \( DP \), \( DQ \), forming with each other a small angle \( FDP \). On \( DP \) set off \( DE \) equal to \( A \), and \( EF \) equal to \( C \), and on \( DQ \) set off \( DG \) equal to \( B \). Join \( E \), and through \( F \) draw \( FH \) parallel to \( DE \), and cutting \( DQ \) in \( H \). The straight line \( HG \) is a fourth proportional to \( A \), \( B \), and \( C \); that is, \( A \) is to \( B \) as \( C \) is to \( HG \).

If we know the length of \( A \), \( B \), and \( C \), we can find the fourth proportional to them by multiplying the length of \( B \) and \( C \) together, and dividing the product by the length of \( A \). Thus, if \( A \) be four feet, \( B \) six feet, and \( C \) two feet, the fourth proportional to \( A \), \( B \), and \( C \) measures three feet; for \( 6 \times 2 = 12 \), and \( 12 - 4 = 3 \).

Problem XVI.—To divide a given straight line into any number of parts which shall be to one another in a given proportion.

Let \( AB \) be the given straight line, which it is required to divide into five parts, which are to one another in the following proportions—namely, 5, 2, 3, 1, 4. First draw the straight line \( AC \) of indefinite length, making a small angle \( BAC \) with the given straight line \( AB \). Along \( AC \), from a scale of equal parts, set off in regular succession \( A D \), equal to 5 of those equal parts \( DE \), equal to 2, \( EF \) equal to 3, \( FG \) equal to 1, and \( GH \) equal to 4. Join \( H \), and through the points \( D, E, F, G \) draw the straight lines \( DI, EK, FL, GM \), cutting the straight line \( AB \) in the points \( I, K, L, M \). The given straight line \( AB \) is now divided into five parts, \( A, I, E, K, L, M \), which are to one another in the required proportions—namely, 5, 2, 3, 1, and 4.

This method of dividing a straight line into any number of parts, which shall be to one another in a given proportion, is based on Problem XII. (page 192). Supposing it had been required to divide \( AB \) into 15 equal parts, it is manifestly only requisite to set off along \( AC \) 15 equal parts, denoted by the dots on the line \( AC \), from \( A \) to \( H \), and then draw straight lines in succession through each dot on \( HA \), from \( H \) to \( A \), parallel to \( HB \).

The process that has been described in this Problem ensures an accurate division in cases where the different parts would be represented by fractions or mixed numbers (see Lessons on Arithmetic, page 160), if we endeavoured to arrive at them by an arithmetical process. For example, had the line \( AB \) in Fig. 23 measured 30 inches, we can see at once that, as the sum of the numbers which show the proportion of the lines into which it is required to divide it is equal to 15, the half of 30, we have only to multiply each number by 2, and mark off \( A \) equal to 10 (or \( 3 \times 2 \) inches, or \( 2 \times 3 \) inches), and so on. But supposing \( AB \) had measured 29 inches, instead of 30, then \( AI \) would be represented numerically by \( 29 \), but by \( 33 \) inches, and, lines involving fractions of inches such as \( \frac{1}{2} \), which are not to be found on an ordinary scale, would be very difficult to mark out without making a special scale for the purpose, or resorting to the plan given above.

Problem XVII.—To draw an equilateral triangle on any given straight line.

Let \( AB \) be the given straight line on which it is required to draw an equilateral triangle. From the point \( A \) as a centre, with \( AB \) as a radius, describe the arc \( BC \); and from the point \( B \) as a centre, with \( AB \) as a radius, describe the arc \( AC \), cutting the arc \( BC \) in the point \( C \). Join \( AC \), \( BC \); the triangle \( ABC \) is equilateral (see Definition 10, page 53), and it is drawn on the given straight line \( AB \).

If the arcs \( AC, BC \) be extended to cut each other in the point \( D \) below the straight line \( AB \), by joining \( DA, DB, DC \), we get another equilateral triangle \( ABD \), which is equal to the equilateral triangle \( ABC \), and which is also drawn on the given straight line \( AB \). By taking any straight line as a radius, and from each of its extremities as centres striking arcs intersecting or cutting each other on opposite sides of it, we get, by drawing straight lines from the points in which the arcs cut each other to the extremities of the straight line used as a radius, a regularly-formed diamond-shaped figure, whose four sides and shortest diagonal or diameter are all of equal length, such as \( ABCD \) in the above figure. This figure with four equal sides is called a rhombus. (See Definition 30, page 53.)

The learner should construct Fig. 24 on a large scale by the aid of his compasses and ruler. On applying a parallel ruler to the opposite sides of the figure \( ABCD \), he will find that they are parallel to each other, and to \( AD \) and \( BC \); \( ABCD \) is therefore a parallelogram, and \( A, B, C, D \) are its diagonals. (See Definition 26, page 53.) From Theorem 5 (page 156) the student learnt that the greatest side of every triangle is opposite the greatest angle, and that the greater the opening of the angle the greater must be the line that subtends or is opposite to it. Now in the triangle \( ABC \), or in any other equilateral triangle, the three straight lines or sides by which it is contained are all equal, and as one another; and as equal sides must necessarily subtend equal angles, the three angles of the triangle \( ABC \)—namely, \( ABC, BCA, CAB \)—are all equal to one another. Again, from Theorem 7 (page 156) we have learnt that the three interior angles of any triangle are equal to two right angles. A right angle contains 90 degrees, and as two right angles contain just twice as many, or 180 degrees, each of the equal angles \( ABC \), \( BCA \), and \( CAB \) of the equilateral triangle \( ABC \), contains \( 180 \div 3 \) or 60 degrees.

Continuing our investigations a little further, we find that each of the angles \( ACE, BDE, CFB \) is half of the angle \( ACB \), and is therefore an angle of 30 degrees. The angles \( ADE, BDF \) are also angles of 30 degrees, because each of them is half of the angle \( ADE \), which, like the angle \( ABC \), is an angle of 60 degrees. The angle \( CAD \) is equal to the angle \( ADB \), and as each of equal angles contains 60 degrees, the angle \( CAD \) contains 120 degrees. In the same way the angle \( CBD \) also contains 120 degrees. The diagonals of the rhombus \( ABCD \) intersect each other at right angles, therefore it will be seen that each of the angles \( CE \), \( DE \), \( F \), \( DB \) is a right angle.

Fig. 24 teaches us how to draw a triangle of 45 degrees without the aid of the protractor, as we will proceed to show. \( ACE \) is an angle of 30 degrees, and so is its adjacent angle...
The angle \( \angle B C E \) by the method shown in Problem VI (page 191). Each of its halves is an angle of 15 degrees, and the angle formed by the angle \( \angle C E \) and the half of \( \angle B C E \) must necessarily be an angle of 45 degrees.

To describe or draw an equilateral triangle, whose sides shall be of a given length, it is manifestly only necessary to set off \( A B \) of the length required, and then to proceed to form the triangle by the mode of construction given above.

LESSONS IN GERMAN.—XXIII.

SECTION XXIV.—CONJUGATION OF VERBS.

Der Säuren expresses a possibility dependent upon the will of another; or upon a law, as:—Säuren, tu, willst,) that thou mayst thus; I cannot (I am not allowed, permitted) to pluck these flowers. Der Säurer, tu, willst,) that thou mayst, the peasant is not allowed (by law) to fish. Säuren, tu, willst,) that thou mayst, I can (have the right) to eat these fruits, but I cannot obtain (get at) them. (§ 83. 1, 2.)

CONJUGATION OF THE PRESENT AND IMPERFECT OF SÄUREN.

Present.

Singular.

2. tu, I am permitted;

Du tuft, thou and permitted;

Er tuft, he is permitted;


e); tu, I was permitted;

Du tuft, thou was permitted;

Er tuft, he was permitted;


1. Säuren corresponds in the present and imperfect to the English "can," as:—Säuren, tu, willst,) that thou mayst swim, the fish can swim.

Er konnte nicht fischt, he could not read.

Säuren also answers sometimes to "may," as:—Tu, willst,) that thou mayst, that may be. Er kann fischen, he may be already there. Er kann lesen, it may rain. (§ 83. 1, 3.)

CONJUGATION OF THE PRESENT AND IMPERFECT OF SÄUREN.

Singular.

2. tu, I am permitted;

Du tuft, thou art permitted;

Er tuft, he is permitted;


2. Säuren expresses a possibility dependent upon the will of the subject or the speaker, as:—Säuren, tu, willst,) that thou mayst, (may, is at liberty to) go. Säuren, tu, willst,) that thou mayst, you may (have permission to) go. Säuren, tu, willst,) that thou mayst, I do not wish to see him. Säuren, tu, willst,) that thou mayst, he does not want to believe that. (§ 83. 4.)

3. Säuren, like "may," denotes a concession on the part of the speaker, as:—Säuren, tu, willst,) that thou mayst, he may be a true friend. Säuren, tu, willst,) that thou mayst, they may have done it. (§ 83. 4.)

CONJUGATION OF THE PRESENT AND IMPERFECT OF SÄUREN.

Singular.

2. tu, I may or may not be allowed;

Du tuft, thou may or may not be allowed;

Er tuft, he may or may be allowed;


2. Säuren in those tenses in which its English equivalent "must" is defective, is to be rendered by "to be obliged, forced, compelled," etc., as:—Säuren, tu, willst,) that thou mayst, he was obliged to do it.

See complete conjugation, § 83. 5.

CONJUGATION OF THE PRESENT AND IMPERFECT OF MÜßEN.

Present.

Singular.

2. tu, I must;

Du tuft, thou must;

Er tuft, he must;


Plural.

2. wir müssen;

Ihr müssen;

Sie müssen;


IMPERFECT.

2. tu, we were obliged;

Du musst, thou were obliged;

Er musste, he were obliged;


IMPERFECT.

2. wir mußten, we were obliged;

Ihr müßtet, you were obliged;

Sie mußten, they were obliged.

5. Saffen indicates necessity, dependent upon the will of another person; thus corresponding in signification with the second and third persons of our word "shall," as:—Saffen, tu, that thou shalt die. Saffen, tu, shall he do it. Saffen, tu, you should (ought) to remain here. Denn er faßt) sätte, if he should come. (§ 83. 6.)

CONJUGATION OF THE PRESENT AND IMPERFECT OF SAFFEN.

Present.

Singular.

2. tu, will I shall;

Du tuft, thou shall;

Er tuft, he shall;


Plural.

2. wir sollen;

Ihr sollen;

Sie sollen;


IMPERFECT.

2. wir sollten, we should;

Ihr sollten, you should;

Sie sollten, they should.

6. Saffen expresses a desire, but not a positive intention, and is rendered by "to wish," as:—Saffen, tu, shall? What does he wish? Saffen, tu, shall? What does he wish to do?

The imperfect often answers to our "was going," when express of purpose, as:—Saffen, tu, that I was going. (§ 83. 8.)

CONJUGATION OF THE PRESENT AND IMPERFECT OF Wollen WITH AN ACTIVE VERB.

Present.

Singular.

2. tu, I wish to go;

Du wußt, thou wishest to;

Er wußt, he wishest to;


Plural.

2. wir wußen, we wish to;

Ihr wußen, you wish to;

Sie wußen, they wish to;


IMPERFECT.

2. wir wollten, we wished to;

Ihr wollten, you wished to;

Sie wollten, they wished to;


7. The perfect and pluperfect tenses of these verbs, as also of saßen, to permit, to cause, is formed by means of the infinitive, instead of the participle (§ 74, 3), as:—

Saffen, tu, he has not been able to go.

Saffen, tu, we have never been able to go.

Saffen, tu, I have not wished to do it.

Saffen, tu, they have been obliged to write.

Saffen, tu, she ought to have read.

Saffen, tu, you have not been willing to work.

Saffen, tu, you have not caused him to go (have not sent him).

8. In the future, therefore, these verbs (except in the tense auxiliaries) are, in form, like the perfect. Compare the following examples:

Saffen, tu, we will be able to speak.

Saffen, tu, I will be able to speak.

Saffen, tu, you will be able to see him.

Saffen, tu, he has been able to see him.

Saffen, tu, he will wish to remain.

Saffen, tu, he has wished to remain.

9. The phrase, Saffen, tu, if ? is like the corresponding one in English, is abbreviated; the full form being Saffen, tu, if?
**LESSONS IN MUSIC.**

Wit dürfen ändern nicht, man shall not wish to have done
wußt man wünschen von ihnen geben, by them.

Wir haben geschrieben wollen. We have not wished to write
schreiben müssen. letters.

Was für eine Macht? Shall we not be obliged to go?
zu haben. She will not be able to go.

Wie wir nicht geben können. You will not be allowed to do.
Wie wir es nicht wissen. You were not allowed to go.

Ich müßte von neuen Anfang leben. I was obliged to read the whole evening.

**They ought not to have done it.**

**EXERCISE 37.**


**EXERCISE 38.**

1. You can go into the garden, but you cannot remain long there. 2. These attentive scholars were allowed to go with their teacher to Mannheim. 3. We can employ [amuse] our time better. 4. Can you speak German? 5. We could not learn our lessons this week. 6. You must learn this week's les-

sons [te Aufgaben vierj. Woche] attentively. 7. You may go to

tomorrow to your parents. 8. He may be a good man. 9. The housewife must (is obliged) to go to market to-morrow. 10. Have you written to your parents? 11. Yes, I was obliged to write. 12. It is two o'clock. 13. I shall arrive at your house at a quarter past three o'clock. 14. Will you come twenty minutes before eight o'clock? 15. I may come to your house this evening, but do not wait for me. 16. As long as [da lange al'] it rains, I cannot go out. 17. Fish can only [nur] live in water, and birds in the air. 18. You should not have done that, it will not be any recommendation [frin Günstigen] to you. 19. I wish to go to the theatre this evening. 20. We may not have the opportunity [Gleichenheit] another time.

**LESSONS IN MUSIC.—IV.**

The Binary (or two-pulse) measure is the boldest of the mea-

sures, and the one most easily felt or performed. It is by far

the best for large masses of voice, and is well adapted to aid

in giving majesty to a tune. Try "St. Stephen's" or "Bedford," first in the three-pulse measure (lengthening the accented notes), and then in the two-pulse measure, and you will understand the

change of the Binary measure.

The Primary (or three-pulse) measure is well adapted to aid in producing a soft and soothing musical effect. When the tune is simple it is not unfit for congregational use, especially if the people have been trained to keep the Accent. The adaptation of this measure to soft and soothing music is illustrated by its analogy (according to Dr. Bryce) to the breathing of health and rest. The Quaternary (or four-pulse) measure, when delicately performed, gives much much

game to a tune. It is adapted to congregational tunes when the movement is not too slow. Try the well-known tune "Vesper Hymn," taking care to give the medium accent. The Somary (or six-pulse) measure is commonly used in connection with quick movements, and is naturally soft, light, and elegant; for this

reason it is better adapted to secular compositions than to sacred music.
Exercise 9.—Don, Me, Soh. Three-pulse Measure. Key D (or C).

Take a low sound of your voice for the key-note in this exercise. If any one gives you the pattern from an instrument, tell him to play in the key of D with two sharps. You understand that the letters under the "staff" are the initials of the notes on the modulator, and direct you in tracing out the tune there. The notes are placed within the accent marks to which they belong. Don occupies the whole of the loud "pulse" of the measure. Ms fills the first soft pulse, and Soh the second. This is the Trinary measure. The second measure is easily understood. In the third measure you have the first Don occupying two pulses (loud and soft), and the second Don only one pulse. The horizontal stroke, as in the second pulse, always indicates that the preceding note is to be continued. Thus the last note of the exercise is continued through the whole measure. In the fourth measure the third accent-mark is followed by no note. In the time of that pulse, therefore, the voice rests. If the previous exercises have been perfectly learnt from the modulator, you will probably be able to make this out without pattern. Be careful to give the proper accent. You are strongly recommended not to study the "staff," at present, in any of these exercises. It is printed here that you may be able to return to it when you have gained some command of voice and some knowledge of music itself, and are not likely to be perplexed by its numerous signs; but if we may suppose that you have done this, then the following remarks will be of use. [The open note is twice as long as the closed notes. The empty "pulse," during which the voice rests, is represented by a distinct character, called a "rest." It tells you to rest as long as one of the closed notes, in the same time, would be sung. A dot after a note, in the old notation, bids you sing that note half as long again. Thus you perceive that the relative length of notes is expressed by symbols, and not, as in the solfa notation, measured out victoriously by the regularly recurring accents placed along the page.]

Exercise 10.—The Scale. Three-pulse Measure.

Take a low note for the key-note of this exercise also. Point it from memory on the modulator, like the last, and all you learn. Mark the accent well, and learn to sing both the upper and the lower line of notes. [The key-note is placed on the lowest line to prevent your accustoming your eye to look for it always in the same place on the staff. It would be well for you if it could be so. But as it is to be found, in different tunes, on every position on the staff, it is important that we should not mislead you. We prefer, however, that this exercise should be sung in the key of D or C, not of E.]

Exercise 11.—Don, Me, Soh. Four-pulse Measure. Key G. Quickly.

Take a middle sound of your voice for the key-note. If your friend patterns, let it be "in the key of G with one sharp," Trace the exercise on the modulator. Sing it with spirit, marking the accents carefully. What measure is it in? [You will notice that the old notation has no mark for the secondary accents.]

Exercise 12.—Don, Me, Soh. Four-pulse Measure. Key F (or E).

Take a low, but not very low, note for your Don. Tell your friend to pattern it (if you are still dependent on him) "in F with one flat." Learn both "parts." Be careful to hold the long notes of the lower line with evenness of sound, swelling them a little in the middle, so as to express the medium accent. [The open note without a stem is to be sung twice as long as that with a stem. There was not room to write the last long open note of the "second" part on the staff.]
EXERCISE 13.—THE SCALE. *Six-pulse Measure. Key D. Quickly.*

Take a low sound for the key-note. Sing, when you have traced the tune on the modulator, rapidly and lightly, marking delicately the accents. In singing from the book, your eye will scarcely rest on the soft accents. You will only have time to think of the "loud" and "medium" marks. [A curve is placed over the dotted open note and the close note, to show that these two notes should be sung as one. The note is written in this way, instead of being written as a dotted open note without a stem (which would give the same length), that the accent may be marked.]

EXERCISE 14.—TROUBADOUR.

(The words from "Ballads for the Times," by M. F. Tupper, Esq.) Key F. M. 96.

You should take a rather low note for your Doh here. Tell your patterning friend—"the key of F with one flat." The first thing you will notice, in looking at this tune, is, that some of the "aliquots" or pulses have two notes in them. The dot which follows Sol, the second note, always means that the note before it takes half a pulse. It, of course, leaves the other half to the other note—in this case Me. When you have carefully traced the first phrase of the tune (five notes) on the modulator, then sing it with special attention to this point—letting the notes Sol Me (which are placed in one pulse of the voice) run from your tongue just twice as fast as the others. And so on with the rest. You will notice that both the first and second
parts of the tone are repeated, so that it is not so long as it looks. If you find the "second" part of the tune low for your voice, pitch the key-note a little higher. Be careful to point on the modulator from memory. Remember that every tone, thus thoroughly learnt, becomes a power by which others will be mastered. You need not attempt the words yet. When you do, let those printed in CAPITALS be sung with increased force and loudness of voice, and those in italics with increased softness. [The square note is used to indicate the place of DOH at the beginning of the staff, but it is not to be sung. The place of DOH, being thus once marked, is not afterwards indicated by a square note as in previous exercises. The pupil must learn to keep the place of DOH in his mind. The notes with a tail to the stem are to be sung half as long as those without the tail.]

LESSONS IN FRENCH.—XIV.

SECTION I.—FRENCH PRONUNCIATION (continued).

VI. Diphthongs (continued).

UA.—Name. wa. Sound: this diphthong has the combined sound of the French U, together with that of a in the English word fat, unless the latter be under a circumflex accent; in which last case the a has the sound of a in the English word mark.

---|---
Ecoue Ay-kauz Senteage (in) | Guano Gu-a-nou Guano.
Empuante Anh-pumant to inject. | Nuage Nuah Cloud.

Sometimes this diphthong has the sound of a in the English word fat, viz.:

Aiglade Ay-gad A watering-place.

To an Englishman, at least, the sound of a w is naturally suggested in the pronunciation of this diphthong.

We might illustrate its sound by the use of a w in the above words, viz.:—

Ecoue Ay-kwahz | Huard War.
Guano Gw-a-nou | Puant Pwhaz.

This last illustration, however, is not strictly correct, because it does not preserve the distinct sound of the French U, which sound, especially in combination, many Frenchmen themselves are not careful to preserve. In common conversation, this diphthong sounds like an English w.

In commencing with qua, the diphthong a w has two different sounds. In some of the sound of wa would be illustrated by the letters koua or k'wa, but in others by ka, viz.:—

Quadraigne is pronounced konwah-draigh-gl', or k'wah-draign-gl'.

Quadrature, a geometrical phrase, is pronounced konwah-dra-ture, or k'wah-dra-ture. But the same word, used as a term of horology, is pronounced kah-dra-ture.

Quai, a wharf, is pronounced kay.

Quaique, a naval term, meaning a ketch, is pronounced kaique.

Until the learner has become really familiar with the French language, the surest way to be correct in the use and pronunciation of words commencing with qua, will be to consult a dictionary.

UE.—Name. we. Sound: this diphthong occurs most frequently as the final letters of French words, after the consonants g and q, in which cases both are silent.

When final, and before other consonants, they have the usual sound of the French U.

UI.—Name, we. Sound: this diphthong has the combined sound of the French U, together with that of French i, which latter is like the letters ee in the English word bee.

VII. Nasal Vowel Sounds.

71. The sound of an and an, em and en, im and en, is represented by the letters anh, and is like the sound of the letters a in the English words an-chor and can-k'er, with an effort to speak through the nose, as it is termed. But be particular to avoid the sound of English g in all nasals.

There is, strictly speaking, a real difference between the nasal sounds of an, en, and in, but it is so slight, and so peculiarly delicate, that scarcely any one not a native Frenchman can detect and describe it intelligibly. In common reading and conversation, these nasals above-mentioned have but one sound, viz., that which has been assigned them in our previous Lessons. It is considered correct enough for all practical purposes.

When extraordinary nicety of pronunciation is demanded, as is always the case in using the language of prayer, and in holy and DEVOTIONAL LANGUAGE, the a of the nasals an, em, and en should be pronounced broader than the e or i in the nasals en, em, im, and in. In the former case, let the a have the sound of ah; in the latter, the sound of a in the word fat.

The sound of an and en is represented by the letters anh, and is like the sound of the letters an in the English word conquer, uttered with an effort to speak through the nose, as it is termed.

The sound of em and en is represented by the letters anh, and is like the sound of the letters en in the English word undo, uttered with an effort to speak through the nose.

Concerning these nasals, remember these two general rules, viz.:—

Rule 1.—Single m's and n's followed by vowels are not nasals.

Rule 2.—When the m and n are doubled, the nasality is destroyed.

Exceptions to this last Rule will appear in their proper places. We now proceed to illustrate these nasal sounds, commencing with examples in which the sounds am and an are found.

AM.

---|---
Ambassade Anh-bass-ad Embassy.
Ambre Anhbr Amber.
Chambre Shambre Chamber.

---|---
Ancestres Anh-sayr Ancestors.
Canute Kanht-tek Song.
Quand Kanh When.

Ain, ein, and e1n have each the nasal sound of an, represented by anh. The reason will be obvious, if we but dissect these combinations, which we now proceed to do, viz.:

In the first, a, is equivalent in sound to e only; hence, substituting a for e in the combination a in, we have simply an, whose sound has been explained.

In the second, a, its sound is represented by anh, for the same reason.

In the third, e, is equivalent only to a in sound; hence, substituting a for e in the place of e in the combination e in, we have an, whose sound is represented by anh.

Again, ean and ean have each the nasal sound represented by the letters anh.

In the proper name Caen have also the sound of an, represented by the letters ean; hence the word Caen is pronounced Kanh.

The following will afford good examples in illustration of the nasal vowel sounds am and an:—

* Like the sound of oate.
LESSONS IN BOTANY.

SECTION XXIV.—INTERROGATIVE FORM OF PRESENT INDICATIVE.

1. In the first person singular of the present of the indicative of almost all those French verbs which in that person have only one syllable, the common interrogative form [Sect. XXII. 9] is not allowed. To render the verb interrogative, the expression est-ce que is prefixed to the affirmative form [§ 98 (5) (G)].

Est-ce que je vais du drap? Do I sell cloth?
Est-ce que je jone souvent? Do I play often?

2. The first person singular of the indicative of avoir, to have; être, to be; aller, to go; pouvoir, to be able; devoir, to owe; savoir, to know, etc., may, however, be conjugated interrogatively according to the general rules.

Aimez-vous vos mouches? Have you your handkerchiefs?
Pouriez-vous des jouets? How much do I owe you?

3. The form est-ce que is always allowable, and sometimes preferable, when the first person singular of the present of the indicative of a verb has several syllables [§ 98 (G)].

Est-ce que tu envoie des livres? Do you send books?
Est-ce que je commence à parler? Do I begin to speak?

4. Est-ce que may, in familiar conversation, be used with all the persons of those tenses susceptible of being conjugated interrogatively:—Est-ce que vous lisez? may be said instead of, Que lisez-vous? What do you read?

5. INTERROGATIVE FORM OF THE INDICATIVE OF ALZER, to go.

Est-ce que j’ai vu? do I go, or am I going?
Est-ce que j’en vois? do I see?
Est-ce que je vois? do I see?
Est-ce que je vois? do I see?
Est-ce que je vois? do I see?

VAN-TU?

Est-ce que tu m’envoies? do you send?
Est-ce que tu m’envoies? do you send?
Est-ce que tu m’envoies? do you send?
Est-ce que tu m’envoies? do you send?
Est-ce que tu m’envoies? do you send?

AINS-VOUS?

Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?

VENT-ILS?

Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?
Est-ce que vous me voyez? do you see me?

6. The article le, preceded by the proposition à, is contracted into a before a noun masculine commencing with a consonant, or an ą aspirate; and into au before a plural noun [§ 13 (8)].

Allez-vous au bal ou au marché? Do you go to the ball or to the market?

7. À l’église means at or to church; à l’école, at or to school. Nous allons à l’église et à l’école, We go to church and to school.

8. Quelque part means somewhere, anywhere; nulle part, nowhere.

Vends-nous où est-il? Where is your nephew?
Il est quelque part, He is somewhere.
Il n’est nulle part, He is nowhere.

RéSUMÉ OF

Est-ce que je vais à l’école?
Vous allez à l’église aujourd’hui.
Est-ce que je commence mon travail?
Est-ce que je parle Anglais?
Est-ce que je ferai ce livre à mon frère?
Allez-vous au marché demain?
J’y vais après-déjeuner.
Envoyez-vous vos enfants à l’école?
Je les envoie chez le professeur.
Je les y envoie cette après-midi.
Vos habits où sont-ils?

EXAMPLES.

Do you go to school?
You go to church today.
Do I begin my work?
Do I speak English?
Do I send this book to my brother?

Do you go to market to-morrow?
I go there the day after to-morrow.
Do you send your children to school?
I send them to the professor’s.
I send them there this afternoon.
Where are your clothes?
They are somewhere.
They are nowhere.
Est-ce que je demeure chez vous?
Do I live at your house?
Est-ce que je mange trop?
Do I eat too much?

VOCABULARY.

Absence, o. absent.
Adresse, o. address.
Banque, f. bank.
Banquier, m., banker.
Billet, m., note.
Bois, m., wood.
Chapeau, m., hat.
Chapelier, m., hatter.

Noir, o. black.
Perruquier, m., hairdresser.
Point, o.
Note, o.
Poste, o., post office.
Rouge, r.
Village, m., village.
Vert, o., green.

EXERCISE 34.

1. Oh est-ce que je vais à la banque? 2. Vous allez chez la chapelière.
17. Vient-il à la banque ce matin? 18. Il a l’intention d’y venir, s’il le temps.
20. Il a une envie d’autre part.

EXERCISE 44.

3. Does the banker go to the hairdresser’s this morning? 4. He goes there this morning.
5. Does he intend to go to the bank this morning? 6. He does not intend to go there.

6. Do you send your letters to the post-office? 8. I do not send them, they are not yet written (écrits).
9. Do I send you a note? 10. You send me a ticket, but I have no wish to go to the concert.
11. Does your brother go to school to-morrow? 12. He goes (thither) to-day, and remains at home to-morrow.
15. Where do you go? 16. I am going to your brother’s, is he at home?
17. He is not at home; he is absent since yesterday.
18. Does your brother live in this village? 19. He does not [Sect. XXIII. 12], he lives at my nephew’s.
20. Are you wrong to go to school? 21. No, Sir, I am right to go to church and to school.
22. Do you wish to come to my house? 23. I like to go to your house, and to your brother’s.
24. When are you coming to our house? 25. Is he there (here) to-day, and remains at home to-morrow.
26. Does the banker like to come to your house? 27. He likes to come to your house.
28. Is the hairdresser coming? 29. He is not yet coming.
30. What are you sending to the scholar? 31. I am sending books, paper, and clothes.
32. Where is he? 33. He is at school.
34. Is there the school in the village? 35. It is there.

LESSONS IN BOTANY.—VII.

SECTION XI.—REPRESENTATIVES FOR LEAVES IN CRYPTOGAMIC PLANTS.

Leaves, properly so called, only exist on plants which bear flowers. The reader may test this by his own experience. Did he ever see a leaf on a mushroom, or a moss, or any other cryptogamic plant? Probably he may say, “Yes, I have seen them on ferns, and these are cryptogamic plants.” Well, we have already stated that the leaf-like expansions on ferns are not leaves, but fronds, and we have explained the distinction between a leaf and a frond. It only remains to be said, in connection with this subject, that the little stem to which these fronds are attached, and which comes from the ground, is designated a stipe, from the Latin stipes, the trunk of a tree. In the next page is a representation of one of the tree-ferns of tropical climates, the trunk of which is designated a caudex, from the Latin caudex, a stem.
In past ages these tree-forms must have been amongst the most numerous of vegetable productions. Coal, we need hardly say, is well known to be nothing more than the remains of vegetable substances, so long buried under great pressure in the earth that they have changed to the condition in which we at present find them. Notwithstanding the change of quality, yet in many cases the original shape of the vegetable has not undergone alteration. So that a person sufficiently acquainted with Botany can readily tell the kind of plant from which any specimen of coal under consideration has been formed.

Although fronds are the substitutes for leaves in ferns and several other cryptogamic plants, nevertheless these organs are not the universal substitutes; but the general complexity of cryptogamic plants, the microscopic nature of these organs, and the comparatively limited acquaintance with this division of the vegetable world, render it undesirable to state much concerning them in a series of papers like these, in which so many tribes of flowering plants claim our notice.

SECTION XII.—ON THE REPRODUCTIVE ORGANS OF PLANTS: THE FLOWER AND ITS APPENDAGES.

Having written what is necessary concerning the nutritive parts of plants, we shall now describe their reproductive members, the flower and its appendages. It would be folly, indeed, to describe formally what is meant by a flower, but the purposes to which a flower is designed in the economy of vegetable nature will require our attentive consideration. Without flowers there could be no fruit; without fruit there can be no seed; and without the latter the greater number of vegetables could not be multiplied. The reason, then, for describing the flowers the reproductive organs of plants will be manifest. To state this fact, that flowers are the reproductive portions of a plant, is very easy. To demonstrate, however, the elaborate means by which the functions of reproduction are discharged is very difficult. Indeed, the laws affecting the multiplication of animals and vegetables are so similar in many respects, that many of the terms employed in this department of Botany are borrowed from the sister studies of animal anatomy and physiology; and without some preliminary knowledge of these sciences it would be next to impossible to make the reader comprehend the intricacies of vegetable reproductions.

We therefore shall not attempt to deal with these intricacies, but shall content ourselves by saying that all plants most probably, certainly all evidently-flowering or phanogamous plants, possess reproductive sexes, although they are not always in the same plant, in the same flower of the plant. Occasionally, however, the two sexes are on different flowers, and sometimes on different plants. We may, therefore, popularly say, that the greater number of flowers contain both gentleman and ladies; but occasionally, on some plants, the gentlemen and ladies have flowers, each sex to itself; and occasionally, again, the gentlemen monopolise all the flowers on one plant, and the ladies all the flowers on another. When the two sexes reside on one plant, then such a plant is said to be monocious, from two Greek words, μονός (pronounced mon'-os) and οικός (pronounced oi'-kos), signifying "one house;" the plant, we suppose, being regarded as a house, and the flowers as chambers in the same. When, however, the males all reside in the flowers of one plant, and the females in all the flowers of another, then such plants are said to be dioecious, or two-housed; the reason of which will be obvious.

SECTION XIV.—MANNER IN WHICH FLOWERS ARE ATTACHED.

The attachment of flowers to the parent stem usually takes place through the intervention of a little branch-like appendage, to which the term peduncle, or occasionally pedicel, is applied. The reader will therefore remember that a peduncle or pedicel stands in the same relation as a petiole to a leaf. It is also called the primary organ of inflorescence, and the flower-stalks which spring from it are called the secondary, tertiary, etc., axes. These pedicels or flower-stalks are arranged on various plants in different ways, and thus give rise to various terms to denote the nature of inflorescence. The word peduncle is derived from the low Latin pedunculus, a little foot, while pedicel is derived from the Latin pediculus, which has the same meaning. Both words are diminutives of the Latin pedes, feet.

The inflorescence, or mode of flowering, is said to be definite or terminal when the primary axis is terminated by a flower. When the original stem goes on growing in a straight line, giving off as it proceeds little flower-shoots or secondary axes, along the primary axis, this is called an indeterminate inflorescence; but when the primary axis grow to a flower, then the term indeterminate inflorescence is applied; the propriety of which term will be obvious. The term axillary is sometimes given to this condition of inflorescence. For an instant at Fig. 60 in the opposite page, he will be at no loss to comprehend what is meant by indefinite or axillary inflorescence. The reader will here please to observe the little leaf-like things from the axils (or junctions with the primary axis) of which the flower-pedicels spring in this example. Such leaf-like appendages are frequently to be seen attached to the pedicels of many flowers. They are called bracts, from the Latin bractea, a thin plate of metal, and although their usual appearance is green like a leaf, yet they sometimes undergo very strange modifications. Thus, the pineapple, which we discovered long ago to be no fruit, is, in reality, nothing more than an assemblage of fleshy bracts, and the scale of the fir-cone is nothing more than hard leathery bracts. In the umbel the bracts give rise to what botanists term the involucre, a Latin word, which is derived from involucre, to wrap or roll, and which means anything that serves to wrap or cover.

Under the classification indefinite inflorescence are compr-
hended the raceme, the panicle, the corymb, the umbel, the spike, the capitulum, and the cyme, all of which we shall now proceed to describe.

The raceme, from the Latin racemus, a cluster, is that kind of inflorescence in which the pedicels or secondary axes are almost equal in length, and arise immediately from the primary axis or stem. Of this kind of inflorescence the black, white, and red currant-trees offer familiar examples (Fig. 62).

The corymb is a modification of the Latin pendant, anything of a little round swollen figure, the diminutive of panicus, a word about the quiil in a shuttle), sometimes called a compound raceme, is a form of inflorescence in which the secondary axes or pedicels, springing from the primary axis or stem, do not at once bear each a terminal flower, but ramify a third, and sometimes even a fourth time. Of this description is the inflorescence of the hop and ivy-hope (Fig. 54). The corymb, from the Greek κορυμβος (pronounced kor-um-bos), a branch, is that kind of inflorescence in which the lower pedicels, much longer than the upper ones, terminate, in consequence of this difference of length, at the same level, or nearly so, as the latter. An example of this is afforded by the Mahalaeeh cherry, of whose inflorescence a diagram is appended (Fig. 64).

The umbel, from the Latin umbella, a little shade, the diminutive of umbra, a shade, is an inflorescence in which the pedicels or secondary axes, being equal in length amongst themselves, spring from the same level, rise to the same height, and diverge like the ribs of an umbrella or parasol. An umbel is simple when each pedicel terminates at once in a flower, as, for example, in the common cherry (Fig. 65); and compound when the pedicels instead of terminating at once in each of its own flowers, severally give off other pedicels on which the flowers are arranged. An example of this is seen in the common fennel (Fig. 66).

The spike, from the Latin spicu, a point, may be either simple or compound. The compound spike is that form of inflorescence in which the pedicels are completely, or almost completely wanting, and the flowers directly and completely separate, as may be seen in the vervain (Fig. 70). The compound spike is that form in which the secondary axes, instead of terminating in a flower, emit each a little flower-bearing pedicel. Of this description is the inflorescence of wheat (Fig. 69).

The capitulum, from the Latin caput, a head, is the form of inflorescence in which sessile flowers are collected upon the thick terminal axes, of a peduncle. This term may be flat, as we see it in the marigold and senecio (Fig. 71), or concave, as in the fig. It appears, then, that the capitulum is that form of inflorescence to which the fig belongs.

The cyme, from the Greek κυμος (pronounced ku-mos), a wave, is a definite inflorescence which imitates by turns several of the indefinite kinds of inflorescence, from all of which it essentially differs in the circumstance that the primary axis is itself terminated by a flower which appears before the umbel in itself is subsidiary axes also terminates in a flower, but the secondary axes flourish before the tertiary ones, tertiary axes before quaternary ones, and so on in like manner for the rest. The chief varieties of the cyme are the racemose cyme, as in the campanula or blue-bell; the dichotomous, or divided, cyme (Fig. 67), from the Greek διχοτομος, apart, and ραχυς (pronounced ra-nos), to cut apart the corymb cyme (Fig. 72); the umbelliferous cyme (Fig. 73); the scorpoid, or scorpion-like, cyme, as in the myosotis; the rosalaceous, or forget-me-not; and the contracted cyme, in which the flowers are crowded together through the extreme shortness of the axes. The fascicule, from the Latin fasciculus, a little bundle, is an inflorescence in which the axes preserve a certain length and an irregular distribution, as in the sweet-william.

In India inflorescence is that which partakes of the characters of both definite and indefinite inflorescence. In the dead-nettle the general inflorescence is indefinite, whilst the partial inflorescence consists of true cymes or fascicules. In the malow there is a similar arrangement (Fig. 73). In the groundsel (Fig. 68) and the chrysanthemum the general inflorescence is a definite cyme, but the partial inflorescences are capitulose. In the mullein, inflorescence is that which partakes of, and to which the carrot, the fennel, angélica, etc., belong, each umbel in itself is indefinite, but the aggregate of umbels is definite; frequently, indeed, the axis of an umbel bears a little central umbel of its own.

**Reading and Elocution.**

**Punctuation.**

71. **The Apostrophe.**

A Quotation mark consists of four commas placed above the line; two at the beginning and two at the end of a word, sentence, or part of a sentence. The two which are placed at the beginning are inverted, or turned upside down.

74. A Quotation mark shows that the word or sentence was spoken by some one, or was taken from some other author.

**The Diacritic.**

76. A Diacritic consists of two periods placed over a word: thus, a.

The kindling fires o'er heaven so bright, look sweetly out from yon azure sea.

Banished from Rome! what's banished, but set free from daily contact of the things I loath? "Tried and convicted traitor!"—Who says this? Who'll prove it, at his peril, on my head? "Banished!"—I thank you for it. It breaks my chain! I held some slack allevage till this hour—but now my sword's my own.

Your counsel's merciful. For this all thanks. He does not touch a tusk of Catiline. "Traitor!" I go— but I return. This — trial! Here I devote your son! I've had wrongs to stir a fever in the blood of age.

The eye could at once command a long-stretching vista, seemingly closed and shut up at both extremities by the coiling cliffs. It seemed like Laocoon strangling ineffectually in the hollow coils of the monster Python.

In those mournful months, when vegetables and animals are alike coöred by cold, man is tributary to the howling storm and the sullen sky; and is, in the pathetic phrase of Johnson, a "slave to gloomy fate.

I would call upon all the true sons of humanity to cooperate with the laws of man and the justice of Heaven in abolishing this "curse of traffic!"

Come, faith, and people these deserts! Come and redeem these rocky realms of forlorn humanity.

I am a professed lucubrator; and who so well qualified to delineate the sable hours, as "A measur, mus-rud mope, adjust and thin?"

He foresaw therefore the busting tests of his father; the pleasant "south country" and the "well Lahai-rod!" he went out and passively meditated at the events (see Genesis xxiv. 62). The Grecian and Roman philosophers firmly believed that "the dead of midnight is the noon of thought." Young observes, with much energy, that an "undevout astronomer is mad."

Young Blount [his] armour did unlace, and, gazing on his ghastly face, said—"By Saint George, he's gone! that spear-wound has our master sped; and see the blood rise upon it: Good night to Marmion!"—"Unmuttered Blount! thy brawling case; he open his eyes," said Eustace, "peace!"

A celebrated modern writer says, "Take care of the minutes, and

* In this lesson, as well as in some of the preceding lessons, there are several sentences of poetry which are not divided into poetical lines. The object of printing these lines without regard to this division, was to prevent the student from falling into that "sing song" utterance, into which he is too apt to fall in reading verse. It remains to be observed here, that abbreviations and contractions, such as occur in poetical sentences in this lesson and others, which appear in the form of prose, are not allowable in prose itself.
the hours will take care of themselves." This is an admirable remark, and might be very seasonably collected when we begin to be "weary in well-doing," from the thought of having much to do.

I've seen the moon glide the mountain's brow; I've watched the mist o'er the river stealing; but never did I feel in my breast, till now, so deep, so calm, and so holy, a feeling; 'tis soft as the thrill which memory throws o'erward the heart in the hour of repos.

Best be the day I 'scaped the wrangling crew from Pyrrho's maze and Epicurean sty; and held high converse with the godlike few, who to the scenery, as well, and car, and eye, beach beauty, virtue, truth, and love, do melody.

But thou, who Heaven's just vengeance dar' at defy, this deed, with fruitless tears, shalt soon deplore.

O Winter! ruler of the inverted year! thy scatter'd hair with elect-like nashes fill'd, thy breath conceived upon thy lips, thy cheeks fringed with a beard made white with other snows than those of age, thy forehead wap't in clouds, a leafless branch thy sceptre, and thy thighs a sliding car, indebted to no wheels, but urg'd by storms along its slippery way, I love thee, all unlively as thou soon'st, and dreadest as thou art!

For as I passed by, and beheld your devotions, I found an altar with this inscription, "To the unknown God." Whom therefore ye ignorantly worship, him declare I unto you.

XIV. THE ASTERISK, OBELISK, DOUBLE OBELISK, SECTION, PARALLEL, PARAGRAPH, INDEX, CARET, BREVE, AND BRACE.

The student should take particular notice of the following marks, so that he may call them by name, and discover their use in the following examples:

* An Asterisk, or Star.
† An Obelisk, or Dagger.
‡ A Double Obelisk.
∥ A Paragraph.
§ An Index.
‖ A Caret.
¶ A Breve.
|| A Brace.

78. The Asterisk, Obelisk, Double Obelisk, Paragraph, Section, Parallels, and sometimes figures or letters, are used to show that there is a note at the bottom of the page. When many notes occur on one page, these marks are sometimes doubled.

79. The Paragraph was formerly used to show the beginning of a new subject in a chapter.

60. The Section is generally used to sub-divide chapters into lesser parts.

81. The Index or Hand § points to something which requires particular attention.

82. The Breve — is placed over a letter to show that it has a short sound; as, Helena.

83. The Brace ∥ is used to unite several lines of poetry; or, in prose, to connect a number of words with one common term.

84. The Caret ‖ is never used in printed books; but in writing it shows that something has accidentally been left out; as,

reected
George has his lesson.

Ours.—When several asterisks or stars are placed together, they represent an ellipsis.

Examples.

Many persons pronounce the word Helena* incorrectly. They call it Helenas; and the words acceptable, recogniz, Epicurean, and European, are sometimes incorrectly called acceptable, recogniz, Epicurean, and European.

The heresy, therefore, of Naaman shall cleave unto thee.
* And he went out from his presence a lper as white as snow.

The Cougar† is the largest animal of the cat kind, found in North America; and has occasionally received the name of the American lion, from the similarity of its proportions and colour to those of the lion of the old world.

The keeper of the elephant gave him a gallon of arrack,† which rendered the animal very furious.

I fell upon my knees on the bank, with my two servants, and the drags of the ministry.

The history of Joseph is exceedingly interesting and full of instruction.

It was a cave, a huge recess, that keeps till June December's snow; a lofty precipice in front, a silent tarn * below.

§ Pronounced Co-la.
∥ Pronounced Co-la.
*** The class of the clergyman.
∫ Stole.—A long robe worn by the clergy of England.
‡‡ The house of correction.

MECHANICS.—VI. FINDING CENTRES OF GRAVITY.

In the last lesson it was shown that every mass of matter has a centre of gravity, but we did not inquire how such centres are found in bodies of known shapes. To that part of our subject we now proceed.

As a general rule, the problem requires high mathematics for its solution; but there are some cases in which the centre can be discovered without much difficulty. I take, first, the practical method by suspension, which gives it exactly whenever the body is of a uniform thickness, such as a deal board, or card, or piece of paper. The two opposite faces should be equal and alike, the edges being either perpendicular or square to them, running up at the same slope. In all such cases it is evident that the centre of gravity is within the substance of the board half-way across between the faces. If, therefore, we can find the point on either face under which it lies, by boring straight in half-way at that point, the required centre is reached.

But how find the outside point? Let the board be of any irregular shape, as at A (Fig. 27), and bore two holes through it perpendicularly at any two points, near its edge, o and q. Put a straight iron rod now through o, and on the rod, by a small ring, hang a plum-line, or a, close to the board. Put rod, line, and board now across two supports, so arranged that the rod may be horizontal. The board having settled to rest, the centre of gravity will, as I showed in last lesson, be somewhere behind the plum-line. Chalk now, or mark with a pencil, the course, o a, of this line on the board. Perform the same operation with the hole q, pencilling in like manner the line q n. What now have we? Two lines, behind which both the centre of gravity lies; whence we infer that their intersection, o, is the point required.

But the method in part applies to bodies which have not parallel faces like boards, or are not cut perpendicularly, or at the same slope across at their edges; but in such cases the sought centre is not midway across. All that is necessary is that there should be a flat face on it, (Fig. 28), and find, by trial, the point or flat face, and then, as at A (Fig. 27), o and q, two points, near its edge, perpendicular to the face, and determine the point a, which has been shown at b (Fig. 27). You can still determine the point a, behind which the centre of gravity lies, by boring two passages at o and q, perpendicularly to the face, into its substance, suspending and marking the lines o a, q n, as before. The centre of gravity will still be behind the point a; but where, or how far in, is another question, the answer to which depends on the shape of the body.

If the board which above first occupied our attention be supposed to become very thin—to be cardboard, or even paper—the body becomes almost all surface, and the point o and the centre of gravity nearly coincide. Practically, they become identical; and the operation is sometimes spoken of as the finding of the centre of gravity of an area or surface. In strictness, a surface cannot have a centre of gravity, for (see Lesson 1.) the centre of gravity of a parallelogram of no thickness can have more weight, no force, no centre of force. But, for all that, the inquiry is useful. We may agree, for mechanical purposes, that a surface should have such a centre; and the best course for that purpose is to give it a thickness the smallest we can conceive, namely, that of one particle or atom. Imagine, then, a triangle, or polygon, or circle, one atom thick; and let us agree that, when we find its

* This with the St, before it, is the name of a small island situated on the west of Africa, noted for the exile of Napoleon I.
† Promounced Co-gar. The name given to this animal by the Americans generally is panther, evidently a corruption of panther.
‡ Arrack is a very strong spirituous liquor.
§ Interpreter means an interpreter.
∥ The whole history of Joseph will be found in the Bible; from the 37th chapter to the end of the book of Genesis.
centre of gravity, we have the centre of gravity of an "area" or "surface." Also let it be understood that the centre of gravity of a line, straight or curved, means that point for such a line of atoms.

TO FIND CENTRES OF GRAVITY BY CONSTRUCTION.

This is done by the rule for finding the centre of parallel forces, given in Lesson IV. (page 120). We shall commence with the most general case, namely:

1. To find the common Centre of Gravity of any number of Bodies, the separate Centres and Weights of which are given.—The masses may be anyhow placed, but the operation is the same whether they are all on the same plane, as in the case of the balls on the ground, or at different planes, as in the case of the triangles in Fig. 27, above, or are some in that plane, some above, and some below. Let them be four in number and on the same plane, their centres being A, B, C, D; then four parallel forces, the weights, act at these centres: what has to be done? Join first A with X, and cut the joining line at X inversely as the weights at these points. Next connect X and C, and cut C X at Y inversely as the two first weights to that at C. Lastly, join Y and D, that Y D at Z inversely, as the weights of the three balls already used are to that of the fourth, D. This last point, Z, is the required common centre of gravity.

You observe that the joining and cutting of the lines is in no way influenced by, or dependent on, the bodies being on the same or in different planes, or of their number. How many soever they be, the operation is the same. Note, also, that a common centre of gravity can be outside the bodies of which it is the centre.

2. To find the Centre of Gravity of a Right Line.—A mechanical right line being, as we have agreed, a line of atoms of equal size and weight, the case is that which we have considered in Lesson IV., of a number of equal parallel forces acting at equal distances from each other, along a right line. The resultant passes through the middle point of that line; hence the centre of gravity of a right line is its middle point.

This enables us to find the centre of gravity of a uniform rod by "uniform," I mean such that the cross sections are of the same size and form throughout its length. Such a rod may be considered a collection of equal mechanical right lines placed side by side, their ends being made flat or level. As the centre of each line is in its middle, the centre of the whole bundle is in the cross section at the rod's middle. And observe that this holds good of all other bodies, besides mere rods, which can be considered made up of equal parallel lines, such as a cylinder or uniform pillar, or of a beam of timber, a cubical block of stone; the centres of gravity will be in the cross sections at their middle points. And it makes no difference whether the flat ends of the cylinder, pillar, beam, or block are perpendicular to the lines of which it is supposed to be composed, as in c and e (Fig. 28), or oblique to them, as at d and f (Fig. 29); the centre of gravity is still in the middle cross section parallel to the flat ends. Moreover, as all bodies so shaped may be considered a collection of lines, one atom thick, piled on top of each other, either perpendicularly or with a slope, like cases or a pile of sovereigns, the centre of gravity of each must lie also on the line joining the centres of gravity of the two areas which form their ends. The centre itself, therefore, is the point in which this line pierces the middle cross section, as at c and e, Fig. 28, in the cylinder and cube. But this requires us to be able to find the centre of gravity of such areas, of which take first the triangle.

3. To find the Centre of Gravity of a Triangle.—This we do by considering the triangle made up, as in the triangle a, Fig. 30, of lines an atom thick, all parallel to the side A B. The centre of gravity of each line is at its middle point. If, therefore, I can satisfy you that the middles of all the lines are on the line c m, which joins the vertex c with the middle m of a b, I have, then, to prove that c m bisects, or divides into two equal parts, every line parallel to a b. Suppose, now, that I cut c m into three equal parts, c x, x y, y m, as in the triangle a, b, c, Fig. 30, and draw parallels to a b at the two points of section inside, meeting a c and b c each in two points from which parallels to c m are drawn, meeting a b in four points, two on each side of c m.

Now, since c m is equally divided, and the white figures inside are parallelograms, it is evident that the line parallel to c m marked a b, on each side, are equal to each other, and to c x, the third part of c m. Hence the three small shaded triangles next to a c are equal to each other, and have equal angles. The sides of the sides of a b and a c are therefore, and shows that a m is cut by the parallels to c m into three equal parts. For the same reason b m is cut into three equal parts; and since a m is equal to b m, the six parts into which a b is divided are equal to each other. You thus see that the first parallel above a b is made of parts, two on either side of c m, equal to the parts below, and is therefore bisected by c m. The next above is also evidently bisected, being composed of two parts, on either side. Now I divide c m into five parts instead of three; I have four other parallels also bisected by c m; if into 7 or any other number, it is the same—I can fill the whole triangle with parallels to a b bisected each by the line c m. The centre of gravity of the triangle is therefore on c m.

But by a similar reasoning it can be shown that this centre of gravity must be in a l (in triangle e, Fig. 28) bisecting the parallelogram made of the two triangles, a c x and a c y. For, since the diagonals bisect each other, the line b d is the bisector of the common side a c of both the triangles, a b c and a c d. The centre of each, therefore, is on that line, and therefore the common centre of both—that is, the centre of the parallelogram. But by the same reason, considering the parallelogram made of the two triangles on b d, the centre is on a c. Being thus on both diagonals, it is at their intersection.
4. To find the Centre of Gravity of a Polygon.—Let $A B C D E$ (Fig. 31) be the polygon, and from the angle $A$ draw the dotted lines $A C$, $A D$ to the remote angles $C$ and $D$. The polygon is thus cut up into three triangles. Let $O$, $H$, and $K$ be the centres of gravity of these latter figures; there are thus three bodies whose centres, $O$, $H$, and $K$, are known, and whose masses are the three areas of the three triangles. Suppose now that you had calculated these areas, and had them written down in numbers. Then join $O$ with $H$ and cut $O H$ at $X$ inversely as the numbers expressing the areas of the triangles $A B C$, $A D C$. Connect $X$ now with $K$, and cut $X K$ at $Y$ inversely as the quadrilateral $A B C D$ to the triangle $A E D$; the point $Y$ is the required centre. If the polygon had more sides than are in Fig. 31, the process is the same, and must be continued until all the triangles into which it is necessary to divide the polygon have been gone over.

5. To find the Centre of Gravity of the Circumference of a Circle.—Let the circumference be taken to be a curved line of atoms, as in $a$, in Fig. 32, to the right; and through the centre $O$ of the circle let any line, $A O B$, be drawn passing through two of them, one on either side. Since these two are of equal weight, and equally distant from $O$, their common centre of gravity is that of $A B$, that is, the point $O$. So, likewise, going round the figure, the centre of gravity of every opposite pair of atoms is $O$, and therefore $O$ is the common centre of all, or of the circumference.

The centre of gravity of a ring is thus seen to be the centre of the circle in which it is formed, for the ring may be considered a bundle of circles an atom thick, bound together, one above and around the other, so as to have for common centre of gravity the centre of the central circle.

The centre of gravity of the area of a circle is also the centre of figure of the circle, for the area may be considered as made up of a number of circles of atoms, lying one inside the other, and having the same centre, $O$, which, by the above, is therefore their common centre of gravity.

The centre of gravity of a hollow sphere may, in like manner, be proved, by drawing lines through $O$ to the atoms on its surface, to be the centre of figure of the sphere; and a solid sphere may be considered as consisting of a number of these hollow ones inside one another.

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**LESSONS IN PENMANSHIP.**

In Copy-slip No. 46 (page 196), an example was given of the letter $x$. This letter is formed of the letter $c$ twice repeated; the first, or the one to the left, being turned upside down, while the second, or the one to the right, is formed in the ordinary way. The left half of the letter is commenced on the line $c$ with a hair-line which is turned at the top to the right, and brought downwards without being thickened by pressure on the pen. The hair-line is turned to the left as it approaches the line $b b$, carried round, and terminated in a dot about midway between the lines $b b, c c$. The right half is then added. It is made in precisely the same way as the letter $c$, the thick down-stroke touching the thin down-stroke of the turned $c$, and forming the thickened centre of the letter.

In Copy-slip No. 48 the learner will find an example of the letter $o$, which is commenced on the central line, $c c$, by a hair-stroke carried up in a slanting direction to the right. This hair-line is then turned at the top line, $a a$, and carried to the left, and the letter is finished in the same manner as the letter $c$, or the right half of the letter $x$; but in making the thick down-stroke care must be taken to let it pass over the point in the line $c c$, at which the up-stroke forming the loop or bow of the letter $e$ was commenced.

Copy-slips Nos. 47 and 49, comprising the words *tax* and *axe*, are given to show the learner how the letters $x$ and $o$ are connected with letters that precede or follow them.

In the last lesson it was said that the letters $c, x$, and $o$ are modifications of the letter $o$. The learner may prove this in a practical manner for his own satisfaction, if he will take the trouble to make the letter $o$ in pencil, on a piece of ruled paper, and then trace the letter $c$ or $e$ over it in ink; or otherwise, by making the letters $c$ and $o$, and then adding to them the fine hair-stroke on the right side that is required to form the complete oval of the letter $o$. To show that $x$ is a modification of $o$ it will be necessary to make the letter $o$ twice over, so that the right side of the first touches the right side of the second, and then trace the letter $x$ over the double $o$ thus formed; or, as in the case of $c$ and $o$, the hair-stroke that is necessary to complete the oval of $o$ may be added on the right and left of the letter $x$. In the letters $c, x$, and $o$, the bottom-turn is carried to the right, beyond the limit of the bottom-turn of the letter $o$, in order to join them the more readily to any letter that may follow them.
LESSONS IN ARITHMETIC.—XIV.

DECIMALS (continued).


To multiply 634 by 2149.

\[ 634 \times 2149 = \frac{634 \times 2149}{10000} \]

Now the numerator shows us that we must multiply the figures together as in whole numbers, and the denominator shows us that the result will have as many decimal places as there are decimal places in the multiplier and multiplicand together.

\[ 634 \times 2149 = 1332466 \]

and the required result must have 5 decimal places. Hence the answer is, 133246.6.

Hence we see the truth of the Rule for the Multiplication of Decimals.

Multiply the two numbers together, as in whole numbers, and cut off from the resulting product as many decimal places as the sum of the number of decimal places in the multiplier and multiplicand.

Obs. — When the number of significant figures in the product is not as great as the sum of the number of decimal places in the multiplier and multiplicand, we must prefix ciphers.

Example.— Multiply ‘013 by ‘02.

Multiplying as in whole numbers, we get 26; but since there are 5 decimal places in the multiplier and multiplicand together, we prefix 3 ciphers to 26, and the required result is by the rule ‘00026.

The reason of this may also be seen analytically thus:—

\[ 013 \times 02 = \frac{013 \times 02}{10000} = 00026 \]

(From Art. 5, 6.)

Exercise 32.

1. Find the products of the following numbers, and point them according to rule:

| 1. 09 \times 3 | 15. 2132 \times 4318 | 25. 103 \times 964 | 35. 2132 \times 006 | 45. 103 \times 7912 |
| 2. 1013 \times 25 | 16. 2132 \times 3926 | 26. 103 \times 8912 | 36. 2132 \times 1032 |
| 3. 3039 \times 41 | 17. 2132 \times 10296 | 27. 103 \times 22000 | 37. 2132 \times 40296 |
| 4. 3039 \times 25 | 18. 940061 \times 5312 | 28. 103 \times 32296 | 38. 2132 \times 1032 |
| 5. 2039 \times 12 | 19. 731024 \times 10296 | 29. 103 \times 82296 | 39. 2132 \times 40296 |
| 6. 80094 \times 004 | 20. 394388 \times 10304 | 30. 103 \times 32296 | 40. 2132 \times 1032 |
| 7. 0009 \times 0009 | 21. 394388 \times 82296 | 31. 103 \times 82296 | 41. 2132 \times 1032 |
| 8. 10159 \times 0035 | 22. 2132 \times 1032 | 32. 000971 \times 23951 | 42. 2132 \times 1032 |
| 9. 10159 \times 00096 | 23. 000971 \times 00096 | 33. 2132 \times 40296 | 43. 2132 \times 1032 |
| 10. 2566723 \times 000001 | 24. 420062 \times 832103 | 34. 2132 \times 1032 |
| 11. 32123921 \times 00000003 | 25. 10159 \times 40296 | 35. 2132 \times 1032 |
| 12. 25242 \times 00556 | 26. 394388 \times 10304 | 36. 103 \times 82296 | 44. 2132 \times 1032 |
| 13. 44046 \times 43 | 27. 840031790 \times 1123971 | 37. 103 \times 82296 | 45. 2132 \times 1032 |
| 14. 35619 \times 1032 | 28. 08316731 \times 00000003 | 38. 103 \times 82296 |

2. In 1 rod there are 166 feet: how many feet are there in 413 rods?

3. In 1 degree of the earth’s circumference there are 69° 05 British miles; how many miles are there in 506 degrees?

4. In 1 barrel there are 31.5 gallons: how many gallons in 65° 25 barrels?

5. In 1 inch there are 2.25 miles: how many miles are there in 60° 5 inches?

6. In 1 square rod there are 39 30 square yards: how many square yards are there in 260 05 rods?

7. In 1 square rod there are 272 25 square feet: how many square feet are there in 100 rods?

HISTORIC SKETCHES.—VII.

KING CHARLES’S VETO ON EMIGRATION.

Fate was almost cruel to King Charles the First. One act of his, or rather let us call it one act of his government, recoiled more on his head than ever four cannon recoiled upon its gunner.

Eight vessels were lying in the Thames in the early part of the year 1637, bound for "the plantations" in America. When they were about to sail, an order came from the king in council forbidding the masters of them to go. Obedience was exacted by the royal officers from the all-unwilling masters, and the intending passengers were compelled to land again, to disembark in their baggage, and to renounce the object of their voyage. The ships were emigrant ships, laden with colonists’ stores, and intended for colonists’ use; the people who had taken passage in them were of the stuff from which colonies—nay, empires—are made; and the object of the people in going was to establish a settlement where politics and religion, which were discouraged at home, might have freedom to live, and liberty to grow. An embargo was laid upon the ships, and for the time their departure was delayed. Some of the would-be voyagers never pursued their journey; they refused to give the guarantees which were required of them before they could get past the touch-holes; they returned to their homes and their plantations, and made themselves names in English history for ever. Among them were John Hampden, who first tried conclusions with the king by refusing to pay a tax levied by the royal authority only; Sir Arthur Hazeldrig, one of the most determined enemies the kingly power ever had; John Pym, the future leader of the House of Commons, and promoter of all the constitutional resistance to the privileges which the king claimed as his own.

And many kindred spirits were flying from tyranny and oppression at home, going with their worldly wealth to follow in the footsteps of the Pilgrim Fathers, who, a few years before, had sailed and founded in the wild regions of the West a colony where freedom was to flourish till it grew up and overshadowed the land.

Certainly fate was cruel. Had Cromwell, and Pym, and Hampden, and the rest, been suffered to depart, how might not English history have been written differently? None, of course, can tell whether, among the noble army of patriots who at that time thronged Parliament, there might not have been found another Hampden, another Pym to impeach Lord Strafford, another "Cromwell, quibbling in his counsel’s bosom," but that his right hand was there at the time, and considering what they afterwards became, it is excusable to speculate upon what different scenes would have presented themselves, had not the unlucky order of embargo been issued from the privy council.

But why were those men going? England had been the home, not of themselves only, but of their forefathers for generations. Cromwell’s family counted among its members prominent soldiers as poor Charles afterwards found, and tried to use the knowledge in bribing his enemy—that same Henry Cromwell who was secretary to Cardinal Wolsey, and who, after that statesman’s fall in 1530, had risen in King Henry’s service, till he became Earl of Essex, and was finally promoted to the honour of being executed, by order of the master he had served too well—the master whose commands, as Mr. Hallam tersely observes, "were more of the man’s will than the man’s reason." The society of the men who, now, less bound by the strongest ties to the land of their birth. What motive could they have for voluntarily forsaking all that was dear to them in nationality, and turning their backs upon the country they loved? Disgust at things as they were in the country, and despair of ever seeing them become better. Shortly stated, these were the causes which drove such men away.

"We strove for honours—it was in vain: for freedom—‘tis no more," they might have said with the indignant Roman citizens.

Henry the Eighth had begun that system of ruling by virtue of his own strong will, which the nation afterwards, for national purposes and under circumstances of national danger, allowed his daughter Elizabeth also to exercise. But even under her, beneficent and nationally glorious as her reign was, the people, by their representatives in Parliament, were constantly striving to put a bridle on that sovereign power which the queen was so fond of wielding. They loved her much, but they loved their children more, and they would not suffer her to forge chains for freeborn limbs, nor permit that they and theirs should breathe by royal permission. When the dangers which caused the people for a while to submit themselves wholly to her, passed away, no less time lost in throwing back the privileges which Elizabeth and her high-handed father had taken into their own hands. In the re-conquest it was inevitable that collisions should take place between the queen and the Parliament, and collisions did actually take place; but owing to the perseverance of the House of Commons, and to the great good sense of Elizabeth, who always knew when to bosen the reins which were being held too short, the result of the disputes was always favourable to right and liberty, and never cost the queen a whit of her people’s affection. But when she died, in 1603, and was succeeded by James of Scotland, there were still some ugly instruments at the disposal of the crown against...
the liberty of the subject. The wisdom of Elizabeth's advisers had used these instruments sparingly, and had kept them as much as possible out of sight. They were now to fall into hands which knew not how to use them wisely—hands which clutched the blade instead of the hilt of the weapon, and yet themselves badly cut accordingly.

The ugly instruments in question were the Star Chamber and High Commission, tribunals unknown to the common law of the land, exercising a jurisdiction quite incompatible with the existence of liberty, and apt to become the means of all sorts of oppression. It would take too much space to examine here the whole history of these courts. With regard to the former of these, it may be said that such a monstrous instrument of oppression, bearing the name of courts, has been taken to throw a sentimental and false colour upon its actions, with a view to making it an element in the composition of historical romances. It will be sufficient to say that it was a court composed of the king himself, and such members of his privy council as he chose to summon; that it took cognizance of certain offences not then noticed as such by the ordinary law courts, such as libel and slander, and also assumed a right to take any case it chose from the consideration of the regular courts of law, and especially the criminal courts, and deprived a man in this way of the right of trial by his peers, which had been secured for him by Magna Charta. The lords of the council were at once judges and jury, even in cases where the crown was concerned; there was not any appeal from their sentence, and the sentences of the court were often most ruinous (perhaps more as a matter of course, than necessarily from any man to be fined to such an extent as would prevent his getting a livelihood), even where they did not condemn a man to imprisonment, and sometimes to torture. Any punishment short of death—and many of the punishments came only just short of it—the court of Star Chamber asserted its power to inflict; and the claim having been put forward in action at a time when men were not able to question it, came at length to be accepted as a matter of course, and was no more to suffer by it, and by those faithful guardians of the liberties of England who only bided their time to announce that the court itself was an illegal thing, and ought to be abolished.

The High Commission was a tribunal invented under Queen Elizabeth, a sort of ecclesiastical Star Chamber, composed of ecclesiastics, who made it their business to "sniff out moral taints," and to be down on any one who worshipped God in any other way than that prescribed by the Church of England. It was armed with power to fine and imprison, and this power it used till resistance became so strong, even under Elizabeth, that it was deemed prudent to admonish it from above. It was a sort of Protestant Inquisition; but Englishmen were not Spaniards, and the seeds of priestly tyranny were crushed ere they could grow into a plant. Still it existed, in company with the Star Chamber, which overrode more and more intolerable in its administration under the government of Elizabeth.

Men had endured much from the Tudor princes, as they always will endure at the hands of rulers whose strong personal character makes them respected, even though feared; but from princes of the House of Stuart, they were by no means ready to put up with insult and oppression, so that when members of Parliament were cited to appear in the Star Chamber to answer, as it were, a charge by which the House of Commons had been offended, Parliament, they resisted, and remonstrated with the king, and declared what he had done to be a breach of privilege of Parliament. Against other acts of the Star Chamber, and of the government, the House also protested, and Puritans in politics, as well as in religion, who had been trained up in Elizabeth's parliaments, and who sat in the parliaments of James I., had often words of remonstrance and warning, not fearing even the direst displeasure which the chances were would be their reward for their boldness.

The king was despicable, his government was weak: the Parliament men were for the most part noble, and unquestionably they were strong; so all through the reign of James I., 1603-1625, there were perpetual conflicts between the sovereign and the people, and though when the king died the Crown had not given up any of its so-called prerogatives, there had been conjured up a deep spirit of resistance to them, a spirit which found expression in the reign of James's successor, his ill-fated son, Charles I.

But much had yet to be borne before order-loving, law-fearing Englishmen could be induced to rise up and say, "This thing shall not be." With a government as weak, or weaker than James's, Charles pretended even greater claims than his father, and exercised his prerogative even more annoyingly and more tyrannically. He levied certain taxes on the people, not only without the consent of Parliament, but in direct contravention of several statutes; he issued proclamations, and required them to be obeyed as laws; he presented the offer of advice as unwarrantable interference; and he refused finally to summon the counsellors, whose advice was always so unpalatable. Brought up in the notion that kings are appointed directly by God, and that the Church of England was also of Divine institution, he deemed it his duty to defend the Church against all attack; an attack on it, he took for an attack upon himself, and backed with all his might the claims of the Church against his people.

In order to do this he was necessitated to employ very extensively, in the face of increasing opposition, the two courts of which mention has been made.

Two members of Parliament, Sir John Eliot and Sir Dudley Digges, were imprisoned by order of the Star Chamber, for "seditious" words used by them, as members, when the Duke of Buckingham was impeached; and when the House refused to vote supplies till its members were released, the king threatened them, but gave way about his prisoners. Then came a series of attacks on the constitution by the king and his ministers, which were repelled with more or less damage to the good-will between him and his people; the king tried to govern without Parliament, and Parliament was resolved there should be no peace for the king; and William Prynne, with Edward Stratford as chief adviser in state affairs, and Archibald Hamilton as his secretary, strove to make himself an absolute king, caring little apparently how rough-shod he rode over the feelings and affections of his people. The honour of the nation was forgotten by a disgraceful foreign policy, pirates from Morocco were allowed to prey upon ships in the English Channel, the influence of England abroad had sunk to zero, and at home all power and statesmanship were dealt with in laying the nation, bound hand and foot, at the feet of the king.

The Star Chamber was set in motion against the opponents of the kingly power, and indeed against all who ventured to criticize the actions of government. Sir David Fonis was fined £5,000 for dissuading a friend from paying an unlawful tax; Prynne, a barrister of Lincoln's Inn, for an abusive book he had written against some of the practices in the king's household, and against the ultra-High Church practices of the primates, was sentenced to be disbarred, to be put in the pillory at Cheapside and at Westminster, to have both ears cut off, to be fined £5,000, and to be imprisoned for life! People were ruinously fined for turning their arable land into pasture, in contravention of some obscure law of Henry VIII; for refusing to lend money to the king; and for encroaching on the royal forests. One man, Morley, was fined £2,000 for reviling and striking one of the king's servants at Whitehall; another, named Allison, was fined £2,000, imprisoned, and pilloried at Westminster, for having said falsely that the Archbishop of York had incurred the king's displeasure. For calling the Earl of Stafford "a base lord," Sir Richard Granville was ordered to pay £24,000 to the earl and £4,000 to the king; Sir G. Markham having thrashed Lord Darley's huntsman for abusing him, and having promised to do the like by Lord Darley, should he approve, was fined £40, and was fined £400; Landlord proprietors being ordered by the king's proclamation not to live idly in London, but to go to their estates, were fined in the Star Chamber for non-compliance.

In 1637 Burton, a divine, and Bastwick, a physician, were condemned for sedition and schism to the same punishment as had been inflicted on Prynne, and that unfortunate man having again offended, was further mutilated and fined another £400. Williams, a member of the House of Commons, was sent to the Tower, for some trumpery offence against Law: Osbaldistone, the master of Westminster School, for having nicknamed Land in a letter to Williams, was ordered to be pilloried before all his school, and to pay £5,000, but he saved himself by flight. Lilburne, charged with distributing seditious pamphlets, was whipped by the hangman, pilloried, and imprisoned with iron chains on him.

It was under circumstances like these, when despair seemed...
to have seized the minds of men; when the king was hurrying

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forward headlong in a career of violent misgovernment, and no

when

one was found to stand in his way and stop his mad course;

but

when oppression seemed to be triumphant, and right and justice

resolved

were openly trodden under foot; when honour had gone from

compelled

England, and the homes of her people were no longer pleasant

The

places, that Hampden, and Pym, and Hazlrig, and Cromwell

proposed to quit her shores and begin life anew in America.

The royal order, arbitrarily issued, prevented them as we have

seen. They returned to their homes and their duties, and when,

borne

compelled as a last resource to summon Parliament, whose

advice he had not sought for eleven years, the king again ad-

dressed the House of Commons, these men were in their places,

resolved to do their duty to the uttermost, even to exceed it

the Earl of Strafford, the supporter of the impeachment of Laud,

the life and soul of all the constitutional opposition which the

parliament made to the king. His name is not to the warrant

for the execution of Charles I. (January 30, 1648-49), though

with Hampden, Hazlrig, and two more, he was one of those

five members whose arrest the king in 1641 endeavoured to

effect in person (see "Historic Sketches," IV., page 120); but

his name stands out brilliantly among those advanced patriots

and purely disinterested men who in 1641, immediately after

the execution of Lord Strafford, wrang from the king a consent

to the abolition by statute of the courts of Star Chamber and

High Commission.

Of Oliver Cromwell, the fourth man among the detained, it is

unnecessary now to write. Much has been said for him,
ANIMAL PHYSIOLOGY.—VII.

THE ORGAN OF SMELL.

In the preceding articles on the organs of sight and hearing it was remarked that while the sensations excited through their agency were so different, the external causes which operated on the eye and ear respectively were not dissimilar. Rigid vibrations, propagated by bodies themselves in violent but otherwise unnoticed vibration, are conveyed through intervening media for great, and, in the case of light, unlimited distances, by waves which are capable of indicating the direction from which they proceed. These vibrations, therefore, can inform the mind concerning objects far removed from its instrument, the body, with an accuracy which makes us scorn the idea that we can be deceived in that which our eyes have seen and our ears heard. Through these avenues the human mind extends itself, till it touches, and by the aid of reason may be said to grasp, the universe; and the highest powers of the mind are employed in interpreting the messages brought to us by light and sound.

In marked contrast to these are the remaining senses of which we have to write—namely, those of smell, taste, and touch. These senses are excited by material particles applied directly to those parts of the body which can take note of their peculiar qualities, and hence they are far less necessarily con-

ected with mental operations. Their uses have more relation to our animal than to our intellectual life, and the appetites which arise from a desire to gratify these senses have always been considered to be less refined and more sensual than those which pertain to the senses of sight and hearing. It is true that a spurious delicacy and refinement of the sense of smell have caused the wealthiest classes in times of high civilization to delight in costly and rare essences and scents; but the extensive use of these has been the characteristic of effeminate races, and of times when civilization, in its highest sense, had begun to succumb to luxury. When Rome boasted of her costly perfumes, she had almost ceased from the prouder boast of being mistress of the world; and the more manly tone of modern and western society has decided between Hotspur and the top, to the prejudice of the latter.

Matter or material substances exist in three forms—the solid, liquid, and gaseous; and almost all substances can be made to assume each of these forms. Thus ice may be transformed into water and into steam. When the particles of matter hang together so closely and rigidly that they will not move over one another without the application of force, they form a solid. When the particles hang together so loosely that they will move over and round each other with the slightest force, so that they can scarcely be said to hang together at all, the substance is called a liquid. When the particles not only do
not hang together, but exert a force to fly off from one another, the substance they form is called a gas. The sense of touch, strictly and properly defined—that is, the sensation of heat and of resistance—has to do with solids. The sense of taste has to do with liquids only, as nothing is rapid which is not liquid or capable of being dissolved. The sense of smell occupies itself with gases for the same reason, but can gain access to the organ, or cause the sensation of smell. Lest the reader should suppose this statement opposed to the testimony of his experience, from the well-known fact that solids, such as cedar-wood, camphor, and musk, excite the sensation of smell, while ordinary scents are preserved and carried about in a liquid form, it must be explained that these substances contain volatile essential principles, which, freed from the necessity of the gaseous state, give off perceptible quantities of vapour. Some solids give off particles of their substance in a state of vapour without first becoming liquid, as is ordinarily the case. Thus snow, which coats the earth in winter, will diminish daily, even though the air is frosty, and there is no melting process going on. In other cases, as in cedar-wood, oils naturally volatile seem to be long entangled in the solid material, and by the power of some external means, such as heat, to give off sufficient quantities of vapour. This is sometimes truly wonderful. Dr. Carpenter states that a grain of musk may be freely exposed to the air for ten years, during which time it perfumes the whole surrounding air; yet when weighed, there is no perceptible loss observed. Matters which exhale odoriferous emanations are detected at a great distance, from the centre of the source to the most distant place, so as to pass equally throughout all other gases. Thus, though there be but a very small escape of coal-gas in one part of the room, it soon announces itself to the nose in every corner of the apartment. This is a faculty peculiar to gases, and produces many interesting results, which, however, cannot now be dwelt upon.

The final cause for which the sense of smell is given is to the higher animals, not to MAN. To them it is the organ of warning against entering into the lungs and stomach noxious matters, and secondarily to guide them in the search for wholesome air and food. As a rule, to which, however, there are many exceptions, nauseous smells are associated with noxious gases, and that food which gives off a pleasant aroma is of a nature, and in a condition, to supply good nutrition. The bulk of the atmosphere consists of insidious gases, admirably mixed so as to suit the purposes of respiration, and the main products of vegetable life are nutritive and bland; but small quantities of destructive effluvia and of deadly poisons are no uncommon things in nature, and unless some kind of quarantine were exercised on air and food, the system could not be maintained in health. True, therefore, to its office of sanitizing inspector, the organ of smell holds a position at the entrance of the road to death. The relations of this organ to the lower and right-hand side, as they would appear if the head were cut in two with the downward stroke of a sharp, restless knife, made as near to the middle plane as possible, yet so as to be on the left of the upright partition between the two nose-chambers. The ordinary course of the air, when no food is being swallowed, is upward through the nostril, then horizontally through the lower passage of the nose to the lungs, passing along the partition behind the soft palate, ent ring the hole immediately below the part marked as the "epiglottis," and so on to the lungs. The simpler course of the food is horizontally through the mouth, and then vertically downward. If the reader has understood the engraving, he will see that the air and food passages cross one another; or, perhaps, it makes more clear the engraving than that every single wave breaks as soon as it reaches the eye, which gives it strength, and passes out again below and in front of the partition, behind the soft palate, as before, and then returns, as before, to enter the lungs through the nose. That cold air, introduced through the nose, instead of through the mouth, is less likely to be injurious, is so far recognized, that respirators are used by delicate persons in cold air, while it is not thought necessary thus to protect the nose.

There are curious connections between the nasal chambers and the hollows in many of the bones of the face and head, and in the cranial cavity, behind the orbits, and through the air sinuses. The nasal branches of the brain are numerous.

The nose has another office, in that it serves as a sewer for the eye. Two little ducts from the inner corner of the eye join and form a tube, which, after passing through a bony canal, delivers its drainage into the lower meatus of the nose by a small orifice, shown in the engraving. Hence, violent blowing
of the nose is often resorted to in order to clear the eye from dust and tears.

So far as concerns ourselves, the use of the olfactory organ is rather to teach us what to avoid than what to seek, and the pleasures of smell are rather incidental to other healthful conditions than much prized on their own account; yet the varied fragrance of a thousand flowers, so delightfully diffused as not to pull the sense, or to surcharge the pure air, is no small addition to the delights of the garden and the country. If, however, we endeavour to imprise these odours, and make them our own, they are nearly always suggestive of a sickly effeminacy, and have called down sneers on their possessors. Thus, Cowper writes—

"His better hand, more busy, gives the nose
Its burgomast,"

and Tennyson—

"His essence turned the live air sick;
And again Shakespeare—

"He was perfumed like a williner."

LESSONS IN ENGLISH.—VIII.

PREFIXES (continued).—

Apo, of Greek origin, from, as apostle, from the Greek από (pronounced ap'-o), from, and απελ ιλεία (pronounced a-ple'-lee-ya), I send; that is, a person sent from one to another, a messenger.

Apo has the force of our English prefix un, as in unsee.

This is an exact import in the word apocalypse, a revelation, from the Greek απο and καλέω (pronounced ka-le'-yo), I conceal; that is, according to the Latin, an unwinding; and according to the Greek, an uncovering.

"O for that warning voice which he who saw
Th' apocalyptic, heard cry in heaven aloud."—Milton.

Arch (ch sounded like k), of Greek origin (from ἀρχή, pronounced ar'-ke, a bēginiiia), in the forms arch, archie, and archy, denotes the origin, the head, and hence government. It is the second syllable in monarch, monarchy; and as the letter which in Greek represents the ch is pronounced like k, arch thus introduces a Greek pronunciation into our tongue. Hence you may learn the error which pronounces architect (from ap'chek, first, or head, and αρχ to, pronounced teck'-ton, a maker or builder), as if its arch was pronounced like the monosyllabic word arch; that is, the arch in a building.

Besides a type and an antitype, theology recognises an archetype, or original type, an original mould or model, in which, in virtue of which, and after the likeness of which all created beings were formed, as was taught by the Greek philosopher Plato.

"There were other objects of the mind, universal, eternal, immutable, which they called original ideas, all originally contained in one archetypal mind or understanding, and from thence participated by inferior minds and souls."—Cudworth.

This word arch (from ἀρχή) is found also pronounced in the ordinary English manner, as in archbishop—that is, a chief bishop, the chief bishop of a province. In its signification of chief it is used also to denote something questionable, bad, or humorous.

"Doggett thanked me, and after his comic manner spoke his request with so arch a leer that I promised," etc.—Tuller.

"Come, tell us honestly, Frank," said the squire with his usual archness, "suppose the church, your present mistress, drest in lawn sleeves, on one hand, and Miss Sophia, with no lawn about her, on the other, which would you be for?"—Goldsmith.

Auto, of Greek origin, equivalent to self, is found in autocrat, from the Greek αὐτός (pronounced aw'-tos), one's self, and αυτοκρατία (pronounced krat'-e-a), power, government, one who governs himself and by himself; hence autocracy is arbitrary power, despotic.

"The divine will is absolute; it is its own reason; it is both the producer and the ground of all its acts. It moves not by the external impulse, or inclination of objects, but determines itself by an absolute autocracy."—South.

Be, of Saxon origin, in the forms be and by, connected pro-

lably with, the verb to be and the proposition by, denoting the active power or agent, as a prefix, performs the part of an intensive, and increases, sometimes in a bad sense, the inherent import of a word; e.g., beloved, bedamned, besneak, beroape. In other cases it seems to do little more than aid in forming words, as an adverb out of an adjective; as behind (hind, hinder), before, below, beneath. The adverb betimes (early) is made up of and time, bytime; that is, in time.

"He that goes out betimes in the morning is more like to dispatch his journey than he that lingers till the day be spent."—Bishop Hall.

By means also, near, as "Stand by me."

"And as he (Jesus) passed by, he saw Levi." (Mark ii. 14.)

Hence the phrase by and by denoted immediately, as may be seen in Mark vi. 25, in which, and in other passages of Scripture, it is the representation of a Greek word which signifies straightway, forthwith. The repetition of the by may have had emphasis for its object. Hence is explained the word by-stander, that is, one who stands near. At present, by and by seems in conversation to intimate some little distance of time from the actual moment.

Bene, a prefix of Latin origin (from bonus, good; bene, well), is found in union with words of Latin origin; thus with facio, I do, and its parts facere, factum (in combination a man may pass into), it forms benefaction, benefit, beneficial, beneficent; so in union with dicco, I say (diuere, dictum), bene forms benediction, and with volo, I am willing, it forms benvolent. Hence, one who is benevolent is one who wishes well; and one who is beneficent is one who does well; a benediction is a good word, a blessing, and a benefaction is a good deed, a gift. The opposite prefix is the Latin malo (pronounced ma'-lo), ill or evil. The contrast is well illustrated in these words, where, as in other instances, the old spelling is retained, as offering so many historical facts—

"The kynge, willing to show that this benefice was to hym most acceptable, and not worthy to be put in oblivion, called this grant of money a benedelence, notwithstanding that many with grudge and waterstolne gave great summes toward the new fownde (found) benedelence."—Hall.

"Edward IV."

Bi, in the forms of bi and bis, of Latin origin (bis, twice), has in English the force of tico or twice; biped (pes, Latin, a foot), two-footed, biscuit (cuire, French, to cook), twice-cooked.

"The inconvenience attending the form of the year above mentioned, was in a great measure remedied by the Romans in the time of Julius Cesar, who added one day every fourth year, which from the day of its insertion, viz., the sixth of the calends of March, was called bisextile or leap-year."—Priestly, on History.

Cata, of Greek origin (κατά, pronounced kat'-a, down), properly denotes motion in a downward direction, and appears in the word cataract (from the Greek καταράς, pronounced ras'-so, I strike or dash), which, according to its derivation, signifies a breaking-down; that is, of the rock which leads to a downfall of water. This prefix is found in other words of Greek origin, as in cataclysm (from the Greek κατακλύσμα, pronounced kat'-a-klu'-zo, I destroy), a deluge, from the verb κατακλύσω, (pronounced kat'-a-klun'-so, to inundate), a term applied to the deluge.

"The catacombs are subterraneous streets or galleries from four to eight feet in height, and from two to five in breadth, extending to an immense and almost unknown length, and branching out into various walks under the city of Rome."—Buonacc., "Italy."

Cent, of Latin origin, from centum, a hundred, is found in centenary, a hundred or hundredth; centuple, a hundredfold; centurion, a commander of a hundred soldiers in the Roman army. The old Saxon word hundredor may be compared with centurion.

"Hundredors, aldermen, magistrates, etc."—Spelman.

The import of hundredor or hundreder may be learnt from the following words, describing the ancient civil division of England for the purpose of government:

"As ten families of freeholders made up a town or tithing (a tenth), so ten tithings composed a superior division, called a hundred, as consisting of ten times ten families."—Blackstone, "Commentaries."

Circum, of Latin origin (Latin, circuit, a circle or ring), signifies around, as in circumstances (from circum, and the Latin verb sto, I stand), literally the things which stand around you; what has
been called “a man’s surroundings.” Circum enters into the composition of many words; e.g., circumnavigation, circumbulation, circumpect, circumscribe, etc.

“The circumscription of a thing is nothing else but the determination or defining of its place.”—More, “Soul.”

Cis, of Latin origin, signifying on this side of (Rome being considered the centre), is found in Cisalpine, this side of the Alps, in opposition to Transalpine, on the other side of the Alps. Gallia Cisalpina was what we call Lombardy; Gallia Transalpina was Gaul or France.

Co, of Latin origin (cum, with), occurs in the forms cog, col, con, cor, etc.

Co, as in colossus (from co and also, Latin, I grow), to grow together; it is found in the derivatives coalescence, coalition.

“No coalition which, under the specious name of independency, carries in its bosom the unrecognizable principles of the original discord of parties, ever was or will be a healing coalition.”—Burke, on the Nation.

Cog, as in cognate (from cog, and natus, Latin, born), born with, of the same family or kind; cog is found also in cognition (Latin cum, with, and nosco, I know), knowledge; a means of knowing, a cognizance or token.

“For which cause men imagined that he gave the sunne in his full brightness for his cognizance or badge.”—Hall, "Henry IV.

Col, as in colloquial (Latin cum, with, and loquor, I speak), relating to conversation; as also in collusion (from col, and ludo, Latin, I play), a playing together; that is, to deceive.

“Well, let us now leve the coked collusion that remained in France, and return to the open dissimulation which now appeared in England.”—Hall, "Henry VI.

Com, as in concomenatore (from com, and memor, Latin, mindful), to keep in mind, to recall to mind; found in commensurate, comminate, commute, compact, etc.

“A different spinning every different web Asks from your glowing fingers; some require The more compact, and some the looser wreath.”—Dyer, "Fleas.

Cor, as in correct (from cor, and rego, Latin, I rule), and correspond, corrode, corrupte, corruptate (from crus, and ruga, Latin, a wrinkle).

“The full lips, the rough tongue, the corrupte cartilaginous palate, the broad, cutting teeth of the ox, the deer, the horse, and the sheep, qualify this tribe for browsing upon their pasture.”—Paley, "Natural Theology.

Contra, of Latin origin (contra, over against), as in contraband (bannum, low Latin, a decree, law), against the law, smuggled; and in contradistinction, contrary. Contra appears in another form—numly, counterfeit (from counter, contre, and faire, French, to make), and in counterpart, a covering.

“On which a tissue counterfeit was cast, Arachne’s web the same did not surpass, Wherein the story of his fortunes past In lively pictures neatly handled was.”—Drayton, "The Barons’ War.

De, of Latin origin, denoting motion downward, has, in combination, the following meanings, being modifications of its original import:

1. Down, in as decrease, develop (Latin, volvo, I roll); de-throne, to put down a king.

“The question of dehiering or castrating of kings will always be an extraordinary question of state, and wholly out of the law.”—Burke, "French Revolution.

Also in debase (from de, and batre, French, to beat), which originally meant to lower in regard to material things; e.g.:

“King Edward III., in the sixteenth year of his reign, proclaimed that no man should sell wool-fols or leather under such a price, so that these staple commodities might not be debased.”—State Trials, 1606.

The application of the word debase to a moral influence is exemplified in this citation:

"Sue. So let her go. God sent her to debase me, And aggravate my folly, who committed To such a viper his most sacred trust Of secrecy, my safety, and my life."—Milton, "Samson Agonistes.

2. From, as in debar, to bar or keep from, to prevent.

"His song was all a lamentable lay, Of great unhappiness, and of usage hard, Of Cythia, the lady of the sea, Which from her presence faultless him debarred."—Spenser.

3. Out, thoroughly, as in declare (de and clareaus, Latin, clear), in which the prefix has the form of an intensive; to make clear, that is, by utterance.

4. Not, with a force like un in undo, reversing the sense; as, to discompose, to do the opposite of composing, that is, compound;

decollation (de and colum, Latin, the neck), un-necking, that is, beheading, decoricate (de and cortex, Latin, bark), to strip off the bark; detame, etc.


Decei, of Greek origin, meaning ten, is found in decade, a period of ten years; in decadence (from the Greek déka, pronounced deek’-a, ten, and λεπος, pronounced log’-os, word, discourse), the ten words or commandments of God. Deca is found also in the Latin form of decei, as in decemviri (Latin, decem, ten, and vir, a man), the decemvirs.

"By this time were the ambassadors returned with the Athenian laws, and therefore the tribunes (at Rome) were so much the more earnest and urgent that once at length they would set on to describe and put down some laws. And agreed it was that there should be created decemvirs above all appeals."—Holland, "Epist."

Demii, of Latin origin, in the forms demi, semi, hemi, a half, is found in damny, in semibrevere, and in hemisphere.

"Thou wouldst make an absolute courtier, and the firm fixture of thy foot would give an excellent motion to thy gait, in a semi-circled farthingale."—Shakespeare, "Merry Wives of Windsor.

A farthingale is a hooped petticoat or gown.

Día, of Greek origin, through (as to divide), is found in diameter, a measure through, from one side of the circle to the opposite; in diagonal (from the Greek δια, pronounced dy’-a, through, and γων, pronounced goyn’-er, a corner or angle), a line drawn from corner to corner; in dialogue (from día and logos, Greek, a discourse), etc.

Var. How doest, fool?

Ape. Dost dialogue with thy shadow?

Var. I speak not to thee.—Shakespeare, "Timon.

Día is abbreviated into dí, as in dichotomy (from the Greek δια, through, and τύπω, pronounced tom’-no, I cut), a twofold division, or class.

"All things reported are reducible to this dichotomy: 1. the fountain of invention; 2. the channel of relation."—Fuller, "Worthies.

Dis, or dis in another form, may be rendered by the phrase, in two directions, or in different ways, as in distract (from dis and traho, I draw); to distract is to drag a person’s mind in two or more directions so as to produce confusion and pain. Dis is found in those forms, namely, did, dif, div.

Dí, dif, etc., as in diverse (from di and versus, turned), turned in opposite directions, different, opposed—

"And for there is so great diversita
In English, and in writing of our tongue,
So pray I God that none miswrite these.
Ne miss the metre for deceit of song.

Chaucer. "Troilus.

Dif, as in difficult, where the dif (dis) has a reversing force; difficult comes from dis and facilius; facilius is the Latin for easy, the a being changed into i, as is customary in compounds of facio; so that difficult is equivalent to our uneasy; that is, not easy.

Dir (of Latin origin), as in dirges, a sacred song, so called from the beginning of the Psalm, "Dirige nos, Domine" (Direct us, O Lord), and accustomed to be sung at funerals.

“The raven croaked, and hollow shrieks of owls,
Sung dirges at her funeral.”—Ford, "Lover’s Melancholy.

Down, of Saxon origin, is the expression of descent; hence motion from a higher to a lower level; and hence, perhaps, the application to "the downs," that is, hillocks viewed in relation to their declivities. Down was formerly used as a verb.

"The hidden beauties seemed in wait to lie,
To down proud hearts that would not willing die.

Sir P. Sidney, "Arcadia."
LESONS IN PENMANSHIP. — XV.

The last of the four letters that may be considered as being modifications of the letter `o` is the letter `s`, examples of which are given in Copy-slip Nos. 50 and 51. That its form is based in a great measure on the letter `o`, may be seen by drawing a fine line through the middle of this letter diagonally from right to left, from the point in which a line drawn in the direction of the slope of the letter (as in our early copy-slips), and touching its right side, would cut the line a a, to the point in which a line, also drawn in the direction of the slope of the letter, and touching its left side, would cut the line b b. The letter `s` is formed in the following manner: — First, a hair-stroke is carried upwards diagonally from left to right, a little above the line a a; the pen is then brought downwards, and a curved down-stroke is made, which is turned upwards to the left when it has reached the line b b, and terminated in a dot made about midway between the lines b b, c c on the diagonal hair-line with which the letter was commenced. The letter `s` is connected with any letter that follows it by a hair-stroke carried to the right from the middle of the curved down-stroke on the right of the letter, as may be seen in Copy-slip No. 51. When `s` is preceded by any letter which terminates in a bottom-turn, the hair-line of the bottom-turn is carried into the diagonal up-stroke with which the letter is commenced; but when the letter that precedes it does not end in a bottom-turn, as b, f, o, r, v, and w, the connecting hair-stroke is carried into the direction of the diagonal up-stroke midway between the lines a a, c c, the lower part of the diagonal up-stroke being of necessity omitted, and the letter is finished in the usual manner, as will be seen in Copy-slip No. 59. When double `s` occurs in any word, the first `s` is sometimes made by a hair-line looped above the line a a, like the of the letter `f`, turned at the top to the left, and conveys gradually into a thick down-stroke, which is brought down

Dum, in Saxon, signifies an elevation, a hill, and even a mountain; it may be the origin of our land as in Broughton, a fortified height. Downs may be hence derived. In "Webster's Dictionary" Dowses are defined as 'ridges of high land, such as lie along the coasts of Essex and Sussex, in England; hence roads in which ships lie off these hilly coasts at anchor.' What is called "Salisbury Plain" is, in the parts near the city, a chalky down, famous for feeding sheep.

The student will do well to continue his study of the Saxon elements of our language. For this purpose I recommend to him the poetry of Wordsworth, the simpler portions of which are pre-eminently Saxon. In order that he may have a specimen under his eyes, the opening stanzas of "Lucy Gray," by Wordsworth, are given in the following

EXERCISE.

1. Parse the following stanzas:

   Oft had I heard of Lucy Gray:
   And, when I crossed the wild,
   I chanced to see at break of day
   The solitary child.

   No mate, no comrade, Lucy knew;
   She dwelt on a wide moor,
   The sweet face of Lucy Gray
   Will never more be seen.

2. Form sentences having in them the following words:

   Compound, simple, primitive, derivative, substitution, suffix, prefix, distinction, ahead, amain, affection, allow, attract, ambiguity, anarchy, antichrist, autocracy, academician, conversion, collision, contravening, dialogue, distinction.

3. Write a theme on each of the following subjects:

of these the two latter are of Greek origin. The former is Latin. As the word is thus made up of terms from two languages, it is a sort of hybrid. No. 2 signifies with; No. 3 signifies to take; the τ is merely the termination. If you put 2 and 3 together you have syllab, which with the termination ble makes syllable. A syllable, then, is so much of sound as may be taken or uttered at once. No. 1 means equal (part found in the English par and pair); par syllabic, then, signifies that which is equal in its syllables; and nouns are called parsyllabic which have the same number of syllables in all the cases of the singular number. I may of the singular number, because the plural of all nouns is not parsyllabic, inasmuch as the genitive plural, as in the cases of arum and orum, has a syllable more than the other cases. Now nouns which have in the genitive singular a syllable more than they have in the nominative singular are called impar syllabic. In this word, as here given, you find an additional syllable, namely, τοι from τοιν, the n becoming m, before the p—which signifies not. Impar syllabic, then, is not par syllabic; and the words denote those nouns which in the genitive singular have not the same number of syllables as they have in the nominative. Pisces, a fish, is par syllabic; for in the genitive it is pisces, having two syllables as in the nominative. But cantor, a singer, is impar syllabic, for in the genitive it is cantoris, having three syllables, whereas the nominative has but two. Here then we have one distinction—namely, nouns of the third declension are either par syllabic or impar syllabic.

Now, inquiry has shown that par syllabic nouns have a vowel stem, and impar syllabic nouns a consonant stem; that is, that the stem of the former ends in a vowel, and the stem of the latter ends in a consonant. Of the stem of a noun and a verb I have already said something. It is better to repeat than not to be understood. Take nubes, a cloud, and form the genitive; the genitive is nubis. You get the stem by cutting off the sign of the genitive, which in this case is s (as in the English cloud, cloud’s). You thus obtain nubi. Nubi has two syllables, the same as the nominative nubes. It is therefore par syllabic, and ends in a vowel. Take also dolor, grief; genitive, doloris. Cut off is, the sign of the genitive, and you obtain dolor. Dolor ends, you see, in a consonant, and is a consonantal stem. The word is also impar syllabic, because it increases in the genitive singular. Impar syllabic nouns, then, have consonantal stems. In this case the stem and the nominative are the same, both being dolor. But in nomen, a name, genitive nominis, stem nomin, the nominative and the stem are alike. Of consonantal stems, then, there are two classes: first, those of which the stem is identical with the nominative; second, those in which it is different. The consonants in which the stem terminates are:

- c.
- g.
- t.
- d.
- p.
- b.
- m.
- n.
- r.
- a.
- liquida, the liquid.
- altitud.

From these stems the nominative is formed with or without the addition of s. An instance of the formation of the nominative with the addition of s, is found in nomin. rex, a king, gen. regis, stem reg; add s and you have regis, which is pronounced res. An instance of the formation of the nominative without the addition of s you find in nomin. leo, a lion, gen. leonis, stem, leu, shortened into leo.

**LESSONS IN LATIN.—VIII.**

**THE THIRD DECLENSION.**

We pass on to the third declension. In the third declension we find, in the nominative case, so great a variety of terminations, that we must endeavour to arrange the nouns in certain classes. The genitive singular, however, is the characteristic case, and it ends in s.

Before classifying these nouns, I must give you some explanations. Par syllabic is a word I have to use. It consists of three words, which I will mark thus:

1. pari syllabl (is);
2. 3.

The genders of the nouns of the third declension may be stated thus, though the rules are not without exceptions:

First, nouns ending in o, or, or, and imperasylabic in es, are masculine; second, nouns ending in iste, in is, uter, and us (gen. uter et us), and o, which ends in a s blended with the preceding consonant, as well as parsyllabic in es, are feminine; third, nouns ending in a, e, e, i, en, or, ur, ur, and us (gen. obtas, eias, stris), are neuter. By practice you will in time become familiar with these somewhat complex facts.

I proceed to set down specimens in classes.

**CLASS I.**

**NOUNS WITH CONSONANTAL STEMS: IMPAR SYLLABIC.**

1.—Without the termination s.

(i.) The stem and the nominative are the same; stems end in r and l.

Thus: nom. dolor; gen. doloris; stem. dolor.

**EXAMPLES.**

**MASCULINES.**

<table>
<thead>
<tr>
<th>Case</th>
<th>Singular.</th>
<th>Plural.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>noster, a goose</td>
<td>nostros, a goose</td>
</tr>
<tr>
<td>D.</td>
<td>dotor, to grief</td>
<td>dotri, to a goose</td>
</tr>
<tr>
<td>Ac.</td>
<td>dotus, a goose</td>
<td>dotus, a goose</td>
</tr>
<tr>
<td>V.</td>
<td>dotus, O grief!</td>
<td>dotus, O goose!</td>
</tr>
<tr>
<td>Ab.</td>
<td>dotarius, by griefs</td>
<td>dotarius, by goose</td>
</tr>
</tbody>
</table>

**NEUTERs.**

<table>
<thead>
<tr>
<th>Case</th>
<th>Singular.</th>
<th>Plural.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>guttur, a throat</td>
<td>calcar, a spur</td>
</tr>
<tr>
<td>D.</td>
<td>guttur, to a throat</td>
<td>calcar, to a spur</td>
</tr>
<tr>
<td>Ac.</td>
<td>guttur, a throat</td>
<td>calcar, a spur</td>
</tr>
<tr>
<td>V.</td>
<td>guttur, O throat</td>
<td>calcar, O spur</td>
</tr>
<tr>
<td>Ab.</td>
<td>gutturatorius, by throats</td>
<td>calcaritus, by spurs</td>
</tr>
</tbody>
</table>

**VOCABULARY.**

- Agger, aggeris, m., a mound or dam.
- Fulgur, fulguris, n., lightning.
- Illi, to him.
- Illis, to them.
- Dilectis, 3. I love, Mater, materis, f., a mother.
- Error, erroris, m., error.
- Nobis, to us.
- Frater, fratis, m., a brother.
- Odor, odoris, m., smell.
- Tibi, to thee.
- Vectigal, vectigalis, n., a tax.
- Vobis, to you.

One.—Est mithi, I have had with the noun as nom. to est, thus: est mithi, I have a throat; so in the plural, guttura sunt nobis (throats are to us), we have throats. In the same way,
LESSONS IN DRAWING.

Exercise 25.—Latin-English.

Exercise 26.—English-Latin.
1. I have a spur. 2. Hast thou a goose? 3. They have geese. 4. Have you a wound? 5. The colour of the lightning is on the cushion. 6. I do not like taxes. 7. Rumours are troublesome. 8. Have they a complete library? 9. Have not you a brother, a sister, and a mother? 10. They have griefs. 11. Thou hast a great cushion.

(ii.) The stem and the nominative are different; stem in hand r.

Masculine and Feminae.

Cases.

Singular.

N. leo, a lion.
N. leonis, of a lion.
D. leoni, to a lion.
Ac. leonem, a lion.
V. leo, O lion! Ab. leone, by a lion.

Plural.

N. leones, lions.
G. leonum, of lions.
D. leonis, to lions.
Ac. leones, lions.
V. leones, O lions! Ab. leonibus, by lions.

N. corpus, a body.
G. corporis, of a body.
D. corpori, to a body.
Ac. corpus, a body.
V. corpus, O body! Ab. corpore, by a body.

Cases.

N. corporis, bodies.
G. corporum, of bodies.
D. corporum, to bodies.
Ac. corporibus, to bodies.
V. corporibus, O bodies!
Ab. corporibus, by bodies.

In two of the words declined above, corpus, corporis, corpor, and genus, generis, gener, the stems—namely, corpor and gener—remain to end in r. The r, however, is only the representative of words belonging to masculine and feminine stems, and the words are declined according to the laws of pronunciation passed into r. Thus, instead of corpus, corporis, we have corpore, the s being changed into r and the u into o. Similar changes take place in tellus (tellius) tellus, the earth; pulvis, pulviris, dust; mas, maris, a male; ves, vesis, brass; filis, filoris, a flower.

Vocabulary.

Littus, littorum, a shore.
Lumen, luminis, n., light.
Occasio, occasiunis, f., an opportunity.
Opus, operis, n., work.
Ordine, ordinis, m., order.
Comparum, comparum, of comparison.
Decus, decoris, m., becomingness.

Exercise 27.—Latin-English.

Exercise 28.—English-Latin.
1. Doth thou fear charcoal? 2. Why does the mother strike the boy? 3. They have no bagues. 4. Thou hast a wound. 5. Thy fathers have wounds. 6. Woman's frighten mothers. 7. Peace flourish in the region. 8. Thou hast a great name. 9. I have not a pledge. 10. They have an opportunity. 11. The man's opportunity is great.

Key to Exercises in Lessons in Latin.—VII.

Exercise 21.—Latin-English.
1. Good men love good boys. 2. Good boys are loved by good men. 3. A good boy loves school. 4. The good masters of good boys are loved. 5. Hast thou a master good? 6. The war is deadly. 7. I have a good female friend. 8. The boys are in school. 9. Are not the boys in school? 10. Many foreigners sail into Britain. 11. The boar of my friend is great. 12. There is play on the river's bank. 13. Scholars love (like) letters. 14. There are frogs on the banks. 15. The goat is great. 16. There are deadly wars in they inland.

Exercise 22.—English-Latin.

Exercise 23.—Latin-English.
1. The horse neighs. 2. The horse's mane is beautiful. 3. The files are troublesome. 4. Are the files troublesome? 5. Good scholars are not troublesome. 6. Long wars are troublesome. 7. Horses run quickly. 8. A man gallops the horses. 9. A horse is guided by a man. 10. I am delighted by a beautiful horse. 11. The fields are fruitful. 12. The herbs of the fields are various. 13. The husbandman commits to the fields grains of corn. 14. The husbandman tills the fields. 15. How beautifully the fields flourish. 16. Various herbs flourish in the fields.

Exercise 24.—English-Latin.
lines express an idea with great force and power, but for a learner to begin the art by sketching is altogether a mistake. We once heard an eminent landscape painter say that "sketching is the ruin of hundreds of young artists; it is beginning at the wrong end; let them draw well first and secure the power, then afterwards they may sketch." Sketches are clever and valuable only when they are done by men who can really draw well; the unfortunate result of the habit of sketching by an inexperienced hand may be compared to that of the very objectionable system which compels schoolboys to write out pages of Latin or English for punishment. There are many who acknowledge in after years that their handwriting was spoiled by these "tasks" or "impositions," and who were never able afterwards, with all their efforts, to write well. Let the pupil therefore give up all idea of sketching, and seek to draw well, if he at all hopes to make the art useful for practical purposes, or to secure in its practice a pleasurable resource in leisure hours.

There is much to be said upon the advantage to be gained by a knowledge of geometrical drawing, a branch which depends for its accuracy upon the use of compasses, scales, and rulers. We have already explained a method of drawing curves by hand, that is, by previously placing points in the course of the intended curve, and then drawing the line through these points. There are innumerable instances of curves which may be better drawn without the aid of instruments than with them. Leaves and flowers, for instance, afford an inexhaustible supply of curvilinear lines, to copy which we usually depend entirely on the eye and the hand; while there are curves which frequently come under our notice, to draw which we shall be materially assisted by principles borrowed from geometry. But though we cannot employ compasses to draw the forms of flowers and leaves, yet by the practice of geometry we easily associate lines, angles, and centres with curves, although they are not visible upon the object. Instruments are usually depended upon for drawing architectural curves, mouldings, and the like, because they must be constructed according to received proportions. We propose now to place before our readers some examples of architectural curves, with the rules for constructing them; our reason for doing so being simply to show the pupil a way of making his eye familiar with the construction of curves on geometrical prin-

![Fig. 62.](image)

![Fig. 61.](image)

![Fig. 53.](image)

![Fig. 63.](image)

![Fig. 53.](image)

![Fig. 60.](image)

From long experience we have found it to be the case that they always make the best and quickest draughtsmen, and do their work with the least labour, who have dipped deeply into geometrical drawing and lineal perspective. In their practice they have acquired a habit of precision, and have learnt the means to arrive at it readily, and have become fully impressed with its importance; they know the reasons why in such and such directions lines must be drawn; the mind and the eye have acquired a keener perception of the principles of proportion; a feeling for arrangement has grown from the use of instruments in geometrical exercises, and then in the end the hand readily takes up the practice.

The curve called the Scotia (Fig. 58).—Let \( a b \) and \( c d \) be the two lines between which the curve is to be formed. Draw \( b d \) perpendicular to \( c d \), and divide it into three equal parts; through \( e \) draw the line \( g f \) parallel to \( a b \); from \( e \), with the radius \( e b \), draw the arc \( e y \), and at the same time mark the
point \( f \); from \( f \), with the radius \( f y \), draw the arc \( gi \); \( bg \) will be the curve required.

The curve called the Cyma Recta (Fig. 59).—Let the curve be formed between the lines \( a b \) and \( c d \); draw the line \( b d \), and divide it into five equal parts; make the second division from \( b \), vix., \( e \); upon \( b e \) describe the equilateral triangle \( b e \), and upon \( e d \) describe the equilateral triangle \( e g f \); from \( f \), with the radius \( f h \), draw the arc \( h e \), and from \( g \), with the radius \( g e \), draw the arc \( e d \); \( b e d \) will be the curve required.

The pupil can draw an equilateral triangle upon a given line by the following method. Let \( a b \) (Fig. 60) be the line upon which the triangle is to be described; from \( a \) and \( b \) as centers, with the radius \( a b \), describe two arcs intersecting each other in the point \( c \); join \( c a \) and \( c b \); the triangle \( a b c \) is an equilateral triangle. (See Lessons in Geometry, VII., page 260.)

The curve called the Ogee (Fig. 61).—Let it be drawn between the lines \( a b \) and \( e d \); draw \( d e \), perpendicular to \( e d \), and divide it into four equal parts; through the first from \( e \)—namely, \( h \)—draw the line \( h i \); parallel to \( a b \), make \( h i \) equal to \( h e \); draw the line \( k l \) parallel to \( e d \), and from \( i \), with the radius \( i k \), draw the semicircle \( k g l \); join \( i d \), and upon it draw the equilateral triangle \( i m d \); from \( m s \) as center, with the distance \( m d \) or \( m l \) as radius, draw the arc \( d n l \); the line \( d n l \) \( g k \) will be the curve required.

By recommending the practice of geometrical drawing, we only wish to direct the pupil where to find further assistance in free-hand drawing; we will now show, by a few examples, how these principles may be applied. An oval or egg-shaped figure (Fig. 62) would be very difficult to draw, if the boundary line only were to be attempted without some assistance from geometry; there would be a great deal of rubbing out and alteration before it was finished. Let the pupil try the figure in the following manner: first by the help of compasses, then by hand only. Draw the straight line \( a b \), and divide it into two equal parts in the point \( d \). Through \( d \) draw \( c d \) at right angles to \( a b \), and make \( d c \) equal to \( a d \) or \( d b \). Construct upon \( a b \) the equilateral triangle \( a e b \), and take the point \( g \) at one-third of the distance from \( e \) to \( b \), and determine the point \( f \) in the same way. Then from the points \( f, g, \) draw the lines \( f i, gh \), perpendicular to \( a e \) and \( e b \) respectively, and make each of them equal to one-half of \( c f \) or \( e g \). After this arrangement has been made, draw the semicircle \( a c b \) and the arcs \( b e \) and \( e c \) through \( h \) and \( i \). It will be necessary to repeat it a few times, when the pupil will begin to see the advantage and useful drawings. We will give him another example (Fig. 64), for which he must arrange the scaffolding himself, with one exception, because it includes a principle which we will merely allude to now, as we shall have better and more frequent opportunities by and by to enlarge upon it. The exceptional assistance we offer in this case, is that of the dotted line which runs through the centre of the handle of the trowel, and passes in a direct course to the point of the blade. We may here observe that an implement of this kind, to be really useful, ought to be so constructed; and if we look at it with an artistic eye, the composition of lines which make up this very simple subject, must strike any one as being more symmetrical than if the handle and the blade had been united at any other angle. This remark upon so insignificant an object as a garden trowel may appear trivial, but it is the principle we contend for, and which is, in reality, of the greatest importance. It is true we might have selected a more noble object, but it would not have better illustrated our meaning, or have made it more evident, and at the same time have provided the pupil with an example for his practice more suited to the experience he has at present attained as a draughtsman. Nature teaches us this lesson, and it is evident everywhere that harmony of line and proportion always accompany the greatest utility and strength.
LESSONS IN ARITHMETIC.—XV.

DECIMALS (continued).

10. Division of Decimals.

Case 1.—Divide 120·3033 by 3·27.

\[ \frac{120\cdot3033}{3\cdot27} = \frac{1203033}{327} = \frac{1203033 \times 1000}{327 \times 1000} = \frac{3679000}{327} \]

3679 is the quotient arising from dividing the dividend by the divisor as if they were whole numbers, and the denominator 100 shows that there must be two decimal places in the quotient. These two decimal places arise, as will be seen by the fraction \( \frac{100}{100} \), from the fact of there being two decimal places more in the dividend than in the divisor.

Case 2.—If the number of decimal places in the divisor and dividend were the same, the result would be exactly the same as if the divisor and dividend were whole numbers. Thus,

\[ \frac{1203033}{327} = \frac{1203033}{327} \times \frac{1000}{1000} = \frac{1203033}{327} \times \frac{1000}{1000} = 3679000 \]

Case 3.—Suppose that there are more decimal places in the divisor than in the dividend.

Take, for example, \( \frac{1203033}{327} \).

The true quotient in this example is an integer, but it will not be so in all cases.

It will be better in practice, before commencing the operation, to annex ciphers to the dividend sufficient to make the number of decimal places equal to the number in the divisor, in which case the result will be exactly the same as if the division had been in whole numbers.

Additional Example of Case 2.—Divide 411·95 by 1·25.

\[ 411.95 \div 1.25 = 329.56 \]

Dividing as in whole numbers, we get a quotient 329, and a remainder 70. Now annex ciphers to the dividend, which will not alter its value, and continue the division. We now find that the true quotient is 329.56.

Additional Example of Case 3.—To divide 356·7 by 2·31. Annexing a cipher to 356·7 before commencing the operation, we have—

\[ 356.7 \div 2.31 = 154.02 \]

The part of the true quotient already obtained is an integer, the division being in fact the same as that of \( 356 \). If more ciphers be annexed to the dividend, we shall get decimal places in the quotient, and the more we obtain the nearer to the true quotient shall we arrive.

11. These examples will sufficiently illustrate and explain the following:

Rule for the Division of Decimals.

Divide as if the divisor and dividend were whole numbers.

If the number of decimal places in the dividend exceed the number in the divisor, cut off from the quotient as many decimal places as are equal to number this excess, prefixing ciphers if necessary.

If the number of decimal places in the dividend and divisor be equal, the division will be the same as in whole numbers.

If the number of decimal places in the divisor be less than the number in the divisor, annex as many ciphers to the dividend as will make the number equal to the number in the divisor, and then proceed as in whole numbers.

12. We subjoin other examples of division of decimals.

Example.—Divide 1 by 10·473, carrying the quotient to 5 places of decimals.

We are at liberty to write 1 thus—\( 100000 \), putting as many ciphers after the decimal point as may be required. Since there are to be 5 decimal places in the quotient, and since there are 3 in the divisor, we must add 3 ciphers.

\[ 10.473 \div 1.00000 = 9548.9205 \]

Hence the required answer is 9548, prefixing a cipher in order to get 5 decimal places in the quotient.

13. Example.—Divide 3 by 0·00002.

Annexing 4 ciphers to 3, since there are 5 decimal places in the divisor, we have—

\[ 30000 \div 2 = 15000 \]

the division by the rule being, in fact, the same as that of \( 30000 \div 2 \).

14. It will be observed that we are not required in some cases to find more than a certain number of figures of the quotient when it is a decimal. Sometimes, however, we shall find that there is no remainder,—i.e., that the quotient can exactly be found in the form of a decimal. But if by continually dividing we cannot arrive at a stage where there is a remainder, then we can only get what is termed an approximation to the result. The more figures of the quotient we take, the nearer we shall be to the value of the true quotient.

Thus, in the division above performed in Art. 12, if we stopped at four decimal places in the quotient, the result would be 9548. Carrying on the operation one step further, we see that 8 is the next figure of the quotient, and therefore—this 8 meaning \( 0_{0000} \)—we are nearer to the true quotient by \( 0_{0000} \). Where we are required to find a quotient to a given number of places, it is customary to carry on the division to one place more than is actually required, in order to see whether the next figure is greater or less than 5. If it is greater than 5, then we shall be nearer to the true result if we increase the last figure of the required number of places by unity.

Thus, in the case above given, finding that the fifth decimal place is 8, the quotient to four decimal places will be more accurately written 9548 than 9548, because 9548—or, what is the same thing, 0000— is nearer to 0000 than 9548 is. Now 9548 is \( 0_{0000} \) more than 9548; whereas 9548 is \( 0_{0000} \) less than 9548.

The same method is applied whenever a limited number of decimals is employed. We shall return to this subject hereafter.

EXERCISE 33.

1. Find the quotients of the following examples in division of decimals:

<table>
<thead>
<tr>
<th>Example</th>
<th>Quotient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 5·94 + 4</td>
<td>10. 4·3567 + 0·001</td>
</tr>
<tr>
<td>2. 54 + 3</td>
<td>11. 10532 + 0·002</td>
</tr>
<tr>
<td>3. 54 + 0·94</td>
<td>12. 80005 + 0</td>
</tr>
<tr>
<td>4. 46·94 + 2</td>
<td>13. 4 + 0·0001</td>
</tr>
<tr>
<td>5. 1·638 + 25</td>
<td>14. 0 + 0·000001</td>
</tr>
<tr>
<td>6. 4·0035 + 6·31</td>
<td>15. 0 + 0·000002</td>
</tr>
<tr>
<td>7. 3900 + 0·01</td>
<td>16. 72323 + 0·06</td>
</tr>
<tr>
<td>8. 32004 + 1·75</td>
<td>17. 72323 + 0·06</td>
</tr>
<tr>
<td>9. 60·0001 + 101</td>
<td>18. 00000 + 0·003</td>
</tr>
<tr>
<td>10. 62323 + 9·62</td>
<td>19. 2358674 + 0·005</td>
</tr>
</tbody>
</table>
LESSONS IN FRENCH.—XXV.

SECTION XXV.—IDIOMATIC USES OF VERBS, ETC.

1. The verb aller is used, in French, in the same manner as the verb to go, in English, to indicate a proximate future.

Allez-vous écrire ce matin? Are you going to write this morning?
J'vais écrire mes lettres. I am going to write my letters.

2. The verb venir is used idiomatically, in French, to indicate a past just elapsed. It requires, in this signification, the preposition de before another verb.

J'ai venu d'écrire mes lettres. I just wrote my letters.
Nous venons de recevoir des lettres. We just received letters.

3. Aller trouver, venir trouver, are used in the sense of to go to, to come to, in connection with nouns or pronouns representing persons.

Aller trouver le fermier. Go to the farmer.
J'ai envie d'aller le trouver. I have a desire to go to him.

4. Aller chercher means to go for, to go and fetch.

Aller chercher le médecin. Go and fetch the physician.
Je vais chercher du sucre et du café. I am going for sugar and coffee.

5. Envoyer chercher means to send for, to send and fetch.

Envoyer chercher le marchand. Send for the merchant.
J'envoie chercher des légumes. I send for vegetables.

6. The first and second persons of the plural of the imperative are, with few exceptions, the same as the corresponding persons of the present of the indicative. The pronouns nous, vous, are not used with the imperative.

7. PLURAL OF THE IMPERATIVE OF ALLER, ENVOYER, AND VENIR.

Allons, let us go. Envoyons, let us send. Vénons, let us come.

8. Tous, m., toutes, f., followed by the article les and a plural noun, are used in French in the same sense as the word every in English.

Votre frère vient tous les jours. Your brother comes every day.
Vous allez à l'école tous les matins. You go to school every morning.

9. Tant, m., toute, f., followed by the pronoun le or la and the noun in the singular, are used for the English expression the whole, coming before a noun.

Il reste ici toute la journée. He remains here the whole day.

10. A day of the week or of the month, pointed out as the time of an appointment or of an occurrence, is not preceded by a preposition in French.

Venez Lundi ou Mardi. Come on Monday or Tuesday.
Venez le lundi ou le samedi. Come on the fifteenth or sixteenth of April.
LESSONS IN GEOGRAPHY.—VIII. DISCOVERIES OF THE NINETEENTH CENTURY.

Sir John Ross, who sailed in the Victory in 1829, on an expedition to the north, again explored Baffin Bay, Lancaster Sound, and Prince Regent Inlet; discovered land which he called Boothia Felix, from the name of his patron; and explored the coasts of this new country, until he was so hemmed in by the ice-blocks that he could neither advance nor return. This expedition accordingly remained in this condition during the space of four years, the longest period on record of the detention of navigators in the northern regions. While thus detained the members employed their time in making excursions which enlarged our geographical and meteorological knowledge, and added to philosophy the fine discovery of the north magnetic pole, one of the most interesting results of this celebrated botanist; Boothia Felix, the expedition discovered King William Land, and to the north-west coast called after the same sovereign. As to the north-west passage, he found that this did not exist in Prince Regent Inlet, nor to the south of latitude 70° N.; but Sir John Ross failed in discovering a free passage in the frozen seas of America, by which he could find his way to Behring Strait; in fact, the peninsula which separates Prince Regent Inlet from this northern sea, at the place where the eastern and northern seas join, is not only very narrow, but is chiefly covered with lakes which reduce the isthmus between the two seas to a breadth of three miles.

Other expeditions, no less dangerous, and equally difficult, if not more so, had been undertaken by land, with a view of exploring the northern regions of America, and the coast of the Polar Sea. In order to supply the blank on this important subject so eagerly sought for during so many ages, Samuel Hearne, employed by the Hudson Bay Company, in 1771 commenced his expedition at Prince of Wales Fort, and discovered the Coppermine River, which he traced to its embouchure in the Polar Sea. Franklin, in 1820-21, made an expedition by land along the same coast, between the Coppermine River and Cape Smith, and completed his journey by traversing the difficult and not very formidable, was highly useful in a geographical point of view. Two years afterwards the same officer undertook another expedition to the north, and explored the country between the Mackenzie River and Cape Back; at the same time Dr. Richardson, one of the party, explored that part between the Mackenzie River and the Coppermine River. The part of the coast from Cape Smith explored by Franklin and Captain Franklin’s discoveries, extending to 150 miles, was nearly completed in this respect by Captain Back, and after him by Mosser, Dease and Simpson, so that the northern shores of North America are now geographically known almost throughout their whole extent.

Our geographical knowledge of the interior of the continent of North America was greatly increased by some of the important expeditions. Lewis and Clarke travelled to the sources of the Missouri among the Rocky Mountains, and reached the Pacific Ocean by descending along the course of the Columbia River. Pike, in exploring the sources of the Mississippi, discovered those of the Arkansas and the Red River. Major Long, James Peak, Mosses, Cass and Schoolcraft, travelled over this vast region, so remarkably studded with lakes and rivers, and belonging partly to Britain and partly to the United States. Mackenzie, in 1789, went from Montreal, and travelling to the north-west, descended along the course of the river which bears his name, and found that its source was in the Slave Lake, and its termination in the Arctic Ocean; he then crossed the chain of the Rocky Mountains, and reached the Pacific. In South America, Baron von Humboldt began his explorations, and accompanied by Alexander von Humboldt, visited the republics of Venezuela and Ecuador, and the Granadn Confederation, studying during his travels all the phenomena of nature, tracing the geography of the country, measuring the heights of the Andes, examining the craters of volcanoes, delineating on maps the courses of rivers, and, in short, exploring the greater part of this magnificent country. On the river Amazons, he made observations equally curious and important. He proceeded from Peru to Mexico, and made similar observations in the latter country; and he has described his scientific discoveries in these regions in a style both effective
and interesting; so that in no portion of the globe have greater advances been made in the knowledge of physics and geography, and of all the sciences connected with them. Botanical geography may, in fact, be said to have originated with Baron von Humboldt. If to this we add that the author of the "Tableaux de la Nature" studied the countries in which he travelled both in an economical and political point of view, his merit as a scientific traveller stands unrivalled.

The travels of La Condamine in Peru and on the river Amazon; of Smith and Maw, on the same river; of Messrs. Spix, Martins, and Auguste St. Hilaire, in Brazil; of Don Felix Azara, in Paraguay; of Captains King and Fitzroy, in Patagonia and Tierra del Fuego; of M. Stephenson, in Chili and Peru; of M. Gay, in Chili; and of M. Schomberg, in Guiana, have all contributed to the perfection of our knowledge of the geography, the productions, the geology, and the population of South America. Among these later travellers must be mentioned M. A. d'Orbigny, a learned French geologist, who, in 1826, after a sojourn of seven months at Buenos Ayres, ascended the Parana stone, some of which weigh eighty tons. The great gates are each composed of one single mass; and there are colossal images rudely sculptured, showing that at a very early period there must have been some communication between the Old World and the New. The traveller above mentioned then visited in succession the cities of Cochabamb a and of Santa Cruz de la Sierra; courageously penetrated into the province of the Chiquitos, which he surveyed in every direction to the river Paraguay and the Brazilian province of Matto-Grosso; noted the manners of the Guarayos, a tribe still entirely savage; traversed the province of the Moxos, to the north-east of Upper Peru; passed some time in the forests inhabited by the Yuracares Indians; discovered the points of discharge of the Rio Beni and Rio Mamoré, tributaries to the Amazon; visited Potosí, the city of inexhaustible mines; and finally sailed for France from the coast of Peru. This remarkable expedition lasted for the space of eight years, and produced valuable results for the geographer, the natural historian, and the geologist.

OAHAEITE OR TAHITI, THE "GEM OF THE PACIFIC."

as far as 1,000 miles from its month, travelled over the province of Corrientes, and other parts of the Argentine Confederation, visited the bords of savages which people the Grand-Chaco, and returned to a civilised territory, passing through the provinces of Entre-Ríos and Santa-Fe. He then travelled into Patagonia, ascended the Rio Negro, and sojourned eight months in that country amongst the stalwart savages, whose Herculean forms and size had been described with so much exaggeration by Pigaletta, Drake, Sarmiento, Lemaire, Byron, Bougainville, and many other navigators. This intrepid naturalist then proceeded to Chili, having doubled Cape Horn and reached Bolivia, sometimes called Upper Peru, of which he explored the western region, rendered so remarkable by the labours of the ancient Quichuas. He ascended the summits of the Andes, and on his reaching the opposite sides of these amazing heights, beheld a magnificent panorama of snowy peaks, and of immense chains of mountains. He at last reached the vast table-land on which is situated the great Lake of Titicaca, 150 miles long, rendered so famous by the Temple of the Sun, built by the Incas, on an island in its centre. At the village of Tiahuanaco, near the banks of this lake, are also to be seen the remains of the stupendous palace erected by the ancient Peruvians. The interior courts, 300 feet square, are built of enormous blocks of

From the extremity of South America let us pass on to the regions which surround the Antarctic pole. There we see navigators of all nations braving the storms and the icebergs of those seas which are covered with everlasting mists, in order to enrich geography with important observations and discoveries. After the immortal name of Cook, came those of William Smith (1816), of Lieutenant Barnafeld, of the Russian officers Bellinghausen and Lazareff (1819), of Biwell (1820), of Wedell and Palmer (1822), of Biscoe (1830), and of Balleny (1839). It is to these navigators, some commissioned by the government of the nations to which they belonged, and others who were simply whalers or seal-catchers, that we owe the successive discoveries of New South Shetland, the South Orkneys, Palmer Land, Trinity Land, the islands of Peter and Alexander, Enderby Land, Adelé Land, Graham Land, and the islands of Biscoe and Balleny. Three voyages in the southern circumpolar seas—those of Dumont d'Urville, of Captain James Clarke Ross, and of the American Commodore Wilkes—deserve particular notice. The French expedition, under the command of Captain Dumont d'Urville, after a careful exploration of the Strait of Magellan, proceeded in 1838 towards the icy regions, and was stopped by an iceberg in latitude 64° S. The two vessels endeavoured to overcome the obstacles which opposed their progress, but they
were blockaded by the ice during five successive days, and only secured their safety by a small change of the wind to the south. The efforts of the crew, who cleared their way through the immense blocks of ice with which they were surrounded.

Sailing in a different direction, they discovered Louis Philippe Land; and returning northward, Captain D’Urville visited, agreeably to his instructions, the island of Juan Fernandez, the Marquesas Islands, Otaheite or Tahiti—which has gained the name of the “Gen of the Pacific” from its beauty of scenery—Samos, Yap, Hao, and the Fijee Islands. He then touched at Banks Island, the Vanikoro, Solomon, and Caroline Islands, and others, and arrived at the hospitable port of Guam. He then sailed through the great Asiatic Archipelago, and explored the banks of New Guinea, Australia, and the isles of Santa; he made the tour of Borneo, and stayed a short time at Hobart Town, in Tasmania. In January, 1840, the vessels of the same expedition, L’Astrolabe and La Zélée, sailed again towards the icy regions of the south, and swept over the immense space from 120° to 170° E., which had not hitherto been fully explored by navigators. Having discovered some land and coasts which they supposed to belong to the yet undiscovered Antarctic continent, they returned to New Zealand, and explored its coasts, and those of the islands of the Louis Archipelago and New Guineas, including the dangerous reefs of Torres Strait.

The object of the expedition under Captain, afterwards Sir James Ross, was to investigate the problem of the Antarctic continent of which D’Urville was considered to have seen the shores. He sailed for this purpose, with the Erebos and Terror under his command, and early in 1840 he discovered land in latitude 58° 30' S., and having discovered a collection of peaked mountains, varying from 9,000 to 12,000 feet in height, covered with snow, and surrounded with immense masses of ice which jutted into the ocean like huge promontories. An island discovered in the vicinity of this land was called Victoria. In latitude 76° 8' S., and longitude 170° 82' E., they discovered another island; and next day they beheld a mountain 13,400 feet high, belching forth, at an immense elevation, the flames and smoke; to this they gave the name of Mount Erebus. Having reached latitude 78° 4' S., the farthest south point yet reached in the Antarctic Ocean, the expedition proceeded on its way in a retrograde direction, coasting, as it were, the land first discovered, it being impossible to get on shore on account of the ice in which it was enveloped. It was thus ascertained that this land extended in latitude from 70° S. to 80° S., and in longitude from 145° to 175° W.

A second voyage of Captain Ross was fruitless, and a third ended in the discovery of a small volcanic island in latitude 64° 12' S., and in longitude 54° 29' W. The expedition of Wilkes, the American navigator already mentioned, was practically useless; as it was proved that his claim to the discovery of the Antarctic continent could not be supported even by the testimony of his own officers. Recent attempts to penetrate into the land around the south pole have proved unsuccessful.

LESSONS IN GERMAN.—XIV.

Vocabulary.

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EXERCISE 39.

1. Ich muss auf die Reise gehen. 
2. Was soll sie Kranken geben? 
3. Was soll ich heut in die Schule kommen? 
4. Was sollen die Schule in die Schule kommen? 
5. Was soll er heute sein? 
6. Was sollen sie geben? 
7. Was sollen die Schule geben? 
8. Was soll ich geben? 
9. Was sollen die Schule geben? 
10. Was sollen die Schule geben? 
11. Was sollen die Schule geben? 
12. Was sollen die Schule geben? 
13. Was sollen die Schule geben? 
14. Was sollen die Schule geben? 
15. Was sollen die Schule geben? 
16. Was sollen die Schule geben? 
17. Was sollen die Schule geben? 
18. Was sollen die Schule geben? 
19. Was sollen die Schule geben? 
20. Was sollen die Schule geben? 
21. Was sollen die Schule geben? 
22. Was sollen die Schule geben? 
23. Was sollen die Schule geben? 
24. Was sollen die Schule geben?

Vocabulary.

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EXERCISE 40.

1. In welchen Jahren? 
2. Ich gebe in meiner Schule. 
3. Mit wem geht dieser Mann? 
4. Er geht mit meinem Bruder nach der Stadt. 
5. Er legt sie raus, um in seinem Leben zu gehen. 
6. Er legt sie raus, um in seinem Leben zu gehen. 
7. Er legt sie raus, um in seinem Leben zu gehen. 
8. Er legt sie raus, um in seinem Leben zu gehen. 
9. Er legt sie raus, um in seinem Leben zu gehen. 
10. Er legt sie raus, um in seinem Leben zu gehen. 
11. Er legt sie raus, um in seinem Leben zu gehen. 
12. Er legt sie raus, um in seinem Leben zu gehen. 
13. Er legt sie raus, um in seinem Leben zu gehen. 
14. Er legt sie raus, um in seinem Leben zu gehen. 
15. Er legt sie raus, um in seinem Leben zu gehen. 
16. Er legt sie raus, um in seinem Leben zu gehen. 
17. Er legt sie raus, um in seinem Leben zu gehen. 
18. Er legt sie raus, um in seinem Leben zu gehen. 
19. Er legt sie raus, um in seinem Leben zu gehen. 
20. Er legt sie raus, um in seinem Leben zu gehen. 
21. Er legt sie raus, um in seinem Leben zu gehen. 
22. Er legt sie raus, um in seinem Leben zu gehen. 
23. Er legt sie raus, um in seinem Leben zu gehen. 
24. Er legt sie raus, um in seinem Leben zu gehen.

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1. If we desire to be happy, we must not deviate from the path of virtue. 2. I know that he is not your friend, but I know likewise [and] that he is a man of probity [Metics]. Let them know that this news is only a rumour [Scrib]. 4. They must not say everything they know. 5. You must be very careful in the choice of your friends. 6. We ought to know to whom we apply. 7. Will you tell the tailor, when he has finished your coat, to call on me? 8. Have you time to go with me to the city? 9. If he had not been able to perform [sagt fasse zu] cratere vermag fuisse the work he would not have undertaken [unternehmen] yet]. 10. Have you time to read this letter? 11. He goes to school, in order to learn the Latin language.

**Exercise 41.**

**Resumé of Examples.**

The conscience is the voice of the soul, the passions are the voices of the body; to which of them (both) voices shall I listen? And they went after Jonathan as he drew (forth) toward David.

**Exercise 42.**

1. The Reiter triegen bei dieser Aufgabe: the genitive to express a superlative sense.

**Exercise 43.**

1. After the termination of the war, the soldiers will be paid off.

**Vocabulary.**

- **Abgebieten**, separated. 
- **Abgeben**, to dispose of; sell. 
- **Abgeben**, to discard, diminish. 
- **Abgente**, to indicate, declare. 
- **Abstellen**, to praise, extol. 
- **Abstellen**, to incite. 
- **Abstellen**, to urge, drive. 
- **Abstellen**, to apply, employ. 
- **Abstellen**, to point out, show.

- **Vogel**, n. prayer.
- **Vogel**, n. chain of mountains.
- **Gebies**, m. verdigris.
- **Kraut**, m. call.
- **Kraut**, m. customer.
- **Lieb**, n. light.
- **Lieb**, n. love.
- **Magnet**, n. loadstone.
- **Magnetknopf**, n. magnetic needle.
- **Magnetknopf**, n. magnet, n. adage.

**Our Holiday.**

**Gymnastics—V.**

**The Parallel Bars.**

The parallel bars afford advantages similar to those of the horizontal bar; which was the subject of our last paper; and also give scope for a still higher and more attractive series of exercises which are highly beneficial in strengthening the muscles of the arms, chest, and back. The form and construction...
of this valuable addition to the apparatus of the gymnasium are shown in Fig. 15. Two bars, made of deal, ash, or any light wood, rounded so as to be readily grasped by the hand, and from six to eight feet in length, are fixed on strong upright supports, either firmly embedded in the ground, or standing on a solid frame like that represented in the illustration. The distance between the bars is generally about a foot and a half, or such that the shoulders of the individual practising may readily pass between them. The bars should also be about the height of the shoulders from the ground.

The gymnast starts from one of the cross-pieces which are arranged at either end of the figure. Placing the hands firmly on the bars, he springs up into the position illustrated in Fig. 16. This is known as the rest. The heels should be close together, the toes turned out, the head erect, and the chest thrown forward. The hands may be with the knuckles outward, as in the cut, or with this grasp reversed; or, again, with the palms and fingers extended flat on the tops of the bars; according to convenience or inclination in executing the different movements.

From this position you may (1) travel along the bars from end to end by the movement of the hands. Keep the legs straight, and let the progressive movements of the arms be equal on either side. Do this first with the ordinary, and then with the reversed grasp.

2. From the rest, give a rapid turn, releasing one hand and bringing it to the same bar that is held by the other. This is called facing, and after performing the movement you may travel as before, but grasping the one bar only.

3. Other rests are the rest on the fore-arms, in which they are placed flat along the top of the bar; and the drop rest, in which the weight is transferred to the hands, and the body sinks partially down, the elbows being raised above the shoulders.

4. Raising the legs should be practised in the following manner. With a firm grasp in the rest, begin by swinging them slowly backwards and forwards, to acquire freedom of action. Then raise first one and next the other alternately. Lastly, raise them gradually in front of you, keeping them close together and stiffly extended, and endeavour to bring them high that they form a straight line parallel to the line of the bars, but two or three inches higher, while the body is, as it were, in a sitting position. This will try your muscles, and you must not expect to do it at the first or the second attempt, but you will derive benefit in practising it until you are able to accomplish it with ease. When you have succeeded, open the legs, moving them from side to side, and still keeping them on a perfect level.

5. Next, from the rest, raise the legs the reverse way—i.e., backwards. With a gradual movement this will not be so easy as the last exercise; but with a swinging motion the body may be brought to the position shown in Fig. 17. Again open the legs, and stretch out as in swimming.

6. The last exercise brings us to the actual swing, which must be practised cautiously, and the movement gradually increased according to the strength and skill of the beginner.

The expert are able to swing so high, simply grasping the bars in the ordinary manner, that the feet in the forward movement get above the level of the head, and in the backward progression the body is brought almost into the perpendicular position, the head being nearly level with the hands. But we do not advise any one who practises for health's sake alone to attempt this, although he may see others perform it.

Here we must note, once for all, that in these and other exercises the young gymnast must keep steadily before him the object with which he set out, namely, to develop and strengthen the physical powers, thereby securing health and activity; and not to equal or exceed some other and perhaps more expert gymnast or gymnasts in the performance of striking feats. If this is not borne in mind, and the practice regulated accordingly, it is not only possible, but certain, that more harm than good will result to the learner from the usual routine of either a public or a private gymnasium.

7. The following is the method of accomplishing the turn over. You start from a standing position, and, grasping the bars firmly, bring the legs forward and upward with a spring, until the body hangs perfectly level below the bars. This we may call the first stage of the turn; and each stage should be well practised before proceeding to the next. Now, from this horizontal position, the weight resting upon the hands, carry the legs upward until the body resumes the perpendicular, but with the head downmost; thus half the circle is described.

Then bring the legs downward, the reverse way from the previous movement, until the body again hangs horizontally, but the face directed towards the ground. This is the third stage of the turn, which will be completed by a light spring downwards, bending the knees as the feet touch the earth. The quick and regular performance of each of these movements in succession constitutes the perfect turn backwards, which will not be difficult after the preliminary exercises have been thoroughly mastered. The turn over forwards is accomplished by reversing these movements, the legs being swung backwards.

8. To perform the roll you sit astride the bars, bend the body forwards until the head is between them, the arms being placed outside, and then throw the legs upward, and turn quickly over, legs outside, which brings you back to the straddling position. This may be done again and again, until you have traversed the length of the bars, when you may reverse the roll and go back to the other end; but for the backward roll let the forearms rest upon the bars, which should be grasped firmly behind you.

9. The sling or hammer (Fig. 18) must be performed by the backward turn as previously described, but instead of bringing the legs between the bars in the descent, let the feet rest on them, back to body hang from the bars by the hands and feet in the manner shown in the illustration.

10. To vault out of the bars, raise the legs slightly above them, and then turn and jump downwards cleanly to the ground, either over the right bar or the left, throwing the weight upon the arm, and not touching the bar with the body as you descend. The light vault downward from the rest at the end of the bars will need no explanation.

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Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.
LESSONS IN BOTANY.—VIII.

SECTION XV.—PARTS OF AN INDIVIDUAL FLOWER.

Having already described the chief arrangement which flowers assume, we may now proceed to examine the parts of which flowers themselves are made up. For the purpose of our first examination it will be well to select a flower in which the various parts are all developed; for this co-existence of all the parts necessary to constitute a perfect flower is not invariably; in certain species one or more of these parts are wanting, and conversely in certain species the parts are redundant. Thus botanical productions are very apt to assume monstrous appearances, sometimes by the suppression of organs, at other times by their change, or their presence in increased numbers. In point of fact, the greater number of garden flowers are, botanically speaking, monstrous, and being cultivated having succeeded in effecting remarkable changes. They are beautiful for a mere lover of flowers to look at, and often the objects of much solicitude, but quite unfit for the purpose of being the subjects of a young botanist’s first investigations. Thus, how striking is the difference between the wild and cultivated roses! The flower-leaves of the former are few and distant, the flower-leaves of the latter numerous and closely packed. Yet the additional flower-leaves, called petals, of the garden rose are only modifications of the stamens, or little thread-like growths of the wild flower. In saying, therefore, that we will commence our study of the parts of a flower by examining a perfect specimen, we mean the perfection of nature, not the perfection of the gardener.

The reader cannot do better than select a ranunculus or buttercup as the subject of his first floral dissection.

On examining this flower it will be seen to consist of several circular rows of organs, or whorls, as they are termed. Commencing externally, we first meet with the whorl (Fig. 75), made up of five parts coloured greenish-yellow. These five parts collectively form what is termed the calyx, from the Greek κάλυα (pronounced kál’i-ya), a husk, or shell, and each individual of the five parts is termed a sepalc, said by Professor Hemalow to be derived from a Latin word sepulchrum, a receptacle, obtained by substituting s (s) for p (p) in the Greek word ἱπαλαβος, which also means a leaf.

Proceeding with our dissection, we next arrive at the bright yellow flower-leaves (Fig. 76), each of which is termed a petal, from the Greek πεταλον (pronounced pet-a-lon), a leaf, and the whole five collectively are termed the corolla, from the Latin corolla, a diminutive of corona, a crown or garland. These portions of this, or any other flower, are not its reproductive portions, but are merely to be regarded as protective coverings for the reproductive organs within. The term perianth, from the Greek peri(th) (peri), around, and ἁντος (an’t-0s), a flower, is frequently given to the calyx and the corolla of a flower taken collectively, on account of the fructifying portions of a flower being surrounded by these parts. Proceeding still with our examination, we next arrive at many whorls or circular rows of stamens (from the Latin stamen, a thread or fibre), or male parts of the flower. Our diagram (Fig. 77) represents one of them cut off. Lastly, we arrive at several whorls of carpels, from the Greek καρπος (kar’pos) fruit, or pistils, from the Latin pistillum, a pounder, and so called from their likeness to the pestle used by druggists (Fig. 78), each consisting of the ovary, or seed-vessel (from the Latin ovum, an egg), below, and terminating above in what is called the stigma, from the Latin stigmas, a mark or brand, the intermediate portion being called the style, from the Latin stylus, an iron pen used for writing on tablets by the Romans.

Let the reader, then, not fail to remember that the stamens are the male parts of plants, and the carpels or pistils are the female parts. The carpels or pistils we have already stated to be composed of ovary below, style in the middle, and stigma above. Each stamen is also divided into a filament or thread-like portion, and anther or head. This anther or head is filled with a dust, called pollen, from the Latin pollen, fine flour, which, by falling upon the stigma, causes the ovary to expand, the fruit to open, and the seed to grow. This pollen the reader, we doubt not, has seen a thousand times over. It is very easily recognisable in most large flowers, especially tulips, in which if we thrust our fingers or our noses, one or the other, as the case may be, comes back covered with a yellow powder. This yellow powder is pollen, without which the tulip plant would be totally incapable of producing seed.

SECTION XVI.—DIFFERENT FORMS WHICH THE CALYX AND THE COROLLA MAY ASSUME.

First of all, as to the calyx. In our example—the buttercup
we have seen it to consist of five separate portions, and to be coloured yellowish-green; but the calyx is not always thus, being subject to modification both as to shape and to colour. In the pimpernel (Fig. 79) the calyx is divided into five separate portions, as we find it in the buttercup. Such a calyx is called polypetalous. In the gentian tribe it is no longer divided into five distinct sepals, but the calyx displays two chief leaves. Here it is said, in botanical language, to be monosepalous, or composed of one piece, and quinquifid, or with five divisions (Fig. 80). In the lychmis tribe there is a calyx in which the rudiments only of these fissures are apparent, giving rise to the appearance of five teeth; hence such a calyx is said to be quinquedentate (Latin dens, a tooth). The calyx is termed regular when the sepals of which it is composed, whether equal or unequal, form a symmetrical whorl, as in the pimpernel (Fig. 79); but irregular when the sepals do not form a symmetrical whorl, as in the dead-nettle (Fig. 81). The calyx is said to be free when it is not attached to the pistil, adherent (from the Latin ad, to, and harro, to stick to) when it is partly or wholly consolidated with the pistil. Although in our example, the buttercup, and in most other examples, the calyx is easily recognisable, yet in certain others it gives no right to the ovary that its discovery is rather more difficult. In the madder (Fig. 82) the calyx seems to have altogether disappeared, so tightly has it become attached; in the sunflower (Fig. 83) the calyx adheres to the ovary, which it quite surrounds, but eventually becoming free, separates in thread-like prolongations. In each of the little florets of the dandelion (Fig. 84) the calyx is at first attached, but separated eventually into the form of an aigrette or plume. In the centranthus (Fig. 85) the calyx, first adherent, separates in various feathery branches.

The real calyx is made up of an association of sepals; but a sort of imitation calyx, called the involucrem, a term which has been already explained, is made up of bracts, those little modified leaves which we have already spoken of as being often found on the inflorescence, as in the acai (Fig. 86). The accorn-cup (Fig. 87) and the spiny involucre of the chestnut (Fig. 88) are also different modifications of the same thing.

READING AND ELOCUTION.—VIII.

ANALYSIS OF THE VOICE.

If we observe attentively the voice of a good reader or speaker, we shall find his style of utterance marked by the following traits. His voice pleases the ear by its very sound. It is wholly free from affected suavity; yet, while perfectly natural, it is round, smooth, and agreeable. It is equally free from the faults of feebleness and of undue loudness. It is perfectly distinct in the execution of every sound, in every word. It is free from errors of negligent usage and corrupt style of pronunciation. It avoids a measured, rhetorical chant, on the one hand, and a broken, irregular movement, on the other. It renders expression clear, by an attentive observance of appropriate pauses, and gives weight and effect to sentiment, by occasional impressions of hesitation. It also lightens the meaning of sentences, by the emphatic force which it gives to significant and expressive words. It avoids the "school" tone of uniform infections, and varies the voice upward or downward, as the successive clauses of a sentence demand. It marks the character of every emotion, by its peculiar traits of tone; and hence its effect upon the ear, in the utterance of certain sentences and paragraphs is like that of a varied melody, in music, played or sung with ever-varying feeling or expression.

The analysis of the voice, for the purposes of instruction and practice in reading and declamation, may be extended, in detail, to the following points, which form the essential properties of good style in reading and speaking:

1. Good "Quality" of Voice.
2. Due "Quantity," or Loudness.
3. Distinct Articulation.
5. True Time.
6. Appropriate Pauses.
7. Right Emphasis.
8. Correct "Infections."
10. "Expressive Tones."
11. Appropriate "Modulation."

I. QUALITY OF VOICE.

The chief properties of a good voice are—


This property of voice is exemplified in that ringing fulness of tone, which belongs to the utterance of animated and earnest feeling, when unobstructed by false habit. It is natural and habitual in childhood; it is exhibited in all genuine singing, and in the properly cultivated style of public reading and speaking.

To obtain roundness and fulness of voice, it is exceedingly important that the student observe the following suggestions. Be attentive to the position of the body. No person can produce a full, well-formed sound of the voice, in a lounging or stooping posture. The attitude of the body required for the proper use of the voice is that of being perfectly upright, without rigidity. The head must never be permitted to droop; it should be held perfectly erect. The back must be kept straight, and the shoulders pressed backward and downward. The chest must be well expanded, raised, and projected; so as to make it as roony as possible, in order to obtain full breath and full vores. Breathe freely and deeply; keep up an easy fulness in the breath, without overloading the capacity of your lungs. Make your utterance vigorous and full, by giving free play to the muscles situated below the bony part of the trunk; these should move energetically, in order to drive the breath upward with due force, and thus give body to the sounds of the voice. Keep the throat freely open, by free opening of the mouth, so as to give capaciousness and rotundity to every sound. A round voice can never proceed from a half-shut mouth.

The large and full effect of vocal sound, produced by the due observance of the preceding directions, forms what is called by great authorities in education, the "orotund." (round, or, literally, round-mouthed) voice, which is considered the ample style of oratory, or public reading, in contrast with the limited utterance of private conversation. The attitude of body, and the position and action of the organs, demanded by "orotund" utterance, is likewise highly favourable to health and to easy use of the voice; while stooping and lounging postures, a sunken chest, and drooping head, tend both to suppress the voice and injure the organs, besides impairing the health.

Practice in the style of vehement declamation, is the best means of securing a round and full tone. The following exercise should be repeatedly practised, with the attention closely directed to the management of the organs, in the manner which has just been described, as producing the "orotund," or resonant quality of voice.

Exercise on the "Orotund."

Who is the man that, in addition to the disgrace and mischiefs of the war, has dared to authorise, and associate with our arms, the tomahawk and scalping-knife of the savage?—to call into civilised alliance the wild and inhuman inhabitant of the woods!—to delegate to the merciless Indian the defence of disputed rights, and to wage the horrors of this barbarous war against our brethren?—My lords, we are called upon as members of this house, as men, as Christians, to protest against such horrible barbarity!—I solemnly call upon your lordships, and upon every order of men in the state, to stamp upon this infamous procedure the indelible stigma of the public abhorrence!

2.—Smoothness of Voice, or "Purity" of Tone.

Smoothness of voice, in reading and speaking, is the same quality which, in relation to vocal music, is termed "purity" of tone.

This property of voice consists in maintaining an undisturbed liquid stream of sound, resembling, to the ear, the effect produced on the eye by the flow of a clear and perfectly transparent stream of water. It resembles, like every other excellence of this kind, a free, upright, and unembarrassed attitude of the body,—the head erect, the chest expanded. It implies natural and tranquil respiration (breathing); full and deep "inspiration" (inhauling, or drawing in the breath); and gentle "expiration" (giving forth the breath); a true, and firm, but moderate exercise of the "larynx" (or upper part of the throat); and a careful avoiding of every motion that produces a jarring, harsh, or grated sound.
"Pure" tone is free from (1) the heavy and hollow note of the chest; (2) the "guttural," choked, stifled, or hard sound of the swollen and compressed throat; (3) the hoarse, husky, "harsh," or reedy; and grating style, which comes from too forcible "expiration," and too wide opening of the throat; (4) the manner, too high, by forcing the breath against the nasal passage, and, at the same time, partially closing it; (5) the wiry, or false ring of the voice, which unites the guttural and the nasal tones; (6) the affected mincing voice of the mouth, which is caused by not allowing the due proportion of breath to escape through the nose. The natural, smooth, and pure tone of the voice, as exhibited in the vivid utterance natural to healthy childhood, to good vocal music, or to approved public speaking, avoids every effect arising from an undue preponderance, or excess, in the action of the muscles of the chest, of the throat, or of any other organ, and, at the same time, secures all the good qualities resulting from the just and well-proportioned exercise of each. A true and smooth utterance derives resonance from the chest, firmness from the throat, and clearness from the head and mouth.

Without these qualities, it is impossible to give right effect to the beauty and grandeur of noble sentiments, whether expressed in prose or in verse.

Childhood and youth are the favourable seasons for acquiring and fixing, in permanent possession, the good qualities of agreeable and effective utterance. The self-taught cannot exert too much vigilance, nor take too much pains, to avoid the encroachments of faulty habit in this important requisite to a good docetion. The subjoined exercise should be frequently and attentively practised, with a view to avoid every sound which mars the purity of the tone, or hinders a perfect smoothness of voice.

**Exercise in Smoothness and "Purity" of Voice.**

No sooner had the Almighty ceased, but all the multitude of angels, with a shout, Loud as from numbers without number, sweet, As from best voices uttering joy;—heaven rang With jubilee, and loud hosannas filled The eternal regions;—lovely reverent, Towards ether throne they bow; and to the ground, With solemn adoration, down they cast Their crowns, inwove with amaranth and gold.— Then crowned again, their golden harps they took, Harps of purest frame, the strings by side, Like quivers hung, and with preamble sweet Of charming symphony they introduce Their sacred song, and waken raptures high.

**Exercises for Versatility or Pliancy of Voice.**

**Very Loud.**

And dar'st thou, then, To bear the bow of Moses on thy head,— The Douglases in his hall? And hop'st thou hence unscathed to go? No! by St. Bride of Bothwell, no!— Up, drawbridge, groom! What! warder, ho! Let the portcullis fall!

**Very Soft.**

I've seen the moon climb the mountain's brow, I've watched the mists o'er the river steali— But ne'er did I feel in my breast till now, So deep, so calm, and so holy a feeling — 'Tis soft as the thrill which the memory throws Athrough the soul in the hour of repose.

**Very High.**

I awoke:—where was I?—Do I see A human face look down on me? And doth a roof above me close? Do these limbs on a couch repose? Is this a chamber where I lie? And is it mortal, you bright eye, That watches me with gentle glance?

**Very Low.**

Of old hast Thou laid the foundation of the earth; and the heavens are the work of Thy hands. They shall perish, but Thou shalt endure; yes, all of them shall wax old, like a garment; as a gesture shall Thou change them, and they shall be changed: but Thou art the same; and Thy years shall have no end.

**Very Quick.**

I am the Bider of the wind, The Stirrer of the storm: The hurricane I left behind Is yet with lightning warm:— To speed to thee, o'er shore and sea I swept upon the blast.

**True Pitch of Voice.**

The proper pitch of the voice, when no peculiar emotion demands high or low notes, is—for the purposes of ordinary reading or speaking—a little below the habitual note of conversation, for the person who reads or speaks. Public discourse, being usually on graver subjects and occasions than mere private communication, naturally and properly adopts this level.

But, through many cases of adversity, we sometimes hear persons speak on too low a key for the easy and expressive use of the voice, and sometimes, on the other hand, on a key too high for convenient or agreeable utterance.

**Exercise on Middle Pitch.**

In every period of life, the acquisition of knowledge is one of the most pleasing and improving of the human mind. But in youth, there are circumstances which make it productive of higher enjoyment. It is then that everything has the charm of novelty; that curiosity and fancy are awake, and that the heart swells with the anticipations of future eminence and utility.

Contrast this pitch with that of the pieces before quoted, as examples of "high" and "low."
LESSONS IN PENMANSHIP.—XVI.

In our last lesson, in Copy-slip No. 52, we gave an example of the elementary looped stroke which enters into the composition of the letters J, Y, and G, and, with a little modification, into the formation of the letter Z. To make this new elementary stroke, a thick down-stroke must be commenced at the letter a, as in Copy-slip No. 57, for example, and carried downwards in a slanting direction towards the left. As the stroke approaches the line b b, the pressure on the pen must be lessened and gradually reduced until the thick stroke narrows into a hair-line, which is turned at the line h h, and brought upwards over the line b b, in a direction slanting upwards towards the right, crossing the down-stroke in a graceful curve a little below the last-named line.

The distance between the lines b b and h h should be exactly nine-sixteens of an inch. The learner, on referring to Copy-slips No. 30 (page 133) and No. 39 (page 173) will see that letters carried below the letter b b terminate on a line at the distance of seven-sixteens of an inch below it, when the stroke below b b is of uniform thickness throughout, as in the letter p, or has a bottom-turn to the right, as in the letter q. In the formation, however, of looped letters, an eighth of an inch more is required to give space enough to admit of the loop being turned in an easy and flowing stroke. To show the necessity of this, the learner has only to turn the loop before reaching the line h h, when he will find that this imparts a stunted appearance to the stroke, or to any letter into whose composition it enters, which is far from satisfactory.

To form the letter j, it is only necessary to place a dot above the elementary looped stroke that has just been described, on the line d d, which is, as it has been stated in a previous lesson (page 61), three-sixteenths of an inch above the line a a. In Copy-slip No. 54 the elementary strokes entering into the composition of the letters y and g are shown, the first of these letters consisting of the top-and-bottom-turn and the elementary looped stroke, while the second is formed by a combination of this stroke and the letter o. In Copy-slips No. 55 and 56, the letters y and g are given, showing how the elementary strokes of which they are composed are joined together, while in Copy-slip No. 57 an example is given of the method in which the letter j is joined to any letter that follows it, and the letter y to a letter that precedes it.

The learner has now been taught how to make nineteen out of the twenty-six letters of the writing alphabet, and these we shall bring under his notice in a single lesson, after giving a few more examples for practice in writing letters looped below the line b b, and combining them with others.
LESSONS IN GERMAN. XV.

SECTION XXVII.—SEPARABLE PARTICLES.—(continued).

We refer to the place where anything may be supposed to exist or transpire, as:—Wo ist mein Messer? Where is my knife? Wo laufen die Kinder? Where (in what place) are the children running?

It is used in answer to wo; that is, to designate some particular place, as:—Du, hier ist es; da, dort ist es. Du laufen, they are running here.

An denotes direction, or motion from the speaker, as:—Barum laufen die Kinder hin? Why are the children running thither?

Der is the opposite, in significance, to hin; denoting motion or direction toward the speaker, as:—Barum laufen die Kinder her? Why are the children running hither?

These words are frequently compounded, one with the other; thus, from wo and hin, we have the compound, wohin; from wo and her, weisen; from ta und hin, taufen; from ta und her, taufen; from hier und hin, tiefern; and from hier und her, hierher (sometimes contracted to tiefern). (§ 103. 3.)

Examples of the use of wo, ta, hin, her, and hin compounded.

Wo reinen unsere Brünette hin? Where do our friends travel to? or, Where do our friends travel from?

Wo reinen unsere Brünette? Whither do our friends travel? They travel thither, where their relatives reside.

Wo kommen die Jüngel her? Where do these birds of passage come from? or, Whence come these birds of passage?

Sie kommen tober, wo es jetzt is. They come from (there) where it is now too cold for them.

Vocabulary.

Baff bude, f. back-house.
Bait, soon.
Bittergiaffrie, f. picture-gallary.
Brevf, m. frog.
Gant, f. goose.
Hingessen, to go to.
Birt, m. shepherd.
Agentu, some-where.
Sept, now.

Sept, m. head.
Riesen, to lie.
Müge, f. cap.
Männig, nohow.
Dehns, although, notwithstanding.
Oerjace, n. opera-house.
Ritter, m. knight.
Schaefer, m. pastor.
Sehen, already.
Schmrr, m. brother-in-law.

Schneidmen, to swim.
Stoff, m. rope-maker.
Sitzen, to sit.
Springen, to spring.
Stehen, to stand.
Tiep, m. pond.
Werfstat, f. work-shop.

Resume of Examples.

Wo ist das größte Schiff? Where is the greatest happiness: at the court of a tyrannical king, or in the cottage of a contented day-labourer?

Wo gehen Sie hin? Where do you travel to?

Der Reiter ist auf dem Pferde; the horse rides tranquilly along the ranks of the soldiers to and fro.

Wegen rettet er mit seinen Scharen to-morrow he rides with his troops to the battle-field.

In der Feinigung hatten die englischen Truppen the unfortunate final consolations in hope.

Der Winter ist da. aber der Winter. The winter is here, but the spring is in the city.

Ich gehe heute dahin, weisen ich einen, I wished (already) to go yesterday.

Exercise 45.

1. Where is the picture-gallary of this town? 2. Where was that gentleman born (jetzt)? 3. He was born in Bohemia. 4. Where does your friend, the actor, reside? 5. He resides in the city. 6. Whither do these emigrants go? 7. Whence do these immigrants come? 8. They come from France. 9. Whence is much given, much is required. 10. Here the revenge (Häkte) and whetted dagger (geschmitten) of a traitor outer not (enger) but — beneath [unter] the shade of this tree comes no king. 11. He throw down the book before me. 12. What art thou going? 13. I am going to my brother-in-law. 14. Will these go to America? 15. No, they will stop here. 16. There is water in the pond. 17. Where do these come from? 18. They come from Germany.

Vocabulary.

Stiefmutter, m. emigrant.
Stiefmutter, m. servant.
Stiefvater, m. acquaintance.
Stiefvater, m. brother-in-law.
Stiefmutter, m. emigrant.
Stiefmutter, m. servant.
Stiefvater, m. acquaintance.
Stiefvater, m. brother-in-law.

Exercise 46.


Exercise 47.

1. When did he live? 2. He lived in the fourteenth century (in vierzehnten Jahrhundert). 3. My friend told me he would never go there again (wieder). 4. Do you go to Spain? 5. No, I shall not go thither. 6. The commander-in-chief upon whose troops where the danger was most (die meisten Gefahren). 7. Is this ship from Spanien or from Havre? 8. No, it is neither (weder) from Spanien nor (noch) from Havre, it comes from Hamburg. 9. These immigrants are going to Milwaukee, and are emigrants from Bohemia and Veniee. 10. Can you leap over that gate (Tuer)?
11. I could when I was young. 12. He bade [let] me go thither, that he might speak to me about it.

SECTION XXVIII.—SEPARATE PARTICLES.—(continued).  
Do, da, hin, etc., besides being compounded one with another (Sec. XXVII.) are also united with prepositions; thus producing a separate class of adverbs, as:—Braun strömte &; the, of what (whereof) are you speaking? Ihr strömte von meinen hüütten; wollen Sie einst tavernen? I am speaking of my books; will you have one of them? (one thereof?) Ihr strömte auf den steady; feminismen Sie thither? I am on the road; come up! Ihr kann nicht hinauf gehen; feminismen Sie thither! I cannot go up; you come down!

In, in, in, thither, etc., when used with nouns, are translated by prepositions; and the adverb, unlike its English equivalent, is placed after the noun, as:—Iege ich ten Berg hinab, I go up the mountain. feminismen Sie ten Berg thither, come down the mountain.

1. The verb feminism frequently answers to our "get," as:—Wies ich in thither Garten gefommen? How did he "get" into this garden? Er could not, wir er feminismen sett, he does not know how to "get" out. feminismen Sie with thither Mannent sett fort, I "get" along with this man very well.

VOCABULARY.

Braun, to roar. Gesagt, m. hill, hilltop.  
Gafz, f. cabbin. Kraup, m. crossway.  
Gafz, f. barracks. Stief-, n. steamboat.  
Dich, m. thief. Stiefmutter, f. railroad.  
Dichfrieden, to terrify. Stiefvater, n. railroad.  
Feigen, m. rock. Steigen, f. railroad.  
Gafz, m. house. Steigen, f. railroad.  
Hälfte, f. precept. Stiefvater, n. railroad.  
Erfan, to roam. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Hälfte, f. precept. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Hälfte, f. precept. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Hälfte, f. precept. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Hälfte, f. precept. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Hälfte, f. precept. Stiefmutter, f. railway station.  
Gafz, m. mountain. Stiefmutter, f. railway station.  
Hälfte, f. precept. Stiefmutter, f. railway station.

Résumé of Examples.

Sie gehen hinab in das wide Meer. They look down into the wild sea.

Da giebt uninterminable Regen herab. There pours down interminable rain.

Die Lands vollen ten Berg hinab. The boys hastened up the mountain.

Der Bergmann steigt herauf aus der Tiefe des Spalanten. The miner comes up out of the depth of the shaft.

Peter went out and wept bitterly. Peter went out and wept bitterly. Peter went out and wept bitterly.

The judge called the peasant in. He threw himself into the roaring flood.

Die Lust erfuhr von dem Bauer herein. The life of men, like a skiff, fluctuates hither and thither.

Der Stiefvater set vom Haufie der Tiller fell down from the house.

EXERCISE 48.


EXERCISE 49.

1. The son hastened down to receive his father. 2. His speech lasted over two hours. 3. The roar sprang out from his hiding place. 4. Will you go over to Frankfurt to-day by the steamboat? 5. No, I shall go over by the railroad and return by the steamboat. 6. Do not go beyond the crossway. 7. I saw your friend come in as your uncle went out. 8. These men who go over that bridge are in danger of their lives. 9. Will you go out to-day with your friend? 10. From this hill we look over our country. 11. How did the thief get into your house? 12. Edward precipitated himself from the rock. 13. I shall pass your house this morning, and shall come in, without your asking me to do so.

LESSONS IN ARITHMETIC.—XVI.

DECIMALS.—(continued).

15. Terminating and Circulating Decimals. Reducing Fractions to Decimals.

It is evident, from what has been said, that vulgar fractions can be reduced to decimals by the process of the division of decimals. For we have only to divide the dividend with a decimal point, followed by a series of ciphers, and then divide by the divisor, according to the rule already given for the division of decimals. Thus, 40 may be reduced to a decimal as follows:—

\[
\begin{array}{c|c}
40 & 7000 \\
& 175 \\
\end{array}
\]

Therefore \( \frac{4}{5} = 0.75 \).

Decimals which, after continuing the division of the fractions from which they arise far enough, at last give a result without a remainder, are called terminating decimals.

16. To determine whether a Fraction will produce a Terminating Decimal or not.

Since a decimal is a fraction with 10 or power of 10 for its denominator, it is evident that if a given fraction will produce a terminating decimal, it must be capable of being expressed in the form of an equivalent fraction, which shall have a power of 10 for its denominator.

Now 10 is composed of the prime factors 2 and 5. Hence, if the denominator of the given fraction, when in its lowest terms, contains any factor besides 2 and 5, it cannot produce a terminating decimal. But if the denominator contains only 2's and 5's as its factors, then, by multiplying numerator and denominator of the fraction by a factor, we can always transform the fraction into an equivalent one, having a power of 10 for its denominator—that is, into a terminating decimal.

For example:—

\[
\begin{array}{c|c}
\frac{23}{4} & 217 \\
\frac{4}{23} & 588 \\
\end{array}
\]

Similarly, \( \frac{2}{5} \) gives a terminating decimal, for \( 8 = 2 \times 2, \)
and therefore by multiplying by $5 \times 5 \times 5$, we make it $10 \times 10 \times 10$, or 1000.  

$$\text{Hence } 3 = \frac{3 \times 5 \times 5 \times 5}{10 \times 10 \times 10} = \frac{3125}{1000} = 0.3125.$$  

17. We see from the preceding remarks the truth of the following  

Rule for determining whether a given Vulgar Fraction will produce a Terminating Decimal.  

Reduce the given fraction to its lowest terms, and split the denominator into its prime factors.  

If the denominator have for its factors 2's or 5's, or both, and no other factors, the fraction will give a terminating decimal, but not otherwise.  

18. To determine in this case the Decimal without actually dividing.  

If one of the factors 2 and 5 occur fewer times than the other, multiply numerator and denominator by the power of the factor which occurs the fewest times in the denominator, which will make the number of times it occurs equal to the number of times the other occurs.  

Thus, in the instance already given, 250 is made up of three 5's and one 2 as factors. We therefore multiply numerator and denominator by the second power of 2.  

Similarly, in $\frac{1}{8}$ being the third power of 2, we multiply numerator and denominator by the third power of 5.  

Of course, it will be perceived that the number of decimal places in the terminating decimal which is equivalent to a vulgar fraction, will be the same as the greatest number of times that either of the factors 2 or 5 is repeated in its denominator, when the fraction is reduced to its lowest terms.  

Example.—Determine the decimal which is equal to $\frac{323}{18}$.

Reduced to its lowest terms this is $\frac{323}{18}$ or $\frac{17}{9}$. Multiplying numerator and denominator by 2, or 8, the fraction becomes $\frac{646}{72}$ or $\frac{323}{36}$.  

19. Circulating or Recurring Decimals.  

Decimals in which the same series of figures is repeated indefinitely, are called circulating or recurring decimals; and the series of figures thus repeated is called the period.  

Thus, $\frac{3}{7} = 0.428571$, etc., the period here being 6, and the figures 428571 repeating, are called repeating decimals.  

A recurring decimal is indicated by writing a dot over each figure of the period, or, sometimes, where the period is long, by writing a dot over the first and last figures only of the period.  

Thus, the decimals we have given before as examples would be written—  

$$0.\overline{3} = 0.333\ldots, \quad 0.\overline{123} = 0.123123\ldots, \quad 0.\overline{6} = 0.666\ldots.$$  

Decimals in which the period commences immediately after the decimal point, are sometimes called pure circulating or recurring decimals; others being entitled mixed circulating decimals.  

Thus above $0.\overline{6}$ is a pure, while the other two are mixed circulating decimals.  

20. Fractions producing Circulating Decimals.  

We have seen that all vulgar fractions in their lowest terms, which have any other factors besides 2 and 5 in their denominators, will not produce terminating decimals; that is to say, in performing the division we shall never arrive at a remainder which is zero. We shall, however, arrive at a remainder which is the same as one of the remainders which has already occurred.  

This is evident from the following considerations:  

The largest possible remainder in any division is the divisor diminished by unity, and therefore there cannot possibly be more than this number of different remainders. Hence, at the very first division, if this number of remainders have occurred, a remainder will occur which is the same as one of the preceding remainders. Now it is plain that when this is the case, the whole of the operation which has been performed since that remainder last occurred will be repeated, and that the same remainder will occur again after exactly the same interval, and so on ad infinitum.  

Now to every remainder there will correspond a figure in the quotient, and therefore the figures in the quotient corresponding to the interval between two remainders which are the same will continually recur.

21. This will be made plainer by examples.  

Reduce $\frac{1}{7}$ to a decimal.  

$$\frac{1}{7} = 0.\overline{142857}.$$  

Here it will be seen that at the point indicated by the star the remainder 2 occurs, and therefore the division will, after this point, be identical in every respect with that already performed. Hence the figures in the quotient, 142857, will continually recur, or the quotient is the pure circulating decimal, $0.\overline{142857}$.  

It will be observed that the period here is as large as it could possibly be, for the greatest possible remainder is 6, and all the remainders from 1 up to 6 inclusive occur.  

[The process has been exhibited in the form of Long Division, to allow of the remainders appearing in the operation.]  

22. Reduce $\frac{11}{12}$ to a decimal.  

We see at once that the quotient will be a circulating decimal, since $\frac{11}{12}$ being in its lowest terms, 3 is a factor of the denominator.  

$$\frac{11}{12} = 0.\overline{916666}.$$  

23. Reduce $\frac{9}{50}$ to a decimal.  

$$\frac{9}{50} = 0.18.$$  

Here the remainder 20 is at once repeated, and therefore the quotient after the first figure 5 will consist of 6 continually repeated, or it will be the mixed circulating .96.  

24. Reduce $\frac{3}{25}$ to a decimal.  

$$\frac{3}{25} = 0.\overline{12}.$$  

Here the remainder 25 occurs again, and therefore the periodical part of the quotient will, after this point, consist of the figures 45 continually repeated.
MECHANICS.—VII.

AXIS OF SYMMETRY.—STABLE AND UNSTABLE EQUILIBRIUM—INTRODUCTION TO THE MECHANICAL POWERS, ETC.

AXIS OF SYMMETRY.

There is a large number of cases in which, though we may not be able actually to find the centre of gravity, we can say it is on some line in reference to which the body is symmetrically formed. In an egg, for example, the line joining the round and pointed ends is an axis of symmetry. If we make cross-sections of it perpendicular to this line, they will be all rectangles through the centres of which the line will pass. The elliptic oval at A, Fig. 33, and the cylinder at c, and the right cone at d, are instances. The cubical box at e, is another in which the cross section is a square, the line joining the meetings of the diagonals on the upper and lower faces being a symmetrical axis. The oval board at b, also, in which all the dotted lines are bisected by the arrow perpendicular to them, is another instance, the arrow being the axis of symmetry. Wherever two such axes exist, of course the centre of gravity is their point of intersection; but if there be one only, as in the portion of the ring in Fig. 34, the position of the centre on it must be ascertained by other means.

STABLE AND UNSTABLE EQUILIBRIUM.

In the last lesson, I showed you that when a body rests in equilibrium on a horizontal plane, the perpendicular from the centre of gravity falls within its base. This condition being satisfied, it will not upset of itself, but may be overturned from without by a force acting sideways. What are the conditions on which depend the case, or the difficulty, with which it can be so upset? Let three cylinders, a, b, c, Fig. 35, be taken in illustration; the first of broad base and small height, the other two of equal heights and bases, the latter narrow in each. Suppose that a force, say of one pound, represented by the dotted arrow pointing to the right, is applied transversely to each, and let the weights of the bodies be represented by arrows pointing downwards on the vertical lines in which their centres of gravity lie. Now, the resultant in each cylinder of these two forces, represented by the arrows slanting to the right, is the upsetting force. If this arrow strikes the ground outside the base of any cylinder, it will overturn; if within, it will remain standing as before.

1. Now, taking any one of the cylinders, say a, it is evident that the transverse force remaining the same, and the height at which it is applied the same, the greater its weight is the longer will the arrow o p be, and therefore the more will the resultant o n slope downwards towards o p, tending to fall within the base. Therefore, everything else being the same, the greater the weight of the body the less easily is it upset, that is, the more stable it is.

2. Again, suppose the weights of the two cylinders a, c, to be equal, but the base of the former greater than that of the latter, if equal transverse forces, be applied to both at equal heights, then o n being also equal in both and equally inclined to o p, the resultant will tend more to fall within the base in a than in b, that is, everything else being the same, the broader the base, the greater the stability.

3. Further, as in b and c, the bases and weights being the same, and the transverse force applied to each cylinder being still one pound, the force is applied higher up in one cylinder than in the other, then the resultant is more likely to meet the ground within the base in the latter than in the former; that is, the lower down the transverse force is applied, everything else being the same, the greater the stability.

4. Lastly, as is evident from d, e, f, in Fig. 35, when the body is inclined to one side, the perpendicular from the centre of gravity meets the base nearer to its circumference on that side; and, if the transverse force is applied in that direction, the resultant tends more to fall outside the base; that is, everything else being the same, the stability is least when the upsetting force acts in the direction in which the body leans.

These are truths known to everybody from experience, but of which we here see the "reason why," and what is of no less importance, we obtain a rule by which we may measure the amount of stability or instability in any case that may come before you. If you draw figures for bodies of different weights, different bases, different transverse forces, and their heights of application, you will by trial feel your way, and soon clearly understand the subject.

But the cases to which the terms "stability" and "instability" are more commonly applied, are those in which there is only one point of support, and the slightest force from without causes disturbance.

In Fig. 36, as was shown in Lesson V., (page 188) the body supported at the point o is in equilibrium in the two positions o a b and o c d. Now the first of these is one of stability, the second of instability. What do these terms denote? This; that, if you pull the stable body out of its rest into any other position to right or left, say o e f, back it will return to a o b, as though by a free choice. In the disturbed position o e f, the weight acting downwards at o pulls it back; it can descend, but not ascend. Try the same on the position o c d; the body, no longer supported from below, cannot re-ascend; down it will rush to the stable position; and, after oscillating there for a few turns, come to rest. We see thus that in stable equilibrium the centre of gravity is in the lowest possible position; in unstable in the highest.

Now take the same body attached to the post at its centre of gravity, o, Fig. 37. However you turn it round, o is supported, and the body rests. The equilibrium, therefore, is neither stable nor unstable. It neither returns on disturbance to the first position nor rushes away from it. This is termed "neutral equilibrium"; the centre can neither ascend nor descend.

Now take the egg-shaped bodies, Fig. 38; that represented at b is stable, for the centre of gravity, supported from below, is in the lowest possible position. Disturb it into the position, a, this centre ascends, and the weight pulling downwards brings it back to b. The body in the position c is unstable. It is in
equilibrium, but on disturbance rolls through the position c into the position b. In this case also you see the centre, for stability, must be in its lowest position; for instability, in its highest. But perfectly round balls, such as in Fig. 27.

(page 220), are neutral, their centres, as you roll them on the ground, can neither ascend nor descend.

Take now the balls in a, Fig. 39, which represents a geological section of hills and valleys. Those on the tops of the hills are unstable, because their centres of gravity are in their highest positions. Disturb them, and down they roll into stable positions in the valleys, the lowest positions of these centres. But here now a new principle is brought to light. A body may admit of several positions of equilibrium, but an unstable is always between two stables, and a stable between two unstables. The ball in the valley has a ball perched on the hill on either side, and the ball on the hill has a ball in the valley on either side.

Take another illustration. Let it be a convex body, like a seashore pebble, with one side, as in Fig. 39, b, flatter than the other. I showed you in the last lesson that such a body should have as many positions of equilibrium on a plane as you can draw lines from its centre of gravity piercing its surface at right angles. Let such points in this pebble be A, B, C, D, the first and third most distant from the centre O than the other two. If I now try to make it rest on the ground at A, the centre being higher than it would be if the body touched the ground on either side of that point, it will roll down to either B or D, which are two stable positions. We thus learn that,

The Positions of Equilibrium of a convex body, supported from below, are alternately stable and unstable.

As a further illustration of the peculiarities of the centre of gravity, take an egg. Why does it generally rest with its pointed end downwards, as at d, Fig. 39, while an egg, as at c, turned in wood of the same size and form, rests broad-end down? Explain, also, the reason the prancing-horse toy, represented at Fig. 40, supported at the edge of a table, and having a wire attached to him, which carries a heavy ball at its other end, does not fall on the ground, but when disturbed, rocks backwards and forwards. Also, how a rocking-horse is set rocking by the child on his back. The four-oared boat and crew in Fig. 41, supported by the point of a needle on the iron upright below, imitates a boat's motion at sea, rising, and plunging, and going round, if the oars are bended at their ends; explain this. Also, how the harlequin, Fig. 42, is balanced on his pedestal, as he twirls round and bows, leaning forward and falling backward at the imminent peril of coming to the ground. Instances of this kind could be multiplied without end, but as much as our space allows has been said on the centre of gravity, which we shall now leave to apply the principles so far set forth to practice, commencing with the Mechanical Powers.

**Introduction to the Mechanical Powers.**

Before turning to the mechanical powers, the following principles, which are necessary to complete a knowledge of parallel forces—the first of them required for explaining the lever—must be established and understood. In the account given of parallel forces in Lesson IV. such only were considered as act in the same direction, pull or push together, each adding to the effect of every other; and of these the subject of the centre of gravity in Lessons V. and VI. furnished numerous exemplifications, the forces all pulling towards the earth's centre. Now you have to consider two forces, unequal and parallel, but acting in opposite directions.

Suppose two such forces applied to a body, as in Fig. 43, where A and B are the points of application, and the arrows A, B, O, C represent their magnitudes and directions. Let A P be 7 pounds and B Q 3 pounds; how can we find their resultant? From a very simple consideration. Whatever it be, or at whatever point it acts, it must be such that a force at that point, equal and opposite to it, will balance it, and therefore make equilibrium with its components A, P, B, Q. Now, that point cannot be inside the line A B, for in that case the resultant of the two which will pull together would not be opposite to the third. The point must, therefore, be outside A B and on the side of the greater force A P. Let the point therefore be O, and O R the resultant, O S being the force equal and opposite to it, which makes equilibrium with A P and B Q.

Then, since there is equilibrium, the resultant of the two that pull together, B Q and O S, must be equal and opposite to A P; and therefore, as proved in Lesson IV., A P is the sum of B Q and O S. But, if A P being 7 pounds, and B Q 3 pounds, evidently O S must be 4 pounds, the difference of these forces. The resultant in magnitude therefore is the difference of the components.

Now for the point of application. Since the resultant of 4 pounds at O and 3 pounds at B must cut B O at A inversely as the forces, if I divide A B into four equal parts, three of these will be in A O; or, which is the same thing, seven parts in B O and six parts in A O, showing that O is the point whose distances from A and B are inversely as the forces. Putting all together, we learn that—

1. The resultant of two Unequal Parallel Forces which act at two points of a body in opposite directions is equal in magnitude to their difference.

2. Its point of application is outside of the greater force, at distances from the points of application of the components, as the forces are inversely as these forces.

The rule to be observed practically in finding this centre is, to cut A B into as many equal parts as there are pounds, or other units, or fractions of a unit, in the difference of the forces, and then to measure outwards from A along the production of A B as many of these parts as there are pounds or other units in B Q; the point O so obtained is the parallel centre required. And you see that what is thus proved for the numbers 3 and 7 must hold equally for other numbers, whatever they be.

There is one particular case of this principle, which I shall just notice. Suppose A P becomes equal to B Q; what of their resultant? how large is it, and where applied? In magnitude it is nothing, being the difference of the forces; and the point of application is nowhere, at least within reach; for on A B produced no point O can be found such that A O be equal to B O. Pairs of forces of this kind are termed "couplets," and they play an important part in Mechanics, in producing a tendency to rotation; but we shall not consider them here.

One consequence more: How find the resultant of any number of parallel forces, some acting in one direction, others in the opposite? Evidently by compounding separately, and finding the centres of those, which act in the opposite directions. You thus get two simple parallel and opposite forces the resultant
of the opposing sets, and their centres of application; and therefore, by the aid of the principle above established, learn that—

1. The Resultant of a system of Parallel Forces, which act, some in one direction others in the opposite, is in magnitude the Difference of the Sums of the Opposing sets of Forces.

2. Its Point of Application is had by finding the parallel centres of each opposing set, and taking a point on the side of the greater sum, on the production of the line joining those centres whose distances from these points are inversely as the sums of the opposing forces.

For example: Suppose eight parallel forces are applied to the eight corners of a box, five of 2, 4, 6, 7, and 9 pounds directed to the east, and three of 10, 11, and 18 pounds to the west; the resultant will be 8 pounds, acting towards the west and at a point on the line joining the parallel centres of the two sets, and outside the greater, whose distances from these centres are inversely as 36 to 28.

These principles, with others previously established, we now apply to the Lever; first taking the cases in which the forces, usually termed the “Power” and the “Resistance,” or “Weight,” are parallel. The principle of leverage may be understood by the aid of Fig. 44. Two balls, say of iron, connected by a thin bar, are supported by a cord at a point o. How is this point to be selected so that the balls may equally balance each other, the weight of the rod not being taken into consideration? Again, having recourse to numbers, let the balls be 13 pounds and 4 pounds, and their centres the points A and B; how is o to be found? Evidently by cutting A B so that A o to b o inversely as 13 to 4; or, on dividing that line into seventeen equal parts, so that four of them be in A o and thirteen in b o. If the bar be supported by the cord from above, or by a prop from below, at this point there is equilibrium. This is the principle of the Lever, of which the ball, b, may be considered the Power, and the ball, A, the Resistance. We say, therefore, that the support, or prop, commonly called the “fulcrum,” must be so placed that the arms A o, b o of the lever on each side of o be to one another inversely as the Power and Resistance.

But, as inverse ratio puzzles some persons, I shall put the matter in another light. You observe that at the end, A, of this lever, there are only 4 equal parts in the arm, but 13 pounds in the resistance, while, in the arm, b o, the parts are 13, and the pounds only 4. Now, suppose the parts were all inches, then if you at either end multiply the number of inches in an arm by the number of pounds on that arm, you get the same number—namely, 52, for product. Choose any other numbers different for 13 and 4, and the result is the same; the numbers at either end multiplied together give the same product. Therefore another way of stating the Condition of Equilibrium in a lever is, that the product of the Power and arm on one side should be equal to that of the Resistance and arm on the other.

But be careful to be clear as to what is meant by “the product of Power and arm, Resistance and arm.” This puzzles some persons extremely, from its never being clearly explained to them. Strictly speaking, the product of a force and a line, or of a resistance and an arm, is nonsense. Multiply a bag of flour by the iron beam from the end of which it hangs, and who can divine what the result of the operation is to be? neither flour nor iron, but something between! Then, to remove every possibility of confusion on this point, keep in mind (as the example above shows) that we multiply numbers only, not the Power and its arm, or the Resistance and its arm, but the number which denotes the units of force in one, by the number which denotes the units of length in the other. Then you can make no mistake, there will be no confusion; and you can still say, knowing the meaning of your words, that the Power multiplied by its arm is equal to the Resistance multiplied by the other arm. This product is commonly termed the “Moment” of the Power or Resistance, and the Condition of Equilibrium is stated as follows:

For Equilibrium in a Lever the Moments of the Power, with reference to the fulcrum, and Resistance should be equal.

ANSWERS TO QUESTIONS IN LESSON V.

1. To prevent the perpendicular from his centre of gravity falling outside his base as he springs on the fore-foot to advance. On coming down to counterpoise the centre of gravity’s falling forward.

2. He draws his feet under the chair, in order to get a base over which he can extend his biceps, which centre of gravity, and lifts that centre upwards by his muscular strength.

3. He leans to the opposite side in order to keep the common centre of gravity of himself and bucket over the base of support.

4. Else the perpendicular from his centre of gravity would meet the ground in advance of his feet.

5. Because the resultant of the forward motion, and the weight of horse and rider acting at their common centre of gravity, is then more apt to meet the ground outside the base of support of the horse’s legs.

6. Because in that case the perpendicular from the centre of gravity, being lower down, is less apt to meet the ground outside the base when the road slopes to one side.

[It will be noticed that some of the figures which have been employed in Lesson VI, in Mechanics, have been introduced a second time in the present lesson. This has been done to spare the reader the trouble of having to turn from one page to another when reference has been made in the course of a lesson to any figure which has been used before as a means of illustrating the text. Whenever, therefore, any figure is repeated, it must be understood that this is the reason for its repetition.]

LESSONS IN FRENCH.—XVI.

SECTION I.—FRENCH PRONUNCIATION (continued).

75. We proceed with our illustrations of the nasal vowel sounds in and in, on and on—

The nh in the pronunciation of oanh and onh must have a short stopped sound, as in the im of timbre, and the on of bon-bon. The full sound of nh, which would give vann for vin, and bonh for bon, should be studiously avoided.

<table>
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<tr>
<th>FRENCH</th>
<th>PRONUNCIATION</th>
<th>ENGLISH</th>
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<tbody>
<tr>
<td>Im</td>
<td>Anh-bay-soc</td>
<td>Foam</td>
</tr>
<tr>
<td>Imp</td>
<td>Anh-pay-neh-tahus</td>
<td>Impedance</td>
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<tr>
<td>Imp</td>
<td>Anh-pay-rat-oahr or t’wahr</td>
<td>Master-sword</td>
</tr>
<tr>
<td>Impe</td>
<td>Anh-po-sibl</td>
<td>Impossible</td>
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<tr>
<td>Limbe</td>
<td>Lamb</td>
<td>Limb</td>
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<tr>
<td>Limple</td>
<td>Lamb-joed</td>
<td>Limpid</td>
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<th>FRENCH</th>
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<tr>
<td>Cinq</td>
<td>Sanck</td>
<td>Five</td>
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<tr>
<td>Cheun</td>
<td>Sh’mah</td>
<td>Bocod</td>
</tr>
<tr>
<td>Pin</td>
<td>Pah</td>
<td>End</td>
</tr>
<tr>
<td>Instant</td>
<td>Anh-staunh</td>
<td>Instant</td>
</tr>
<tr>
<td>Medecin</td>
<td>Mayd-saun</td>
<td>Physician</td>
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<tr>
<td>Vin</td>
<td>Vah</td>
<td>Wine</td>
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<tr>
<th>FRENCH</th>
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<tr>
<td>Bombe</td>
<td>Bomh</td>
<td>Shell</td>
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<tr>
<td>Comble</td>
<td>Konahl’</td>
<td>Consummation</td>
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<tr>
<td>Lombard</td>
<td>Lonh-bar</td>
<td>Lombard</td>
</tr>
<tr>
<td>Nombre</td>
<td>Nombh-br’</td>
<td>Number</td>
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<tr>
<td>Plomb</td>
<td>Plomb</td>
<td>Lead (a metal), Trumpet</td>
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<tr>
<td>Trommette</td>
<td>Troh-pett</td>
<td>Trompet</td>
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<tr>
<th>FRENCH</th>
<th>PRONUNCIATION</th>
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<tr>
<td>Box</td>
<td>Bonh</td>
<td>Good</td>
</tr>
<tr>
<td>Canton</td>
<td>Kahn-toun</td>
<td>Canton</td>
</tr>
<tr>
<td>Done</td>
<td>Donh</td>
<td>Then</td>
</tr>
<tr>
<td>Longtemps</td>
<td>Lonh-taunh</td>
<td>A great while</td>
</tr>
<tr>
<td>Maison</td>
<td>May-roux</td>
<td>House</td>
</tr>
<tr>
<td>Mon</td>
<td>Monh</td>
<td>Mine</td>
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<tr>
<td>Raison</td>
<td>Ray-roux</td>
<td>Reason</td>
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<tr>
<td>Repondit</td>
<td>Ray-pouh-loe</td>
<td>Replied</td>
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76. The French word monsieur is pronounced by foreigners all sorts of ways, except the right way, in common conversation. The author knows of no one French word so much in use by those who speak the English language as this, and yet pronounced so variously and incorrectly. Let us analyze this word, and, if possible, set forth its correct sound.

Remember, then, that the n and r of the word monsieur are
always silent; the n is silent by the rule of custom, and the r is silent according to the general rule which obtains concerning final consonants.

Take out of the word the letters n and r, and we have mosieu.

Divide it now into syllables, and we have mo- and sieu. In the first syllable the o is short, like the letter o in the English word not, therefore the pronunciation of the first syllable, mo, is easily ascertained. But in the second and last syllable, sieu, we have a diphthong of three successive vowels, viz., ieu, divided thus, but pronounced as one syllable, preserving the sounds of both divisions. The sound of i is short, like i in the English word fig, and the sound of e is exactly like e mute or unaccented.

These are the elements of the different sounds in the French word monsieur, and are thus pronounced, viz., mo-sieu, or mo-siuh.

Sometimes it is pronounced mo-siuh, but incorrectly, because the Parisian critic and scholar gives it but one s, and that at the beginning of the second syllable.

Hence it will be perceived that it is simply ridiculous to pronounce this word mon-sier or mon-sieu. The on in this word is not a nasal, because the n is silent. The i is not long, and cannot be illustrated by ei, but is short, as above explained.

77. We now proceed to examples in which the nasal vowel sounds wns and ws are found.

UM.

French.
Hambrecht.
Parfum.

Pronunciation.
Un-bl-maun.
Par-fun.

English.
Humbly.
Perfume.

The following are exceptions to the above illustrated pronunciation, viz.

French.
Lumbago.
Rum, Bhum, and Rumb.
Umlle.

Pronunciation.
Lo-n-bag-o.
Rum.
Oun-bl.

English.
Lumbago.
Rum.
Uh-mer.

The following are exceptions to the above illustrated pronunciation, viz.

Nunepatif.
Nom-de-nal.

Nunepatift.
Nom-de-nal.

78. Ym and ys are now very seldom found in the French language; they are, however, pronounced like um and us, which have been already illustrated.

NASAL DIPHTHONGAL SOUNDS.

79. There are seven nasal diphthongal combinations, and they are thus divided and pronounced, viz.:—

fan divided into i-an and pronounced ean.
fon " e-on " ean.
man " u-an " un or wahn.
un " u-in " un or wahn.
ouan " ou-an " oan or wahn.
oul " ou-in " oan or wahn.

SECTION XXVI.—PLACE OF THE PRONOUNS.

1. The personal pronoun used as the direct [§ 2 (3), § 42 (4)] object of a verb, is in French placed before the verb, except in the second person singular or in the first and second persons plural of the imperative used affirmatively.

Il me voit, il l’aime, He sees me, he loves him.
Il nous aime, il vous aime, He loves us, he loves you.

2. The personal pronoun representing the indirect object of the verb [§ 2 (3), § 42 (5)] answering to the dative of the Latin, and to the indirect object of the English with the preposition to expressed or understood, is also in French placed before the

Il me parle, il lui parle,
Il nous donne une fleur,
Il vous parle, il leur parle,
He speaks to me, he speaks to him.
He gives us a flower.
He speaks to you, he speaks to them.

3. The personal pronoun is generally placed after the following verbs: aller, to go; accourir, to run to; courir, to run; venir, to come; penser à, songer à, to think of.

Il vient à moi,
Il pense à vous, à eux,
He comes to me.
Their thanks of you, of them.

4. In the imperative used affirmatively, the pronouns follow the verb.

Alnez-les, parlez-leur,
Lose them, speak to them.

5. The words en and y follow the above rules, except the third.

J’en parle, j’y pense,
I speak of it, I think of it.

6. The pronoun used as the indirect object of a verb, answering to the genitive or ablative of the Latin, and to the indirect object which in English is separated from the verb by a preposition other than to, is in French always placed after the verb.

Je parle de lui, d’elle, d’eux,
I speak of him, of her, of them.

7. All pronouns used as objects of verbs must be repeated.

Je les aime, je les respecte, je les I love them, respect, and honour

VOCABULARY.

Affaire, f. affair.
Arbre, m. tree.
Avis, m. advice.
Cerisier, m. cherry-tree.
Communiquer, l. to communicate.
Compagnon, m., companion.
Compagnie, f. company.
Pense-er, l. to think.
Poiutier, m. pear-tree.
Pommier, m. apple-tree.
Respect, l. respect.

EXERCISE 47.


EXERCISE 48.

1. When are you going to write to your brother? 2. I am going to write to him to-morrow morning.

3. Do you intend to write to him every Monday? 4. I intend to write to him every Tuesday.

5. Do you wish to speak to him today? 6. I do wish to speak to him, but he is not here.

7. Where is he? 8. He is at his house.


* The preposition to is understood. He gives a flower to us.
THE POPULAR EDUCATOR.

Yes, Sir, I speak to them about (de) this affair. 11. Do they give you good advice? 12. They give me good advice and good examples. 13. Do you go to your sister every day? 14. I go to her every morning at a quarter before nine. 15. Does she like to see (voir) you? 16. She likes to see me, and she receives me well. 17. Do you think of this affair? 18. I think of it the whole day. 19. Do you speak of it with (avec) your brother? 20. We speak of it often. Do you send your companion to buy them? 21. I send him every day. 22. Are you at home every day? 23. I am there every morning at ten o'clock. 24. Do you like to go to church? 25. I like to go there every Sunday with a companion. 26. Do you speak of your houses? 28. I speak of them (en). 29. Does your brother speak of his friends? 30. Yes, Sir, he speaks of them (d'eux). 31. Does he think of them? 32. Yes, Sir, he thinks of them (à eux). 33. Does he think of this news? 34. Yes, Sir, he thinks of it (y). 35. I love and honor them.

SECTION XXVII.—RESPECTIVE PLACE OF THE PRONOUNS.

1. When two pronouns occur, one used as a direct object of the verb (accusative), and the other as the indirect object (dative), the indirect object, if not in the third person singular or plural, must precede the direct object [§ 101 (1)].

Je vous donne, I give it to you.
Il nous donne, He gives it to us.

2. When the pronoun used as an indirect object [dative, Sect. XXV, 2] is in the third person singular or plural, it must be placed after the direct object [§ 101 (2)].

Nous le lui donnons, We give it to him.
Nous le lui donnant, We give it to him.

3. The above rules of precedence apply also to the imperative used negatively:

Ne nous le donne pas (R. 1), Do not give it to us.
Ne le lui donnez pas (3, 2), Do not give it to him.

4. With the imperative used affirmatively, the direct object precedes in all cases the indirect object [§ 101 (5)].

Donnez-le-nous, Give it to us.
Montrez-le-leur, Show it to them.

5. En and y always follow the pronouns:

Je lui en donne, I give it to him.
Il nous y envoie, He sends it to us.

6. PRESENT OF THE INDICATIVE OF THE VERB.

Vous, to see.
Je vois, I see; do, see, or am seeing.
Tu vois.
Il voit.

Nous voyons.
Vous voyez.
Ils voient.

7. The above verbs take no preposition before another verb.

The preposition pour is used to render the preposition to, when the latter makes no sense in order to:

Je vais chez vous pour parler à vous, I go to your house to speak to you.
J'ai besoin d'argent pour acheter des marchandises, I want money to (in order to) buy goods.

RéSUMÉ OF EXAMPLES.

Voulez-vous nous le donner? Will you give it to us?
Je veux le prêter. I will lend it to you.
Vous voulez me donner? Can you give it to me?
Je ne vous ne pas donner. I cannot give it to you.
Votre frère peut-il le lui envoyer? Can your brother send it to him?
Il ne veut pas lui envoyer. He will not send it to him.
Qui veut le leur prêter? Who will lend it to them?
Pouvez-vous ne pas leur prêter. No one will lend it to them.

Envoyez-nous-le, Send it to us.
Ne nous en envoyez pas. Do not send it to us.
Donnez-nous-en, Give us some (of it).
Vous les envoyez pas. Do not send them to us.
Envoyez-le-leur, Send it to them (in order to), to satisfy them.
Je vous l'envoye. I can send it to you there.

* After the verbs pouvoir, to be able; ceur, to dare; savoir, to know, the negative pas may be omitted.

VOCABULARY.

Givre, but little.
Marchande de modes, draper.
Préfet, 1, to lend.
Prêt, 1, to lend.
Semaine, 1, week.
Souvent, often.
Voyage, 1, journey.

EXERCISE 49.


Avez-vous peur de nous les prêter? 8. Je n'ai pas peur de vous les prêter.


Voulez-vous leur parler? 12. Je veux leur en parler, si je ne l'oublie pas.


EXERCISE 50.

1. Will you send us that letter? 2. I will send it to you, if you will read it. 3. I will read it if (si) I can. 4. Can you lend me your pen? 5. I can lend it to you, if you will take care of it. (Sect. XXI, 3.) 6. May I speak to your father? 7. You may speak to him, he is here. 8. Are you afraid of forgetting it? (Sect. XX, 4.) 9. I am not afraid of forgetting it. 10. Will you send them to him? 11. I intend to send them to him, if I have time. 12. Do you speak to him of your journey? 13. I speak of him of my journey. 14. I speak to them of it. 15. Can you communicate it to him? 16. I have a wish to communicate it to him. 17. Do you see your acquaintances every Monday? 18. I see them every Monday and every Thursday. 19. Where do you intend to see them? 20. I intend to see them at your brother's and at your sister's. 21. Can you send him there every day? 22. I can send him there every Monday, if he wishes (s'il veu lo). 23. Can you give them to me? 24. I can give them to you.

25. Who will lend them books? 26. No one will lend them any. 27. Your bookseller is willing to sell them good books and good paper. 28. Is he at home? 29. He is at his brother's. 30. Are you wrong to pay your debts? 31. I am right to pay them. 32. Will you send it to us? 33. I am willing to send it to you, if you want it. 34. Are you willing to give them to us? 35. We are willing to give them to you.

HISTORIC SKETCHES.—VIII.

THE GORDON RIOTS.

"My Lord George, do you really mean to bring your rashly adherents into the House of Commons? If you do, the first man of them that enters I will plunge my sword, not into his body, but into yours." Strong language, certainly, especially for the House of Commons, and yet never was speech spoken more earnestly or significantly than this, and the unusual character of it passed without rebuke from the Speaker. The person addressed was Lord George Gordon, the man who addressed him was his own kinsman, Colonel Murray; the date of the speech was Friday, the 2nd June, 1780, and the occasion on which it was delivered will be set forth in the following sketch.

... a week after the death of Henry VIII., in 1547, the policy or impolicy, the religious zeal or the intolerant spirit—which you will—of the English Government, deemed it necessary that those who lately had been subject to systematic persecution for their religious opinions should change places with their persecutors. Laws of the most stringent kind were passed by the Protestant king, Edward VI., against Papists, as the professors of the Roman Catholic faith were then commonly called, and by them was made an offence punishable with heavy fine and imprisonment, and in certain cases capital, for a man to hold the faith in
which he had been educated. Queen Mary, in 1553, repealed these laws, but they were re-enacted with fresh rigours by Elizabeth when she came to the throne in 1558. At these times these laws were made, it was not contemplated that there could be a dissociated Church of England, but when the Puritans arose—the men who fought the battle of religious and political freedom against a Tudor queen, and against all the Stuart kings—Fresh laws were framed to check them, and fetters the most oppressive and the most harassing were forged for them as they had been forged for the Roman Catholics. Every one within the realm was ordered to go to church on Sunday, or to be fined twelvepence. The penalty was equal to two days’ wages to a labouring man—and those who did not go for a month were fined £20. Subsequently, in the reign of Charles II. (1660-1685), it was ordered that no one should be admitted to office in any corporate town who had not within a year previously taken the Lord’s Supper according to the rites of the Church of England, and certain oaths were prescribed to persons elected which no Romanist could take. The Book of Common Prayer was ordered to be used in every place for public worship, and no one was allowed to be a schoolmaster, or to have anything to do with the instruction of youth (dancing, for instance), unless he had signed a declaration of conformity to the Liturgy. Meetings of more than five persons for the purpose of worshipping God otherwise than by using the Prayer Book were liable to be broken up by force, and the persons fined. The Test Act, passed in the twenty-fifth year of Charles II., required all civil and military officers, and all persons in the service of the Crown, to take the oaths of allegiance and supremacy, to declare their disbelief in the doctrine of transubstantiation, and to receive the sacrament in the Church of England; and another law of the same kind forbade any one to sit in Parliament or to vote for a member until he had taken such oaths as no Romanist could possibly take.

William and Mary (1688-1702) assented to a law granting Protestant dissenters the right of meeting for public worship if the place of meeting were duly registered; but the laws which gave this and certain other privileges to Protestants, warded yet closer the rivets of intolerance on the unfortunate Catholics, who were still forbidden to meet, or to celebrate the Mass. Statutes of George I. (1714-1727) and George II. (1727-1760) confirmed the odious Test Act, and extended it. Not only were all persons in the Church, and all persons in public posts still compelled to descerate the sacrament of the Lord’s Supper, and to take startling oaths, but all ecclesiastical and collegiate persons, all preachers, teachers, schoolmasters, lawyers, and high constables were compelled, under pain of deprivation, fine, and forfeiture, to take the oaths of supremacy and allegiance, and to abjure the Pope and the Pretender.

In 1779, the year before the words at the beginning of this article were spoken, an Act was passed relieving the Protestant dissenters from almost all their disabilities, those created by the Test Act and Corporation Act excepted. But the people thus enfranchised could not bear that a slight concession made the year before to Romanists, and allowing them to meet for worship under certain restrictions, should remain unrepealed. It was not enough that the Romanists should be shut out from every post of every kind in the public service, that he should be precluded from getting a living by instructing in any branch of knowledge, and that he should be unable to practise at the bar; the lately persecuted felt they could not enjoy their freedom if their fellow-sufferers by the law were also relieved, though only in part.

A number of organisations, calling themselves Protestant Associations, had been formed in England and Scotland for the purpose of obtaining the removal of disabilities from Protestant dissenters. They chose Lord George Gordon for their chief, and had they searched the whole country over they could not have found a representative more thoroughly unsuited to guide them to their legitimate aspirations, though it must be confessed there was no fitter incarnation of their weaknesses and their folly. They were ingrateful at the slightest concession given to their fellow-Christians, and they resolved, if possible, to procure the repeal of it, and if that was not to be, then they would do whatever their too ready hands might find to do. At the suggestions of Lord George, petitions were got up and numerously signed, begging the Legislature to deliver the land from the guilt of allowing certain of the inhabitants to pray together! Every means were taken to make the petition from the Protestants of London a "monster petition." Advertisements were issued, speeches were made to inflame the public mind, and petitions were not wanting to induce the people to add their names.

Towards the end of May, 1780, a crowded meeting was held in Coachmakers’ Hall, where Lord George spoke at length, addressing the people in a highly inflammatory harangue. He promised to present their petition to the House of Commons, of which he was a member, if they would attend him with not less than 20,000 persons, on the 2nd June. Resolutions were passed pledging the Association to meet with as many friends as they could muster on that day in St. George’s Fields; and in order the better to distinguish those of the "true Protestant" party, it was agreed that the petitioners and their friends should wear blue cockades in their hats.

On Friday, the 2nd of June, Lord George Gordon met his followers; some 60,000 strong, in St. George’s Fields, and after addressing them in a foolisb speech, full of intolerant and seditious and treasonable words, march to Westminster Bridge, up Fleet Street and the Strand to Palace Yard, of which they took rictious possession. The Houses had not yet met when the processionists arrived; there were not any police to keep order, and the troops had not any instructions.

Very soon the disposition of the assemblage was apparent. Thousands had only availed themselves of the Protestants’ petition to indulge their natural instincts to commit robbery and violence, and to make the stage of the House of Commons a place of blood. The commoners, who had been met by the House with a milder reception, began to arrive, these persons commenced to be natural. Earl Mansfield, one of the most upright and able Chief Justices England ever had, had agreed to preside over the House of Lords instead of Lord Chancellor Thurlow, who was ill at Tumbridge. As soon as his carriage came into Palace Yard it was attacked, the windows were broken, the legs of the coach were shot, the door was forced open, and was forced open, a man with difficulty escaped into the House, torn robes and bleeding face, no wig. The Archbishop of York was subjected to like violence, and the Bishop of Lincoln, whose carriage was literally demolished, was taken fainting into a house, whence he escaped in disguise over the leads. The Duke of Northumberland was pulled out of his carriage and robbed of purse and watch; the Lord President of the Council and other peers were also so roughly handled that they could hardly get into Westminster Hall. The Lords continued to arrive, and business commenced; but little progress, had been made when Lord Montfort rushed in to say that Lord Boston was in the hands of the mob, and in imminent danger of his life. One who was present says:—"At this instant it is hardly possible to conceive a more grotesque appearance than the House exhibited. Some of their lordships with their hair about their shoulders; others with their hats knocked off by the mob; some with the blood of a ghastly in ‘Hamlet;’ and all of them standing up in their several places, and speaking at the same instant. One lord proposing to send for the Guards, another for the justices or civil magistrates, many crying out, ‘Adjourn, adjourn!’ while the skies resounded with the huzza’s, shoutings, or hootings in Palace Yard.”

Lord Boston escaped from the crowd just as the House of Lords were proposing to go out and rescue him; but it being impossible to go on with business, the House adjourned at eight o’clock, and its members managed to get away unperceived by side ways and passages.

Some 200 members of the House of Commons assembled, but the noise of the Protestant rioters almost drowned their voices in debate. Lord George Gordon presented the monster petition, and moved that the House should consider it in committee forthwith. An amendment was moved that it should not be considered till the 6th instant (four days on), but the sense of the House could not be taken, because the rioters had...
possession of the lobbies, whence they kept up a cry of "No Popery!" "Repeal, Repeal!" Lord George constantly went out to encourage the people to persevere, bade them keep up the demonstration, and compel the House to listen to them at once. The uproar was tremendous. Within the House there was wisdom and dignity, and some anger. One member was for sending Lord George Gordon instantly to Newgate, others were for refusing to consider anything in connection with the petition while the House was under intimidation, and Colonel Murray, when the rioters were actually knocking at the door of the House, addressed to his kinsman the words which are spoken at the head of this story. Lord George, the Prime Minister, sat calmly in his place, and by his conduct succeeded in infusing a spirit of confidence into the wavering members. Privately he sent for a detachment of the Guards, and these coming about nine o'clock in the evening, the rioters dispersed, the House divided, and rejecting Lord George's motion, adjourned till June the 6th.

With the exception of the burning of the chapels of the Papist and Sardinian ministers, which were utterly destroyed, no great damage was done by the rioters in London that night. The magistrates thought the disturbances were over, but on Sunday, June the 4th, the Roman Catholic chapels in Moorfields, and the houses belonging to Romanists in that district, were attacked and gutted. Next day the like fate befell the chapels and houses of the obnoxious religions in other counties. On the following day, the nonconformists, being, by the act of authority, resolved to attack the house of Sir George Savile, who originated the slight measure of toleration which had been granted to the Catholics. Savile House—in Leicester Fields, now Leicester Square—was accordingly besieged, carried by storm, and destroyed with all that was in it.

On June the 6th the House of Commons met under the protection of a body of soldiers, and Lord George Gordon appeared with another company of soldiers in his hat. Col. who, Herbert drew the attention of the House to the cockpit, and recommended Lord George to remove it, adding that if he did not he (Colonel Herbert) would step across the House and remove it for him, upon which Lord George put the obnoxious sign into his pocket. While the debate was going on, a mob attacked the official residence of the Prime Minister in Downing Street, but the rioters were dispersed. Lord George'satts. The afternoon a vast multitude assembled before Newgate, and demanded the release of their friends who had been committed a few days before. The demand being refused by the governor, an attack was made on the gaol; fire and levers, pickaxes and crowbars were freely applied, and in the course of a few hours the prison, which had lately been rebuilt at great cost, was a smoking ruin. In the possession of the story was being left. The liberated prisoners increased the number and audacity of the mob, who proceeded to break open the prison at Clerkenwell, and to liberate the prisoners there; and the houses of several obnoxious persons were destroyed in open day. Towards night, however, the mob, drunk with success and with liquor also, grew bolder. At midnight they congregated in front of Lord Mansfield's house, in Bloomsbury Square, and burned it with its contents, including a library of inestimable value, and a priceless collection of materials for history. Lord and Lady Mansfield escaped by a side entrance.

From six-and-thirty different places the fire and smoke went up, promoted by the efforts of incendiaries; but for magnitude, perhaps, the worst fire was that which finally caused the Government to act decisively against the offenders—the fire at the distillery at Halesowen. The distillery took 8½ hours. Mr. Langdale, a Roman Catholic, and this fact, coupled with the attraction caused by the stores of spirit, was sufficient to draw the attention of the rioters. The place was sacked and then fired. Hundreds of drunken wretches perished in the flames, the gin ran down the gutters in a blaze, and the flames from the burning premises lighted the sky over all London.

The mob were then ordered by troops to be dispersed whether by doing, even at the bidding of a magistrate, they did not render themselves liable to prosecution for murder. But the danger increased. The king, in council, had the question of military interference debated, and upon the Attorney-General giving it as his opinion that under the circumstances which then existed the soldiers might legally be called upon to act, the king announced that there was at least one magistrate (meaning himself) in the country who was determined to do his duty. Soldiers were forthwith ordered to take military possession of the town, and the instructions to their officers were that if the people did not disperse on being summoned, they should be fired upon.

Upon these orders the officers acted. Troops marched through the streets, and in some houses they were quartered as garrisons. Unhappily, the march of the soldiers was not unimpeded, though it can scarcely be said to have been resisted. The people would not disperse, the soldiers fired, and the garrisons were blown up. Two hundred persons were shot dead in the streets, besides those who, caught in the flames of the distillery, and 250 more were sent wounded to the hospitals. A few hours served to replace the authorities in possession of London, and "on the morning of Thursday, June the 8th, no truce was to be seen," says Lord Mahon (Earl Stanhope), of the recent tumults, beyond the smouldering ruins, the spots of blood upon the pavements, and the marks of stones upon the houses.

On Friday, June the 9th, Lord George Gordon was arrested and sent to the Tower, but subsequently escaped trial in consequence of some technical law in the legal proceedings. His followers were not so fortunate. Out of a large number condemned to death at the July Assizes, many experienced the king's mercy, but twenty-one were hanged for the part they had had in the Gordon Riots.

SYNOPSIS OF THE LIFE AND REIGN OF GEORGE III.

George III. was the son of Frederick, Prince of Wales, and the Princess Augusta of Saxo-Gotha. His father was the eldest son of George II. He was the thirty-second monarch of Great Britain and Ireland after the Norman Conquest, and the first of the Hanoverian Dynasty, or House of Brunswick. He married the Princess Charlotte of Mecklenburg, by whom he had nine sons and six daughters.

Born in London . June 4, 1738
Death of Frederick, Prince of Wales . May 2, 1751
Begun to reign . Oct. 25, 1760
Married . Sept. 8, 1761
Stamp Act for American Colonies . Oct. 27, 1765
Tax on Tea Imported into American Colonies enforced by Lord North . Aug. 8, 1770
Stamp Act repealed . April 5, 1772
Riot at Boston, American Colonists meet at Philadelphia . Nov. 20, 1773
Boston Port Bill passed . June 20, 1774
Declaration of Independence by the American Colonies . July 4, 1776
Death of Earl Chatham . May 11, 1782
"No Popery!" Riots . July 27, 1782
Siege of Gibraltar . July 27, 1782
Independence of the American Colonies acknowledged by Great Britain . Nov. 30, 1782
Peace of Versailles . March 13, 1783
William Pitt, Prime Minister . March 27, 1783
Warren Hastings impeached for his government in India . Jan. 1788
Temp. Insanity of the King . Oct. 18, 1788
Commencement of the French Revolution. Destruction of the Bastille . July 14, 1789
Louis XVI. of France and Marie Antoinette beheaded . Jan. 21, 1793
Declaration of War against England by the French Republic . Nov. 26, 1793
Lord Howe's Victory off Ushant . June 1, 1794
Partition of Poland . Sept. 23, 1795
War with Spain . July 19, 1796
Battle of Cape St. Vincent . Feb. 14, 1797
Suspension of Cash Payments . Feb. 25, 1797
Mutiny at the Nore, June, 1797
Battle of Camperdown, Oct. 11, 1797
Irish Rebellion commenced May 4, 1798
Battle of the Nile, Aug. 1, 1798
Capture of Seringapatam (India) May 4, 1799
Legislative Union of Great Britain and Ireland June 18, 1800
Bombardment of Copenhagen April 2, 1801
Peace of Amiens . Feb. 27, 1802
Renewal of War with France, Mar. 1, 1803
War with Spain . Jan. 2, 1804
Battle of Trafalgar and Death of Nelson . Oct. 21, 1805
Death of William Pitt Jan. 23, 1806
The "Delicate Investigation;" an Inquiry into charges against the Prince of Wales . Sept. 13, 1806
Death of Charles James Fox Sept. 13, 1806
Abolition of the Slave Trade procured by Wilberforce . Sept. 17, 1807
Peninsular War begins . Aug. 23, 1808
Battle of Vimeiro, Aug. 21, 1808
Convention of Cintra, Aug. 23, 1808
Battle of Corunna and Death of Jemmy, July 16, 1809
Riots and Arrest of Sir Francis Burdett, April 6, 1809
Battle of Talavera. July 27, 1809
Expedition to Walcheren Aug. 10, 1809
Battle of Busaco Sept. 27, 1810
Return of the Insanity of the King . Nov. 19, 1810.
LESSONS IN GEOMETRY.—VIII.

PROBLEM XVIII.—To draw a square upon a given straight line.

Let \( A \) be the given straight line upon which it is required to draw a square. By Problem III. (page 157), draw the straight line \( AB \) perpendicular to and therefore at right angles to \( A \) at \( B \) at its extremity \( A \), and set off along \( AB \) straight line \( A B \) equal to \( A B \). Then from the point \( C \) as a centre, with \( C B \) as radius, draw the arc \( A E D \), and from the point \( E \) as a centre, with the radius \( BA \), draw the arc \( A F D \), cutting the arc \( A E D \) in the point \( D \). Join \( D B \), \( D C \); the figure \( A C B D \) is a square, and it is described upon the straight line \( AB \) as required.

ANOTHER WAY.

Draw the straight line \( AB \) above, and set off \( A C \) equal to \( AB \). Then with the parallel ruler draw \( CD \) through the point \( C \) parallel to \( AB \), and \( BD \) through the point \( B \) parallel to \( AB \). The parallelogram \( ABED \) is a square, and it is described upon the given straight line \( AB \).

The angles at the four corners of a square are right angles, each containing 90 degrees. The diagonals which intersect each other at right angles in the point \( O \) bisect the angles at the corners, or divide them into two equal parts. The angles \( CAD \), \( DAB \) into which the right angle \( CAB \) is divided by the diagonal \( AD \), contain each of them 45 degrees. If the learner will carefully construct a square on a large scale, as in Fig. 25, he will find that the angles \( CAD \), \( DAB \) can be also divided into two equal angles by drawing straight lines from the point \( A \) through \( F \) and \( E \), the points in which the diagonal \( AD \) cuts the sides \( AB \), \( CD \). As \( A \), \( E \), \( D \), and as these angles each contain 45 degrees the angles \( CAF \), \( FAD \), \( GAE \), \( EAH \), each contain 22\(\frac{1}{2} \) degrees. Again, in the triangle \( AFE \), which is an insosceles triangle (see Definition 20, page 53) because the side \( AE \) is equal to the side \( AF \), the angle \( EAF \) contains 45 degrees. Now, if the angles of any triangle are equal to two right angles, or 180 degrees, the two angles \( AEF, EAF \) must together contain 180—45, or 135 degrees, and as these angles are subtended by equal sides, they are equal to one another, or, in other words, each contains 135\(\frac{1}{2} \) or 67\(\frac{1}{2} \) degrees. From this it is found that the angles of an insosceles triangle be known, we can easily determine how many degrees are contained by each of the remaining angles.

Also, if two angles of any triangle be known, the third can be determined by adding together the degrees contained in the known angles, and subtracting them from 180 degrees. For example, in the triangle \( ACF \) we know that the angle \( FAC \) contains 22\(\frac{1}{2} \) degrees, and the angle \( ACF \) 45 degrees; the angle \( AFC \) is therefore equal to 180 degrees, less 67\(\frac{1}{2} \) degrees, the sum of the degrees contained in the angles \( FAC, ACF, AFC \) or 112\(\frac{1}{2} \) degrees. The value of the angle \( AFC \) might also have been determined by subtracting the value of the angle \( ACF \) from 180 degrees, since by Theorem 3 (page 156) the angles \( AFC, ACF \) are equal to two right angles.

To construct a square, whose sides shall be of a given length, all that we have to do is to set off \( AB \) of the length required, and then proceed to form the square by the method of construction given above.

It will be a useful exercise for the learner to draw straight lines from the point \( D \) through the points \( E \) and \( F \), cutting the sides \( A \), \( B \), \( C \), \( D \) as the lines \( A \), \( F \) produced cut the sides \( B \), \( C \); and then determine the values of every angle he can find in the diagram thus formed from the method we have followed in the above remarks.

PROBLEM XIX.—To draw an equilateral triangle of a given altitude.

In Definition 24 (page 53) the learner was taught, that in any triangle a straight line drawn from the vertex of one of its angles, perpendicular to the opposite side or to that side produced, is called the perpendicular of the triangle. This straight line is also called the altitude of the triangle, from the Latin

ERRATUM.—In Lessons in Geometry VIII. (page 309), in Problem XIV. line 17, for "the square of the length b by the length of b," read "the square of the length a by the length of a."
altitude, height, because it shows the height of the top or vertex of the triangle from its base. In Fig. 24 (page 299), \( \triangle ABC \) is the altitude of the triangle \( \triangle ABC \), and \( \triangle DEF \) the altitude of the triangle \( \triangle ABC \). If, then, we have to determine the altitude of an equilateral triangle already drawn, as in the triangle \( \triangle ABC \) in the same figure, it is manifest that we have only to draw a straight line from the point where the given base is equal to the base \( \triangle ABC \), and join the point of bisection and the point \( C \), which is the top, vertex, or apex of the triangle.

But to proceed with the problem under consideration.

Let the straight line \( A \) represent the altitude of the equilateral triangle required. Draw any straight line \( BC \) of indefinite length, and from a point \( D \), taken as nearly as possible in the centre of the line, draw \( D E \) at right angles to \( BC \). Then, along the straight line \( D E \) set off \( DF \) equal to \( A \), from \( D \) as a centre with the distance \( DF \), describe the semicircle \( HDF \), cutting the straight line \( BC \) in the points \( G \) and \( H \). Then from \( G \) as centre with the distance \( GD \), describe the arc \( GL \), cutting the semicircle \( HDF \) in \( L \). Then, from \( H \) as centre with the distance \( HD \), describe the arc \( HK \), cutting the semicircle \( HDF \) in \( K \). Through \( F \) draw the straight line \( FK \) parallel to \( DF \), and the same thing, touching the arc \( D \), \( D K \) (see Problem \( \chi \), page 192), and through the points \( L \) and \( M \), draw the straight lines \( DN, DO \), meeting \( FK \) in \( N \) and \( O \). The triangle \( DNO \) is an equilateral triangle, having its altitude \( DF \) equal to the given altitude \( A \).

If we join \( LF \), the triangle \( DLF \) is an isosceles triangle, having the side \( DL \) equal to the side \( DF \). As the sides \( DL, DF \) are equal, the angles \( DFL \) and \( DFL \) are equal, and of these the angle \( DFL \) has been shown to be an angle of 75 degrees, and the angle \( NPL \) is equal to 90-75, or 15 degrees, since the angle \( NPD \) is a right angle, and \( LFD \) an angle of 75 degrees. Its value can also be found by subtracting the value of the angles \( NPL, NPL \) from 180, thus: 180 - (60+15) = 105 degrees.

Problem XX.—To draw an angle which shall contain a given number of degrees.

Although it is plain, from the preceding problems, that it is possible to draw many angles containing a given number of degrees without the aid of any instruments, except a pair of compasses and a ruler, it is necessary to resort to the protractor or scale of chords in drawing the great majority of angles when the extent of their opening is stated. The protractor has been described already (page 113). The scale of chords will be found on any "Plane Scale" of boxwood or ivory, sold by mathematical instrument makers, and consists of a line graduated or divided in such a manner as to show the opening of any angle from 1 degree to 90, in degrees only. The method of using the scale of chords is as follows:

On any straight line, \( XY \), set off a portion, \( AB \), equal to the opening of an angle of 60 degrees, as marked on the scale of chords. From the point \( A \) as a centre, with \( AB \) as radius, describe the arc \( BC \). Then, suppose it to be required to draw an angle of 40 degrees, apply the arc \( BC \) divided into nine (or ninety, if it be large enough) equal parts in the points \( a, b, c, d, e, f, g, h \). Then, set off one foot of the compasses at \( A \), draw arcs through the points \( a, b, c, d, e, f, g, h \), in succession, cutting the straight line \( AB \) in the points numbered 10, 20, 30, etc. The distances along \( AB \) intercepted between the extremity \( A \) and each arc in succession are respectively chords of angles of 10, 20, 30, 40, 50, 60, 70, 80, 90 degrees.
ANIMAL PHYSIOLOGY.—VIII.
THE ORGAN OF SMELL.—(concluded).

To us the sensations of smell are far less vivid and reliable than those of sight and hearing, or even those of touch and taste. This is shown by the fact, that the ideas which these sensations leave behind them are less distinct: the memory retains them

students in chemistry, will have been struck with the number of men whose sense of smell is imperfect and unreliable; and even those who think they have this sense unimpaired are often misled, from the fact that they are conscious of a sensation, not produced by odour, but which is, in fact, only the general sense of touch, common to the surface of the body, and only more acute in the delicate lining membrane of the nose. Such students can

for a shorter time, and will not reproduce them at will. Moreover, those sensations furnish but few starting-points for thought, or speculation, or reason to proceed from. We seldom employ the smell in investigation, unless it be upon objects which give no indication whatever to any of the other senses; and when we do so, we are not satisfied until we have other confirmatory evidence as to the nature of those objects. The chemist in the laboratory will make use of this sense, as a rough-and-ready method of detecting gases which cannot be otherwise easily dealt with, but he always confirms their presence by other tests if possible. Any one who has presided over the practical experiments of

detect pungent gases like ammonia and chlorine, but cannot distinguish between them, or between aromatic gases like alcohol and chloroform. On the whole, we make such little use of our organ of smell, its acuteness being as often an inconvenience as an advantage to us, that we endure the loss of this sense with more patience and with less sense of privation than that of any other. The estimate we form from experience of the comparatively small value of this sense, is apt to make us misjudge its importance to the lower animals. But if we imagine that the impressions which this sense brings to animals are as dull, indistinct, and unreliable to their consciousness as to ours, a little

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observation of the habits of animals will soon lead us to suspect one thing: The sense seems to be the keenest in the carnivora, and man is so sensible of his inferiority to these in the sense of smell, that he supplements his deficiency by their acuteness.

The little terrier will inform his master, the rat-catcher, if the rat is at home, by his impatient scratching at the mouth of the hole. The huntsman sees a fox cross an alley in a wood; heyward has gone he knows not whither, and has left no sign or track of the fox's presence. But a pointed, or if you will, a mustache-like, nose, will answer his purpose; and when motioned to the place he sniffs the ground in uncertainty, but for a moment, and then flings up his nose towards the sky, and with one long, melancholy howl makes his comrades of the pack, and, in almost less time than it takes to write it, they are all in full cry on the trail, making the echoes ring with their confident music. Who has not observed the pointer, as it follows the scent, the front part of the animal being very much less alert than Medusa's head when it turned to stone? Yet, if you mark him well, his whole frame is instinct with tremulous emotion; his eyes glister, and seem starting from his head; his nostrils twitch, and his limbs quake with excitement. The game lies hidden in deep cover; it is impossible for him to see it; but as you look at him you feel certain that he is as vividly conscious of its presence, as if his eye saw, or his foot were upon it.

We have seen, in writing of the other senses, that while beasts seem to have these in greater efficiency than men, this is because their attention is not abstracted from their indications, and not because the organ is any more perfect or elaborated in its structure; but in the case of the smell, a corresponding development and complication of structure accompanies a keener sense of its indications. The rabbit has nostrils and a sense of smell equal to that of the beast consists in the fact, that in the latter the brain and the brain-case—which it accurately fits—are much smaller; the jaws—and therefore the hollow of the mouth—are much larger and longer. Now, the nasal cavity which lies between these parts, in the beast, of the elongation of the jaws, and not of the curtailing of the brain. The nose is almost always at the end of the head, for the longer the nose the more there is to protrude. Under the brain, at the posterior part of their course, where they also begin to descend to enter the throat. Hence, instead of comparing the face to a three-storied house, as we did in speaking of the man, it should be compared to a two-storied shed, with a lean-to behind for the accommodation of the brain. The turbinated bones are, therefore, not so much one above as one behind the other, for the inferior bulb, being very much enlarged and contorted, or folded, so as to fill up the whole large chamber. This bone is very differently shaped in the different animals. In the sheep it arises by a broad plate, which runs inward from the outer wall of the nose, and then divides into two plates, both of which assume the form of scrolls, one curling upwards and the other downwards; and the number of turns of these scrolls is so great, that if a transverse section of the nose be made, the edge of the bone looks, on the one side, like the teeth of a saw, while on the other, the edges are removed by the inwards projection of the nose. This bone is called the olfactory, and it is the sense of smell that makes us to the surface over which the sense is as the half-moon, seen in the sky.

It will be seen that the design of all these structures, however different their form may be, is to increase the surface over which the pituitary membrane, as it is called, can be spread. Now, in man, the membrane of the lower scroll-bone is not so specially the seat of the organ of smell as of a refined and acute sense of touch; for the nerve which supplies it is not from the olfactory bulb, but from the fifth pair of nerves. It is this nerve which is excited by the application of snuff, so that the snuff does not act as an odour, but as an irritant, and the pleasure may be compared, by those who do not appreciate it, to the pleasure of scratching in other parts of the body. In beasts, however, the nasal branch from the fifth pair of nerves would seem to be a nerve of special sense; and, besides this, since the turbinated bones are not one above, but one behind the other, the air passes successively over them, instead of below the ethmo, or upper turbinated bones, as in man.

Perhaps it is not out of place here to remark upon some functions discharged by the nose, which are not olfactory. In the porpoise the brain has no olfactory lobe, and there are no olfactory nerves; and therefore the nasal passages are made subservient to the supply of the lungs with air. A reference to the engraving will show how the canal from the slit-like opening at the top of the head passes down past a valve, which closes it against the water when the animal is submerged, and then onward to the head of the windpipe, which here does not open into that of the esophagus (or food-trough), but is continued up, and thrust into, the nasal canal, while the mean, flat muscles of the soft palate and food-trough grasp it firmly. If the animal chooses, however, he can force the water from his mouth past this perforated plug, and make it issue in a stream from the blow-hole. Though the function of smelling seems to be thus entirely sacrificed to other uses, in the nose of the whale and porpoise, it will be seen from the engraving that an osiride leaden covering (or, as it is called, the stomodeum) is provided, which is covered by a disc-shaped plug. Through this organ, no doubt, the porpoise can test the purity of the water in which it is immersed.

The hog uses his disc-shaped snout to turn up the earth, and the tapir curls his flexible nose round the grass to tear it up; but these slight differences from the usual development of the organ sink into insignificance beside the enormously elongated trunk of the elephant. In this beast, the two narrow tubes into which the nasal chambers are continued forward, run to the very end of the organ, where there is, on the upper side, a finger, which seems to be as serviceable as any of our own. Strong bundles of muscles run along the trunk on all sides, and radiating one pass between the object, so that the beast can move his trunk in any one of them, round any way you please.

In birds the sense of smell is by no means so efficient as in mammals. This we may pronounce with certainty, because not only is the organ, and its accessory apparatus, less developed, but the habits of birds indicate that they are but little guided by the sense of smell. Raptorial birds, like flesh-eating animals, have better-developed olfactory organs than grain-eating fowls. The nostrils of these birds are much more elongated, even to the extremity of that of the turkey, although the carrion-feeding bird (first-named) does not exceed the other in weight; but it would seem that this sense in the vulture and condor is only useful to them in selecting while at their meal, and does not guide them to the meal itself. A number of confined condors had some streaks of flesh, wrapped in paper, placed before them, but they would not touch them. In our owls, when hunting, the paper was removed, they were seen tumbling over one another in their eagerness to snatch the food.

The general peculiarities of the organ of smell of birds are the following:—The nerve leaves the skull by one hole, and not through many, as in beasts; the membrane to which the nerve of smell goes is confined to the base of the beak, and the outer nostrils are not at the end, but at its sides or base; and though those at the sides are flattened, yet the membrane for the nasal cavity is of great size, and many nerves arise from it, which pass to the membrane. These peculiarities indicate greater acuteness in the sense of smell; and this is thought to be associated with its habit of probing among loose earth, to hunt for worms, by scenting them.

In the pelican there are no external nostrils whatever; and this, is, doubt, reasonably accounted for by the fact that this bird fishes under water with its long bill, and detains its prey by the floor of its expanse. The peculiarities indicate greater acuteness in the sense of smell; and this is thought to be associated with its habit of probing among loose earth, to hunt for worms, by scenting them.

In the higher reptiles, the internal organ is very like that of birds; but in some the nostrils are wide apart, and in others, as in all the crocodiles, they are united into one, which in the true crocodile of the Nile is shaped like a half-moon, and closed by a valve from behind; and in the gavial, or slender-snouted crocodile of the Ganges, the skin round the nostril can be raised so as to allow it to be just lifted above the surface, while the
rest of the animal is concealed. In both cases the nostril is placed at the tip of the snout, for reasons which those who have read the lessons on the ear will understand. Space fails to write of the organ in the serpent, the frog, and the siren; but, in passing on to describe it as it occurs in the fish, it should be remarked, that in all the foregoing animals there is a communication between this organ and the air-passage to the lungs.

The position of these blind nostrils, as they are called, are, as we have seen, very various. In some cases, they open just behind the teeth, as in the toad; and in others, far back in the alimentary canal. They are sometimes double, and sometimes single; but they are always present: and consequently these animals all breathe naturally through the nose: and for this reason it has been difficult to discuss the function of smell without trenching on the function of respiration. In fish, on the contrary, there are no lungs; and therefore the hind outlet of the nose is not present, and the organ is solely an organ of smell.

Its usual form is that of a roundish sac, opening on the side of the muzzle by one or two external holes. The sac is either round, in which case a column of cartilage rises in the centre, and radiating folds run from this to the circumference; or elongated, when a bar of cartilage runs across it; and on each side of this plate pass off to the sides; and these secondary plates at their middle portion are elongated into flaps, which float freely in the water of the sac. An example of the first form is seen in the sturgeon, and of the last in the ray and dog-fish. In the drawing of the dog-fish, one sac is represented with a fore-and-aft flap to the nostril, the fore-flap being pulled forward by two threads, so as to dispose the interior; while, on the other side, these flaps have been wholly removed, to expose the organ. These cartilaginous flaps are moved by proper muscles, so that they may in the sacs be rapidly changed by their action; hence these fish have been said not only to smell, but to scent their prey. In the lamprey, or nine-eyed eel, the nasal sac is single, and in the middle line above the head.

In the nautilus, Professor Owen has detected an organ of smell; and the pretty little organs which are thrust up from the back of the naked sea-eels are considered to be of the same nature. We have already pointed out the organ in the lobster; but when the sense resides in insects is yet unknown.

Notwithstanding these difficulties and uncertainties, it is hoped that it has been shown that there is sufficient evidence of contrivance in the nasal organ in the animal kingdom, to make us exclaim with David, "How wonderful are thy thoughts! how great is the sum of them!"

LESSONS IN GERMAN.—XVI.

SECTION XXIX.—POSITION OF THE VERB, ETC.

When for the sake of emphasis a word (which is not the subject) is placed at the beginning of a principal sentence, or if a subordinate sentence precedes the principal sentence, the subject is placed after the finite verb (a present or imperfect), as—Das ist der Sturm, there goes your friend. Der ist kein Reuter, here stands his brother. Zu lange fährt das Schiff, too long already hast thou slumbered. Zu weit muß gehe, now I must go. Wir haben heute Nacht die Freude getan, regattas etc. etc. got start, when I returned home yesterday, it was raining very hard. Denkt Programm und verehrt, we will not, he cannot realize your program and to-morrow he will not realize. Der Schepper hat mich geschnellt, the boatman has rowed me rapidly. When transitive, it is conjugated with haben (§ 71.1), and signifies to convey in a vehicle, to drive, as—Der Schepper hat mich geschnellt, the coachman has driven me rapidly. Der Schepper hat mich geschnellt, the boatman has rowed me rapidly. When intransitive, it is conjugated with sein (§ 71.1), and signifies to ride in a vehicle, as—Ich bin geschnellt, I have ridden (in a carriage, boat, or other vehicle).

2. Reiten is also used transversely and intransitively, and signifies to ride, as on horseback, as—Der Reiter reitet das Pferd und das Reiten, the Arabian rides the horse and the camel. Ich habe ein Reitgesellschaft, I have ridden a fleet horse. When used intransitively (§ 71.1), it is conjugated with sein, as—Es ist seine Pferd geschnitten, he has ridden (on horseback) very rapidly.

VOCABULARY.


RéSUMé OF EXAMPLES.

Das ist das erste Mal, und hier fällt ihnen wieder a rose blossoms, and here falls off.

Hier steht der Junge, and der Herr stands the youth, and Unterhändler the aged man.

Morgen verläßt das neue Pumpwerk—To-morrow the new steamboat leaves.

Junge, fährt zu kreatam, too long already hast thou delayed to redeem the lost time.

Es muß ich einen Brief schreiben. I must now close my letter.

Sehr kann er nicht frey sein, and To-day he cannot be joyful, and morgen nicht laden. Ersparst. to-morrow not laugh. Adage. 

Exercise 50.


Exercise 51.

1. It is too cold for him to-day to go over to Frankfort. 2. There runs the hare over the hill. 3. There drives your brother. 4. The confectioner is gone to the bakehouse in order to bake bread. 5. The butcher goes to market in order to buy sheep. 6. Your coachman has driven me rapidly here. 7. Do you see that man upon that horse which we saw yesterday? 8. The soldiers ride on beautiful horses. 9. They say one rides in those carriages comfortably. 10. We have ridden in your coach to pay our visits. 11. Tread not beyond the law! 12. The new steamboat passes down the river to-day for the first time.

SECTION XXX.—COMPARISON OF ADJECTIVES.

German adjectives are compared by suffixing to the simple form of the positive, er for the comparative, and ist for the superlative; thus, positive mit (mild), comparative mit-er (milder), superlative mit-est (mildest). (See §§ 3, 4, 5.)

1. When the positive ends in c, etc., or er, the c of this termination is, in the comparative, omitted, as—c etc., der noble, etc. (nobler). It may be here remarked, that adjectives of this class add for the superlative a only; thus, etc., der, etc. (nobler). Adjectives, when compared, are commonly contracted when euphony admits.

Adjectives in the comparative and superlative are subject to the same rules of inflection as when in the positive degree (§ 37.1.)

* The disposition to contract two concurrent syllables attains a permanence in almost every language. Thus, in English, we have examples for reference: rendezvous for rendez-vous, rope for rope, etc. So hoped, preserved, etc. Words containing each two syllables, are pronounced as though consisting of but one. This is a serious difficulty in the way of foreigners learning our language, but one which in the German, by a conformity of orthography to pronunciation, is entirely avoided.
INFLUENCE OF THE ADJECTIVE IN THE COMPARATIVE AFTER THE OLD DECLENSION.

Masculine. Feminine. Neuter.
A. Der schöne, sie schöne, es schön, beautiful.
B. Der schönere, sie schöner, es schöner, better.
C. Der schönsten, sie schönst, es schönst, best.

INFLUENCE OF THE NEW DECLENSION.

Masculine. Feminine. Neuter.
A. Der schöne, sie schöne, es schön, beautiful.
B. Der schönester, sie schönste, es schönste, best.

INFLUENCE OF THE SUPERLATIVE AFTER THE NEW DECLENSION.

Masculine. Feminine. Neuter.
A. Der schönsten, sie schönsten, es schönsten, best.
B. Der schönstesten, sie schönstesten, es schönstesten, best.

2. Superlatives of the Old Declension are used only in address, as:—Guter Bruder, greatest brother. Dearest Mother. Best Friends, nearest friends, etc. (§ 37. 2.)

3. The Old form of the superlative is rarely used; the article (when English) always preceding it, as:—Mein Gut ist der schönste, my best is the finest. Instead of the round form, the dative of the New Declension, preceded by the article *am*, contracted from *an* a men, is often used, as:—Mein Gut ist am schönsten. (See § 38. 1, etc.)

The adverb *meist*, like its English equivalent (more), is likewise employed in the comparison of adjectives, as:—Sie ist meist freundschaftig, she is more amiable than beautiful. (See § 43. 1, etc.)

Adjectives of all degrees of comparison may in the simple and absolute form be employed as adverbs; but when the superlative is so used, the form produced by the union of am with the dative is adopted, as:—Er schreibt schön, he writes beautifully.

3. Der schönste, als ich, he reads more rapidly than I. Sie liebt am schönsten, she reads the most rapidly. (§ 106.)

5. Adjectives, when used as adverbs, are compared in the like manner, as:—Geleistet (learned), geleisteter (more learned), geleistetst (most learned); rührend (affecting), rührender (more affecting), rührenderst (most affecting).

6. As or or so, in phrases like the following, is answered in English by "*the more;*" thus, *as mehr je munterer, the more the merrier.* *As meist, as the more, the better.* *As or so, the more or so, as:—Er ist bald fest, he is soon enough; je voller der Knabe, je öfter er is, the more perfect a work is, the more useful it is.

7. This is likewise used without, as:—Er ist braun von schöner, thrornup he ran the faster. Er wäre nun teils unfreund- samen zu, he listened now the more attentively.

8. The following adjectives are irregular in comparison (see § 39—)

Out, good; beter, better; *better or am besten, best.*

Seem, high; höher, higher; *höher or am höchsten, highest.*

Näher, nearer, nearst; *näher or am nächsten, nearest.*

Mehr, more; *mehr or am meisten, most.*

weniger, little; weniger, least or *weniger or am wenigst, least or or few; or fewer; or leastest.*

Vocabulary.

Blume, f. flower. Blumen, n. flowers.
Buche, f. beech. Büchen, n. beeches.
Dicht, thick, stout, cor-

palulent. Dichter, m. poet.
Grüne, f. oak. Grünen, n. oaks.

Jungling, m. youth. Junglinge, n. youths.
Lust, f. air, atmosphere. Lustigkeit, n. joy.
Stimmung, m. custom. Stimmungen, n. moods.

Drückt, m. spirit, mind. Drücken, to press, press.
Evangelisch, pious, religious.
Geburt, m. birth. Geburtstag, m. birthday.
Vortrefflich, excellent. Vortrefflichen, n. excellences.

Blättern, to prattle. Bräutigam, m. bridegroom.
Dichter, m. poet. Dichterin, f. poetess.
Schiff, f. country air. Schiffe, n. ships.
Druck, m. Ovid. Druck, m. print.
Dichterin, f. poetess. Dichter, m. poet.
Marina, n. Marina.

Inn, n. inn. Inn, n. inn.

Résumé of the Weather.

Das Wetter ist heute fällter, als The weather is colder to-day
gestern. The weather is colder yesterday.
Der eitle Mensch is nicht Immer The noblest man is not always
täglich der mächtigste der mächtigst, the most ambitious and the
richest, not always the wisest.
Der Kühne is gewöhnlich am In The wise man (is) generally
recht, dem man am meist, the most modest, the most
vollends; stupid the most obtrusive.
Gut er bescheidene muß meist flag. A good commander—chief
muß mehr sein. must be more prudent than
resolute.
Dieses Tuch ist als fester. A good soldier.
Hier ist das beste Koch. This cloth is better than that.
Hunger is der beste Koch. The hunger is the best cook.
Die Tanne ist der höchste Baum. The pine is the highest tree.
Weisheit ist mehr zu schätzen, als Wisdom is more to be prized
Reichtum — aber am meisten, than riches, but virtue and
Ehre am größten. devotion the most.

Exercise 52.

1. Dieser Nacht hat einen schönen Satz, seiner, und der

Exercise 53.

1. The more frequent your intercourse is with nations, the more our commerce will be extended. 2. The choice of the kings of England as beautiful as those of the German kings. 3. England is not so fertile as Spain or Italy. 4. It is as easy to do good as to do evil. 5. Virtue is the greatest ornament of man. 6. A song said (used to say), that the more

on the immortality of the soul, the more important it appeared to him. 7. The Rhine presents the most beautiful view. 8. The country air was more beneficial in the recovery of this youth than the treatment of the most efficient doctor. 9. Ovid is a less agreeable writer than Virgil. 10. The spring is more variable than the autumn. 11. This view is beautiful, but the view from that hill is more beautiful. 12. Florine is the capital of Italy. 13. The stars in the heaven shine brightly. 14. She is more beautiful than amiable. 22. The louder the man called, the faster the boy ran. 23. The boatsman rowed rapidly across the river.
LESSONS IN PENMANSHIP.—XVII.

Any intelligent self-teacher, who has carefully followed our instructions from the beginning, and has been able to find time to write for at least an hour daily, will now find that he has acquired the proper position of the hand in writing, and the right mode of holding the pen, while he has also gained sufficient control over the muscles of his hand and wrist to be able to make the movements necessary to form the letters that have already been brought under his notice, without the temporary inconvenience which a beginner invariably experiences from an undue tension of the ball of the thumb and the muscles on the opposite side of the palm of the hand, caused by holding the pen too stiffly, and not permitting the fore-finger and thumb to

play freely on the joints by which, so to speak, they are hinged together and connected with the wrist and arm. On the contrary, through having gained sufficient confidence in his skill and powers by daily practice, he begins to move the pen freely and rapidly over the paper, while the down-strokes of his letters, which were at first crooked and unevenly formed, are now regularly sloped and sharply and clearly defined at the edges. He begins to find, too, that he longer requires so many examples for practice in words composed solely of the small letters of the writing alphabet to be placed before him by means of engraved copy-slips, inasmuch as he can select words enough for himself, in writing which he finds a useful exercise in testing his knowledge of the forms of the letters with which he is already acquainted, the way in which each is connected with letters by which they are preceded or followed, and the relative proportion of the parts which extend above and below the lines that contain the body or main part of the letters. But although the majority of our self-taught students may not require en-

graved copy-slips, there must still be many of our readers who do, and for their benefit examples for practice are given in Copy-slips Nos. 58, 59, and 60. After furnishing examples of the seven letters of the writing alphabet that yet remain to be mentioned, we shall proceed to give a series of copy-slips in the various kinds of writing generally taught in schools, from which the learner will be able to make himself acquainted with the forms of the capital letters. The instructions already given for tracing out the shapes of the small letters have, of necessity, been copious and ample, and to those of our readers who may be able to write, the explanations of the methods used in forming each letter of the writing alphabet, may have appeared minute and tedious. It must be remembered, however, that these elementary lessons in Penmanship are intended rather

for learners who are trying to teach themselves to write, and for those who are endeavouring to improve a faulty style of handwriting, than for those who have had the benefit of being shown how to shape their letters by a writing master; and it is for the guidance of self-teachers, who have no one to show them how each letter should be formed by writing it before them, that our instructions have been made as elaborate and precise as they are.

But even to those who know how to write, these minute directions may be of the greatest importance. Many of our readers, we trust, are engaged in the good work of teaching adults in evening schools. To such as these our lessons will afford assistance in conveying in suitable terms the instructions they are giving, and accompanying that instruction by accurately-formed diagrams on the black-board, which will serve as examples to all the members of a large class, and save the labour and loss of time involved in writing separate copies for each individual of which the class is composed.
LESSONS IN LATIN.—IX.

THE THIRD DECLENSION (continued).

CLASS I.

NOUNS WITH CONSONANTAL STEMS; IMPARISyllABIC

(continued).

2.—With the termination s.

Consonantal stems with the sounds k (c), t, p.

MASCUlinE AND FEMININE.

A few words of explanation may here be desirable. The Latin c represents the Greek ς (gamma), and for the most part was pronounced like our k. Thus the Romans pronounced Cicero, the name of their great orator, Kikero. Now the s in judex is made up of these letters, thus, judex—c and s blending together to form z; hence, judge, judges: in the genitive, the laws of pronunciation convert the e of the nominative into i as it does in comites, comitum. From this example you see that the variations which words undergo are not arbitrary. Those variations depend on the nature of the letters that come together, and in their ultimate causes, on the structure of the organs of speech, as these organs are in each nation modified by natural endowments, climate, culture, and a variety of other circumstances.

The b in urbs may be considered as equivalent to p, for b and p being labials—that is, letters in pronouncing which the lips are chiefly used—are, as letters of the same organ, inter-changeable, or may be used the one for the other, under certain conditions.

VOCABULARY.

Altare, altar, a. an altar.
Artifex, artifices, m., a craftsman, artist.
Cælibus, calibus, m., a heaven.
Cervix, cervicis, f., the neck.
Equus, equitis, m., a horseman or knight.
Grex, grēs, m., a flock.
Homines, hominum, m., mankind.
Lapis, lapis, m., a stone.
Lapidem, lapi, m., a stone.
Nex, nēx, m., a bond.
Pecus, pēcis, m., a herd.
Praemia, premiis, f., a reward.
Praemium, premi, m., a reward.
Praemium, praemi, m., a reward.
Principes, princeps, m., a prince.
Primum, primum, a, the first.
Reges, regem, m., a king.
Regem, regem, m., a king.
Rex, regis, m., a king.
Rex, regis, m., a king.
Urbs, urbis, f., a city.
Voces, vocem, f., a voice.

EXERCISE 29.—LATIN-ENGLISH.


EXERCISE 30.—ENGLISH-LATIN.

1. I defend artists. 2. Artists are defended by me. 3. Has he a reward? 4. He has not a flock. 5. I am pricked in the neck. 6. Artists paint rocks. 7. The laws of the kings are deadly. 8. The corn-land of the horseman is yielded. 9. Why is the bond of promise? 10. The people blame bachelors. 11. Soldiers have rewards. 12. Ape teaches many things (multa).

EXERCISE 31.—LATIN-ENGLISH.


EXERCISE 32.—ENGLISH-LATIN.

1. Sailors defend ships with (their) bodies. 2. Birds are on the rocks. 3. Are rocks loved by sailors? 4. Slaughter injures the people. 5. Birds strike the kings. 6. Acex defendit domum. 7. The birds of the cities are injured. 8. The seat of the prince is praised. 9. We conquer the companions of the princes.

General view of nouns of the third declension, according to their stems:

Class I.

Nouns with consonantal stems, or imparisyllabic.

1st division: Nouns without the termination s.

1st subdivision: Nouns in which the nominative and the stem are the same; the stems end in r and s.

2nd subdivision: Nouns in which the nominative and the stem are different; the stems end in s and r.

2nd division: Nouns with the termination s, with the sounds k, t, p.

Class II.

Nouns with the vowel-stems, or parisyllabic.

With and without the termination s.

Some peculiarities belonging to this declension must be briefly indicated. The termination of the conclusive singular is properly es, which is connected with the consonantal stem by the interposition of e. In the vowel-stems no interposing vowel is required, because there is a vowel in the stem. That vowel is i. Vowel-stems, therefore, end in ism in the accusative, and in is in the ablative singular; for the most part, however, they in usage have e in both. However, in satis, thirtis, tasseis, aough, and vis, strength, 4 only is used. Vis is a defective noun, and is thus declined: visus, vis, visum, visus, virium, virium, virium, the plural being complete and regular. In these nouns,—namely, frēbris, a fever; securis, an axe; pelvis, a basin; turris, a tower; and restis, a cord, ism is more usual than em; but less usual than em is it in class,
LESSONS IN DRAWING.

a fleet; messis, a crop of corn; claris, a key; navis, a ship. 1 The ablative singular has for the most part i (perhaps from ie) instead of e in particular with the vowel-stem in i. In imparitallibilis with consonantal stems, e is the usual ablative termination, but i sometimes found, deriv'd from the usage in the vowel-stems. Nouns which make the ablative singular in i, make the genitive plural in ius instead of ius; and nouns neuter, which in the ablative singular end in i, in the nominative, accusative, and vocative plural end in i.

Adjectives of the third declension, in general, follow the declension laws of the nouns, only that in the ablative singular they prefer i. Adjectives of the third declension are of two sorts: first, those that have three terminations, as, alius, m., alii, f., alium, n., lively, active; second, those that have two terminations, as the comparative, viilior, m. and f., viilius, n. meaner; under this second class may stand such as ferox, fierce, which in the nominative singular is m., f., and n. (accusative, vocative), but in the plural has for the neuter a separate form in is, as feroxia.

DECLENSION OF AN ADJECTIVE OF THREE TERMINATIONS.

EXAMPLE.—Acer, acris, acre, sharp, acute, pungent, energetic.

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
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</thead>
<tbody>
<tr>
<td>N. acer</td>
<td>acris</td>
</tr>
<tr>
<td>N. acris</td>
<td>aceris</td>
</tr>
<tr>
<td>G. acris</td>
<td>aceris</td>
</tr>
<tr>
<td>G. acerum</td>
<td>aceris</td>
</tr>
<tr>
<td>D. aceri</td>
<td>aceris</td>
</tr>
<tr>
<td>D. abaceris</td>
<td>abaceris</td>
</tr>
<tr>
<td>A. acerem</td>
<td>acerem</td>
</tr>
<tr>
<td>A. abacerem</td>
<td>abacerem</td>
</tr>
<tr>
<td>V. acer</td>
<td>aceris</td>
</tr>
<tr>
<td>V. abacer</td>
<td>abacer</td>
</tr>
<tr>
<td>Ab. aceri</td>
<td>aceris</td>
</tr>
<tr>
<td>Ab. abaceri</td>
<td>abaceri</td>
</tr>
</tbody>
</table>

DECLENSION OF AN ADJECTIVE OF TWO TERMINATIONS.

EXAMPLE.—Suavis, m. and f.; suaves, n., sweet.

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. suavis</td>
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</tr>
<tr>
<td>N. suavem</td>
<td>suavei</td>
</tr>
<tr>
<td>G. suavis</td>
<td>suavem</td>
</tr>
<tr>
<td>G. suavium</td>
<td>suavium</td>
</tr>
<tr>
<td>D. suavi</td>
<td>suavium</td>
</tr>
<tr>
<td>D. abasuvi</td>
<td>abasuvi</td>
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<tr>
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<td>suavem</td>
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<tr>
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<td>abasuvi</td>
</tr>
<tr>
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<td>suavium</td>
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<tr>
<td>V. abasuvi</td>
<td>abasuvi</td>
</tr>
<tr>
<td>Ab. suavi</td>
<td>suavium</td>
</tr>
<tr>
<td>Ab. abasuvi</td>
<td>abasuvi</td>
</tr>
</tbody>
</table>

OTHER FORMS OF ADJECTIVES OF TWO TERMINATIONS.

EXAMPLES.—Major, m. and f.; majus, n., greater; audax, m., f. and n. (audacem in acc.) ; audacia, n., plural, bold.

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
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<tbody>
<tr>
<td>N. major</td>
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<tr>
<td>N. majoris</td>
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</tr>
<tr>
<td>G. majoris</td>
<td>majoris</td>
</tr>
<tr>
<td>G. majorum</td>
<td>majorum</td>
</tr>
<tr>
<td>D. majori</td>
<td>majori</td>
</tr>
<tr>
<td>D. majoribus</td>
<td>majoribus</td>
</tr>
<tr>
<td>A. majorem</td>
<td>majorem</td>
</tr>
<tr>
<td>A. majoribus</td>
<td>majoribus</td>
</tr>
<tr>
<td>V. major</td>
<td>major</td>
</tr>
<tr>
<td>V. majoribus</td>
<td>majoribus</td>
</tr>
<tr>
<td>Ab. majoro</td>
<td>majoro</td>
</tr>
<tr>
<td>Ab. majoribus</td>
<td>majoribus</td>
</tr>
<tr>
<td>Audax, m. and f.;</td>
<td>audacia, n., bold</td>
</tr>
<tr>
<td>audacia, n.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. audax</td>
<td>audacia</td>
</tr>
<tr>
<td>N. audacis</td>
<td>audacia</td>
</tr>
<tr>
<td>G. audax</td>
<td>audacia</td>
</tr>
<tr>
<td>G. audaciam</td>
<td>audaciam</td>
</tr>
<tr>
<td>D. audaci</td>
<td>audaci</td>
</tr>
<tr>
<td>D. audaciam</td>
<td>audaciam</td>
</tr>
<tr>
<td>A. audacem</td>
<td>audacem</td>
</tr>
<tr>
<td>A. audaciam</td>
<td>audaciam</td>
</tr>
<tr>
<td>V. audax</td>
<td>audacia</td>
</tr>
<tr>
<td>V. audaciam</td>
<td>audaciam</td>
</tr>
<tr>
<td>Ab. audaci</td>
<td>audaci</td>
</tr>
<tr>
<td>Ab. audaciam</td>
<td>audaciam</td>
</tr>
</tbody>
</table>

KEY TO EXERCISES IN LESSONS IN LATIN.—VIII.

EXERCISE 25.—LATIN-ENGLISH.

1. I have great grief. 2. Hast thou not great grief? 3. Mothers have great griefs. 4. The colour of the cushion is beautiful. 5. Is the colour of the cushion beautiful? 6. He has (is under) a deadly error. 7. Why has father (is under) deadly errors? 8. I have a brother. 9. Brothers have great griefs. 10. Lighting frightens animals. 11. Do not lighting frighten mothers? 12. Lighting frightens sparrows.

EXERCISE 26.—ENGLISH-LATIN.


EXERCISE 27.—LATIN-ENGLISH.

1. I fear charcoal. 2. The boy strikes the pea-cocks. 3. The regions are beautiful. 4. Thou hast an opportunity. 5. We move the ashes.
nothing more? But we hope that very few of our readers will like to stop there. To draw from nature and the real thing, we trust, is the ambition of every one who makes up his mind to go through these lessons, that he may make the art of drawing a useful and valuable auxiliary to his occupation as a means of expressing himself, as well as a pleasing recreation for leisure hours. Another reason why we recommend the pupil to study our lessons in geometrical perspective is, as we have said before, when treating upon drawing a simple outline from the flat (a term used by draughtsmen when copying from a drawing), that the practice of geometrical perspective assists the eye to under-

Fig. 65.

Fig. 66.

Fig. 67.

stand and calculate more readily the proportions of retiring lines and planes. As a practical illustration of this principle, we meet with it repeatedly in the readiness with which an experienced carpenter will tell you the length of a board without taking the trouble to measure it. His eye is so accustomed to the foot-rule, and the space a repeated number of measurements will cover, that to him it is no difficulty to say within a very close approximation how long the board is. It is the repeated practice of geometrical perspective that enables a draughtsman to decide upon the proportional length of a line or plane as it retires, and to draw either correctly on his paper. If we did not consider it in this way with regard to free-hand drawing, it would be of very little use in the practice of drawing from nature. It would be absurd to expect, when we are seated before a subject—say a picturesque farmhouse, with the accom-

We will now give a geometric method of representing two walls meeting at an angle, as an illustration of what we have stated. Let two lines, \( a \), \( b \), \( c \) (Fig. 65), forming an angle of 90 degrees, represent the plan of two walls meeting at the point \( a \), of which \( b \) forms an angle of 40 degrees with the picture plane. \( PP \) is the picture plane, \( HL \) the line of sight, \( PP \) base of the picture, \( SP \) the station point, and \( VP \) and \( VP \) are the vanishing points for the corresponding numbered lines of the plan. First draw the picture plane, and then the line \( a \), placing it at an angle of 40 degrees with the \( PP \); then from \( a \) draw \( b \) at an angle of 90 degrees—that is, a right angle—with \( a \); this will be the plan of the walls as they are placed before our vision. Then mark \( a \) to represent the supposed distance we are from the angle of the walls. Find the vanishing points for the two lines of the plane. We have already given the rule
for finding the vanishing point (see page 137); \( v'p2 \) is the vanishing point of \( ac \), and \( v'p1 \) is the vanishing point of \( ab \); \( v'p \) and \( v''p \) are visual rays—that is, they are imaginary direct lines—passing from the extremities of the object through the \( v'p \) to the eye. These lines will indicate where the points \( a, b, \) and \( c \) would be depicted on the picture plane—viz., at \( e, f, \) and \( g \).

The extremities of each wall come closer together on the plane of representation—that is, the picture plane—and therefore we do not see the whole extent of the wall as we should do if we stood parallel to it. We will carry out the subject, and show the walls as they would naturally appear. To do this we must make a fresh diagram, because, to prevent confusion, we do not wish to add any more lines to that already given. We recommend the pupil to repeat the perspective view of the plan in Fig. 65, as given in Fig. 66. In this figure \( pc \) and \( p''c2 \) represent the points of contact of the line \( ac \)—that is, the line were brought to the picture—in other words, to touch it. Then, in this case, it would be represented in the picture its natural size, therefore we call the perpendicular line drawn from \( pc \) to \( p''c2 \) the line of contact, marked \( lc \). Upon this line we always measure and set off heights of objects. Suppose, then, the height of the wall to be marked at \( r \), draw a line from \( r \) to \( v''p2 \); \( s \) to \( f \) will be the top of the wall \( ac \); draw a line from \( s \) to \( v''p1 \); \( sm \) will be the top of the wall \( ab \). Now if we wish to draw the courses of the bricks, we must set them off also upon the line of contact as we did to represent the top of the walls, and draw them to their respective vanishing points; also, the perpendicular joints of the bricks must be marked in the plan, and brought down by visual rays in the same way as the ends of the walls were found. We have represented a few of the bricks, leaving the reader may ask why we do not draw the line from \( p''c2 \) to \( v''p1 \), instead of \( v''p2 \). Our answer is, because \( pc \) is the point of contact for \( ac \) and not \( ab \); if \( ab \) had been produced to the \( pp \) for a point of contact, then it would have been right to draw a line from \( p''c2 \) in the direction of \( v''p1 \).

All that we have now done in this perspective diagram is, that we have shown the horizontal retiring length of the base of the wall each way—viz., \( a''x, a''y \) on one side, and \( b''x, b''y \) on the other. To have drawn these lines equal to the length of the walls themselves—that is, those of the plan—would have been a very great mistake, because as they retire the further pupil to complete the drawing; the plan of the door is shown at \( no \), its height at \( p \). (We will observe, by way of parenthesis, that all heights of objects are marked or set off on the line of contact; all horizontal lengths and breadths are shown in the ground-plan, and brought down by visual rays.) We will give one other method of showing the horizontal perspective length of a line or plane, and then leave the pupil to think over and practise all that we have been trying to teach him. Let \( ab \) (Fig. 67) represent the length of a line to be shown in perspective at a given angle with our position or with the picture plane. Let \( r's \) represent the point of sight, \( s \) the station point, \( h'l \) the...
horizontal line or height of the eye, $b$ $p$ base of picture. Let $a^2$ be the point where the line commences, and from which it retires; and, to simplify the matter, let $p$ $s$ also be the v.r. (The pupil will remember that all retiring lines vanishing at the point of sight, are lines going off at a right angle with our position, or with the picture plane. We advise him to turn to page 73, and read the perspective rules and axioms again.)

Make the distance from $p$ $s$ to $d$ equal to $p$ $s$ $p$ $r$. Draw a line from $a^2$ to $p$, and on $p$ $r$ make the distance $a^2 b^2$ equal to the given line $a b$; draw a line from $b^2$ to $b$, which will cut off the space $a^2 c^2$. $c^2$ is the height of a $b$. The lines horizontal and vertical sides of planes are determined by the same rule. Let it be required to draw a series of retiring square slabs (Fig. 68). On the base of the picture $b$ $p$, beginning at $a$, set off any required number of divisions to represent the length of the side of each slab; from these points, $a$, $b$, $c$, etc., draw lines to $p$. Find the distance point, $d$, as in the last case; draw lines from $b$, $c$, $d$, etc., to $d$, cutting a $p$ in $g$ $h$ $l$. From $g$, $h$, $l$ draw lines parallel to the base of the picture, which will complete the squares required; for as $a b$ of the first square is parallel with our position, and touching the picture plane, its true length $a b$ is therefore shown, whilst $a g$ is its retiring or perspective length.

Having now shown, as we promised, how the retiring horizontal distances of objects may be faithfully represented on paper, we will give some examples as subjects for exercises.

Fig. 69 is an example of a retiring row of posts, their distances being purposely shown by the geometric method of the last two problems. It is almost needless to direct the attention of the pupil to the diminishing retiring spaces between the posts; however, he will see, as we have previously endeavoured to make clear to him, that those retiring distances can be satisfactorily proved. Fig. 70 is given as an exercise, including many of the principles we have before explained—viz., angular perspective, horizontal retiring lines, inclined lines of the roofs, and horizontal retiring distances, all of which the pupil, we trust, will now be able to arrange for himself, and to find its vanishing points.

LESSONS IN ARITHMETIC.—XVII.

DECIMALS (continued).

24. To reduce a given Circulating Decimal to a Vulgar Fraction.

Take the decimal .34567.

Denote the true value of the equivalent fraction by $f$. Then

$$f = \frac{34567}{100000}$$

the period 567 being supposed continued ad infinitum.

If we multiply $f$ by 100,000, and also the decimal by 100,000, the results will still be equal.

Hence 100000 $f = \frac{34567}{100000}$

The decimal place being moved five places to the right, and the period 567 being still continued ad infinitum on the right of the decimal point as before.

Similarly, 100 $f = \frac{34567}{100000}$

Now the difference of 100000 $f$ and 100 $f$ is the same as the difference of the decimals to which they are respectively equal. Now this difference is 34567 - 34 = 34534, because the infinite recurrence of the period 567 on the right of the decimal point is the same in each decimal, and therefore vanishes when the subtraction is performed.

Hence 99999 $f = \frac{34567}{99999}$

and $f$, the fraction required, is

$$\frac{34567}{99999}$$

Now observe carefully how each part of this fraction has arisen. The numerator is obtained by writing down the figures of the decimal as far as the end of the first period without the decimal point, and then subtracting the values of the figures which occur before the period, or, as we may call it, the non-recurring part. The denominator 99990 arises from subtracting 100 (i.e., 10 raised to the same power as the number of figures in the non-recurring part) from 100000 (i.e., 10 raised to the same power as there are figures in the non-recurring part and period together).

This subtraction will necessarily produce a number 99990, containing, that is to say, as many nines as there are figures in the period, and as many ciphers as there are figures in the non-recurring part.

It will be seen from the above detailed explanation of the method by which the equivalent vulgar fraction may be determined, that an analogous method would apply to any circulating decimal whatsoever.

Hence we get the following

Rule for reducing a Circulating Decimal to a Vulgar Fraction.

Subtract the number formed by the figures of the non-recurring part from the number formed by the figures taken to the end of the first period, and set down this difference as a numerator. Take as many nines as there are figures in the period, and, annexing to them as many ciphers as there are figures in the non-recurring part, set down the number so formed as a denominator.

26. We have proved the rule in the case of a mixed circulating decimal. The case of a pure circulating decimal is included in it; for in a pure circulating decimal there is no non-recurring part, and therefore nothing to be subtracted, and the denominator will consist wholly of nines, their number being equal to the number of figures in the period.

Thus $\frac{67}{99} = \frac{675}{990}$

27. For the sake of clearness, however, we will perform the process for a pure circulating decimal. Take $.67$, for instance.

Let, as before, $f = \frac{67}{99}$

Then, 100 $f = \frac{6700}{990}$

and therefore subtracting, as in the previous case,

$$99f = 67$$

Or, $f = \frac{67}{99}$

and it is evident, from the way in which they arise, that the number of nines in the denominator is equal to the number of figures in the period.

The process, of course, if there is an integral part in the original decimal, that will remain unaltered, and the required answer will be a mixed number, which may be reduced to an improper fraction if necessary.

Example.—3.1415.

Taking the decimal part separately, $1415 = \frac{1415}{1000}$.

Hence $3.1415 = 3 + \frac{1415}{1000}$ expressed as an improper fraction.

Or it may be expressed as an improper fraction at once:

$$3.1415 = 3 \frac{1415}{1000}$$

The truth of this latter method may be established exactly in the same way as the two cases we have already explained.

29. The learner is recommended at first, in reducing circulating decimals to vulgar fractions, to perform the operation in the way we have indicated in the examples already given—i.e., by multiplying by the requisite powers of 10, subtracting, etc. He will thus better appreciate the truth of the rule which he will afterwards employ. It is evident that the equivalent fractions found by the rule will often not be in their lowest terms.

EXERCISE 35.

Reduce to their equivalent vulgar fractions the following decimals:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Equivalent Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1</td>
<td>1/10</td>
</tr>
<tr>
<td>.03</td>
<td>3/100</td>
</tr>
<tr>
<td>.005</td>
<td>5/1000</td>
</tr>
<tr>
<td>.6</td>
<td>6/10</td>
</tr>
<tr>
<td>3.14</td>
<td>314/100</td>
</tr>
<tr>
<td>3.1415</td>
<td>31415/10000</td>
</tr>
</tbody>
</table>

30. Approximation. Decimals correct to a given number of places, etc.

We have already remarked that if we take only a limited number of the figures of a decimal, we approach nearer and nearer to the true result as we continue to take in more figures.

We give an example, taken from De Morgan's "Arithmetic," which shows this clearly.

= \frac{22}{7} = 3.142857...

Now taking successively one, two, three, etc., figures of the decimal, we have—

\[ \frac{2}{7} \text{ is less than } \frac{22}{7} \text{ which is less than } \frac{355}{113} \]

\[ \frac{14}{22} \text{ is less than } \frac{22}{7} \text{ which is less than } \frac{333}{106} \]

\[ \frac{355}{113} \text{ is less than } \frac{355}{113} \text{ which is less than } \frac{312}{106} \]

\[ \frac{22}{7} \text{ is less than } \frac{355}{113} \text{ which is less than } \frac{312}{106} \]

etc.
LESSONS IN ENGLISH.

We thus see that the difference between the decimal and the true value of the fraction continually diminishes. In the case of a terminating decimal this difference becomes zero when we have taken all the figures. In that case of a circulating decimal, it never actually becomes zero, but we can make it as small as we please by taking a sufficient number of decimal places.

31. When a result is required correct only to a certain number of decimal places, it is better, as we have already explained (Art. 14), to find one figure more of the result than is actually required, so as to ascertain whether this figure is greater or less than 5. If it is greater, we increase the figure in the last place which is required by 1.

The following is an example of a decimal continually approximated to in this way, by taking successive figures, and increasing, where necessary, the last figure by unity —

Let $301.269$ be the decimal. The successive approximations would be —

<table>
<thead>
<tr>
<th>Approximation</th>
<th>5, 49, 4.30, 4.292, 4.291, 4.2912, 4.29117, 4.291169</th>
</tr>
</thead>
<tbody>
<tr>
<td>Here 5 is nearer to the true value than 4 would be.</td>
<td></td>
</tr>
</tbody>
</table>

32. Operations in which circulating decimals occur are better conducted by reducing the circulating decimals to their equivalent vulgar fractions, if absolute accuracy is required. If an approximate result is desired true to a certain number of decimal places, then, in addition to the last figure, it will be sufficient to take in two or three figures of the period beyond the number of places required, and then add or subtract. For instance, in adding $4.567$ to $312.4567$ correctly to 9 decimal places, we should write the decimals as follows:

\[
\begin{array}{c}
4.567 + 3.124567 = 7.691567 \\
5.625 + 3.124567 = 8.749567 \\
8.27 + 3.124567 = 11.394567
\end{array}
\]

In all cases, however, where circulating decimals are involved as multipliers or divisors, it will be best to reduce them to their equivalent vulgar fractions before performing the multiplications or divisions, and then afterwards to reduce the resulting fractions to decimals.

EXERCISE 36.

1. Write down the decimals containing respectively one, two, three, four, five, and six decimal places which are the nearest approximation to the decimals: 67519473, 203671407.

2. Find the value correctly to seven decimal places of the following expressions:

\[
\begin{align*}
1 & : 20127 + 838297 + 900376.1 \\
2 & : 15379 + 2134520 + 18 + 702178 \\
3 & : 35 + 6.9 - 5.467 + 3.625 \\
4 & : 274 + 3.678123
\end{align*}
\]

EXERCISE 37.

1. Reduce the following decimals to vulgar fractions:

\[
\begin{align*}
\frac{3}{1} & = 2.72 \quad \frac{4}{1} = 2.729 \quad \frac{5}{1} = 2.7291 \quad \frac{6}{1} = 2.72916 \quad \frac{7}{1} = 2.729162 \quad \frac{8}{1} = 2.7291623
\end{align*}
\]

2. Change the following sets of decimals to similar and convergent terminals:

\[
\begin{align*}
1 & : 0.31, 0.56, 0.36, 0.26, 0.32, 0.323, 0.323532, 0.26, 0.32353, 0.3235332, 0.3235333, 0.32353335, 0.323533355,
\end{align*}
\]

3. Add together the following sets of decimals:

\[
\begin{align*}
1 & : 2.123 + 2.23 + 8.24 + 6.76 \quad 2.32 + 8.32 + 3.23 + 6.15 \quad 3.12 + 7.24 + 2.32 + 1.02 \quad 4.26 + 9.02 + 7.15 + 3.15 \quad 5.60 + 2.4 + 6.45 + 4.15 + 45 + 24 \quad 6.9 + 1.5 + 6.78 + 7.32 + 124.39 \quad 7.3 + 7.9 + 2.7 + 3.75 + 375 + 27 + 51 \quad 8.50 + 3.50 + 73.23 + 197.21 + 4.20 + 5.78 + 932 \quad 98 + 9018 \quad 9.16 + 134.23 + 2.03 + 97.25 + 3.02 + 99.05 + 1.5 + 0.14
\end{align*}
\]

4. Subtract the greater from the less in the following sets of decimals:

\[
\begin{align*}
1 & : 8.63 - 13.7642 \quad 2.45 + 12.41 \quad 7.1428 - 12.09 \quad 2.47632 + 84.7397 \quad 5.8016 - 400.75 \quad 9.25462 - 0.0963 \quad 3.3586 + 0.3856 \quad 6.47824 + 87 \quad 9.64329 - 0.003153
\end{align*}
\]

5. Multiply together the following decimals:

\[
\begin{align*}
1 & : 3.72 \times 2.6 \quad 4.24 \times 15.7 \quad 7.397 \times 8 \quad 1.23 \times 6 \quad 4.85 + 63 \quad 2.45 + 7.3 \quad 8.657 \times 3 + 87 \quad 9.77 \times 297
\end{align*}
\]

6. Work the following examples in division of recurring decimals:

\[
\begin{align*}
1 & : 719.280917 + 8 \times 750730 + 519 + 8 \times 24081 + 368 \quad 745 \quad 87 \quad 9 \times 8 \quad 9 \times 8 \quad 10 \times 22345 + 3297 \quad 3 \times 212 + 125 \quad 10 \times 516053 \quad 11 \times 437624 + 368 \quad 2 \times 229 + 267 \times 497 \quad 12 \times 5397 + 2576515
\end{align*}
\]

LESSONS IN ENGLISH.—IX.

DERIVATION: PREFIXES (continued).

Before proceeding further with these prefixes, we may now expose a common error. It is generally thought that words have several disconnected significations. Several significations many words have, but these significations are all allied one with another, and they are allied one with another in such a way that a genealogical connection runs through them all. I mean that the second euses from the first, and conducts to the third. This meaning of words, or parent-signification, is, in all cases, one that denotes some object of sense, for objects of sense were named before other objects. Our first duty, then, is to ascertain the primary meaning of a word. From that meaning the other meanings flow, as by natural derivation. Those secondary or derivative significations, then, can scarcely be termed meanings; they are not so much meanings as modifications of the primary import of the root. Certainly they are not independent significations. Thus viewed, words have not two or more senses, but in the several cases the one sense is varied and modified. Even in instances in which opposite meanings are connected with the same word, the filiation may be traced, as both Jacob and Esau sprang from the same stock. I will take an example in the word prevent. Prevent means both to guide and to hinder, to lead, and to debar from. The opposition is sufficiently decided. Yet these two opposed meanings are only modifications of the root-sense of the word. First I will exhibit the diversity, and then explain it.

Prevent, signifying to guide, aid forward:


Prevent, signifying to hinder, obstruct:

"Where our prevention ends, danger begins."—Ceres.

"Which, though it be a natural preservative to some evils, yet without either stop or moderation, must needs exhaust his spirits."—Reign. Woffington.

"Physick is either curative or preventive; preventive we call that which preventeth sickness in the healthy."—Browne, "Pulcer Errors."—"Prevent us, O Lord, by thy grace," means "aid us forward."—"Preventive of sickness," signifies that which causes sickness not to come. There is the contrariety. Now for the explanation. Prevent is made up of two Latin words, namely—pre, before, and venire, I come or go. Now, you may go before a person for two opposite purposes. You may go before him in order to guide, aid, and conduct him onward; or you may go before him to bar up his way, to hold him back, to prevent his advance. And as either of these two purposes is prominent in the mind of the speaker, so the word is used by him to signify to guide or to hinder. The proper meaning, then, of prevent is, to come before: hence, 1, to guide, or, as a natural consequence, 2, to aid; or again, 1, to obstruct, and, as a natural consequence, 2, to stop, etc. And how the moral and spiritual importa...
out of the physical, is also seen in the diverse application of the word; for, as we have just read of preventive medicine, so in divinity you may read of "preventive grace."

These remarks, illustrations of which occur in what has just preceded, and will occur in what is about to follow, may serve to show you the subject must be studied genealogically. Indeed, every word has a history; and in the dictionaries, every account given of a word ought to be a complete history of the word; a history of its origin, uses, and application, the one traced from the other logically, or according to the laws of thought, and philologically, or agreeably to the laws of language. Very different, and very inferior, is the character of most dictionaries. But to return to the subject of English prefixes.

E., of Latin, or rather Greek origin, in the forms e, ef, en, denotes out of, as in egress (e and gradior, Lat. I walk), a walking out; excess (ex and cedo, Lat. I go, a going beyond—that is, too far; effect (ef and facio, Lat. I do), a thing made out, produced; a result.

E., "All occasions must be taken of sending forth pious heavenly ejaculations to God."—Bishop Hall.

Ex., "The ecclesiastical courts possessed the power of pronouncing excommunication; and that sentence, besides the spiritual consequences to follow from it, was attended with immediate effects of the most important nature. The person excommunicated was shunned by every one as profane and impious; and his whole estate, during his lifetime, and all his movables, for ever were forfeited to the crown."—Hume, "History of England."

Ex., "Two white sparv inrustationes, with efflorescences in form of shrubs, formed by the trickling of water."—Woodward, "On Fossils."

En is a prefix found in the English, the French, and the Greek languages. Into the English it appears to have come from the Latin, through the French. Many words of Latin origin have passed through the French into the English. En is the form in Greek. In Latin, en becomes in. In French, both en and in are used. The same is the case with the English. Though en and in to the same particle, it may be advisable to handle them separately, in order that their respective usages may become apparent.

En is found in the forms en, em. The prefix signifies in or into, e.g.—

"He (Samson) rises and carries away the gates whereby they thought to have encaged him."—Bishop Hall.

So in encamp, encase, enchain, enchant, enclose (or inclose), endemic (en and demos, Gr. a people), peculiar to a district. En sometimes has an intensive or augmentive effect on the verb with which it forms a part; as in encourage, enfeebles, enchindle (candle), encrease (increase), encumber (incumber, from the French encombre, Lat. cumulus, a heap).

"Encumbered soon with many a painful wound, Tardy and stiff he treads the hostile round; Gloomy and fierce his eyes the crowd survey, Mark where to fix and single out the prey."—Rope, "Pharsalia."

En has also, though seldom, the force of a negative; as in enemy. Enemy is from the Latin inimicus, where the English en represents the Latin in. Inimicus is made up of in, not; and amicus, a friend.

En, for the sake of euphony, becomes en before b and p; ember, emblem, embosom, embroil, empire, empower (empower). "At eve within you staudius nook, But my brass-embosom'd cock
Prouetray'd with many a holy deed,
Of martyrs crowned with heavenly meed."—Warren.

There is a tendency to substitute i for e in many words. This tendency deserves encouragement, if only for the sake of uniformity.

Enter, coming from the Latin (intra, within) through the French (entro, between, among), is found in enterprise (enter and Fr. prendre, Lat. prehendere, to take, to take hold of), an undertaking; also in entermint (in and terra, Lat. the earth), now more common as interment. It is found also in entertain (Fr. entretenir, Lat. inter and tenere, to hold).

"His office was to give entertainment
And lodging unto all that came and went,
Not unto such as could him feast again,
And double quite for that he on them spent;
But such as want of harbour did constraine,
Those, for God's sake, his dewry was to entertaine."

Spenser, "Faerie Queene."

Epi, a prefix of Greek origin, from επι (epi), signifying upon, as epidemic, upon or over (widely spread over) a people. Epicdemii declares that a disease is inborn, native to the soil; epidemic that it is very prevalent. Epi is found in epigram (epi and the Greek γραμμα, pronounced gram'ma, a writing, from the verb γραφω [graph'-o], I write), epigraph (epi and ληφης, pronounced len'-sia, a taking), epiphany (epi and Greek φως, pronounced phal'-no or fl'-no, I appear), epistle (epi and στηλή, pronounced stel'-lo, to send), etc. etc.

"He that would write an epithaph for thee,
And do it well, must first begin to be
Such as thou wert; for none can truly know
Thy worth, thy life, but he that hath lived so."—Dame.

Equi., of Latin origin (equum, equal), denoting equality, forms part of several words, as equisipouos (equi and poser, Fr. to weigh; pendere, Lat. to hang); equality, equivocal (equi and vox, Lat. a voice).

"Faith! here's an equivocator that could swear in both the scales against either scale; who commended treason enough in God's sake, yet could not equivocate to heaven; oh, come in, equivocator."—Shakespeare, "Macbeth."

En, of French origin (Lat. a, ex), is in English found in words borrowed from the French, as in cascade (es and scala, Lat. a ladder), a scaling (of a city), escape (Fr. echapper, to get away), eschew (old Fr. eschoir, to fall due), a forfeit, eschew (old Fr. eschaver, to shun), eschewen (es and sanctum, Lat. a shield).

"Hence without blushing (say whate'er we can)
We more regard the eschewen than the man;
Yet, true to nature and her instincts, prize
The hound or spaniel as his talent lies."—Cowper.

En, of Greek origin (eu, pronounced you), signifying well, occurs in euphony (eu and the Greek φως, pronounced pho'-no, a sound), euthanasia (eu and the Greek φαναις, pronounced than'-a-tos, death), a happy death; the eu in euonym occurs as a part of the word; euonym being from the Greek ewon, pronounced u'-no, a bed, and εχω, ok'-o, to have, or have charge of; euonyms were chamberlains. Men were made euonyms by the jealousy of Eastern despots. They were also made so in order to give them a contralto voice. The latter fact is well alluded to in this quotation:

"Our present writers, for the most part, seem to lay the whole stress in their endeavours upon the harmony of words; but then, like euonyms, they sacrifice their manhood for a voice, and reduce our poetry to be like echo, nothing but a sound."—Landbeck, "Poesis and Theis."

Eve, of Saxon origin, signifying always, is seen in everlasting, evermore; evermore appears in the older writers as evermo.

"I shall readily grant that the words for ever and everlasting do not always, in Scripture, signify an endless duration."—Barrow, "Sermons."

Extra, of Latin origin, with the meaning out of, appears in extraneous, out of (not belonging to) the subject; extraordinary (extra and ordo, Lat. order), out of the usual order.

"Some lands, either because they were in the hands of irreligious and careless owners, or were situate in forests and desert places, or for other now unsearchable reasons, were never united to any parish, and therefore continue to this day extra-parochial."—Blackstone, "Commentaries."

Fore, of Saxon origin, whose original is probably found in the German vor, which denies and reverses the action expressed in the verb, occurs in forbid (not to bid; that is, to bid not).

"Rather how hast thou yielded to transgress,
The strict forbiddance, how to violate
The sacred fruit forbid'd thee."—Milton, "Paradise Lost."

For is found also in forbear, not to bear or take; to abstain.

"Phidias, when he had made the statue of Minerva, could not forbear to engrave his own name, as author of the piece."—Dryden.

Fore, a different word from the preceding, of Saxon origin (vor,
Germ., is advene; vorwarts, Germ., forwards), appears in foretell, forecast, forefathers, forehead.

"The foreknowledge is not the cause of all that are foreknown."—Hammond.

In forgive (Germ. vergeben), the idea seems to be that of giving away, giving without a return, giving freely, and hence to pardon (Fr. pardonner, in low Lat. perdono).

"Not soon provoked, however stung and teazed, And if perhaps made angry, soon appeased; She rather waves, than will dispute her right, And injures make forgiveness her delight."—Cooper.

Hept., of Greek origin (ἐπτα, pronounced hop-'ta, seven), forms the first syllable of heptagon (Greek ἑπτάγων, pronounced gon-'i-a, an angle), that which has seven angles, and consequently seven sides; and heptarchy (Greek ἑπτάρχη, pronounced ar'ko, government), a sevenfold government.

"Seven independent thrones, the Saxon heptarchy, were founded by the conquerors."—Gibbon.

THE SNAIL.

We will imagine that while strolling round your garden or in the fields you have just picked up a snail. Hold him tenderly, and not long in your hand, or you may make him very wretched. How so? Remember his body is cold, your hand is hot, almost like a furnace to him, and the temperature must be enough to make him faint. In truth, while on a human hand the snail must feel about as comfortable as St. Lawrence on his gridiron. Besides, St. Lawrence gained honour and applause for his suffering, but no such reward awaits the snail; so, out of a kindly feeling, do not keep him long in the hot hand.

Then how shall we observe our friend and study his comfort also? Get a piece of clean window-glass, and place the snail upon it. He will hold firmly to the glass with his broad, expanded, snakelike foot. Then, by looking at the gentleman through the glass, as he moves along, the reader will be able to note the mode in which such animals walk, mark the wave-like motions of the foot on the glass, and remember that all soft-bodied animals with a foot like the snail's, are named Gastropods, a word which means "having the foot and belly joined," and which is derived from the Greek γαστροπ, (gaz-teer), the belly, and ποδός (pods), a foot.

In so noticed the snakelike foot, and tested the force with which it clings to the glass, let us look at the head of our snail. The first noticeable objects are what children call the horns or feelers. Look closely at them. What is that black shining speck on the top of each feeler? The eye of the snail, according to the judgment of most naturalists. Strange sort of eye, which can thus be lifted up above the body, when its owner wants to take a survey of the world. If we want to obtain a wider view, we get on an elevation; the snail manages matters in another manner, he lifts up the eye itself. As the snail contemplates one of us through those black specks, the question rises, is he not terribly frightened at a being having an eye as large as his whole body? However, unfortunately, in the present state of snail education, it is impossible to impart his views to us, so we will let that topic pass.

In the tip of the tail, ingeniously he tucks the whole machine into its case, just as the top of the finger of a glove is turned in sometimes, when the glove is drawn off. Now wait awhile; see, the tube is pushed out again, and the eye is slowly rolled out from its remarkable hiding-place. Have you a pair of scissors in your hand? Would you like to cut off those feelers, eyes and all? No, some will say, respect even a snail's feelings. Others may answer yes, cut them off, if we shall get any knowledge by so doing; we do not believe such creatures feel pain. Well, you cannot prove they do not feel when thus treated, that's certain; and it shows a better heart to believe they suffer when injured. Those who believe in Shakespeare will probably take this view. They will remember his remark that a worm when crushed feels as much pain as when a giant dies. However, we will dare to be rather cruel for once only; we will do violence to our tender feelings, and, earnestly begging the snail's pardon, we cut off both feelers at one snap of the scissors. Now we have killed the snail, have we not? At least we have blinded him for life? Indignant the snail is certainly; see how he goes back into the innermost part of his house. He may well retire from a world which treats him thus. Now what will be the result? If the snail be in good health, and the operation be not performed too late in the year, that poor disabled-looking snail will be able to live without eyes and feelers in about twenty-five days. This operation was often performed on a great number of snails by Spallanzani, a celebrated Italian naturalist of the last century. Such a reproduction of organs proves the possession of singular vital powers in so lowly a creature. But Spallanzani and others have gone beyond this. They repeatedly cut off the heads of snails, and those heads, with all their organs, have been in a few months reproduced! That is a power which some men might have envied. Even the little finger of a human being when cut off is gone for life; no power of making a fresh one grow on the old place belongs to the greatest philosopher on the earth. Yet here we have a poor despised creature often able to recover its lost head, eyes, feelers, and mouth. The snail beats us all on such a work; beyond doubt.

Let us not forget, though, the snail's. It is an instrument capable of doing no light work, as those know to whose gardens the animal pays its unwelcome visits. The two lips are formed of a horny substance, which acts in the manner of a file on vegetables. The tough leaves of the white lily are often rasped off in a few nights by this cutting machine. If any one should be desirous of examining minutely the structure of the snail's mouth, he will find some fine specimens in the Physiological Gallery of the Hunterian Museum in the College of Surgeons, Lincoln's Inn Fields.

Of the snail's brain we may just make this remark, that the complete nervous system of the creature's first cousin, the slug, is to be seen in the same museum, and Professor Owen has given a learned description of the whole. Both snails and
sings may therefore know, as well as human beings, what it is to suffer from nervous attacks.

Would any one like to see the heart of a snail? The keeper of the above-mentioned museum will gratify the wish. It is a hard matter to reach the heart, but readers may there inspect the inner part of a snail’s heart, which is generally placed near the middle of the animal’s back.

The snail must, of course, breathe. How does the air enter his system? The snail’s nose, if we may use the expression, is on the back, or right side of the neck—that is, the hole through which the air enters is there placed. Can the snail smell? Plain sense tells us that there is a nose. There never, however, the least doubt that they soon find out vegetables for which they have a liking, as many an indigent gardener will admit.

Snails exhibit in spring and early summer a strange peculiarity. Their bodies are then covered with little spikes or darts of a hornsy substance, about a quarter of an inch long. Some of the older books have engravings representing these darts, which is as if shot off from the bodies of the snails. They are, however, a puzzle to the snail philosophers up to the present time.

Let us now look at the shell. In what light shall we regard this? Is it the snail’s house, or the snail’s skeleton? Either notion may be held. If we deem it the house, then we may well envy the animal for his power, not only of making his own home, but of reparing damages which may happen to its roofs. He is not only his own mason, builder, and architect, but provides his own quarry. We need not say, perhaps, that the lime of the shell is produced from the pores of the animal’s body. When he grows too large for his first house he enlarges it, and thus inhabitant and mansion are always accommodated each to the other. As his family never live with him, he has but his own good-will and pleasure to consult in the building. Two things deserve notice here, and one will have observed great differences in the coloured markings of snails’ shells. Now each snail has his own colour manufacture. A series of glands, like so many chemical workshops, produce the colours which give the various tints to the shell. It is a singular fact that even the baby snail begins its work of building before it is hatched. Even when yet in the egg, the little creatures are found to have formed a thin shell. This is something to the infant preciosity. One thing, however, seems beyond these babies: they cannot form the colouring matter of the shell; the house is built first and ornamented after.

We must now call attention to the snail’s winter house. When food begins to fail, and the autumn nights get cool, the creature becomes drowsy, and makes up his mind to a long sleep. Sometimes he buries himself in the ground, others crowd into sheltered corners. But not the snail. He leaves his ground. Some species retire deeply into the shell, building up four or five thin walls of lime at the entrance, so that the animal is completely closed up and separated from the outside world. Having performed this building feat, the snail bids good-bye to all care and sorrow, dropping into a comfortable sleep for the whole winter. Some of these are indeed rudely roused from slumber by hungry birds, which, discovering the shells, drive their bills through the thin walls, and tearing out the brittle snail, devour him before he has time to awake.

Are snails of any use at all? Readers who wish for variety of food may make wholesome soup of their bodies. Start not at the proposal; one species of snail was eaten in England in the time of Elizabeth, and “a snail feast” is said to be still served by the farmers of the North of England. A modern cookery book describes no less than twelve modes of preparing the animals for food. Is any reader anxious to try a dish? Then take our recipe: Get a sufficient quantity, according to appetite, of the edible snail (Helix pomatia is the learned name), boil them in spring water, then stew pepper and salt over—and done. The Emperor Nero is said to have professed this in Rome; any reader who pleases can, of course, try that way.

Our friends will bear in mind that we purposely avoid in these articles technical descriptions of species and genera, deep physiological discussion, and anatomical details. Our main object is to call attention to the richly varied facts which are to be seen in every field and garden throughout the year. There is much to excite wonder, and remind us of our infinite Creator in the meanest creatures of the waters, land, or air.

### LESSONS IN FRENCH.—XVII.

#### VIII. LIQUIDS.

#### Section I.—French Pronunciation (continued).

#### 80. I and II.—Whenever I and II are preceded by ci, ci, oui, and sometimes by i only, they receive a liquid sound different from that which they have when initial. In the former case, they become liquid, and are so called from their peculiar sound. Yet it is a sound with which foreigners are well acquainted. The only difficulty is, in expressing or illustrating the sound by means of English analogous sounds.

It is the same sound which is given to the letters 1l in the correct pronunciation of the English words: colleter, billiard, brilliant, and William. If you pronounce any one of these words very carefully, observing at the same time the peculiar sound of the letters ill, you will have the correct liquid sound which is illustrated by the peculiar sound of gl in the word seraglio.

In French words containing liquid sounds, observe the following general rules, namely:—

1. Pronounce the letter I before 1I and Ii ll as in the English word oh.

2. Pronounce the letter e before 1I and Ii ll as in the English word day.

In the illustrated pronunciation of the following examples of liquid sounds, the last syllable ye of many of them is scarcely sounded. Let it be but the mere faint echo of the voice.

Name, gl / sound, like gl in the English word seraglio.

#### FRENCH.

<table>
<thead>
<tr>
<th>Pronunciation</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ac-ky-l</td>
<td>Reception</td>
</tr>
<tr>
<td>Breed-y</td>
<td>To brighten</td>
</tr>
<tr>
<td>Kas-tey</td>
<td>Contention</td>
</tr>
<tr>
<td>Day-pooy</td>
<td>Spoil</td>
</tr>
<tr>
<td>Ahn-or-gul-y</td>
<td>To be proud of</td>
</tr>
<tr>
<td>Mool-y</td>
<td>Fair</td>
</tr>
<tr>
<td>Chey</td>
<td>Paper, or a sheet of paper</td>
</tr>
<tr>
<td>Pey</td>
<td>Daughter</td>
</tr>
<tr>
<td>Moo-l-y</td>
<td>To set</td>
</tr>
<tr>
<td>Eer</td>
<td>Straw</td>
</tr>
<tr>
<td>Pahy</td>
<td>To abuse</td>
</tr>
<tr>
<td>Ray-vay</td>
<td>Alarm-clock</td>
</tr>
<tr>
<td>Seal-yohn</td>
<td>Furrrow</td>
</tr>
<tr>
<td>Shey</td>
<td>Seat</td>
</tr>
<tr>
<td>Ty-juhr</td>
<td>Tailor</td>
</tr>
<tr>
<td>Too-o-boel-yohn</td>
<td>Whirlwind</td>
</tr>
<tr>
<td>Trav-l</td>
<td>Labour</td>
</tr>
</tbody>
</table>

But there is another very different and common method of pronouncing the liquid sound illustrated in the preceding examples. Its chief merit is, the case with which it may be made to agree. It cannot be more absolutely vicious, though, it be, at least in our opinion, inelegant.

The following examples will be used to illustrate the kind of pronunciation just spoken of, viz.:—

#### FRENCH.

<table>
<thead>
<tr>
<th>Pronunciation</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-goo-y</td>
<td>Needle</td>
</tr>
<tr>
<td>Booye</td>
<td>Boiled Beef</td>
</tr>
<tr>
<td>Boo-tay-y</td>
<td>Bottle</td>
</tr>
<tr>
<td>Kwee-yoar</td>
<td>Spoon</td>
</tr>
<tr>
<td>Fo-tuh-y</td>
<td>Arm-chair</td>
</tr>
<tr>
<td>Gro-say-y</td>
<td>Current</td>
</tr>
<tr>
<td>Mu-rah-y</td>
<td>Wall</td>
</tr>
</tbody>
</table>

Speaking of these different methods of pronouncing the liquids, the following opinion is taken from Bolmar’s “Leviza’s French Grammar” in the nineteenth century:—

“Last this pronouncing being the easiest of the two, has been adopted by so many people in France, that it is no longer considered a fault, except by grammarians. However, I recommend the former, not only on account of its correctness, but also on account of its being a sound very common to the Spanish, Italian, and Portuguese languages, in which languages this sound does not admit of any variation. It is represented in the Spanish by D, in the Italian by gl and in the Portuguese by th.”

81. GN.—This liquid is much used in the French language. Its correct sound is peculiar, and by no means difficult to attain. It is the sound of the letters gn in the English words bagno, mignonette, and vignette.

Pronounce the word mignonette correctly and carefully, observing, at the same time, the peculiar sound of the letters gn, which will be the correct sound of this liquid.

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The exceptions to this method of pronouncing the letters 
g occur only in these words, in which they belong to different syllables; that is to say, in dividing those words into syllables, it would be found that they belonged to one syllable, and a belonged to the next succeeding syllable, viz.:

**VOCABULARY.**

Aimur, 1, to be fond of. Apportner, 1, to bring.
Bois, m., wood, forest.
Capitaine, m., captain.
Caporal, m., corporal.

**EXERCISE 51.**


**EXERCISE 52.**

1. Does your sister like flowers? 2. My sister likes flowers, and my brother is fond of books. 3. Is he wrong to like books? 4. No, Sir, he is right to like books and flowers. 5. Have you many flowers in your garden? 6. We have many flowers and much fruit. 7. Is your cousin fond of raspberries? 8. My cousin is fond of raspberries and strawberries. 9. Is the cap-

**DISCOVERIES OF THE NINETEENTH CENTURY.**

The Russian Admiral Krusenstern, in 1804-5, made an 

exploratory voyage in Oceania, which enlarged our hydrographical 

knowledge of the Pacific Ocean. In 1819, Bellinghausen 

revisited a part of Polynesia, and made additions to some of the 

groups. About the same period. Freycinet discovered Ross 

Island, and solved some interesting questions relating to those 

distant seas. In 1823 and 1824, Captain Duperre made some 

additional discoveries in Polynesia, and re-explored the 
Papuan group and New Zealand. Captain Lütke, of the Imperial 

Russian Marine, who navigated the seas of Oceania, discovered 
some new islands in the Caroline group, and Olhrarau, between 
them and the Ladrones. In 1531-32, Captain Laplace, of the 

French sloop of war La Favorite, visited the coasts of 

Arabia and other countries washed by the Indian Ocean and 

China Sea; while about the same time Captain Du Petit-Thouars, 
of the Feniss, made surveys along the shores of Kamtschatka, Cali-

fornia, and Australia. The Russian Admiral, Krusenstern, also

* The student must not forget that the article is repeated before 
every noun.
made additions to the geography of the Kurile Isles, the coasts of Japan, and the Sea of Okhotsk. Captain Maxwell, of the suite of Lord Amherst, our ambassador to China, extended our knowledge of these Asiatic regions. The squadron under his command made several important discoveries in the Yellow Sea, particularly Sir James Hall's Islands. This expedition ascertained that the western coast of the peninsula of Corea had been placed on our maps greatly to the westward of its true position; and made known to the world a vast archipelago which no European had previously visited. Captain Maxwell also visited the Loo-Choo Islands, where he was only prevented from doing shipwreck, and seeking the assistance of the inhabitants.

The northern coasts of Asia having been previously imperfectly known, M. Gedenselstrom was commissioned to explore them in 1808; but his efforts were limited. Lieutenant (afterwards Admiral) Wrangell was charged to complete the exploration of these coasts, and to fill up the blanks which then existed in the maps of Siberia, by revisiting the most northern latitudes of these dreary regions. The object of this expedition was to examine the whole of the coast from Cape Chelagke to Cape North, discovered by Cook to the west of Behring Strait, and to determine whether there existed in the vicinity of these coasts an isthmus uniting Asia and America. This dangerous expedition occupied from 1820 to 1824. Beyond Cape Chelagke, he finds the mouth of the Lena, and the mouth of the Olymka, to the mouth of the river Kolyma. He discovered that the hypothesis of the existence of land in this vicinity was unfounded; and he rectified and completed the geography of this part of the continent of Asia. In 1843, M. Müddendorff successfully explored, in the midst of innumerable dangers, the coasts of the Frozen Ocean between Turukans, the sources of the Khatouna, and Cape Taimoura. Traversing Siberia from northerly to southerly shores, he visited the coasts of the Sea of Okhotsk, and part of Tartary.

In the quarter of a century that has elapsed since this time, our knowledge of Central Asia has been greatly extended, by the advance of the outposts of the Russian empire towards the south into the heart of Independent Tartary, and to the north of the River Amur, or Amoor, in the east, which now forms the boundary of the Russian empire, and to the west, that part of Central Asia, nominally tributary to China, which lies to the east of the great sandy desert of Gobi. Commencing at the Caspian Sea, on the western side of the continent, the acquisition by Russia of the Kirghiz Steppes, and the great plains round the Sea of Aral, that are traversed by the Syr Doria or Jaxartes, and the Amoor Doria or Ozus, has led to the thorough exploration of these regions, of which comparatively little had been previously known, and of the vast extensions of territory.

In 1825 an expedition was sent to the Sea of Aral by the Russian Government, under the command of General, now Count de Berg, who was commissioned to make an accurate exploration of the Russian frontier; and in 1845 an eminent Russian sailor, Admiral Alexis Bountakoff, cut out and fitted together ships at Orenburg, and carried them in pieces across the stumpy shores to the Sea of Aral, which were then built and launched. These ships were the pioneers of the establishment of regular steam navigation on the Sea of Aral, and up the great rivers Ozus and Jaxartes, which discharge their waters into it on the south and west, establishing along the coast of the last-named stream a line of water communication through the centre of Turkestan, by which an active commerce is and will be carried on between the Celestial Empire and Russia. For this achievement, the Founder's Gold Medal of the Royal Geographical Society was awarded to Admiral Bountakoff in 1867. Our knowledge of the scenery and the manners and customs of the inhabitants of Khiva, Bokhara, Thibet, and other parts of West Central Asia, has been increased by M. Arminius Vânbry, an enterprising Hungarian, who has travelled through these regions, visiting many places hitherto unknown by Europeans, in the disguise of a dervish, at the risk of his life and liberty.

Passing eastward along the line of the Jaxartes, through the sandy wastes of the desert of Gobi, down the wooded slopes of the mountains that divide Manchooria from Mongolia, and over the rich plains that are watered by the Songari and its tributaries, we stand at last on the shores of the Japan sea, and make our way across its waters to the crescent-formed chain of islands, stretching from the island of Saghalien on the north to the south-eastern extremity of the peninsula of Corea, that form the Empire of Korea. Of this island empire, the most reliable account that we possessed, until Lieutenant Jaxt's recently published work, was one written by Engelbert Krumpfer, in 1690. Several attempts have been made by the Portuguese and Dutch, since the commencement of the sixteenth century, to establish commercial relations with Japan; but trade with this country has always been attended with great difficulty and danger, owing to the repugnance of the inhabitants to hold trade with foreigners. In 1824, however, the Japanese government entered into a commercial treaty with the United States, and in the following year another was concluded with Great Britain. Since that time several ports have been opened to British commerce, while embassies have been sent from Japan to visit Europe and America. The Japanese showing a disposition to abandon many of the customs, and even the costume to which they have adhered without change for many hundreds of years, according to their own account, and to adopt in a great measure the usages of the most civilized portions of the world. Much of an efficient and thorough survey of the Japanese waters has recently (1865-8) been carried out by Commander Bullock, of the Royal navy.

Expeditions into the interior of Asia have, from time to time, thrown great light on the geography of this part of the Old World. We have already (p. 333) alluded to the occupation of the mouth of the river Okhota, by Seward and Foster, in 1843, and the coast of Asia, and Tartary, and of the Bokhara and Mervquill with Turcomania and Khiva. Persia has, at different periods, been visited by a number of able travellers, to whom we owe a knowledge of this country; as, Tavernier, Chardin, A. Joubert, Moorcraft, Morier, Frazer, Kerr Porter, Alexander, and Mees. Coste and Fladun. Of Arabia, we have gained information from Niebuhr, Burchardt, and Rüppel; and the desert of Arabia, the bed of the Red Sea, has been thrown on the western districts of this enormous peninsula, and the condition of its inhabitants, by Captain Richard F. Burton, who visited Mocca and Medina in 1853, and travelled through that part of the country which borders on the Red Sea, by a route hitherto untried by Europeans. A considerable part of Captain Burton's adventurous journey was performed in the disguise of a pilgrim to the cities sacred to Mahometans as the Mecca, Medina, and Bokha. His object, indeed, was to give unto the world a knowledge of its religion, as it would be impossible for a European to pass through that country in quest of information, otherwise than in the garb of the inhabitants of some Mahometan country. Captain Burton's researches were further supplemented and augmented by Mr. William Gifford Palgrave, who travelled from the Dead Sea to the Persian Gulf, through Central and Eastern Asia, and in 1853-5. This gentleman also made his way through the country in disguise, and found, contrary to his own expectation and the general belief, that the interior of Arabia, instead of being a trackless waste, resembling the Sahara in its character, and peopled only by a few wandering Bedouin Arabs, is inhabited by tribes who live in towns and villages, under sheikhs and native princes, actively engaged in trading with each other and the countries bordering on the coast. Mr. Palgrave's discoveries, indeed, were of so important a nature, as to give birth to a new character to the map of Arabia, the interior of which, previous to his visit, has been represented as being little better than a sterile uninhabited desert.

Of recent discoveries in Asia little remains to be said, but that the acquisition of territory recently made by the French in the south of Cambodia and Cochim China, has led to an extended knowledge of this part of India and the Ganges; on the Indo-Chinese Peninsula: whilst our wars with China, and the spirit of enterprise shown by such men as the "English Tai-ping," and other adventurers in the service of the Imperialists, and the so-called Tai-pings who are seeking to overthrow the present dynasty in that country, have secured a more elaborate survey of the Chinese coast, and much information respecting the interior of that wonderful country.
LESSONS IN MUSIC.—V.

The learner must be careful not to let his thoughts be confused by the different uses of the word "time" in ordinary musical language. You will meet with the phrases "common time," "triplet time," etc. The word "time," then, refers to the orderly recurrence of accents—the measure. In the phrases "quadruple time," "duple time," etc., it means rate of movement, the speed with which the accents recur. And when we are referred to "keep the time," it is commonly meant that (though we may have been correct in the rate of movement, and accurate in the recurrence of accents) we have not given the exact proportionate length of each note. It is known that the swings of the same pendulum are of equal length in time, whether they are long or short in respect of the distance traversed; and that the longer the pendulum, the slower it moves; and the shorter the pendulum, the quicker its movement. This gives us the means of regulating the "rate of movement" in music as well as in clockwork. There is an instrument called a "metronome" or measure-ruler, the pendulum of which can be lengthened or shortened according to a graduated scale, so as to swing any required number of times in a minute. Let each swing of the metronome correspond with an aliquot or "pulse" of the measure, or in the quick senary measure, with the loud and medium accents. Then, if the number at which the weight is set is that of the graduated scale of the metronome, be given in the signature or title of the tune, it will indicate to others at which that tune should be sung. Thus, "M. 66," placed at the head of a tune, signifies that, while this tune is sung, the metronome should swing at the rate of sixty-six swings a minute; and that each aliquot of the measure should keep pace with a swing of the metronome. The larger metronomes, which are kept in motion by clockwork and "ticks" to every accent of the measure costs thirty shillings and upward—which that strikes a bell on the recurrence of each stronger accent—costs much more expensive. The smaller metronomes, which simply oscillate without noise, are sold at four shillings and upward, and there are even cheaper instruments than these which are sold at sixpence or cightpence. Each teacher, however, and scholar too may make his string pendulum, which will answer the end very fairly. For this purpose fasten a penny or some such weight at the end of a piece of string. Then, at four inches and five-eighths from the weight, tie a double knot. Hold the string by this knot, and the weight will swing at the rate of 160 swings a minute, and make your pendulum correspond with M. 160. At 6½ inches tie a single knot, and that length of pendulum will correspond with M. 138. The double knots may mark the distances most used, and the single knots those most occasionally between them. The rest of the pendulum may be graduated to the following table—S, standing for single, and D. for double knot.

1st D. at 4½ inches from weight = M. 199.
1st S. at 6½ in. = M. 138.
2nd D. at 9½ in. = M. 112.
2nd S. at 1 foot 1½ in. = M. 90.
3rd D. at 1 foot 7½ in. = M. 63.
3rd S. at 2 feet 6 in. = M. 60.
4th D. at 3 feet 10½ in. = M. 50.

A silk tape with the metronome figures marked at the proper distances would be preferable to the string. A limb of wood might be graduated in a similar manner, with holes punctured for the points of suspension, but it would require different distances to weigh itself.

The "string pendulum" which is here recommended for its convenience of measurement by a common carpenter's rule, is slightly inaccurate, though quite near enough to the truth for all practical purposes. Some such instrument should be used by every pupil. Though it need not be always used for the exercises, it should be constantly referred to as a standard, and strict attention should be given to it in the earlier lessons.

When you have become familiar with the idea of a tune correctly, then set your metronome swinging, and practice singing the tune at the proper rate, or "in the right time." After considerable practice you have taught to keep the accents at regular and equal distances, you will only need your pendulum to give you a correct idea of the "rate of movement," before you commence singing a tune. An accomplished solo singer, or instrumentalist, need not confine himself to strict clock-time, but should vary the rate of movement according to the emotional expression. You, however, are a long way from that position, and should carefully practice yourself with this instrument until you have established in your mind and ear a sense of time.

It is not an easy thing for an unpractised singer to keep an equal rate of movement throughout a tune without aid, but you must learn to do it, and we are persuaded that a careful and frequent use of the pendulum is the best means hitherto proposed for the attainment of this power; but it is customary to recommend the practice of "beating time." To those who may wish to adopt this plan, the diagrams below will explain the method of "beating time" for the different measures—may be of use. But to many persons this is only a hindrance. Let us keep in mind that the object to be gained is—first a mental perception of equal movement, or the regular recurrence of the pulses; and, secondly, a mental command, by which the muscules of the larynx are made to obey the conceptions of the mind. Both these may be gained by careful practice, discipline, and effort on the part of the pupil. If a regular movement of the muscules of the arm is easier to him than a regular movement of the Muscles of the larynx, then let him use the first as a guide to the second—not otherwise. It is, however, frequently necessary, when many sing together, that the leader of the band should beat time, either with a wand, or by the movement of his own hands. The senary measure may be beaten in the same way as the binary.
to confirm this assertion. What a noisy and barbarous music; all rhythm and no sound! . . . It would afford us no very favourable idea of the abilities of modern musicians if they required so much parade and noise in keeping together. The more time is beaten, says M. Rousseau, "the less it is good." Rousseau’s opinion is, perhaps, too strongly expressed; but we think no person of good taste can doubt that it is, in the main, well founded. The practice of making a whole class beat time while they sing, is a return to barbarism. The proper mode of teaching this part of practical music would be to make the members of the class act as leaders in turn; or, if the class be large, one or two at once might be taken out, placed in front of the others, and employed to beat the time—first with the assistance of the teacher, and afterwards by themselves. See Dr. Bryon’s "Rational Introduction to Music."

The peculiarities of the old notation on the staff of five lines will be explained as we come to them, and at the proper period of his course our pupil will be more systematically introduced to them. He is already acquainted with most of the points relating to our "interpreting notation." They are, however, repeated below for the sake of distinctness. Observe that the notation of "slurs, repeats, and expression," applies alike to both notations.

**NOTATION OF THE RELATIVE LENGTH OF NOTES.**—As the accents recur at equal intervals of time throughout a time, marking aliquot parts of the measure, the relative length of notes can be clearly indicated by showing what proportion of the measure each note occupies. This is done by first placing the accent marks at equal distances along the page, thus—

```
| : | : |
```

Or thus:

```
| : | : | : |
```

And then observing the following rules:

**a.** A note placed alone immediately after an accent mark is supposed to occupy the time from that accent to the next. Thus:

```
| : | : | : |
```

Or thus:

```
| : | : | : |
```

**b.** A stroke — indicates the continuance of the previous note through another aliquot (or pulse), thus:

```
| : | : | : |
```

Or thus:

```
| : | : | : |
```

**c.** A dot divides an aliquot into equal parts, and shows that the note before it fills half the time from one accent to the next, leaving only half an aliquot to the note or notes which follow, thus:

```
| : | : | : |
```

Or:

```
| : | : | : |
```

The dot after a mark of continuance shows that the previous note is to be continued through half that aliquot, thus:

```
| : | : | : |
```

Or,

```
| : | : | : |
```

d. The dot and comma together show that the note before them fills three-quarters of the time from one accent to the next, thus:

```
| : | : | : |
```

**e.** A comma signifies that the note before it fills a quarter of the time from one accent to the next. The last note in an aliquot does not require a mark after it, as the proportion left to it is sufficiently evident. Thus:

```
| : | : | : |
```

Or,

```
| : | : | : |
```

**f.** The dot and comma together show that the note before them fills three-quarters of the time from one accent to the next, thus:

```
| : | : | : |
```

**g.** This mark, indicates that the note before it fills one-third of the time from one accent to the next, thus:

```
| : | : | : |
```

**h.** An aliquot or any part of an aliquot left unfilled indicates a pause of the voice, thus:

```
| : | : | : |
```

**Or thus:**

```
| : | : | : |
```

**NOTATION OF SLURS, REPEATS, AND EXPRESSION.**

**a.** When two or more notes are sung to the same syllable, they are said to be slurred. The slur is indicated by a stroke beneath the notes.

**b.** In some times it is required to repeat certain parts of the strain. The manner in which this is done is indicated by the following signs:

**d.** c. abbreviated from the Italian Da Capo, means "Return to the beginning."

**e.** s. abbreviated from Dal Segno, means "Resume, and sing from the sign."

**f.** is used for the sign, and

**g.** abbreviated from Fine, shows where such repetitions end.

**h.** placed over a note shows that a repetition of words commences there.

**c.** Greater "expression" is sometimes given to music by regulating the degree of force with which certain parts of the strain are to be delivered. This is done by means of the following signs placed over the notes:

**f.** abbreviated from forte, signifies loud.

**g.** from piano, signifies soft.

**h.** very loud.

**i.** very soft.

**d.** Sometimes it is needful to indicate the manner in which that force is to be thrown in. For this purpose the following marks are used:

<i> denotes a swell, the voice commencing softly, becoming louder, and then closing softly.

< denotes increasing force.

> denotes diminishing force.

| or | over a note shows that it should be sung abruptly and with accent.

**e.** The same piece of music often requires to be sung with different expression, according to the different words with which it may be used. In that case the marks of expression should be placed on the words. It is proposed that—

**CAPITAL LETTERS,** in printing, or double lines under the word in writing, should distinguish words to be sung louder than others; that,

**italic letters,** in printing, or a single line under the word in writing, should indicate softness; that,

**the acute accent** should denote special abruptness and decision of voice; that,

**A stroke above the words, in printing,** a succession of little strokes over or a stroke through the word in writing, should show a heavy movement; the accents being dragged along, and the lighter ones little distinguished from the stronger; and that,

**Thegrave accent** placed on the words which fall to the strong accent of the music, should indicate a spirited movement, with marked attention to accent.

A slower or quicker movement may be expressed by the words slowly or quickly. The "heavy movement" mentioned above necessarily tends to slacken, as the "spirited movement" does to quicken the pace of the singer.

An analysis of the markings used in the Tonic Sol-fa System has elicited the following principles, which may be of use to the student. Passages should be marked to be sung softly in which

(1) any peculiar solemn or awe-inspiring thought is expressed;

(2) a change from praise to reflection, or (3) from reflection to prayer. Passages should be marked to be sung loudly which express (1) joyful praise, (2) strong desire, (3) ardent gratitude, (4) high resolve, or (5) some inspiring thought. For a much fuller development of this subject of expression (verbal and musical) see the "Standard Course" of Tonic "Sol-fa Lessons," and the "Tonic Sol-fa Repertor." Vol. VIII.

**THE STANDARD SCALE.**—A certain note "about midway between the highest and the lowest that can be perceived by the ear" is fixed on by musicians as the standard of pitch, and the notes arranged upon it, according to the order of the "common mode" or scale already described, are called the standard scale. This note is called C. The second note of the
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LESSONS IN FRENCH.—XVIII.

SECTION I.—FRENCH PRONUNCIATION (concluded). GENERAL RULES FOR PRONOUNCING AND READING FRENCH.

8d. The preceding portions of this section on French pronunciation have been devoted exclusively to the illustration of every known French sound, whether occurring singly, or the result of combinations of vowels, consonants, compound vowels, etc.

nasal, and liquid sounds. Analogous English words have constituted the agents of the foregoing illustrations of French sounds. Generally, this has served to separate words only. But let it be remembered that, to give the correct sound of a French word as it stands alone, it is a very different thing from giving that same French word its correct sound when it is used with other words in the formation of a sentence in reading, or a phrase in conversation.

In this respect, the French language is like our own, as used in common conversation. The system of word-connections, in sentences and phrases in both languages, is nearly identical. For the purpose of illustration we will begin by giving specimens of word-connections in the English language, viz.:

My hat was on the table, pronounced as if printed my het was on the table.

I jumped upon the ground, pronounced as if printed I jump-ap-pun th' ground.

Not at all, pronounced as if printed not-at-all.

I assert a dogma, another denies it, pronounced as if printed I assert-a dogma, another denies-it, etc.

These and similar word-connections occur in almost every sentence and phrase in the English language, where the continuance of sound is not broken by punctuation marks, without our being sensible of it. It is unavoidable. We are, and have been, so constantly used to it, that we notice it only when attention is called to it. It will be observed that the foregoing word-connections in the English language occur when a word ending with a consonant is immediately followed by another word commencing with a vowel. And the same exists when, in common conversation, the word following the one with a final consonant begins with a silent h, viz.:

I was out about an hour, is pronounced as if printed I was-out-about an hour, etc.

Word-connections in the French language also occur under circumstances exactly similar; i.e., when a word ending with a consonant immediately precedes another word commencing with a vowel or silent h.

This feature, therefore, of the pronunciation of French, both in ordinary reading and common conversation, will present no great difficulty to the student. The following rules, thoroughly understood and committed to memory, will place the student beyond doubt and hesitation concerning these word-connections, and other matters pertaining to the correct, intelligible use of the French language, both in reading and conversation.

I.—Pay no attention whatever to the apostrophe.

II.—Pronounce the pronoun elle like the English I.

III.—The final letters et, at, of, with, ous, et, en, and sometimes tion, are pronounced as two syllables.

V.—The letters es final are pronounced like the letters ey in the English word day, except when s forms the plural of words ending in e, in which latter case es are not pronounced.

VI.—Pronounce ces, se, ce, like c mute or unaccented.

VII.—Pronounce ch and rh, generally, like the letters sh in the English word shah, except the letters ch in the word world.

VIII.—The letters final, in the words Christ and anticrist, are sounded, but they are silent in Jean Christ.

IX.—All final consonants after s are silent, except in the words Meme and cen, a bear.

X.—In the word Messieurs, the final letters es are always sounded when proceeding a word beginning with a vowel.

XI.—Whenever a word ending with a consonant immediately precedes a word beginning with a vowel or silent h, the sound of the final consonant of the former word is carried to the first syllable of the latter, or to the word itself, if it be a measurable, just as if the latter word commenced with that consonant. This is most particularly the case if the two words are intimately connected in sense. The above rule owes its existence entirely to usage, to preserve which almost everything else is sacrificed in the French language. Still the student must not observe it too rigidly, except in poetry. Neither in prose nor conversation does this rule hold good in the following cases, viz.:

1. When a harsh sound would be the consequence.

2. Whenever any punctuation mark is placed between the two words in question.

XII.—The letter l, in the words et la conjonction meaning...
and and cent (meaning a hundred) is never carried to the following word in pronunciation.

XIII. The letter a in the word Adel, the month August (pronounced a-del, and not a-del), is not sounded.

XIV. In the compound word cat-il, and a few others, the t is carried to the second syllable in pronunciation.

XV. Whenever a word ending with a silent e is immediately followed by another word beginning with a vowel or h mute, the consonant preceding the silent e of the first word is carried to the next word in pronunciation as—

La France entière, as if printed la Fran-con-tière, and pronounced la Franz-tier.

Homme homme, as if printed homm-e homme, and pronounced on-eay-tom.

XVI. With the words ah, oh, oh, oost (one of the points of the compass), oui, ou, onze, onstéme, pho, unstéme, yach, yatagan, yole, and yucca, no final consonant of a preceding word is connected in pronunciation. Neither is any elision of the article made before any of these words.

XVII. In the phrase vers une heure, the s final of the second word, ses, is not carried to the following word, une, in pronunciation.

XVIII. The word cing is pronounced zan in whatever it comes before a consonant or an aspirated h. But before a vowel or h mute it is pronounced sanh.

XIX. The letters se we have the sound of y, when they are not silent after a and o.

XX. The word diez, ten, before a consonant, is pronounced dees; before a vowel or h mute, des; and at the end of a clause, desse.

XXI. The word seis, six, before a consonant, is pronounced see; before a vowel or h mute, sees, and at the end of a clause, see.

XXII. The word huit, eight, before a consonant, is pronounced hue; or nearly wee; before a vowel or h mute, sweet, or nearly weet.

XXIII. The letters er final are usually pronounced like the letters ay in the English word day. The following words, however, constitute an exception to the above rule. In them the letters er are pronounced like air in English.

Alger Chér Frer Hier Magister Sadder
Amir Collier Plaker Hiver Mer Statbonnier
Belvédère Enfer Gaster Jupiter Niger and
Cancer Fer Gesner Lucifer Peter Ver.

XXIV. Divide each word naturally into syllables, as you would in the English language.

SECTION XXXIX.—USE OF THE ARTICLE (continued).

1. Adjectives of nationality will, according to Rule 4 of the last lesson, be preceded by the article. Il apprend le français, l'anglais, He learns French, English, German, Allemand et l'italien.

2. After the verb parler, the article may be omitted before an adjective of nationality, taken substantively.

Votre frère parle espagnol et port. Your brother speaks Spanish and Portuguese.

3. The article is not used in French before the number which follows the name of a sovereign. This number (unless it be first and second) must be the cardinal, and not the ordinal [§ 26 (3)].

Vous avez l'histoire de Henri You have the history of Henry the Fourth.

4. A noun placed in apposition with a noun or pronoun is not in French preceded by un, une, a or an, unless it be qualified by an adjective or determined by the following part of the sentence.

Votre ami est médecin.
Votre frère est avocat.
Votre ami est un bon médecin.
Votre frère est un célèbre avocat.

5. PRESENT OF THE INDICATIVE OF THE IRREGULAR VERBS.

Apprendre, to learn.
J'apprends, I learn, do learn, or am learning.
Tu apprends.
Il apprend.
Nous apprenons.
Vous apprenez.
Il apprend.

Acquérir, to know.
Connaître, to know.
J'acquérir, Je connais, Je sais, Je sais, or do know.
Tu connais.
Il connaît.
Nous connaissons.
Vous connaissez.
Il connait.

Savoir, to know.
Do you know that Frenchman, that
Englishman, that German, and that Spaniard?

Savez-vous le français, l'anglais, l'allemand et l'espagno1?

Do you know French, English, German, and Spanish?

RÉSUMÉ OF EXAMPLES.

Le Capitaine G. sait-il le français?
Il ne le sait pas, mais il l'apprend.

Connaissait-vous le Docteur L. P.?
Je ne le connaissais pas, mais je sais.

Ce monsieur est-il peintre?
Non, il est architecte.

Ce monsieur est un architecte distingué.

Ce Français parle grec et arabe.

Do you know Dr. L.? I am not acquainted with him, but I know where he lives.

Is that gentleman a painter?
No, he is an architect.

That gentleman is a distinguished architect.

Ce Français parle grec et arabe.

That Frenchman speaks Greek and Arabic.

Avez-vous vu Charles Dix, frère de Louis Dix-huit?

Give me a picture, please, of Louis the Eighteenth.

VOCABULARY.

Allemand, a, German.
Ancien, -e, ancient.
Anglais, -e, English.
Bibliothèque, -e, bookcase, library.
Capitaine.
Chinois, -e, Chinese.
Danais, -e, Danish.

Quatorze, fourteen.

Russes, Russian.
Sueca, -e, Swedish.
Swede.

Polonais, -e, Polish.
Tapissier, -e, upholsterer.

EXERCISE 53.

1. Connaissait-vous ce monsieur?
Oui, Madame, je le connais fort bien.

2. Savez-vous de qui c'est?
Il est une personne qu'il est.

3. Connaissait-il le médecin?
Il est un médecin, monsieur?

4. Do you know our physician?
Yes, sir, he is a captain.

5. Connaissant le capitaine?
Is he not a Dane, he is a Dane.

6. Are you acquainted with him?

7. Do you know Mr. L.?
I am not acquainted with him, but I know where he lives.

8. Is that gentleman a painter?
No, he is an architect.

9. That gentleman is a distinguished architect.

10. Ce Français parle grec et arabe.

11. Do you know Dr. L.? I am not acquainted with him, but I know where he lives.

12. Is that gentleman a painter?
No, he is an architect.

13. That gentleman is a distinguished architect.

14. Connaissait-vous le capitaine?
Il est un capitaine.

15. Connaissait-il le capitaine?
Il est un capitaine.

16. Connaissait-il le capitaine?
Il est un capitaine.

17. Do you know the Englishman who lives at your brother's?
I am acquainted with him.

18. Do you know Mr. L.? I am not acquainted with him.

19. Do you know Mr. L.?
I am not acquainted with him.

20. Do you know Mr. L.?
I am not acquainted with him.

21. Do you know Mr. L.?
I am not acquainted with him.

22. Do you know Mr. L.?
I am not acquainted with him.

23. Do you know Mr. L.?
I am not acquainted with him.

24. Do you know Mr. L.?
I am not acquainted with him.

25. Do you know Mr. L.?
I am not acquainted with him.

26. Do you know Mr. L.?
I am not acquainted with him.

27. Do you know Mr. L.?
I am not acquainted with him.

28. Do you know Mr. L.?
I am not acquainted with him.

29. Do you know Mr. L.?
I am not acquainted with him.

30. Do you know Mr. L.?
I am not acquainted with him.

31. Do you know Mr. L.?
I am not acquainted with him.

32. Do you know Mr. L.?
I am not acquainted with him.

33. Do you know Mr. L.?
I am not acquainted with him.

34. Do you know Mr. L.?
I am not acquainted with him.

35. Do you know Mr. L.?
I am not acquainted with him.

36. Do you know Mr. L.?
I am not acquainted with him.

37. We have very fine flowers; we are fond of flowers.

38. Do you give him to them?
I give them to you.

39. Give us some.

40. Do not give us any.
LESSONS IN PENMANSHIP.—XVIII.

In the copy-slips that are given on this page, a new elementary form is brought under the reader's notice—the first of the four elementary strokes entering into the composition of the seven letters of the writing alphabet that yet remain to be considered. This stroke, which is shown separately in Copy-slips Nos. 61 and 63, enters into the formation of v, w, and b. When exhibited by itself, it may be described as a fine bottom-turn or hooked-stroke, consisting of a hair-line commenced at the line c, and brought downwards, like the lower half of the ordinary bottom-turn, as far as the line b, where it is turned to the right and carried upwards, with a slight inclination to the left after it has crossed the line c, until it reaches the line a. The pen is then brought down the line again to a point about midway between a and c, to thicken it, and then turned abruptly to the right, making a small curved stroke, which completes the elementary form. The short thickened stroke which is made by the downward course of the pen along the hair-line already carried up to the line a, must have its broadest part at this line, and taper gradually downwards until the point is reached at which the curved line completing the stroke is turned to the right. Sometimes this stroke is finished with a small loop at the top resembling the loop of the letter g. The method, however, adopted in our copy-slips is neater and more compact, although the looped form of termination is useful when the next letter happens to be c, as by making the finishing-turn larger, we are the better able to carry it into the fine up-stroke commencing at c, which forms the loop of this letter. In Copy-slip No. 61, as our readers will perceive, the stroke that we have been describing is given with the top-and-bottom turn, to which elementary stroke it is added in order to form the letter v, the simplest of the three letters into whose composition it enters. In Copy-slip No. 63, the bottom-turn is given, to which, twice repeated, this new elementary form is added to form the letter w, while with

COPY-SLIP NO. 61.—ELEMENTARY STROKES FORMING THE LETTER V.

COPY-SLIP NO. 62.—THE LETTER V.

COPY-SLIP NO. 63.—ELEMENTARY STROKES FORMING THE LETTERS W AND b.

COPY-SLIP NO. 64.—THE LETTER W.

COPY-SLIP NO. 65.—THE LETTER b.

COPY-SLIP NO. 66.—THE WORD VOW.

The modification of the bottom-turn, known as the letter l, which stands third in order in Copy-slip No. 63, it forms the letter b. The three letters v, w, and b, are given separately in Copy-slips Nos. 62, 64, and 65. It will be noticed that although in exhibiting the stroke by itself it has been commenced at the line c, and carried downwards and then upwards with a bottomturn, practically it is nothing more than the extension of the fine up-stroke of the bottom-turn as far as the line a, where it is finished in the manner already described. It should be remarked that the letter w is frequently made by adding this termination to the fine up-stroke of the bottom-turn of the letter n. The form, however, that we would recommend our readers to adopt is given in Copy-slips Nos. 64 and 66, where w is formed by the addition of this termination to the fine up-stroke of the second bottom-turn of the letter u.
HISTORIC SKETCHES.

THE BLOODY ASSIZE.

There are some historical events of which we gladly cherish the memory, because of the illustre they spread around our national character; or because of the intrinsic worth of the events themselves. Such are the great victories of the nation abroad and at home, the envoys of our foreign and colonial foes, the winners of steps onward in the path of constitutional freedom, in opposition to the tactics of absolutists and tyrants. Other events there are over which we would gladly draw a veil, if it were permitted us to do so, events so sad and disgraceful, not only to our national character, but to humanity itself, that we would not look at them. But...
HISTORIC SKETCHES.

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do not know the men had been concerned in the rebellion; that
she understood one of them, a minister, was merely persecuted
for his religious convictions, and that the other, a laborer, had
for no legal assistance was in those days allowed to prisoners on
trial for treason—that it was unreasonable to try him for com-
pliny in treason, when the person implicated as the traitor had
not been proved one, seeing that he had not been tried at all,
and that "peradventure he might afterwards be acquitted as
innocent after she had been condemned for harbouring him."

This very reasonable objection was overruled by the judge, who
likened it to the defence already made to the illegal impris-
nonment, and then summed up in violent language against her.
Some accounts, written at the time, report that the jury
three times refused to find a verdict, and that it was only in
consequence of the threats of the judge that they at length
found her guilty. It is but right to say that the account given
in the State Trials says nothing about this, though it gives
eough to show the disgraceful bias of the judge against the
prisoner, and the unjustified part that a violent one, which
he played. He expressed the greatest surprise that the jury
should have hesitated so long about their verdict, adding, "If I
had been among you, and she had been my own mother, I should
have found her guilty." He then passed sentence, the sentence
of the law be it observed, not of the judge, "That you be con-
voyed hence to the place from whence you came, and from thence
you are to be drawn on a hurdle to the place of execution, where
your head will roll till you be dead. And the Lord
have mercy on your soul."

This horrible sentence to death by fire was changed by the
royal clemency—save the mark—to death by beheading, the
utmost King James could be induced to grant to a woman.
When James himself was sent into exile, an Act of Parlia-
ment reversed the attainted of Lady Ellis, on the ground that
"the verdict was injuriously expost with the law, for murder
and violence, and other illegal practices of George, Lord
Jeffreys, Baron of Wern, the Lord Chief Justice of the King's Bench."

At Salisbury, the next town on the circuit, various punish-
ments, including flogging and imprisonment, were passed on rebel
sympathisers who had wished "the cause" good speed; but there
were not any actual rebels for trial till the judge came to Dor-
chester, where the real campaign began. He charged the grand
jury to the effect, that he would punish with the extreme rigour
of the law, not only principals, but all abettors and abettors, all
who had encouraged traitors, whether by word or deed, and all
who had helped any of them to escape. Several hundreds of
"true bills" were found, when the meshes of the net were
declared to be so ample, and Jeffreys, alarmed for his own
convenience if so many prisoners were tried singly, announced
that those who would plead guilty "should find him to be a
merciful judge; but that those who put themselves on their trial,
if they should have victory to claim to live; if they should have
fore, that such as were conscious they had no defence, had better
spare him the trouble of trying them." To show that he was in
earnest, he ordered thirteen out of twenty-nine of those first
convicted to be hanged in thirty-six hours after sentence, and
the remainder the next morning. To one man who objected to
the competency of a witness, he exclaimed, "Villain! rebel
minds I see thee already with a halter about the neck; and
thee, traitor, I see already to be hanged. Two hundred and ninety-two were condemned to death at this
town, and seventy-four of them were actually hanged; the others
were sold as slaves, and sent to the plantations in the West Indies.
Cruel floggings took place, in addition to these severities, on
those who had taken smaller part in the rebellion; one poor
wretch was sentenced to be whipped through every market town
in the county for seven years, that is to say, once for every seven
years.

At Exeter, the first man convicted was sent to instant execu-
tion. Thirty-seven more suffered death at the same place, and
200 were condemned to whipping, slavery in the West Indies, or
imprisonment. At Taunton 500 prisoners awaited their trial,
and Jeffreys observed, in his address to the grand jury, that "it
would not be his fault if he did not purify the place. One
hundred and forty-three were ordered for execution, 283 were to
be sent to the plantations, and, in order that the rebellious county
might be duly warned for the future, Jeffreys ordered some of
the condemned men to be executed in the surrounding villages.
At Wells, the scenes enacted at Taunton were repeated with
sickening iteration, and then Jeffreys went on to Bristol,
where, however, he had but three victims. Two men of the
first rank, and one of them a baronet, had been convicted for
some, one of them was condemned to death, and the other procured a
pardon; but before his release, the other man escaping, Jeffreys ordered
execution to be done on the pardoned one, because "his family
owed a life!"

A large sum of money was made by the judge in the sale of
pardons, notwithstanding the quantity of blood actually shed.
As much as £15,000 was given in one case, £28,000 was refused
in another, and by the time the circuit was over, Lord
Jeffreys found himself rich enough to support the dignity of lord-shan-
celler, a post which was the reward of his zealous services in the
west.

Neither king nor judge profited in the end. The former lost
his throne, which has been ever since barred against the return
of any of his dynasty, and the spirit disembodied on the Bloody
Assizes sat heavily on the soul of the judge, and pressed it down
as the other man would. It was found that King James had fled
on the approach of the Prince of Orange, in 1688, the people
demanded with loud voices that his ill advisers should not
escape. The chief one for whose punishment they thirsted
was Jeffreys, and search was made high and low for him.
Almost he escaped. Steps to ensure his departure from
England had been "secretly taken, and, disguised as a seaman, his
eyebrows shaved off, the better to conceal his features, he had
arrived in a great boat which was to take him back to his
country, when he took it into his head to go on shore. At an ala-
none in Wapping he was recognised by one to whom he had, as judge,
behaved brutally; a mob surrounded the house, and would
have torn the fugitive to pieces, had not some soldiers rescued him
and taken him to the Lord Mayor. By order of the temporary
Government he was sent to the Tower, where he died miserably,
before he could be brought to the scaffold. It is charge of high
commissioners.

In the West of England the man's memory is still preserved
as that of an incarnate fiend, the true representative of perfect
injustice, the sign of brutal cruelty and oppression. Pro-
ably some inventions to his disadvantage have been made by
the fertile brains of angry foes, and possibly some traits of
goodness may have been forgotten amidst the universal execu-
tion which has been his historical epitaph; but there are few
even now-old-days who think the epithet "bloody," which is
usually prefixed to Jeffreys' name, too strong for the man who
presided over the special commission after Monmouth's rebellion,
and who, in his capacity of judge, "played such fantastick tricks
before high Heaven, as made the angels weep."

SYNOPSIS OF THE LIFE AND REIGN OF JAMES II.

James II. was the third son of Charles I. by his Queen
Henrietta Maria of France. He was the twenty-seventh sove-
 reign of England after the Norman Conquest, and the fourth of
the Stewarts dynasty.

Born at St. James's, Oct. 14, 1630.

Began to reign. Feb. 6, 1685.

Rising in Scotland in favour of the Duke of Monmouth. 1683.

Monmouth lands at Lyme, June 11, 1685.

Battle of Sheriffmoor, July 5. 1685.

Execution of Monmouth, July 15, 1685.

"The Bloody Assizes.

Revocation of the Edict of

Nantes, in France, Oct. 12, 1685.

Died at St. Germains, Aug. 6, 1712.

SOVEREIGNS CONTEMPORARY WITH JAMES II.

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<td>Mary, the daughter of James II.</td>
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LESSONS IN BOTANY.—IX.

SECTION XV.—ON THE COROLLA, ITS PARTS AND MODIFICATIONS.

As the calyx may be made up of one sepal, in which case it is termed monosepalous, or of many sepals, in which case it is termed polysepalous, so the corolla may be made up of one or many parts called petals. In the former case a monopetalous, in the latter a polyptetalous, flower results. Even the most cursory observer of flowers must have noticed some of the various modifications of form and arrangement to which petals are subject. Hence have arisen various botanical designations, some of which we shall now proceed to explain. In the disposition and arrangement of petals, those which assume the cross form are very conspicuous. Vegetables of the cabbage tribe, indeed, including turnips, watercresses, and many others, have had the botanical designation cruciform or cruptiform (Latin cruc, cruct, a cross, and fera, 1 bear) given to them from this very circumstance (Fig. 89). The rosaceous disposition of petals is also very well marked, not only being observable in the wild roses, but being shared by numerous other vegetables. The violet-flower, for example, is rosaceous in the disposition of its petals (Fig. 90). The long tapering claw which certain petals have is also highly characteristic, and gives rise to corollae which are said to be caryophyllate, from resembling that of the pink Dianthus caryophyllus. Of this the lychsin (Fig. 91) furnishes a good example. The papilionaceous (Latin, papilio, a butterfly) corolla constitutes an exceedingly well-marked natural division, the name being acquired from the circumstance that they resemble a butterfly in general appearance. No person, we are sure, who has ever seen a pea-flower—and who has not?—can have failed to be struck with the marked resemblance in question. Hence the technical name papilionaceæ has been applied by botanists to plants bearing such flowers. Our diagram (Fig. 92) represents the flower of a common garden pea.

Such are amongst the chief of the modes in which the petals of polyptetalous flowers are arranged. Monopetalous corollae evidently do not admit of these variations, since they only consist of one organ; nevertheless, so numerous are the forms which these one-petaled corollae assume, that many distinctions may be drawn between them. Thus, for example, we have tubulæ, from the Latin tubus, the diminutive of tubus, a pipe (Fig. 93); labiatus (Latin, labium, a lip), or lip-shaped (Fig. 98); labiate (Latin, labium, a lip), or lip-shaped (Fig. 96); personatæ (Latin, persona, a mask), or mask-like (Fig. 100); and ligulatae (Latin, ligula, strap), or strap-shaped (Fig. 101) flowers. When irregular corollæ are neither labiate, nor personatæ, nor ligulatae, they are sometimes called anomalous, from the Greek a, negative, and nous (hom-a-los), equal or similar, as in the fox-glove (Fig. 99).

SECTION XVII.—ON FRUITS AND THEIR VARIETIES.

We have already remarked that the female parts of a flower are termed carpels, from carpos, fruit, because fruit is the result of the development. Sometimes the ovary alone becomes developed into the fruit, but occasionally other parts of the flower attach themselves to the ovary, and thus become incorporated with its substance, helping to form the fruit. In the majority of cases fruit will not ripen except the ovary has been fertilised; but many exceptions occur to this rule. There are certain varieties of oranges, grapes, and pine-apples ripen freely enough, although the ovaries from which they spring have never been fertilised, and consequently they bear no seeds. Now, even in ordinary language, we employ various terms to denominate various kinds of fruit: it follows, therefore, that since botanists recognise many growths as fruits which we in ordinary language fail to dignify by that pleasing term, many botanical designations become necessary. There are two methods of communicating to the reader these distinctions. The first is by telling in what the distinctions consist; the second by showing the various forms which result. Perhaps the latter procedure will, of the two, be the more simple. We shall therefore give drawings of some of the chief varieties of fruit, which are as follow:

Pomæ, or fruits resembling apples (Fig. 102); drupæ, or fruits resembling cherries, peaches, plums, so called from falling from the tree when ripe—the term drupe being derived from the Greek ὀπως (drup'os), an overripe or dry fruit (drup'et-tee), quite ripe, which is derived from ὄπος (drous), an oak or tree, and μήτρα (pip'-to), to fall (Fig. 103); the achianum (from the Greek a, negative, and μήτρα [k'il-na], to gape), a term applied to hard, dry fruits, such as the fruit of the rannunculus, which do not adhere to the shell or pericarp, and do not open when ripe (Fig. 104); the caryopsis (from καρπός [kar'-ru-on], a nut, and σπόρος [sp'o-do], to see), a small, dry, or oblong, or elliptic-cohesive inapantly with the seed within, as in buckwheat (Fig. 105); the follicle (from the Latin folliculus, the diminutive
of folla, a windball or bag), a fruit or seed vessel which splits on one side only, as in the columbine (Fig. 106); the legume or pod (from the Latin legumes, from the verb lego, to gather), a seed-vessel which splits into two valves, having the seeds attached only to one suture or seam at the union of the margin of the valves, as in the whole pea-flower tribe, example the lollis (Fig. 109); the capsule (from the Latin capsula, a little chest), a pericarp which may have one cell only, or many cells, and which splits into pieces by valves, as in the gentian (Fig. 107); the solhecium (Fig. 110), the iris (Fig. 111), the lychnis (Fig. 117), and the corn-poppys (Fig. 108); the pisus (from the Gr. wtkis [pukesi], a box), a fruit which is like a box and throws off a cap, as in the pimpernel (Fig. 118); the silique (from the Latin siliqua, a husk or pod), a pod which splits into two pieces or valves separating from a frame, and which is longer than it is broad, as in the celandine (Fig. 112); the silicule (from the Latin silicula), a little pod or husk, the diminutive of silique, a pod, which splits into two pieces or valves, separating from a frame, and which is about as broad as it is long, as in the Shepherd’s Purse (Fig. 113); the samara (from the Latin samara, an elm-seed), a fruit which is hard, thin, and extended into a wing, as in the maple (Fig. 114); the nut (from the Anglo-Saxon hnut, or the Latin nux, nucis, a nut), as in the chestnut (Fig. 115); and the berry (from the Anglo-Saxon beria, a grape), a succulent or pulpy fruit containing seeds which have no covering but the pulp or rind, as in the deadly nightshade, the fruit of which is shown in Fig. 116.

SECTION XIX.—THE SEED.

The seed, everybody knows, is that part of a plant which, being sown, gives rise to a new plant. We might write a whole treatise on the nature and varieties of seeds, especially as concerns their anatomical construction, but much of this information would be out of place in a series of elementary papers: we shall, therefore, content ourselves with recapitulating some points that have already been adverted to in relation to seeds, and shall then mention some general facts concerning seeds which must not be forgotten.

Seeds, the reader will remember, belong exclusively to flowering plants; and we shall presently discover that seeds admit of two natural divisions characterized by a difference of structure—one division corresponding with endogenous, the other with exogenous plants.

Did the reader ever remember planting a bean for amusement? Most young people have done this, and we will assume that the reader of this lesson has done it.*

* The germination of a bean may be watched from day to day by suspending the seed over water in the mouth of a hyacinth-glass, or crocus-glass. The bean should not be allowed to do more than barely touch the water.

After having remained in the earth a few days, the bean throws up a shoot terminating in two little leaves. These little leaves are embedded, in miniature proportions it is true, in the bean, and may be recognized there by careful examination; however, by planting the bean they are rendered much more evident (Fig. 119). These two thick seed-leaves are termed cotyledons, from the Greek kotyle (ko'ti-le), a cup; and the bean, from possessing two of these cotyledons, is called a dicotyledonous plant.

Again, perhaps the reader has at some period of his life planted a grain of wheat, barley, or, still better, Indian corn (Fig. 120). If he has done this, he may have remarked the result to have differed from that noticeable when the bean was planted. Instead of two seed-leaves, or cotyledons, only one in this case appears on the young plant, which, therefore, is said to be a monocotyledonous plant.

Extending these inquiries still further, it will be found that all plants whose fibro-vascular system grows by external depositions, and which possess reticulated leaves—in other words, all exogenous plants—yield dicotyledonous seeds; and all plants whose stems grow by internal depositions, and which possess straight-veined leaves, yield monocotyledonous seeds.

Thus, then, it follows that even already the reader is so far master of the principles of botanical classification, that he could indicate the grand division of the vegetable kingdom to which any plant belonged by one of three classes of signs—namely,
LESSONS IN GERMAN.—XVII.

SECTION XXXI.—INSEPARABLE PARTICLES.

Besides the separable particles (Sect. XXVI.), there is another class (to, von, et, er, mit, etc., § 64) that, unlike the former, are never used apart from the radical words to which they are prefixed, and hence are called inseparable particles; thus by the union of these particles to, von, et, er, mit, etc., with the radicals setzen, treiben, erfragen, wissen, entdecken, aufbrauchen, etc., corresponding in formation to the English compounds to-bray, to-devise, to-miss, to-miss, etc., in English, the inseparable particles never take the primary accent. (§ 68.)

1. Dor, which is often rendered by the English "ago," unlike the latter, always precedes the word of time to which it refers, as:—Er war vor zwei Stunden hier, he was here two hours ago (literally, he was here before two hours).

2. Er (since), when used with words denoting time, often answers to "for" or "during," as:—Er ist in einer Woche trent, he has been literally is, see Sect. XVII. 6) sick for a week.

3. Ich habe ihn in einem ganger Sabre nicht gesehen, I have not seen him during a whole year (a whole year since).

VOCABULARY.

Anweeien, to answer.

Begeistren, to besten.

Begeisterung, to constitute.

Begeisteren, to describe.

Betreffen, to beheave.

Erfragen, to invent.

Gebären, to receive.

Gefallen, to lower.

(From. XVII.)

RESUME OF EXAMPLES.

Sieben könnten Amateuregegnet hat. My father gave me this beauty.

Mir meinen Beter heute. Today's flower of the bird.

Wegen Medien die ganger. This morning.

Die Freunde haben sich in den Gärten. The friends have taken them.

Sieben könnten die Stirn. The hostels.

Der Referent hat genannt vergessen. The teacher has forgotten the boy.

EXERCISE 54.


EXERCISE 55.

1. They have recommended the foreigners to me and to you. 2. There lives in Naples a friend of mine; I shall recommend him to you. 3. One of my friends, whom you have seen with me, has travelled in America, and has written a letter to me, in which he describes his journey. 4. A man of honour lowered himself to help nobody, in whatever condition he may find himself. 5. Did you receive the news before us? 6. I received it after you; the whole neighbourhood too was informed of it, as we received your letter. 7. When children promised their father to be obedient. 8. Advantages may be derived from this invention, which nobody can account for.

VOCABULARY.

Aufstehen, to begin.

Anwesenheit, w. oc.

Ankommen, to arrive.

Anspruch, to try.

Anstrafen, to light.

Anfagen, to rise.

Angaben, to go out.

Täter, to show.

EXERCISE 56.


EXERCISE 57.

1. Will you have the goodness to pronounce these words to me? 2. Do you pronounce well? 3. I believe I pronounce well, to make a brother pronounces better. 4. Many an innocent mind has been hurt by reading pernicious books. 5. The tempest has disturbed the company in their enjoyments, and has destroyed the house. 6. I have papers to read and letters to write. 7. Those persons who set fire to the house ought to be punished.

SECTION XXXII.—VARIOUS IDIOMS.

Bete (plural) is declined like an adjective, and, unlike its equivalent (both), comes after the article or pronoun with which it is used, as:—Der feine Staat, both the hands; meine feine Staat, both my hands. Alle (all) is sometimes, for the sake of emphasis, placed before bete, and may together be translated, both of them, or simply, both, as:—Alle bete, both of them; (the bete).
VOCABULARY.

Abfahrt, to depart, start.

Anfahrt, other (R. 8).

anderer, otherwise, differently.

anderen, to remain out.

anderen, to visit.

anderen, to remain (there).

anderen, to depart, start.

Staunt, to not, not altogether.

Staat, m. state.

Theater, m. theater (German coin, worth about 35.)

Treuen, to separate.

tat, n. means.

seltener, to become, to change.

Pennsylvanien, n.

Pennsylvania.

Blaume, f. plum.

Nicht, r. right.

Reiten, to speak, talk.

Räder, to move, affect.

Gelassen, to allow.

Freuendliche, f. bear.

Fender, empty.

Résumé of Examples.

Gr hat zwei Töchter, aber beide sind

He has two sons, but both are
deaf and dumb.

dumb.

Der Reif fahre die Reie mit bei-

ten Händen.

Der Reif fahre die Reie mit bei-
ten Händen.

hat der Mann ein Pferd oder
einen Wagen?

Hat this merchant a horse or a

wagon?

Gr hat beide.

Gr hat beide.

Die Reifheit und die Reie sind

The truth and the rose are
dich sehr, aber Reie haben De-

very beautiful, but both have

Hans wichtig Mamm beruhigt

An upright man abhors a lie.

eine lange.

eine lange.

das letzte Mal hat eten so viel

Nearly every human being has

quite as much sorrow as joy.

Exercise 56.


Exercise 59.

forces, acting downwards. A poker put into a fire to raise the coals is also an example, the bar of the grate being the fulcrum; the handle by which a pump is worked is another. A pair of scissors is a double lever of this kind, of which the connecting rivet is the fulcrum, the force of the finger and thumb at one end being the power which overcomes the resistance of the cloth to be cut. A gardener at work with his spade is also a familiar illustration. After he has driven it into the ground he forces the handle downwards, making a temporary fulcrum of the harder earth at its back. In all the principles is the same.

Second Order,—This is a no less important class; but the Power and Resistance, not as in the former case, act in opposite directions, as in Fig. 47; and this accounts for the fulcrum having both these forces on one side of it, for, as I have shown in the last lesson, the forces being opposite, the resultant, which, for equilibrium, must pass through the fulcrum, cannot lie between them. Moreover, as it has been shown there that the distances of \( A \) and \( B \) (see Fig. 44, page 250) are inversely as the forces, so here the distances \( F \) and \( W \) must be inversely as the power and resistance, or, what is equivalent, the power multiplied by its arm \( F \) is equal to the weight multiplied by its arm \( W \).

In this order of levers, as in the former, it should be observed that there is a mechanical advantage gained—a larger weight at \( W \) is overcome by a lesser at \( F \), a result always to be secured where the larger arm can be given to the power.

As an example of this lever, take the crowbar in the illustration in Fig. 48, used differently from that in Fig. 46. The workman makes the ground at the point of his bar his fulcrum, throws the weight of the chest about the middle, and instead of pushing downwards with his hand, lifts upwards. The mechanical advantage is clearly on his side. The oar of a boat is also a lever of the second order; the arms of the oarsman furnish the power; but most persons at first imagine that the rowlock is the fulcrum. This is natural, for it looks very like one, but that it is not such is evident from the fact that the boat is the thing he wants to move. To spurt the water about with the blade is not his object, but with each stroke he makes a temporary fulcrum of the water, by which he imparts a smart blow to his boat, and sends it ahead. The fulcrum is then in the water at one end, the resistance in the middle, and the power at the other end. A nut-cracker furnishes another instance—the fulcrum at the joint, the resisting nut in the middle.

Third Order.—Here again the Resistance and Power, as in Fig. 49, are parallel forces acting in opposite directions, and the condition of equilibrium is the same as in the last order, and for a similar reason; but the mechanical advantage is against the power, which from being nearer the fulcrum must be greater than the resistance. The best examples are found in the limbs of animals. The leg of a horse is a pair of levers with a joint in the middle, which he can make into one or use separately as he likes by means of the muscles attached to them along their lengths. The fulcrum is in the shoulder-joint or the knee-joint, and the resistance is at the hoof when he puts forth his strength to pull a load.

If a man stretches his arm out straight, and so lifts a weight, that weight is the resistance; the shoulder is the fulcrum, and he must put forth a strength by his muscles in the middle greater than the weight before he succeeds in lifting it. If he moves only the lower joint, as in Fig. 50, his elbow is the fulcrum, and the power is midway. It may be asked, Why over use a lever in which the power is a mechanical disadvantage? The answer to be given is, that to lift a large weight by a small force is not the only object aimed at in mechanism, natural or artificial. It is as often desirable to give the end of a lever a very rapid motion, and this can be done with most advantage when it is of the third order. The amount of force put forth in such cases is no consideration in comparison to rapidity of action, especially in animal mechanics. To strike a swift and smart blow with the closed hand, or with a sword in the hand, as it is often necessary to do, a lever of the third order is the most effective.

Levers of the various orders are often worked together, so as to make compound levers, the resistance end of one working into the power end of the other. In this way the effect of a small power is very largely multiplied, and a very great resistance is easily overcome. Such compound levers are used, for instance, that in Fig. 51, where all are of the first order, three fulcrums at \( \nu \), \( \mu \), \( \lambda \); a power at \( p \) overcoming a resistance at \( r \), and there multiplied overcoming a second resistance at \( r_p \), and this eventually lifting the still greater weight \( w \). The power is multiplied in the first lever inversely as the length of the arms, also in the second, and so also in the third. Suppose, for example, the power at \( p \) is one pound, and the short arm of each lever a third of the length of the long arm, then at \( p \) proceeds the weight of the long arm of the second lever at \( r \), a force of 3 pounds. This again produces at \( r_p \) in the third lever 3 times \( \frac{1}{3} \), or 9 pounds; and thus 1 pound eventually balances a weight of 27 pounds at \( w \), the mechanical advantage gained by the combination being 27 to 1.

But suppose that the lengths of the arms were in the proportion of any other numbers in the several levers—say 9 to 4 in the first to 3 in the second to 3 in the third; what weight would 1 pound at \( p \) support at \( w \)? It is not difficult to discover, if you know something about multiplying fractions. Now, in the first lever, by the principle of moments, already explained, 9 times the 1 pound at \( p \) is equal to 4 times the power produced by that pound in the second lever at \( r \); that is to say, this second power is \( \frac{3}{2} \) of a pound. But this force, for the same reason, is multiplied at \( r_p \) in the proportion of 7 to 3, and therefore for a man \( \frac{7}{3} \) of a pound, and this, eventually balances a weight at \( W \) of \( \frac{9}{7} \) of \( \frac{3}{2} \) of that unit, or, on making the calculation, the 1 pound balances 13 pounds 2 ounces. And, of course, what is true of these numbers is true of all others, and the rule you arrive at is this—

Rule,—Multiply together the fractions which represent the ratios of the Power arms to the Resistance arms, and the product obtained is the number of pounds of the Resistance which each pound of the Power balances. When the Power is more than 1 pound, multiply this number into that of the pounds and fractions of a pound in it.

And this leads us to another result, which expresses the relation between the power and resistance without fractions. Since, in the above example, we had the resistance equal to \( \frac{7}{3} \) of \( \frac{3}{2} \) of the power, it is evident that the three denominators multiplied into the resistance must be equal to the three denominators into the power, and thus, extending the principle, we may say that—

The Power multiplied by the several lengths of the Power arms is equal to the Resistance multiplied by those of the Resistance arms.

And you thus have a result not unlike that established above for a man \( \frac{3}{2} \) of a pound, and this, eventually balances only for a combination of levers of the first order, holds equally good of other combinations, mixed or unmixed, all of the second, or all of the third, or of two kinds, or of all three together.
The principle of moments is true for each kind, and therefore for their combinations. For this reason I have above avoided, in the statement of the general principle, the terms "long arm" and "short arm," but used instead "power arm" and "resistance arm," indicating thereby the arms that work with the power or with the resistance.

The example of a combination of levers which is most likely to interest you, is the common weighing machine, used for weighing loaded market carts, or luggage at railway stations.

In Fig. 52 is a ground-plan of this piece of mechanism, where at A, B, C, D, the four corners of the bottom of a shallow box, are the fulcums of four levers of a fourth order, which meet, two and two, on either side as F, and are joined across by a stout steel pin, by which they are also connected with the lever of the second order, E O, which has its fulcumen at E. The end, O, of this lever is connected by a rod which ascends perpendicularly from the ground, and is attached above to the short arm of another lever—one of the first order, generally a steel-yard, to be afterwards described—to the longer arm of which the weighing counterpoise is attached. We thus have a triple combination of levers, the first four at the bottom, by being united at F, being virtually one lever. On these four at a, b, c, d, are four points of hardened steel, presented upwards, on which rests the square wooden platform, on which the cart or luggage to be weighed is placed. The weight pressing at a, b, c, d, tends to depress the common end, F, of the four levers, and with it also the end, O, of the lever E O F. The latter tries to pull down the rod, and with it the short arm of the steel-yard above, which pull is resisted by the counterpoise on the longer arm of the steel-yard, producing equilibrium, and making known the weight of the cart or luggage.

For example, taking the four platform-levers as one, suppose the resistance arms in the combination are each one-fifth of the power arms, then evidently, as proved above, the resistance is 5 multiplied three times into the power—that is to say, 1 pound above on the steel-yard balances 125 pounds, or 1 cwt. and 13 pounds on the platform. If the proportion were one-eighth, it would balance 4½ cwt. 8 pounds, which strikingly illustrates the mechanical advantage gained in these machines. We will now consider the common balance, and the next lesson, examine the principles of other weighing instruments, bent levers, and the wheel and axle, and their combinations.

THE COMMON BALANCE.

Of weighing instruments, the scale, or common balance, claims the first attention. It is a lever of the first order, in which the counterpoise, or power, is equal to the resistance, or substance weighed. There is first the beam, A B, at the ends of which (Fig. 53) are the hooks, from which hang the chains or cords which support the pans or scales below. Since the weights in the scales are required to be equal, the fulcumen, F, should be in the middle of the beam, equally distant from the points of suspension of the chains, else the balance is fraudulent, for the purchaser who has his tea or sugar served to him from the end of the longer arm is getting less than his money's worth. I shall direct your attention in which the line joining the points, A B, of suspension passes through the supporting point of the fulcumen, as it is the simplest; and balances of this kind, as you will see, have a peculiar advantage as to their sensibility.

Now, it is evident, since A B is bisected at F, and the scales, chains, and weights on either side are equal forces, that whatever be the position in which I place the beam, the resultant of these forces must pass through F, and, being there resisted, leave the whole apparatus at rest. Moreover, if the central gravity of the beam is at F, so far as its weight is concerned, there will be equilibrium in every position. But such a pair of scales would be utterly useless, since, for equal weights, the arms should rest only in an horizontal position.

How, then, is this latter object accomplished? By having the centre of gravity of the beam below the fulcumen, when the arms are horizontal. The desired position is then one of stable equilibrium (see Lesson VII.), to which the beam will revert when displaced from it, and in which the line F O is perpendicular to the line A B, joining the points of suspension of the scales. For a good pair of scales, therefore, there must be stability as well as accuracy.

A balance should also be sensitive—should indicate a slight difference of weight in the scales. How is this secured? Suppose the scales equally loaded, and that a slight additional weight (call it w), is thrown into the scale a in Fig. 53, causing it to decline through some angle agreed upon as sufficient to indicate a difference of weights to the eye. As a descends, the centre of gravity, g, of the beam ascends at the other side, until its weight (call it w), acting at a, balances r. We have thus a new lever, A D, the fulcumen of which also is r, and at whose ends the forces w and w act. And since in that case, as proved in the last lesson, w multiplied by A r must be equal to w multiplied by D r, the length A B, and the weight w, of the beam being the same in any number of balances in a manufacturing, that one which moves through the angle agreed on, with the smaller additional weight w, must also have D r smaller; or, which comes to the same thing, since the angles of the triangle A r D c are given, that A r being a right angle, it must have D r smaller. Everything else, therefore, being the same, that balance has the greater sensibility, the centre of gravity of whose beam is as little as possible below the fulcumen. Summing up, then, we have for the requisites of a good balance the following:

1. For Accuracy.—That the arms be equal.
2. For Stability and Horizontal.—That the centre of gravity of the unloaded beam be below the fulcumen, on a line through its supporting point, perpendicular to that which joins the points of suspension of the scales.
3. For Sensibility.—That the centre of gravity of the beam be as little as possible below the fulcumen.

You will observe that the second and third conditions oppose each other. The lower the centre of gravity is below the fulcumen, the greater is its stability, but the less its sensibility. Both qualities are essential, and are therefore secured only by a compromise; the centre for sensibility may approach the fulcumen, but not too close; for stability it keeps off, but not too far.

Further, observe the consequence of making the line joining the points, A B, of suspension pass through the fulcumen. However the pans are loaded, it is only the difference (p) of the weights in them that affects the sensibility. The result of the lever is in b, and of as much of that in a as is equal to it, passes through and is resisted by F, and affects neither stability nor sensibility. If A B were not to pass through F, then these weights would have influence as regards these qualities, but that kind of balance we are not here considering.

A most important question is, how to detect fraud in a pair of common scales. The arms in that case not being equal, all the purchaser has to do, if he doubles the horse or the man, is, after the first weighing, to make the shop weight and the substance weighed change pans. If the two balance each other equally as before, the scales are honest—the arms are equal; but if not, fraud is proved.

But how, in that case, may the purchaser still get his true pound of tea, or sugar, or any other commodity? The shop weight being supposed true, the imperial stamped weight, let the deficient tea be weighed before from the longer dishonest pan.

Leaving it there in the scales, let him require the shopman to remove the weight from the other scale, and fill it with tea until that in the first one is balanced. He now has a true pound of tea balancing the deficient pound, as the imperial weight first did. Let him carry off this pound, and he has his money's worth.

But there is another way by which the purchaser may not
only get his due quantity, but turn the tables on the vendor, and by the very fraudulent balance itself got more than his money's worth. Suppose he is buying two pounds; then let him have one pound weighed in one scale and the other pound in the other scale; at so happens that insensibly the two together are more than two pounds. The reason you will understand by an example. Suppose one arm is 14 inches long, and the other 15 inches. Then, weighed at the latter arm, the purchaser gets only 15½ inches, which is less, but at the former 16½ inches, which is more than one pound. But by the latter he gains a ½th of a pound more than he is entitled to, while at the former he loses only ½st. So our first arm is longer by a ½th, he is a gainer; he has caught the vendor in his own trap. Or, you may add up the two fractions 15½ and 16½, and the sum you will find to be greater than 2 by the fraction ½. And what is true of these numbers is true of all others, which represent the proportion of the arms—what you lose at the long arm is more than recomposed by what you gain at the short one.

**READING AND ELOCUTION.—IX.**

**ANALYSIS OF THE VOICE (continued).**

**II.—DUE QUANTITY, OR LOUDNESS.**

The second characteristic of good reading, is the use of that degree of loudness, force, "volume," or "quantity," of voice which enables those to whom we read or speak, to hear, without effort, every sound of the voice; and which, at the same time, gives that degree of force which is best adapted to the utterance of the sentiments which are read or spoken.

All undue loudness is a great annoyance to the ear, and an injury to the expression; while a feeble and imperfect utterance falls of the main purposes of speech, by being partly or entirely inaudible, and consequently utterly unimpressive.

The failure, as regards loudness, is usually made on passages of moderate force, which do not furnish an inspiring impulse of emotion, and which depend on the exercise of judgment and discrimination. Rather than of feeling.

It is of great service, however, to progress in elocution, to possess the power of discriminating the various degrees of force which the utterance of sentiment requires. The extremes of very "loud" and very "soft," required by peculiar emotions, have been exemplified in the exercise on "versatility" of voice.

There are three degrees of loudness, all of great importance to the appropriate utterance of thought and feeling, required in the usual forms of composition. These are the following:—

2. "Forbidding," or "impassioned." The first, the "moderate," is exemplified in the reading of descriptive, or didactic composition, addressed to the understanding, rather than to the feelings; the second, the "forbidding," is exemplified in energetic declamation; the third, the "impassioned," occurs in the language of intense emotion, whether in the form of poetry or of prose.

Watchful attention will be required, on the part of the student, in practising the following examples, so as to enable him to detect, and fix distinctly in his ear, the exact degree of loudness appropriate to each passage. The exercises should be repeated till they can be executed with perfect precision, so as to form a standard for all similar expression, in subsequent reading.

**Exercises in Moderate Force.**

An author represents Adam as using the following language:—"I remember the moment when my exactions commenced: it was a moment replete with joy, amenability, and anxiety. I neither knew what I was, nor whence I came. I opened my eyes: what an increase of sensation! The light, the celestial vault, the verdure of the earth, the transparency of the waters, gave animation to my presentiments, and conveyed pleasures exceeding the powers of utterance."  

"Impassioned* Force.

Shame! shame! that in such a proud moment of life, in such an Augustus of ages, his brow be soiled by servile burials.

One bolt at your bloody invader, that sick

Between freemen and tyrants had spread through the world,

That then,—oh! disgrace upon mankind!—even then

You should falter,—shall I clie to your pitiful breath,—

Cower down into beasts, when you might have stood men,

And offer a slave's life to a glorious death!

It is strange!—it is dreadful!—Shout, Tyranny, shout,

Through your dungeons and palaces, "Freedom is o'er!"—

If there lipt mere one spark of her fire, dwell it out.

And return to your empire of darkness once more.

**III.—DISTINCT ARTICULATION.**

Correct articulation is the most important exercise of the voice and of the organs of speech. A reader or speaker, possessing of only a moderate voice, if he articulates correctly, will be better understood, and heard with greater pleasure, than one who vociferates. The voice of the latter may, indeed, extend to a considerable distance; but the sound is dissipated in confusion: of the voice of the former not the smallest vibration is wasted—every sound is perceived at the utmost distance to which it reaches; and hence it even penetrates farther than one who is loud, but not diligent in his exercise.

In just articulation, the words are not hurried over, nor pre¬cipated syllable over syllable; nor, as it were, melted together into a mass of confusion; they are neither abridged nor pro¬longed; nor swallowed, nor forced, and, if I may so express myself, shot from the mouth; they are not trilled nor drawn out, nor slip out carelessly, so as to drop unfinished. They are accurately cut out from the lips, as beautiful coins nearly issued from the mint, deeply and accurately impressed, perfectly finished, neatly struck by the proper organs, distinct, sharp, in due succession, and of due weight.

This department of correct reading belongs, properly, to the stage of elementary lessons. But negligence in general habit, and remissness in early practice, are extremely the causes of an imperfect articulation.

A paragraph or two of every reading lesson should, previous to the regular exercise, be read backward, for the purpose of arresting the attention, and securing every sound in every word.

The design of the present lesson does not admit of detail in the department of elocution now under consideration. The importance, however, of a perfectly distinct enunciation can never be impressed too deeply on the minds of the student.

In every articulation is contained more indicative than any degree of loudness to facility of hearing and understanding. Young readers should be accustomed to pronounce every word, every syllable, and every letter, with accuracy, although without labour'd effort. The faults of skipping, slitting, mumbling, swallowing, or drawing the sounds of vowels or of consonants, are not only offensive to the ear, but subversive of meaning, as may be perceived in the practice of several of the following examples.

Examples.

1. That last till night: that last till nigh.
2. He can debate on either side of the question: he can debate on neither side of the question.
3. The steadfast stranger in the forest stray'd.
4. Who ever imagined such an occasion to exist?—Who ever imagined such a notion to exist?
5. His cry moved me: his crime moved me.
6. He could pay nobody: he could pay no one.
7. Up the high hill he heaves a huge round stone.
8. The oft the ear the eyes perceive.
9. Heaven's first star alike ye see.

The following description of a whal chase, taken from Goodrich's "Arctic Voyage," will furnish a useful exercise in distinctness of articulation. Read it with animation and "moderate force," but not too fast.

We pulled in the direction in which the whale was "heading," where the rest of the boats already were; before we got up to them, she had made her appearance at the surface; a second boat had got fast to her,
LESSONS IN GEOMETRY.

and just in time, as she was seen to be "loose" from the first: She did not take out much line from this boat, but remained away a considerably longer time than usual, greatly to our astonishment, until we found that she was "blowing" in some holes in the ice, a good distance from the edge of it. One of the harpoons immediately proceeded over the ice with a hand-harpone, trailing the end of the line with him, assisted by part of his crew, and from the edge of the hole drove his weapon into the body of the poor whale; whilst some of the others following plied the bleeding weapon with lightning strokes, and the monster, with the assistance of the harpoon, threw itself again to the open water outside the ice. Here more of our enemies were waiting, for one boat was immediately upon her, and a gun-harpone was at once driven almost out of sight into her huge sides, which was already bristling with harpoons. The boats was very back as she dived with a howldy roll, which sent it surging gunwale under, taking the line whistling out for a score of fathoms, until the harpooner, knowing she was pretty well exhausted, stepped her way, by taking three or four turn round the "boatard." But every few seconds she would make a start, drawing the boat almost head under, until the line was permitted to run out again, which, as it did so, made a grinding, roaring noise, eating deep into the hard lignum vitae of the boatard, enveloping the harpooner in smoke, and causing the most distinct smell of burning, which was only prevented from actually taking place by the linesman throwing water constantly on it.

Again she appeared at the surface, but far exhausted; still she made a strong fight for it, lashing about with her tail and fins in fury whenever she seemed to have regained breath. It was no very pleasant sight to see her dripping with blood, and rolling up in the air, within but a short distance of us, and coming down on the water with a loud, sharp crack, like the report of a dozen rifles, and which, had it alighted on any of our boats, had power sufficient to have converted their timbers into something very like Lucifer matches. A few more lanes soon separated the two vessels, and she was hailing on her back. The usual cheers of triumph were given, and we had time to breathe and sink ourselves, for it may be believed we had not escaped the showers of sprey which the defunct had sent about so liberally. The water far around us was dyed with blood, and covered with a thick pellicle of oil, upon which the Mollys were so busy as they could be, whilst the edges of the ice, as far as we could see, were deeply crimsoned; and a humming, on the edge of the ice, beside which the final struggle had taken place, was from the summit downward streaked with the black blood which the last few blasts of the dying monster had sent over it.

IV.—CORRECT PRONUNCIATION.

That pronunciation is correct which is sanctioned by good usage or custom. Good usage implies the habit of persons of good education, as regulated by the decisions of learning and taste, exemplified in standard dictionaries—a style which is equally free from the errors of uneducated or negligent custom, and the caprices of pedantry—which falls in with the current of cultivated mind, and does not deviate into peculiarities, on the mere authority of individuals. Good taste in pronunciation, while it allows perfect freedom of choice as to the mode of pronouncing words liable to variation in sound or sound, requires a compliance with every fixed point of sanctioned usage.

The subject of pronunciation, like the preceding one—articulation—belongs properly to the department of elementary instruction. But as this branch of elocution does not always receive its due share of reasonable attention, many errors in pronunciation are apt to occur in the exercises of reading, as performed by even the advanced classes in schools. To avoid such errors it is found, by close and unhesitating, the correct pronunciation of every word which in any lesson is liable to be misconstrued, the standard of reference being any good dictionary of the English language.

LESSONS IN GEOMETRY.—IX.

In the construction of triangles the student has learnt, by Problem XVI. (page 209), how to draw an equilateral triangle of any dimensions, the only two data (or facts given from which other facts may be deduced) that are required in the formation or construction of an equilateral triangle being, the length of one of its three equal sides on the one hand, or its altitude on the other.

It will be remembered that, in Definition 18 (page 53), it was stated that triangles are classified according to the relation of their sides, as——

<table>
<thead>
<tr>
<th>Equilateral,</th>
<th>Isosceles,</th>
<th>Scalene,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having three equal sides</td>
<td>Having two equal sides</td>
<td>Having three unequal sides</td>
</tr>
</tbody>
</table>

and according to the relation of their angles, as——

<table>
<thead>
<tr>
<th>Right-angled,</th>
<th>Obtuse-angled,</th>
<th>Acute-angled,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having one right angle, or 90 degrees, and, of necessity, two acute angles;</td>
<td>Having one obtuse angle, and, of necessity, two acute angles;</td>
<td>Having three acute angles;</td>
</tr>
</tbody>
</table>

Now, as the three interior angles of a triangle are together equal to two right angles or 180 degrees, and as an obtuse angle is any angle greater than a right angle or 90 degrees, when an acute angle is less than a right angle or 90 degrees, it is manifest that——

An equilateral triangle must necessarily be an acute-angled triangle, since it has three equal angles, each of which is less than 90 degrees, being one-third of 180 degrees; while an isosceles, or a scalene triangle, may be a right-angled triangle, or an obtuse-angled triangle, or an acute-angled triangle.

To proceed still further into an analysis of the conditions under which the different kinds of triangles will appear, it may be said that——

1. An acute-angled triangle may have——

   1. Three sides equal, and three angles equal, when it is an equilateral triangle.
   2. Two sides equal, and two angles equal, when it is an isosceles triangle.
   3. All its sides unequal, and all its angles unequal, when it is an obtuse-angled scalene triangle.

II. An obtuse-angled triangle may have——

   1. Two sides equal, and two angles equal, when it is an obtuse-angled isosceles triangle.
   2. All its sides unequal, and all its angles unequal, when it is an obtuse-angled scalene triangle.

III. A right-angled triangle may have——

   1. Two sides equal, and two angles equal, when it is a right-angled isosceles triangle.
   2. All its sides unequal, and all its angles unequal, when it is a right-angled scalene triangle.

We have already learnt, as it has been said above, how to draw an equilateral triangle of any dimensions, the conditions necessary for its construction being given. Let us now see what data we require to enable us to draw any isosceles or scalene triangle characterised by having one right angle, one obtuse angle, or three acute angles.

To determine any isosceles triangle, it is plain that we must have one or the other of the following series of data——

1. With regard to the sides without the angles——

   1. The length of the two equal sides, and the length of the third side or base.
   2. The length of the two equal sides, and the altitude of the triangle.
   3. The length of the base, and the altitude of the triangle.

II. With regard to the sides and angles combined——

   1. The angle at the vertex of the triangle, and the length of the two equal sides.
   2. The angle at the vertex of the triangle, and the length of the base.
   3. The angle at the vertex of the triangle, and the altitude.
   4. The equal angles at the base, and the length of the equal sides.
   5. The equal angles at the base, and the length of the base itself.

In any case, when the length of the sides or altitude is given, either with or without the extent of the opening of all or any of its angles, an isosceles triangle can be constructed, which is the only form of the isosceles triangle which will satisfy the particular requirements laid down in the data; but where the angles only are given, an endless number of triangles similar in form, but of different superficial areas, may be drawn, all of which will satisfy the given conditions set forth in the data, for it must be remembered that the size of an angle is determined by the extent of the opening between the lines that form its sides, and not by the length of its sides: and this leads us to the construction of an isosceles triangle under general conditions, namely——

III. With regard to the angles without the sides——

   1. The angle at the vertex of the triangle.
   2. The equal angles at the base of the triangle.

The first case named above of the construction of the isosceles triangle, when the length of the two equal sides, and that of the third side is given, is used by Problem VIII. (page 191), in
which the learner is shown the method of drawing any triangle having its sides equal to three given straight lines; but the second, in which the length of the two equal sides and the altitude of the triangle are the data given, requires further explanation, and brings us to

**Problem XXI.**—To draw an isosceles triangle of which the length of the two equal sides and the altitude are given.

Let \( a \) represent the length of the two equal sides, and \( b \) the altitude of the isosceles triangle required. First draw the line \( CD \) of indefinite length, and through the point \( e \) taken as nearly as possible in the centre of the line as drawn, draw the straight line \( FG \) perpendicular, or at right angles to \( CD \). From the point \( e \) along the straight line \( FG \) set off a straight line \( h \) equal to \( b \), and from the centre, \( H \), along the straight line \( HF \) set off \( HK \) equal to \( a \). Then from the point \( H \), as centre, with the distance \( HK \), describe the arc \( LKM \), cutting the straight line \( CD \) in the points \( L \) and \( M \). Join \( HL, HM, LM \).

The triangle \( LHM \) is the isosceles triangle required, for the length of its altitude, \( HE \), is equal to \( b \), and the length of its equal sides \( HL, HM \), is equal to \( a \).

**Problem XXII.**—To draw an isosceles triangle of which the length of the base and the altitude are given.

Fig. 30.

In the above figure (Fig. 30), let \( b \) be, as before, the length of its base. First draw the line \( CD \) of indefinite length, and within its limits set off a straight line \( LM \) equal to \( a \). Bisect \( LM \) in \( E \), and at the point \( E \) draw the perpendicular \( EH \), of which \( E \) is the foot, and cut it off \( HE \) equal to \( b \). Join \( HL, HM, LM \). The triangle \( HLM \) is the isosceles triangle required, for it has its base \( LM \) equal to \( b \), and its altitude, \( EH \), is equal to \( a \).

By the aid of Fig. 30 we may easily discover some more facts in geometry, which the student may prove to be correct by his own satisfaction by means of his compasses and parallel ruler, and which are shown by the line \( DK \), and the point \( K \).

First join \( KL \), and bisect \( KL \) in the point \( N \). Join \( KN \). The straight line \( KN \) bisects the angle \( LKH \), or divides it into the two equal angles \( LHN, NKH \). Now apply the parallel ruler to the straight line \( KN \), and by its aid draw through the point \( K \) a straight line \( LP \) parallel to \( KN \). This straight line \( LP \) meets the straight line \( EG \) in the point \( O \), and if the circumference of the circle of which the arc \( LKM \) is a part, is completed, it will also pass through the point \( O \), in which the straight line \( LO \) meets the straight line \( EG \). Now by Theorem 2 (page 156) when a straight line intercepts two parallel straight lines the alternate angles are equal, therefore the alternate angles \( NKL, LHO \), \( LHO, LMO \), formed by the intersection of the straight line \( HL \) with the parallel straight lines \(HN, OL\), are equal to one another. But since the triangle \( LHO \) is an isosceles triangle, of which the side \( HO \) is equal to the side \( HL \), being radii of the same circle, the angle \( LHO \) is equal to the angle \( LOK \) (as it does not matter whether we call the opening between the lines \( OL, OK \), the angle \( LOK \) or \( LOM \), and as the angle \( LIO \) was shown to be equal, then \( LHO \) it must be also equal to the angle \( LOK \).

Therefore the angle \( LHK \) is double of the angle \( DHN \). Therefore the angle \( LHK \) is also double of the angle \( DKC \).

The next thing to be observed is that the angles \( LKH, LOK \), each stand on the same base \( KL \), and that one of them, the angle \( LKH \), has its apex or vertex \( H \) at the centre \( L \) of the circle \( OLK \), while the other, the angle \( LOK \), has its vertex or apex \( O \) on the circumference of the circle \( OLK \). And the geometrical fact to be deduced from this is, that when two angles stand on the same base, and on the same side of it, one having its vertex at the centre of a circle and the other having its vertex at the circumference of the same circle, the angle which has its vertex at the centre is double of that which has its vertex at the circumference. This is true at whatever point of the circumference the vertex of the angle at the circumference may be, the term circumference being understood to apply to that part of the whole circumference of the circle which lies on the same side of the base as that on which the angles are found, as the arc \( LOM \) of the whole circumference of the circle \( OLK \). Thus the angle \( LHM \), standing on the base \( LM \), and having its vertex at the centre \( H \) of the circle \( OLK \), is double of the angle \( C \), which stands on the same base and has its angle at the circumference. It is also double of the angles \( LPM, LQM \), which have their vertices at the points \( P, Q \), of the arc \( LOM \). The angles \( LPM, LOM, LQM \), being each of them equal to half of the angle \( LHM \), are equal to one another, from which we learn another geometrical fact, namely, that all angles standing on the same base and on the same side of it, and having their tops or vertices on the circumference, are equal to one another.

In case 4, where the angle at the vertex of the triangle is given, and the length of the two equal sides, all that is necessary to be done is to draw an angle of the opening required by Problem VII. (page 191), and to set off the length of the two equal sides along the legs of the angle, joining the points in which the legs of the angle are cut in order to form the base; and in Case 10, when the angle of the vertex of the triangle is given, but the length of the equal sides is not stated, the triangle may be completed by cutting the legs of the angle in any two points equidistant from the apex, and joining these points to form the base as before. Case 5, however, on which the length of the base and the angle at the apex of the triangle is given, will require explanation in

**Problem XXIII.**—To draw an isosceles triangle of which the equal at the vertex of the triangle and the length of the base are given.

Let \( a \) be the angle at the vertex of the isosceles triangle required, and let \( b \) represent its base. Draw any straight line, \( CE \), of indefinite length, and along \( CE \) set off \( CD \) equal to \( b \). Then at the point \( D \) in the straight line \( ED \) make the rectilineal angle \( EDF \) equal to the given angle \( c \) by Problem VII. (page 191), bisect \( D \) by \( FG \), and through the point \( E \) draw \( EK \) perpendicular to \( CD \) or \( CE \). Now, because the three interior angles of a triangle are equal to two right angles, the three interior angles of the isosceles triangle required are together equal to the two angles \( CDF, FDE \), of which \( FDE \) is equal to the angle at the vertex; and as the angles at the base of an isosceles triangle are equal, each of the remaining angles is equal to half of the angle \( CDF \). Bisect the angle \( CDF \), by Problem VII. (page 191), and set off \( CK \) equal to \( CD \), and through \( K \) draw \( KG \) perpendicular to \( CE \) or \( CD \).

For Case 6, when the angle at the vertex of the triangle and the altitude are given, in \( LOMN \), let the straight line \( X \) represent the altitude, it is manifestly only necessary to make the angle \( CKD \) equal to the given angle \( A \), and then bisect it by the straight line \( XD \), and after setting off \( KG \) along the straight line \( KL \) equal to the given altitude \( x \), to draw \( CD \) through the point \( G \) at right angles to \( KG \), cutting the legs \( KC, KD \), of the angle \( CKD \) in the points \( C \) and \( D \). The triangle \( XCD \) is of the same altitude, and has the angle \( CKD \) at its vertex equal to the given angle \( A \).

From what has been already said in Problems XXI, XXII, and XXIII, the student will find no difficulty in forming isosceles triangles under the conditions or data set forth in Cases 7, 8, 9, and 11, which will afford useful exercises for practice. The mode of construction is in all cases the same whether the isosceles triangle be a right-angled triangle, an obtuse-angled triangle, or an acute-angled triangle; or in other words, whether it have a right angle, an obtuse angle, or an acute angle at its vertex.
ANIMAL PHYSIOLOGY.—IX.

THE ORGAN OF TASTE.

In proportion as sensations are dissociated from our mental processes, so are they more closely linked with our animal wants. Sensation has two functions: one is to inform the intellect and set the thoughts a-going, and the other to prompt us to do that for the well-being of the body, or for the good of our race, which we should not do, or not do so well and fittingly, unless we were so prompted. All sensations perform both of these functions, but they perform them in very different degrees; thus, the eye, of all the organs of sense, is the most efficient caterer to the mind; but it scarcely prompts directly to any instinctive act. It may stir pleasurable ideas in the mind, but the sensations of sight, irrespective of the ideas they leave, can scarcely be called either pleasurable or painful. Now if we contrast with this most intellectual of all our senses that which is associated with the tongue, we shall find that its relation to these two functions is reversed. The mind, it is true, discriminates between sensations of taste, but it does not dwell upon them, and it cannot readily recall the distinctions to memory. If this statement should be thought to be incorrect because gross sensualists may be said to dwell much upon the gratification of their appetite for meals and wines, it may be answered, that they dwell not so much on the distinctive ideas of the sensations, as on the general remembrance of the gratification they caused; and they dwell on it not as in itself worth entertaining, but as useful knowledge to aid them in repeating the pleasure at some future time. Few men take delight in dwelling on, or describing the sensations of taste; but even an anchoret will own that the pleasures of this sense are, while they last, intense, and quite sufficient to cause ordinary individuals to keep the body well supplied with good food, even though the thought of what quantity or quality of aliment is necessary never crosses the mind. The young, whose tastes have not yet been vitiated, usually eat heartily, with a keen sense of enjoyment while at their meals; but between these their minds are wholly unoccupied with the nature or the pleasures of these meals. The contrast drawn above seems fully to bear out the statement that sensations which are good incentives to intellectual action are not good prompters to instinctive action; and that in proportion as senses cease to be discriminating, they become pleasurable or painful. A pleasurable or a painful sight means one which impresses the intellect favourably or not; but an agreeable or disagreeable taste is strictly confined to the sensation itself.

It will be shown, in speaking of the organ of taste, how intimately the gratification of this sense is bound up with the necessities of the body. In the meantime, assuming this to be the case, we remark that, inasmuch as the wants of the mind are insatiable, while those of the body are limited, the senses more intimately connected with each partake of the nature of these different wants; hence, while the eye is never satisfied with seeing, the gustatory sense is soon cloyed, and the appetite it engenders is only intermittent. Again, with regard to those sensuous impressions which are pleasurable, it would seem that Providence has ordained that the pleasure shall be so united to the requirements of the body, as that it shall be impossible fully to enjoy the pleasure without supplying the requisites to health and use. On the other hand, no natural necessity can be satisfied without gratifying the senses. Even our limited understanding recognizes that it would be dangerous to entrust men with an animal enjoyment which is objectionable, and which could be constantly excited; for this would be a bar to all the higher aspirations of the soul. The Divine Wisdom has not only recognised this danger, but has provided against it, by such elaborate contrivances, that the attempt to gratify the senses irrespective of the wants for which they were given us—an attempt sure to prove abortive sooner or later—is considered to be not only sensual, but unnatural.

The preceding remarks are necessary to the appreciation of some points in the structure and position of the organ of taste. The sense of taste is not of quite so simple a nature as those of sight and hearing, or even of smell. This sense seems to shade away insensibly on the one hand into that of ordinary touch, which the inside of the mouth shares with the whole surface of the body; and on the other, it graduates into another sense, which may be called a sense of relish, which the mouth shares with the
stomach and alimentary canal. The seat of the sense of taste is the tongue; but here again it is necessary to remind the reader that the organ are not confined, as those of the eye and ear are, to the reception of the impressions which excite the sense. The tongue is, in its substance, a sheaf of muscles, and it is largely employed in keeping the food between the teeth, that it may be ground down, in crushing the softer mass and mixing it with the saliva, and in propelling it into the throat. It is further employed as an organ of speech, and when, as is often the case, even in common speech, it is more prominently associated with this office than with any other, and in this capacity has been the object of that powerful and poetic description contained in the Epistle of James. Nevertheless, since the organs of taste are distributed over the surface of the tongue, it seems necessary to describe it as a whole. If the reader will refer to the engraving, he will find the surface of the tongue drawn as it would be seen if the whole of the roof of the mouth and skull was removed, so that he could look down upon it from above. The tongue covers the floor of the mouth; its border lies against the teeth. From the tip it rises to its central part, then slopes away backward to the throat, so that it nearly fills the closed mouth, and its upper convex surface lies along under the concave palate. It has its freedom, moreover, of its tip, so that it can curl completely over and thrust down the throat, because it is confined by a membrane, which attaches the middle line of its under surface to the bottom of the mouth. At one time it used to be the barbarous custom of nurses to cut this membrane in new-born infants, a custom which not unfrequently resulted in the child being choked by its own tongue. It is with the upper surface of the tongue we have to deal, for it is on this surface that the taste is found, and thereby the food passes, seldom getting below the edges of the tongue. The tongue is covered with a mucous, or slime-secretive, membrane, and this membrane, on its upper surface, has a number of little projections. These projections, or papillae as they are called, are of three kinds; named respectively circumvallate, fungiform, and filiform papillae. The circumvallate papillae are situated at the back of the tongue, and form a row of eight fifths, or knobs, rugose, in the form of a V, with its point backwards, towards the throat. They are of singular shape, best explained by the small figure which gives both a section of one of them, and half its surface. They each consist of a button-like projection of the mucous membrane, surrounded by a depression, and then an elevated ring which has another depression around it. They are called circumvallate, or walled round, papillae; and as the name signifies, they are of necessity surrounded by a wall; but the wall is a sunken wall, only made by sinking two ditches, one outside and the other inside it. The outside ditches of these miniature imaginary fortresses touch one another, and that which lies behind the hindermost one is so deep as to be called the foramen cornem, or blind hole. These papillae are the largest of all; they are more powerfully affected by flavours than any others, and it is thought that the rapid junctions run into the depressions around them, and thus the sense of taste is agreeably prolonged. It will be seen from the engraving that all the papillae have secondary ones; but while the main papillae thrust up the outer bloodless coat of the mucous membrane before them, the secondary ones (i.e., the papillae on the papillae) do not do this.

The fungiform papillae are scattered irregularly over the front two thirds of the tongue, being plentifully distributed towards the edges and tip than at the central part. This arrangement prevents the delicate papillae being crushed by the tongue while it squeezes the food against the hard palate, while, at the same time, they are so placed as that the juices of the food so squeezed run off the summit of the tongue, and come into contact with these little rounded eminences. Should the reader examine his own tongue, he will perhaps not at once detect these round papillae, for they are obscured by the dense coating of filiform papillae, which are, under ordinary circumstances, longer than they. If, however, he press his finger on the middle of his tongue, these round knobs will at once start out and become visible, being distended with blood. If, further, a little vinegar be placed on the tongue in a space between these papillae, no taste is observed; but if it run on to them, they immediately erect themselves, and the sour taste is distinctly conveyed.

The filiform papillae cover the fore part of the tongue, running in lines from the middle obliquely forward towards the edges, and other lines of them run, outside those, round the extreme point of the tongue. They are long and slender, and much smaller than the others, and are surmounted by a tuft of threads, consisting of thick epithelium (or outer bloodless layer); and hence they look white or yellow, and impart to the whole top of the tongue a light colour, which contrasts with the deep red of the fungiform papillae. These papillae are probably rather the ultimate organs of touch than of taste.

All these papillae are well supplied with blood-vessels, so that, when the outer coat is taken off, they look, under the microscope, to be little else than tufts of blood-vessels. Nerves forming loops have been traced into them, and these are the carriers of the sensuous impressions. These nerves proceed by two different routes to the brain. Those which proceed from the papillae (including the circumvallate) at the back of the tongue, are gathered into a bundle which joins the eighth pair of nerves; and those from the papillae at the front unite to form a branch of the fifth pair. Each of these sets of nerves conveys both common sensation and the special sense of taste; but the branch of the eighth is more concerned in carrying gustatory impressions, for the sense of taste is keenest in the its edges and under side. These papillae are probably rather the ultimate organs of touch than of taste.

Considering, then, the sense of taste in relation to its uses, we find that not only does it stand at the entrance of the passage for food, to guard the gate, in order to admit good citizens and exclude conspirators against the constitution, as the sense of smell does, but it has other important functions.

First, it stimulates to the act of grinding the food and reducing it to a pulp. This, with the same end in view, is a part of the process, an induction which the bare knowledge of the fact that this comminution is necessary for the after digestive operations of the stomach, could hardly supply. Secondly, from the sensibility of the tongue becoming greater as the food proceeds backwards, it causes it to be carried in that direction while being masticated; and finally, in order to enjoy the most exquisite sensations of taste, the bolus must be held in the roof of the mouth, as the body of the tongue, and the pleasures of taste become gradually more intense in proceeding from front to back.

The presence of food at this point excites what is called the sense of smell, which is the ability to distinguish the smell of one substance from another without having it in the mouth. This involuntary action is curious, not only because the presence of food invariably excites it, but it cannot be excited unless by the presence of some substance at that part. The act of swallowing cannot be effected unless there be something to swallow. Further, a foreign body touches this sensitive part, and if it cannot be swallowed, the stimulus is so violent that, being denied its legitimate result, it will excite the reversed action, and occasion vomiting. Thus, while Nature ungrudgingly grants sensuous gratification where bodily wants exist, she imperiously denies all pleasure if no good end is connected with its gratification. However sad the fact may be to him, the gluton knows that there is a strict limit to his enjoyment. Also for him! he cannot be allowed to have his relish without filling his stomach, and this is of very limited capacity.

In the case of taste, then, the mutual dependence of bodily necessities and the gratification of the sense is very marked; and a consideration of the whole circumstances connected with this sense will furnish a strong argument in favour of the unity of the creation and the omniscience of the Creator; for we have, as essential conditions of the place of the sense of taste, a number of distinct sensations, as we can design to relate to each other. They are these:—

The body, requiring aliment; the sense of taste, prompting to feed; wholesome food, fitted to maintain the body in well-being; peculiar, and often superadded, to tempt the sense.

Putting these in the order in which they are related to one another, we have—food, flavour, pleasure, health. The distinct links in the chain are all wonderful, but the union proves a unity of design and a benevolence of purpose.
LESSONS IN ARITHMETIC. — XVIII.

SQUARE AND CUBE ROOT.

1. We have already stated that when any number is multiplied by itself any number of times, the products are called the second, third, fourth powers, etc., of the number respectively.

The second and third powers of any number are generally called the square and cube of that number. Thus, 81 is the square of 9; 27 is the cube of 3.

Any power of a number is expressed by writing the number of the power in small figures above the number, a little to the right. Thus, the square of 9 would be written \(9^2\); the cube of 3, \(3^3\); the fifth power of 7, \(7^5\); and so on.

Conversely, the number which, taken twice as a factor, will produce a given number, is called the square root of that number; that which, taken three times as a factor, will produce a given number, is called the cube root of it; and so on.

Any root of a number is represented by writing the sign \(\sqrt{\ }\) over the number, and placing the number corresponding to the number of the root on the left of the symbol, thus: \(\sqrt[3]{8}\) indicates the cube root of 8, \(\sqrt[4]{81}\) the fourth root of 81.

The square root of a number is generally expressed by merely writing the symbol \(\sqrt{\ }\) over the number, without the figure 2. Thus, \(\sqrt{3}\) means the square root of 3; \(\sqrt{54}\) the square root of 84.

2. Every number has manifestly a 2nd, 3rd, 4th, etc., power. But every number does not necessarily have an exact square, cube, third root, etc. For example, there is no whole number which, when multiplied into itself, will produce 7; and since any fraction in its lowest terms multiplied into itself must produce a fraction, 7 cannot have a fraction for its square root. Hence 7 has no exact square root. But although we cannot find a whole number or fraction which, when multiplied into itself, will produce 7 exactly, we can always, as will be shown hereafter, find a decimal which will be a very near approximation to a square root of 7, and we can carry the approximation as nearly to \(\sqrt{7}\) as we please. And the same will be true of every number which has no exact square root, third root, etc.

It is desirable that the student should know by heart the squares and cubes of the successive numbers from 1 up to 12, appended in the following table:

<table>
<thead>
<tr>
<th>NO.</th>
<th>SQUARE</th>
<th>CUBE</th>
<th>NO.</th>
<th>SQUARE</th>
<th>CUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>27</td>
<td>4</td>
<td>16</td>
<td>64</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>125</td>
<td>8</td>
<td>64</td>
<td>4096</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>216</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In finding the square of any number which is not very large—under 100, say—the following method will be found useful:

3. Short Method for finding the Square of a Number.

Add and subtract from the number its defect or excess from the nearest multiple of 10. Multiply the numbers so found together, and add the square of the defect or excess.

For instance, to find the square of 97:

100 is the nearest multiple of 10, and 3 is the defect of 97 from it.

\(97 + 3 = 100\)
\(97 - 3 = 94\)
\(3^2 = 9\)

Therefore the required square of 97 is \(100 \times 94 + 9 = 9409\).

Again, to square 44:

40 is the nearest multiple of 10 to 44, and 4 is the excess of 44 over it.

\(44 + 4 = 48\)
\(44 - 4 = 40\)
\(4^2 = 16\)

Hence the required square is \(10000 + 16 = 10016\).

This operation can be readily performed mentally, as will be found by a little practice.

4. Observe, also, that no square number can end in 2, 3, 7, or 8; but that a cube can terminate in any one of the ten figures.

A number which has an exact square root is sometimes called a perfect square.

Exercise 38.

1. Square the following numbers by the method of Art. 3:

\(17, 29, 57, 45, 68, 79, 93, 103, 107\).

2. Determine whether the following numbers are perfect squares or perfect cubes; and where they are not, find the least multiplier which will make them so: 73, 125, 164, 1353, 4824, 5016, 4996.

3. Take any two numbers, and prove that the difference of their squares is equal to the sum of their sum and difference.

4. Take any two numbers, and prove that the difference of their cubes divided by their difference is equal to the sum of their squares and their product.

5. Take any two numbers, and prove that their product is equal to the square of half their sum — the square of half their difference.

5. Extraction of the Square Root.

The square root of any given whole number or decimal can be obtained, or extracted, as is sometimes said, by means of the following rule, which we give without proof, as it requires the aid of algebra to establish it satisfactorily:

Rule for the Extraction of the Square Root of any number.

Separate the given number into periods containing two figures each, by placing a point over the unit’s figure, and also over every second figure towards the left in whole numbers, but both towards the left and the right in decimals.

Subtract the extreme left-hand period of the greatest square which is contained in it, and place this square root of the period, as the first figure of the required whole square root. To the right of the remainder bring down the next period for a dividend. Double the part of the square root already found, and place it on the left of this dividend for a partial divisor; find how many times it is contained in the dividend, omitting its right-hand figure, and annex this quotient to the part of the root already obtained, and also to the partial divisor. Multiply the divisor thus formed by the last figure of the root, and subtract the product from the dividend, bringing down the next period to the right of the remainder for a dividend. Continue the operation until all the periods have been brought down. If the original number be a decimal, the process above indicated must be performed as if it were a whole number, and a number of decimal places cut off from the root so obtained, equal to the number of points placed over the decimal part of the original number.

6. The process will be best followed by means of examples.

Example 1.—Find the square root of 627264.

The greatest square in the first period 62 is the square of 7 or 49. Subtracting 49 from 62, we place 7 as the first figure of the root.

We bring down the next period 72 to the right of the remainder 13, for a dividend, doubling 7 to form a partial divisor, which is contained in 137 (the dividend without the right-hand figure 2) 9 times. We annex the 9 both to the partial divisor and to the part of the root already obtained. Multiplying 149 by 9, we subtract the product 1341 from the dividend, and bring down the next period, 64, to the right of the remainder for a dividend, doubling 79, the part of the root already obtained, for a partial divisor. 158 is contained 2 times in 316, and annexing the 2 both to the partial divisor 158 and to 79, the part of the root already obtained, we multiply the divisor 73441 by 271 by this last figure of the root; the product is 3164, which, subtracted from the dividend, leaves no remainder. Hence 792 is the exact square root of 627264.

Example 2.—Find the square root of 73441.

Placing a dot over the figure in the unit’s place, we put one over every second figure to the right, and then, performing the operation as if 73441 were a whole number, as indicated in the margin, we get 271 as the root. We cut off two decimal places from this, because there are two dots over the decimal part of the original decimal.

The square root is therefore 271.

092.—At any stage of the process, the product of the com-
completed divisor into the last figure of the root must not exceed the dividend. Hence, in finding the figure to be placed in the root, care must be taken to observe whether, when the multiplication is effected, the product will exceed the dividend or not. Thus, in the last example, in the case of the dividend 334, the partial divisor 4 will go eight times in 33, but since the product 8 x 48 is greater than 334, 7 is the next figure of the root, and not 8.

7. In the case of a decimal, if the number of decimal places to be added is known, it should always be made even by annexing a cipher, in order that the last period may be completed.

Example.—Find the square root of 41,341,506.

Here, adding a cipher, we point the decimal thus:—

\[ \frac{41,341,506}{324} \]

\[ \frac{124}{334} \]

\[ \frac{1282}{3315} \]

\[ \frac{12829}{52183} \]

And there will be 3 decimal places in the square root obtained.

Here there is a remainder, or the given decimal is not what is called a complete square. By adding, however, more ciphers, more and more figures can be obtained in the root, to any extent of approximation.

This is a similar case to that of \( \sqrt{7} \) spoken of in Art. 2. To approximate to the square root of 7, we should proceed thus:

\[ \frac{7.0000}{241} \]

\[ \frac{46}{300} \]

\[ \frac{224}{2400} \]

\[ \frac{304}{304} \]

By continually adding ciphers we can carry the approximation to any degree of nearness.

8. Similarly, in the case of any whole number which is not a complete square root, an approximation to the root by means of decimals can be obtained.

The integral part of the root obtained is, of course, the square root of the largest integral complete square, which is less than the given number.

LESSONS IN GEOGRAPHY.—X. DISCOVERIES IN THE NINETEENTH CENTURY.

In tracing the discoveries that have been made in different parts of the world, and the fresh details of foreign countries that have been added to our knowledge of geography during the last forty years, or thereabouts, from 1830 to the present time, our best course, after noting the progress of discovery and the results that have been arrived at in the case of each, which is the object of the last lesson, will be to glance at Oceania, which comprises the whole of our colonial empire on the south-western and eastern borders of the Pacific, and see what has been effected by travellers, voyagers, explorers, and adventurers in that portion of the world's surface.

Lying along the equator, and pretty nearly within a belt bounded by the tenth degree of northern latitude on one side, and the tenth parallel of south latitude on the other, are a number of large islands, which form a long chain between South-Western Asia on the north and Australia on the south. These islands, which belong chiefly to the Dutch, are rich in vegetable and mineral produce of all kinds. Chief among them is Borneo, the largest island in the world (since geographers are now agreed in considering Australia as a continent), peopled by a ferocious race of savages, who, like all the inhabitants of the seaboard of the islands of Malaysia, are greatly addicted to piracy. Our knowledge of this part of Oceania, more especially the islands of Java and Sumatra, has been gathered from the works of Sir Stamford Raffles and others, but since 1840 it has been considerably extended by the investigations made by Sir James Brooke in the Eastern or Asiatic Archipelago.

The story of the adventurous career of this gentleman may be told in a few words. He was an Indian officer who was severely wounded in the Burmese war of 1824-26, and shortly after quitted the service. During a voyage to China in 1830, he saw for the first time the islands of the Asiatic Archipelago, and is said to have there purchased a splendid field for enterprise and research. Disliking an idle life, and being a wealthy man and well able to follow up any scheme on which he had set his fancy, he determined to devote his energies and his means to the attempt of civilising the Malay races, and imparting to them the benefits of commerce, gathering at the same time information about the geography and natural history of those almost unknown regions. Returning to England, he made himself acquainted with the practical duties of a sailor, and having purchased the Royalist, a schooner yacht of 150 tons, he equipped her and furnished her with costly instruments for surveying, etc., and sailed again for the Eastern Archipelago in 1838, arriving off the coast of Borneo, August 1, 1839. Here he became acquainted with the Rajah Muda Hassim, the uncle of the Sultan of Borneo, and immediately commenced a survey of the north-west coast, which he afterwards published in consequence of a rebellion of the Dyaks in that part of Borneo. He then visited Celebes and surveyed the Gulf of Beni, and made a large collection of the quadrupeds, birds, and plants of that island. In 1840 he returned to Borneo, and having rendered considerable assistance to Muda Hassim in the suppression of the rebellion, he was rewarded with a large tract of land called Sarawak, on the north-west coast, and received the title of rajah. He now turned his attention to the suppression of piracy in the Malay waters, and in this he was successful, though the means at his command were but small. Ultimately he was instrumental in procuring the cession of Labuan, an island also on the north-west coast of Borneo, to Great Britain, which is still retained as a British dependency, although the British Government, as late as 1858, declined to purchase Sir James Brooke's claim to the crown of Sarawak.

In Australia, prior to 1840, the explorations had been chiefly confined to surveys of the coast, and short excursions inland for distances varying from fifty to one hundred miles from the shore—such as the expedition of Lieutenants Grey and Lushington in 1839, which resulted in the discovery of the Glenelg River on the north-west coast—except in New South Wales and South Australia, where the researches of the botanical and pastoral pursuits, and the discovery of new localities for settlement and pastoral lands fit for sheep-farming. In 1841, Mr. Edward John Eyre left Fowler Bay, on the south coast of South Australia, on February 25, and reached St. George's Sound, a distance of 1,040 miles from the point whence he started, on July 7, having had no other companion during the last half of his journey than a native Australian. The first attempt to traverse the south-east corner of the Gulf of Carpentaria was made in 1834 by Captain Sturt, who had proposed to go through the length and breadth of the country from north to south and from east to west. His scheme was found to be impracticable from its magnitude; but the British Government supplied the necessary funds for the equipment of an expedition under Captain Sturt's command, to proceed along the Darling as far as Laidley's Peak, and thence northwards across the desert to the Gulf of Carpentaria.

The expedition, however, was a failure as far as crossing the continent was concerned, but Captain Sturt reached a spot in latitude 24° 5' south, longitude 138° 15' east, about 200 miles from the centre of the continent, beyond which it was found impossible to penetrate, owing to the impracticable character of the country and the want of food and water for the horses. He was therefore reluctantly compelled to retrace his steps and abandon his explorations.

Another Australian traveller, Dr. Ludwig Leichhardt, was more successful. Proceeding from Moreton Bay to Jbims, the farthest station on the Darling Downs, Dr. Leichhardt, accompanied by a party of seven persons, quitted this point on October 1, 1844, and made his way through the interior by a route nearly parallel to the coast, across the southernmost part of the Gulf of Carpentaria, and thence to Port Essington, a distance of 1,500 miles, arriving at his destination on December 17, 1845, after a journey of a
LES SONS IN GEOGRAPHY.

little more than fourteen months. Many rivers were discovered, among which was the Mackenzie, on whose banks some good coal-fields were found, and several tracts of country were crossed consisting of rich arable land, admirably adapted for agricultural purposes. His subsequent expeditions, however, were not attended with the same good fortune. In 1847 he set out on a journey across the Australian continent from Sydney to Swan River, which he was compelled to abandon by events over which he had no control, after reaching as far as the downs of the Upper Mackenzie and Peak River. Nothing daunted by the unsuccessful result of his attempt to traverse Australia, he started once more on his great undertaking about the beginning of 1848, from Moreton Bay, only to meet with fresh failure and death. From that time nothing has been heard either of the leader of the expedition or his companions, and although a few traces of their route after quitting the west bank of the Condamine River and Flaxley Downs have been found, nothing definite respecting their fate and what led to the failure of the expedition has ever been discovered.

The principal journeys of discovery in Australia since the disappearance of Dr. Leichhardt have been the expeditions of Mr. Augustus C. Gregory, in West, North-West, and North Australia in 1856 and 1858, in which many important discoveries were effected, and the perilous march of Richard O'Hara Burke, and his companions Gray, King, and Wills, across the continent from Melbourne to the Gulf of Carpentaria in 1860-61. The exploring party started from Melbourne on August 10, 1860, and reached the Gulf of Carpentaria, near the embouchure of the Cloncurry River, on February 11, 1861, having passed for miles and miles through a fertile and well-watered country, thus proving that the whole of the interior, at all events, is not of so barren and desolate a character as had been imagined from the discovery of the great central desert by Captain Sturt in 1844.

To Burke and his companions belong the honour of having been the first to make their way from south to north, across the trackless centre of the Australian continent; but three out of the four were doomed to purchase the distinction they had so gallantly won, at the cost of their lives. Having feasted their eyes with the sight of the blue waters of the Gulf of Carpentaria, the adventurers, worn and weakened by the privations they had endured, and the fatigue and hardships they had undergone in their journey northwards, turned to retrace their steps. Gray died soon after commencing the march homewards; but the three survivors struggled on till, in April, they reached Cooper's Creek, a stream that crosses the boundary line between South Australia and New South Wales, towards its northern limit, where, the year before, Burke had left a few men in charge of a store of provisions. By some sad fatality, the man who had been placed at the head of the little party left to guard the depot, weary of awaiting the return of the travellers, and thinking that they had all perished, had left the spot only a few hours before Burke and his companions reached it. Knowing that it would be utterly useless to try to overtake them, Burke and his friends directed their steps towards Mount Hopeless, a short range on the west side of Lake Blanch, where they found some settlers who had "squatted," in that locality in as wretched a condition as themselves, without clothes and without food, endeavouring to prolong existence by searching in the marshes and swamps for a plant called nardou, which they knew was frequently eaten by the natives when nothing better could be had. Again disappointed of procuring aid, and un-
able to advance any further. Burke and Wills soon died of exhaustion, and King himself was at the point of death, when he was discovered by a party of the natives, who treated him with the utmost kindness, and, when he was sufficiently recovered, brought him on his way towards Melbourne, which he reached in safety towards the close of the year, having met with an expedition which had been sent out to see if any traces could be discovered of the missing travellers.

In other parts of Oceania, little of any importance besides surveys of the coast and different parts of the waters of the Pacific has been effected of late years, nor have any further discoveries been made with regard to the outlying lands of the Antarctic continent that is supposed to encircle the South Pole, 9. 10.

LESSONS IN FRENCH.—XIX.

SECTION XXX.—RELATIVE PRONOUNS [138].

1. Qui, used as nominative, may relate to persons or to things.

Les fleurs qui sont dans votre jardin, The flowers which are in your garden.

2. Qui, used as the object of a verb, can only be said of persons. It is used interrogatively with or without a proposition.

Qui aimes-tu? Whom does your mother love?

3. Qui may be said of persons or things. It can never be understood, and must be repeated before every verb [Sect. XVIII. 1].

Les personnes qui nous voyons, The persons whom we see.

Les langues qui nous apprenons, The languages which we learn.

4. Ce que is employed for that which, or its equivalent what.

Ce que vous voulons, That which you wish, Ce que vous avez choisi, That which you have chosen.

5. Que answers to the English pronoun which, used absolutely before a verb.

Que entendez-vous? What do you think of that?

6. Qui, when not used as an exclamation, is generally preceded by a proposition, and relates to persons or things. It may be preceded by a proposition.

Lequel-ci, lequel-la, l, lesquelles, m. pl., lesquelles, f. pl., whichever, or which, or one in [Sect. XVII. 6], or which one, relates to persons or things. They may be preceded by a proposition.

Lequel avez-vous choisi? Which one have you brought?

Duquel-parlez-vous? Of which one do you speak?

7. Dent, which, or of whom, may relate to persons or things, in the masculine or feminine, singular or plural. It can never be used absolutely, and must always be preceded by an antecedent. It is preferable to de qui or duquel, etc.

Les fleurs dont vous me parlez, The flowers which you speak to me.

Les demoiselles dont votre cœur The young ladies of whom your vous parlez, sister speaks to you.

9. PRESENT OF THE INDICATIVE OF THE IRREGULAR VERBS.

1. être, 4, to say.

Tu dis, Je dis, I say, do say, or am saying.

Il dit.

Nous disons.

Vous dites.

Ils disent.

2. étre, 4, to put.

Tu mets, I put, do put, or am putting.

Me mets.

Nous mettons.

Vous mettes.

Ils mettent.

3. Arriver, 1, to arrive.

Avec, with.

Commander, l, to order.

Écosais, -e, Scotch.

Enfant, m., child.

Vocabulary.

Nom, n., name.

Plaisir, m., pleasure.

Presque, almost.

Rien, nothing.

Soulier, m., shoe.

Vrai, -e, true.

Exercise 55.


Exercise 56.

1. Have you what (ce dont) you want? 2. We have what we want. 3. Is the gentleman whom you know here? 4. The lady of whom you speak is here. 5. Is she just arrived? (Sect. XXV. 2)? 6. She is just arrived. 7. Do you know that gentleman? 8. I know the gentleman who is speaking with you. 9. I heard what he said, but I did not know his name, but I know where he lives (demeure). 11. What do you do every morning? 12. We do almost nothing; we have very little to do. 13. Does the tailor make your clothes? 14. He makes my clothes, my brother’s, and my cousin’s. 15. Do you know what you say? 16. I know what I say, and what I do. 17. Do you know the Scotchman whom your brother speaks to? 18. I know him well. 19. What does he put into his trunk? 20. He puts his clothes. 21. Is that which you say true? 22. What I say is true. 23. Do you understand that which I say to you? 24. I understand all that you say. 25. Of whom does your brother speak? 26. He speaks of the gentleman whose sister is here. 27. Is your brother wrong to do what he does? 28. He cannot be wrong to do it. 29. What are you doing? 30. I am doing that which you do. 31. Where do you put your books? 32. In (dans) your brother’s trunk. 33. Is your brother here? 34. He is not here. 35. He is at my brother’s, or at my father’s.

SECTION XXX.—IDIOMATIC USES OF METTRE, ETC.

1. The verb mettre is used in the same sense as the English to put, in speaking of garments. Mettre le couvert means to lay the cloth, or set the table.

Quel chapeau mettez-vous? What hat do you put on?

Votre frère met son habit noir, Your brother puts on his black coat.

Le domestique met le couvert, The servant is going to lay the cloth.

2. Öter means to take off, to take away, to take out.

Mon domestique ôte son chapeau, My servant takes off his hat.

Ôtez ce livre de la table, Take away that book from the table.

N’as-t-on pas ôté le dîner? Have they not taken away the dinner?
LESSONS IN DRAWING.

3. The verb faire is used before another verb, in the sense of to have, to cause.
   Votre frère fait-il laver une maison? Does your brother have a house built? He has more than one built.
   4. It may be used in the same sense before its own infinitive.
   Je fais faire un habit de drap? I have a cloth made.
   Vous faites faire des souliers de cuir.
   5. Vouloir [See t. XXVII, 6] followed by dire is used in the sense of to mean.
   Que voulez-vous dire?
   Votre sour e veut-elle dire?
   6. Verb fain if used before another verb, in the MUM of tilUtirunomauon? Do not your brother have a hotutluMr have a HOTUTULMr.
   II eu fait tuit bitlr puit, lit that mart than on built.
   May be used in the same MUM before its own infinitive.
   Jo fail faire un habit de drap? I have a cloth made.
   Vous faites faire des souliers de cuir.
   7. Verb want money? He does not want money. He does not want that his sister taken his book from the table? 25. She has not taken it away. Why do you take off your shoes? 27. I take them off because they hurt me. Do you intend to have a house built? 29. I intend to have one built. Does the tailor spoil your coat? 31. He does not spoil it. Who spoils your clothes? 33. No person spoils them. 34. What hat do you wear? 35. I wear a black hat.

RESUMÉ OF EXAMPLES.

Ne mettez-vous pas vos habits?
J'ai peur de les gâter.
Ne portez-vous jamais votre habit noir?
Je le mets tous les Samodis.
Pourquoi n'êtes-vous pas votre manteau?
J'ai trop froid, j'ai peur de l'ôter.
Faites-vous réaccorder vos souliers?
Je fais réaccorder mes habis.
Faites-vous faire une paire de bottes?
Je fais creuser un puits.
Votre frère que veut-il dire?
Que veut dire cela?
Cela ne veut rien dire.
Ôtez-vous vos souliers et vos bas?
Je n'ôte ni les uns ni les autres.
Le dîner est prêt; le domestique va mettre le couvert.
Voulez-vous ôté le couvert?
Je vais mettre le couvert.
Je vais ôter le couvert.

VOCABULARY.

Apothicaire, m., drug-
gist.
Après, after.
Cave, f., cellar.
Cruet, r., 1, to dig.
Dimanche, m., Sunday.
Diner, m., dinner.
Fâché, a., sorry, angry.
Gâté, r., spoiled.
Prêt, a., ready.
Raccordé, r., to mend.
Remettre, r., 4, to replace, to put on again.
Tout-à-l'heure, imme-
diately.
Uniforme, m., uniform.
Velours, m., vellet.

EXERCISE 57.

1. Le Général X. met-il son uniforme? 2. Il ne le met point.
7. Il est midi; le domestique met-il le couvert? 8. Il ne le met pas encore; il va le mettre tout à l'heure.
25. Je vais l'ôter, car j'ai chaud.

EXERCISE 58.

1. Do you take off your coat? 2. I do not take off my coat, I put it on. 3. Do you take off your cloak when you are cold? 4. When I am cold, I put it on. 5. Does your little boy take off his shoes and stockings [§ 21, 4]? 6. He takes them off, but he is going to put them on again. 7. Does that little girl lay the cloth? 8. She lays the cloth every day at noon. 9. Does she take away the things after dinner? 10. She takes away the things every day. 11. Do you intend to have a coat made? 12. I intend to have a coat made. 13. I am going to have a coat and a vest made. 14. Does your brother have his boots mended? 15. He has them mended. 16. What does your son mean? 17. I do not know what he means. 18. Is he angry with me or with my brother? 19. He is neither angry with you nor with your brother. 20. Is he afraid to spoil his coat? 21. He is not afraid to spoil it. 22. Does the druggist want money? 23. He does not want money. 24. Has your sister taken his book from the table? 25. She has not taken it away. 26. Why do you take off your shoes? 27. I take them off because they hurt me. 28. Do you intend to have a house built? 29. I intend to have one built. 30. Does the tailor spoil your coat? 31. He does not spoil it. 32. Who spoils your clothes? 33. No person spoils them. 34. What hat do you wear? 35. I wear a black hat.

LESSONS IN DRAWING.—X

We must now direct the attention of the pupil to shading and foliage; but before commencing, let us earnestly advise him to go over the previous lessons again, so that he may be well prepared to follow us in a course of instruction that will require all the knowledge he can possibly obtain, and a considerable amount of practice in using the pencil, to give him power, confidence, and freedom of execution, combined with truth of representation. We have already warned him against sketching before he can draw well; the danger of falling into a slovenly manner is now before him. He must be careful and slow at first in that he is about to undertake a form of shading and foliage not pro-
duced, he must bear in mind that in proportion to the care, per-
severance, and patience he bestows upon his work, will be the beauty and effectiveness of the result; while, on the other hand, carelessness of execution will degenerate into coarseness and sordidness. He will, in the one case, prove himself to be a clever and satisfactory draughtsman or, in the other, one totally incapable of producing anything worthy of admiration, or fit to be employed for any useful purpose.

The following observations relating to shadows will be found important, as containing principles that influence their treatment under very common and frequent circumstances; they may be classed as positive or decided shadows, and half tints. Decided shadows may be divided into broad shadows and cast shadows. Broad shadows are the shadows upon the object. In Fig. 72, a is the broad shadow. Cast shadows are shadowed by the object, and are thrown upon the ground, or upon some other object. In Fig. 72, b is the cast shadow. As a general rule, for their difference of tone or depth, the cast shadow is darker than the broad shadow, simply because the cast shadow being in most cases thrown upon a more extensive surface (the ground, for instance), there is then round about the cast shadow a surface receiving the rays of light which refracts them, or throws them back again, with less power upon the side of the object in broad shadow; this lowers its tone. When it occurs that no cause for refraction is present, then the broad and cast shadows are equal in tone. In Fig. 72 the rays of light coming from the direction of f fall upon the ground at g g g, and are thrown back again with less power upon a, causing the broad shadow a to be lighter than the cast shadow b, which cannot receive the refracted rays from g g g, being the same surface or plane upon which the light falls. Again, the cast and broad shadows are generally together; this will be considered more fully in its place presently, when we take up the subject of half tint.

The pupil’s first essay will be a very simple way of making a flat tone, before he attempts crossing lines; this simple method he will soon understand, and afterwards find to be an easy introduction to the crossing or cross-hatching system. When the surface is large, the cross-hatching, composed of unequal lengths, not permitting the ends to lap over one another, or terminate on the same level; but if the surface is small, draw continuous lines to the full extent of the shadow, at the same time observing the tone must be regulated by the strength or pressure need in the execution. Draw the square, Fig. 71, in which is shown the method when a broad surface is to be covered by a flat tint of broken lines, as explained above. Fig. 72 is given to represent the continuous lines, commencing carefully and even from one side of the shadow, and terminating exactly
LESSONS IN DRAWING.

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at the other side; observe the tone, and consequently the amount of pressure required for the cast shadow.

There is a very useful little instrument for shading, called a stump, it is made either of leather or paper, rolled up to about the length and thickness of the finger, and pointed at each end. When used, black chalk or lead is ground to a powder, the point of the stump is dipped into it, and then rubbed over the part to be shaded until an even tint is produced. We merely mention the stump here and explain its use, but at present we will put it aside, and keep to the line method until the pupil has thoroughly mastered it; afterwards we will draw his attention to the use of the stump, as capable of producing a ground for shadows to be lined over afterwards. The great art of shading a drawing well is to make use of the shadows, half tints, and our admiration is excited by the correctness and beauty of the form which the line alone determines: now this feeling must be carried on, when introducing the shadows and the infinite number of minor tones, by preserving all that the line intended to give, whilst our attention is engrossed upon the shadows. In Fig. 73 there are several points of importance which must not be passed over: the pupil will notice that the wall to the left has the upper edges of each stone left untouched, because these edges, as they "round off" to the horizontal surface, meeting the mortar, catch the light more forcibly than the faces of the stones which are in a perpendicular position. In old stone walls of ruins these effects are continually to be seen, and must not be disregarded. The depth or intensity of shadows may not only be increased or diminished according to the pressure of the pencil

minor (or lighter) tones, as a means of distinguishing the form of the object, whether as to its general effect, or to the most minute and delicate details. We know that, in nature, objects are not represented to us by lines drawn about their edges; they are distinguishable from each other only by light and shade and colour: therefore, as it is necessary in the first instance to determine by an outline the boundary or form of the object, with all its various changes of surface, so we must as we proceed with the picture, by adding light, and shade, and colour, gradually lose the drawn line in the work, so as to avoid harshness, and that appearance which would strike us as if it had been cut out with a penknife. Of course we cannot altogether do without the line of the form, nor is it desirable that we should; and since our intention is to give as intelligible a representation of the object as we can, lines may be judiciously left without offending the eye by any unseemly harshness of expression. A line only determines the boundary of an object, that is, it gives the form; and in simple outline only, where no light and shade are added,

Fig. 75.
steps is according to the inclination of the sun’s rays, whilst the edge on the top or tread of the steps is directed towards the s; therefore the upper edge of the wall casts its shadow on the line bgdhfimn. In Fig. 75 the pupil will find a useful example for practice in shading. In copying this he must determine the extent of the shadows and the depth of their tints by the directions that have been given above.

LESSONS IN LATIN.—X.

THE THIRD DECLENSION (continued).

ADJECTIVES AND NOUNS OF THE THIRD DECLENSION DECLINED TOGETHER.

Cases. Singular.
N. acer odor, m., a pungent smell. dulcis mater, f., a sweet mother.
G. acris odors, of a pungent smell. dulcis materis, of a sweet mother.
D. acris odor, to a pungent smell. dulcis matris, to a sweet mother.
Ac. acerodorem, a pungent smell. dulcis matre, a sweet mother.
V. acris odor, O pungent smell! dulcis matrem, O sweet mother!
Ab. aceri odoris, by a pungent smell. dulcis matrem, by a sweet mother.

Plural.
N. acris odores, pungent smells. dulcis materes, sweet mothers.
G. acerodorum, of pungent smells. dulcibus matribus, of sweet mothers.
D. acerodoribus, to pungent smells. dulcibus matribus, to sweet mothers.
Ac. acerodoribus, a pungent smell. dulcis materibus, a sweet mother.
V. acris odores, O pungent smells! dulcis materibus, O sweet mothers!
Ab. acerodoribus, by pungent smells. dulcis materibus, by sweet mothers.

Cases. Singular.
N. majus opus, m., a greater work. rudis miles, m., an untrained soldier.
G. majoris operis, of a greater work. rudis militis, of an untrained soldier.
D. majori operis, to a greater work. rudem militem, to an untrained soldier.
Ac. majoroperis, a greater work. rudem militem, an untrained soldier.
V. majori operis, O greater work! rudem militem, by an untrained soldier.
Ab. majore operis, by a greater work. rudem militem, by an untrained soldier.

Plural.
N. majora opera, greater works. rudis militibus, untrained soldiers.
G. maior operum, of greater works. rudibus militibus, of untrained soldiers.
D. majoribus operibus, to greater rudibus militibus, to untrained soldiers.
Ac. majoros operum, greater works. rudibus militibus, to untrained soldiers.
V. majoris operum, O greater works! rudibus militibus, by untrained soldiers.
Ab. majororibus operibus, by greater rudibus militibus, by untrained soldiers.

FORMS OF NOUNS AND ADJECTIVES OF THE FIRST, SECOND, AND THIRD DECLENSIONS.

Example.—Bonum puer, m., a good boy; bona soror, f., a good sister; bonum nomen, n., a good name.

Cases. Singular.
N. — bonus puer, m., a good boy. bonor soror, f., a good sister; bonum nomen, n., a good name.
G. bonior puero, bonor soreori, bonum nomenis,
D. bono puero, bono sorori, bono nomine,
Ac. bonum puerum, bonam soreorun, bonam nomenum,
V. bonus puer, bonus soreor, bonus nomine,
Ab. boio puero, bono soreor, bono nomine.

Plural.
N. — boni pueri, boni sorores, boni nomines,
G. bonorum puoruem, bonorum soreoruni, bonorum nomenum,
D. bonos pueros, bonos soreores, bonos nomenos,
Ac. bonus puero, bonos soreores, bonos nomenos,
V. boni pueri, boni soreores, boni nomenos,
Ab. bonis puere, bonis soreores, bonis nomenios.

Example.—Campus viridis, m., a green field; herba viridis, f., a green herb; gramen viride, n., green grass.

Cases. Singular.
N. campus viridis, a green field. herba viridis, a green herb. gramen viride, n., green grass.
G. campior viridis, herbis viridis, graminis viridulis.
D. campus viridi, herbis viridi, graminis viridibus.
Ac. campum viridem, herbam viridem, graminem viride.
V. campe viridi, herbam viridi, graminem viridi.
Ab. campii viridi, herbae viridi, graminibus viridibus.

Plural.
N. campi virides, herbae virides, graminis viridiles.
G. campior viridium, herbarum viridium, graminium viridium.
D. campios virides, herbae virides, graminibus viridibus.
Ac. campos virides, herbae virides, graminibus viridibus.
V. campus viridibus, herbae virides, graminibus viridibus.
Ab. campii viridibus, herbae virides, graminibus viridibus.

Examples.—Audax vir, m., a bold man; audax femina, f., a bold woman; audax animal, n., a bold animal.

Singular.
N. audax vir, a bold man. audax femina, a bold woman. audax animal, an animal.
G. audace viri, of a bold man. audaece feminam, of a bold woman. audace animalum, of an animal.
D. audacie viro, audacie feminam, audacie animali.
Ac. audacem virum, audacem feminam, audacem animali.
V. audax vir, a bold man. audax femina, a bold woman. audax animal, an animal.
Ab. audaci viro, audaci feminam, audaci animali.

Plural.
N. audaces viri, audaces feminae, audaces animalia. audace virorum, audace virom, audace animalium.
G. audacie virorum, of a bold man. audacie virom, of a bold woman. audacie animalium, of an animal.
D. audacie virum. audacie feminam, audacie animali.
Ac. audacie viros, audacie feminas, audacie animalas.
V. audaces viri, audaces feminae, audaces animalia.
Ab. audacibus viribus, audacibus feminis, audacibus animalibus.

According to these paradigms or examples form the following:

N. vir major, m., a great man.
G. viri majoris, of a greater man. viri majorum, of a great man.
D. viri majoris, to a greater man. viri majoribus, to a great man.
Ac. viri majoris, of a great man. viri majoribus, of a great man.
V. vir majoris, O a greater man! vir majoribus, O a great man!
Ab. viri majoris, by a great man. vir majoribus, by a great man.

LESSONS IN LATIN.—XI.

THE THIRDB DECLENSION (continued).

ADJECTIVES AND NOUNS OF THE THIRD DECLENSION DECLINED TOGETHER.

Cases. Singular.
N. silua magna, f., a great wood.
G. silvae magnae, of a great wood. silvae magnae, of a great wood.
D. silua major, f., a forest. silvae majorum, of a forest.
Ac. silua majorum, of a forest. silvae majorum, of a forest.
V. siluu major, O a great wood! silua majorum, O a forest!
Ab. siluam magnum, by a great wood. siluam magnam, by a forest.

Plural.
N. silvae magnum, n., a great wood. silvae magnae, of a great wood.
G. silvae magnae, of a great wood. silvae magnae, of a great wood.
D. silvae major, f., a forest. silvae majorum, of a forest.
Ac. silvae majorum, of a forest. silvae majorum, of a forest.
V. silua major, O a forest! silua majorum, O a forest!
Ab. siluam magnum, by a forest. siluam magnam, by a forest.

VOCABULARY.

Incumbu, 3 (with in and the ac.), I apply to. Littera, in the singular, signifies a letter of the alphabet. Fundamentum, f., a foundation. Gravis, -e, heavy, weighty. Habec, 2, I have. Hostis, -is, m., an enemy. Immortalis, -is, immortal. Industria, -iae, f., diligence. Morbor, -ae, diseases. Denotes morales, charact. Mortalis, -e, mortal. Motto, -i, a custom. Omnia, -ae, every one; in the plural, all. Tectas, -itis, f., piety. Tenuis, tuum, tuum, thin. Virtus, -onis, f., virtue (originally valor); vox, -is, f., a voice.

Exercise 33.—LATIN-ENGLISH.


Exercise 34.—ENGLISH-LATIN.

1. Brave men yield not to enemies. 2. A bold band is not easily conquered. 3. My son studies with an active (alacri) mind. 4. Do thy sisters love knowledge? 5. They are delighted by the voices of the birds. 6. The birds of the enemy have sweet voices. 7. My daughter is well known by all. The bold boys are admired by Julius Cesar. 9. The bodies of men are mortal, the souls immortal. 10. The piety of the mother delights the son. 11. The daughter is delighted by the virtus of the father. 12. The virtus of boys consists in industry and good character. 13. My mother’s letter (the letter of my mother) is heard by all.

KEY TO EXERCISES IN LESSONS IN LATIN.—IX.

Exercise 29.—LATIN-ENGLISH.

1. Artifices ought to teach boys. 2. The king moves (his) thumb. 3. Kings guard the laws. 4. Laws are guarded by kings. 5. The son bites (his) thumb. 6. The horsemen are harrassed (grieved). 7. Artists adorn cities. 8. The wages of artificers support (their) sons and daughters. 9. The bachelor sleeps. 10. The people are defended. 11. The race of the artificer is prized. 12. Hast thou corn? 13. The neck of the soldier is injured. 14. The age of the bachelor is great.
LESSONS IN ENGLISH.

**Exercise 30.—English-Latin.**


**Exercise 31.—Latin-English.**

1. Birds decoy bachelors. 2. Mothers are slain by fevers. 3. I greatly like the sea. 4. The sea is liked by sailors. 5. Husbandmen cultivate corn-fields. 6. There are sailors in the ships. 7. There is fire in the globe. 8. The brothers are in the fires (flames). 9. The goddesses have altars. 10. Have not the gods altars? 11. The husbandmen defend the sheepfolds with a hatchet.

**Exercise 32.—English-Latin.**


**LESSONS IN ENGLISH.—X.**

**DERIVATION.—PREFFIXES (continued).**

In the prefixes and quotations given in former lessons, we may find a species of indirect history. The prefixes set forth with them, show us how much ours is a composite language, a language that is the composite order of architecture, made up of elements derived from different sources. The facts also inform us that the English nation has been closely connected with the French, and so is much indebted to the ancient Latins. To the corrupt Latin of the Middle Ages we are also obviously indebted; and from the Greek tongue we have derived words and parts of words. We have, however, also lain fairly and evenly to the tribute of the enrichment of our language. In historical or genealogical relations, we Englishmen of this day are connected with the Norman baron as well as the Saxon churl; with the monk and the schoolmen, no less than with the conquers of the world; and may fancy the line of our relationship to stretch from the Thames to the Rhine, and from the Rhine even to the Indus and the Ganges. If every sentence that has been written to convey to the world a history of England had totally perished, still scholars, out of the fossil remains of the nation discoverable in its words, would, after the manner of the geologists, be able to reproduce the great outlines of our English life. Even single words are full of the elements of history. Those elements are often beneath the surface; at least they are not obvious to the common eye. I give you, however, an instance, the historical value of which is clear to all. When, in the early part of the reign of Charles I., the Puritan party began to rise against the royal authority, the more demure members of the party wore their hair cropped so close and short, as, in contrast with the full and flowing locks of the courtiers, to give their heads the appearance of so many bows. Queen Henrietta Maria, the spouse of Charles, observing this marked peculiarity, graphically as well as vividly termed them roundheads. The particular occasion was the following:—"Samuel Bamfildston, a noted republican, was, in his youth, the leader of a deputation of London professors, for the purpose of communicating to Parliament their notions regarding civil and religious government. The queen, who saw this posse arrive at Whitehall, then first noticed the extraordinary roundness of their closely-clipped heads, and saw at the same time that Samuel was a personable apprentice; upon which she exclaimed, 'La! what a handsome young fellow!' Roundheads they were called from that moment, and roundheads they will remain while history endures." You thus see that the term "roundhead" contains a history. It also paints a picture. In the word "roundhead" we possess an historical picture; and the picture which it paints all can appreciate. Why? Because the word consists of Saxon terms, nursery terms. Translate the Saxon "roundhead" into Latin, retaining the capital; and so far from painting a picture, the term does not convey any meaning to the mere English scholar. If, then, you would be understood by the people, use words of Saxon origin. But if you would be well acquainted with the English language, study its Latin, and generally its foreign elements, to which you do not become familiar in the nursery, and which consequently present difficulties, and obstruct the pathway to knowledge. These remarks suggest reasons why we are entering so fully into the composition of English words.

**Hypo of Greek origin (hyp, pronounced ha-per, upon, over, too much), found in hypocrifto; that is, one who is too critical, unjustifiably critical.**

"The hypocrifto controller of poets, Julius Sénigur, doth so severely curse nation, that he seemeth to sit in the chair of the scornfull."—Cotmen, "Remains."

**Hypo of Greek origin (ibra, pronounced hi-po), with the import of under, appears as hypocracy, acting under a mask, acting an assumed character, in a manner so preposterous to something you are not, and dissimulation or concealing what you are. Hypo appears also in hypotenuse (Greek, hip-trus, pronounced ti-nine, to stretch).**

"The square of the hypotenuse in a right-angled triangle is equal to the square of the two other sides."—Locke, "Human Understanding."

Hypo appears also in hypothesis (Greek, hip-trus, pronounced the-sis, a placing), which by its derivation signifies a placing under, as is intimated in the Latin supposition (sub, under; and ponere, to place). An hypothesis, then, is a supposition—something put under certain phenomena or appearances to explain their cause or immediate origin.

"Any hypothesis which possesses a sufficient degree of plausibility to account for a number of facts, helps us to digest these facts in proper order, to bring new ones to light, and to make experiments (that is, decisive tests) for the sake of future inquiries."—Hartley, "On Man."

In, of Latin origin, signifying in, into, and upon, having also a negative force, appears in these forms, namely, in, in, in, ir, is.

In, in the Latin word ignamus, denoting one who knows nothing. Here it makes the statement in the verb equivalent to a negative proposition. Ignoramus properly signifies we are ignorant. An ignorant once in a letter to me spoke of igno- ramus, fancying, with a smattering of Latin, that the plural of mus was mi. If ignoramus is used in the plural, it must stand as ignoramus; but Beaumont uses ignorantus itself as a plural.

"Give blackheads boors, And silly ignoramus, such as think There's powder treason in all Spanish drink."

Ignoramus is used also as an adjective; e.g.,

"Let ignoramus furies find no traders; And ignoramus poets scribile satirices."

II, as in illegal, not legal; illegitimate, not legitimate; the root of both being lex, legis, Latin, a law. In illustrato (Latin, lux, light), the ii denotes upon; illustrato is to throw light upon a subject. In immortale (Latin, indo, I play, cheat), descriptive, the ii seems to be little more than intensive.

In, into, as imbibo (Latin, bibo, I drink, imbibo (embody).

"The soul grows clothed by contagion, Immortal, isola, by which, with less, The divine property of her first being."—Milton.

In imbibition, the im (or em) is intensive or augmentive. In immutare (Latin, mutare, riper), the is negative—immature means unripe; is negative also in immemorial (Latin, mem, mindful); immemorial usage is usage time out of mind.

"And though some impious wits do questions move, And doubt if souls immortal be or no, That doubt their immortality doth prove, Because they seem immortal things to know."

The root of immortal is the Latin mors (moris in the genitive), death; whence mortal.

In, in, as in inclose (Latin, clando, I close), to shut in; in, into, as income; in means also not, as inconiito (abridged into inco-), a word coming to us from the Latin incognitus, unknown, through the Spanish incognito. Inconvenient is made up of in, not, cum, with, and venio, I come; inconvenient, therefore, is that which does not come with you, does not agree with your
condition, position, or wishes. In indigent (Latin, indigio, I
want, from in and ego), needy, the is augmentative.

"Themistocles, the great Athenian general, being asked whether he
would choose to marry his daughter to an indigent man of merit, or to
a worthless man of an estate, replied, that he should prefer a man
without an estate, to an estate without a man."—Spectator.

Ir, not, as in irreparable (from the Latin through the French;
Latin, reparare, to get again), not to be got again, not to be re-
gained or restored.

"Nor does she this irreparable woe
To shipwreck, war, or wasting sickness, owe;
But her own hands, the tools of ev'ry fate,
Wrought the dire mischief which she mourns too late."

Levis, "Status.

In irruption (Latin, rumpo, I break), the ir has the force of into;
the opposite of irruption, a breaking into, is eruption, a breaking out
of. Compare corruption, a breaking together, a breaking up,
a crumbling.

In passes into the form is in isolated (Latin, isaula, an island),
derived immediately from the French isolé; isolated, or rather,
translated, means standing alone, like an island in the sea. The
French form gains prevalence, and has given rise to the verb
isolat and the noun isolation.

Inter, of Latin origin (compare enter as above), signifying be-
tween, among; as intermarry, said of families, members of
which marry one another; inter is found also in interpolate, to
introduce. This is a word which has given trouble to the etymo-
lologists. Both Richards and Du Cange connect it with pedo, to
polish. This view makes interpolation a sort of amendment,
whereas the word carries with it the idea of corruption and de-
privation. Interpolation seems to me a low Latin word, whose
root is the classical Latin pello (pulsa), I drive, so that inter-
polation is something thrust in, something foisted on. This
is the sense in which the word is generally used, denoting the
unjustifiable additions and insertions made to manuscripts by later
hands than those by which they were originally composed.

"The very distances of places, as well as numbers of the books,
demonstrate that there could be no collision, no altering nor in-
terpolating one copy by another, nor all by any of them."—Bentley, "On
Prethinking."

"The larger epitaphs of Ignorance are generally supposed to be inter-
polated."—Jortin, "Ecclesiastical History.

Inter-invisible is thus printed in "Richardson's Dictionary," as
though the word was from the Latin inter, and minor, I stand
between; whereas it is made up of in, not, and terminus, a limit,
or boundary, and so is equivalent to unlimited, or unbounded; as in

"Plains immense
Lie stretched below, invariable meads
And vast savannahs, where the wandering eye,
Unfart, is in a verdant ocean lost."

Thomson, "Summer.

Intro, of Latin origin, signifying within, occurs in the forms
intra and intro, e.g., as in the recent word intramural (Latin,
murus, the wall of a city), intramural liberties, and introduce
(Latin, dico, I lead), to lead within; also introitum (Latin, mitto,
I send), to send or let in.

"So that I (Guido Reni) was forced to make an introspicte into
mine own mind, and into that idea of beauty which I have formed in
my own imagination."—Dryden, "Parallèle.

Magni, of Latin origin (magnus, great), in the forms magna
and magni, enters into the composition of the following words: magnanimity (Latin, animus, mind), greatness of mind; magnify
(Latin, facio, I make to great, exalt; magnificence (Latin, loquor, I speak), great talk. Magnify is connected with the words magnificence, magnificent, magnifier. From magnus,
great, comes also magnitude.

"To these, thy naval streams,
Thy frequent towns superb, of busy trade,
And ports magnific add, and stately ships,
Imnumerous."

Dyer.

Male, or male, of Latin origin (malum, evil), forms a set of
words the opposites of words containing bel; as mallevolence,
beneficence; maladministration, almsgiving; male is found in mal-
administration and maltreat; malfeasions (Latin, facio, I do), are misdeeds.

"That guilty creatures sitting at a play,
Have, by the very cunning of the scene,
Been struck so to the soul, that presently
They have proclaimed't their malfeasions."

Shakespeare, "Hamlet.

Melan, of Greek origin (μελα, pronounced mel-as, black), to
disorder, presents itself in melancholy, literally, black bile (from the Greek μελα, black, and χολη, pronounced kol'-a, bile), whence it was thought came habitual sadness.

"But hail, thou goddess, sage and holy,
Hail, divinites melancholy!
Whose saintly visage is too bright
To hit the sense of human light,
And therefore to our weaker view
O'erlaid with black, said Wisdom's hue."

Milton, "A Penitensio.

Meta, of Greek origin (μετα, pronounced met-ta), signifying
after, and denoting change, transformation, is found in metaphor
(from the Latin θεματο, pronounced fer-ro, I bear), a figure of
speech in which there is a transference of the literal meaning of
the word. Words originally represented objects of sense. It is only
by accommodation or transference that the word which set
forth some sensible objects has come to denote a state of mind
or feeling. Thus acute, which now describes a shrewd, clever
mind, properly signifies sharp, piercing—from the Latin acu, a
noodle. In this view, all words now applied to mental or moral
phenomena, contain metaphors. Instances may be given in re-
lation to the Latin, as, boasted (Latin, ambitus, from ambito, to
breathe); abstraction (Latin, ab, from and traho, I draw), concise (Latin, cum, with, and capio, I take), and of course their corresponding nouns; also, in hard (hard heart), open (open disposition), light (light-hearted).
The term metaphor, however, is specially given to more marked
and striking, not to say artificial instances of transference, on
the ground of some real or supposed resemblance between the
material and the mental objects. Thus, the sun is termed the
kings of day, and the moon the queen of night.

"An horn is the hieroglyphick of authority, power, and dignity,
and in this metaphor is often used in Scripture."—Brown, "A Pulser Errors.

Meta forms the two first syllables of metaphysics (in Greek,
μετα τα φυσικα, pronounced met-ta far'-a, see, after the
physics or natural sciences). The force of the word will be learnt
in these quotations:

"The one part which is physic (physics, relating to matter)
inquireth and handleth the material and efficient causes; and the
other, which is metaphysics (metaphysics, the plural is now generally used),
handleth the formal and final causes."—Bacon, "Advancement of Learning.

"From this part of Aristotle's logic there is an easy transition to
what has been called his metaphysics; a name unknown to the author
himself, and given to his most abstract philosophical works by his
eeditors, from an opinion that these books ought to be studied imme-
diately after his physics, or treatises on natural philosophy."—Grubbs,
"Analysis of Aristotle's Works.

Meta also enters into the Greek word metaepymoseis (en, in,
and φυσικα, pronounced su'-ke, the soul), the passage of the
soul from one body to another.

"The souls of users, after their death, Lucrex affirms to be metap-
ymphased, or translated into the bodies of asses, and there remain cer-
tain years, for poor men to take their pennyporth out of their bones."

—Piscer.

Exercise.

1. Parse the following sentences:

July is a very hot month. In July the grass and flowers are burnt.
Why do you not want to go there? The children go under the
bushes. A bee is on the honeysuckle. The bee will carry the honey
to the hive. Look at the bee. She picks up her ears. She smells the
mice. Puss wants to get into the closet. The mice nibble the
biscuits. February is a cold month. It snows. It freezes.

2. Form sentences having in them these words:

Signification; prevent; inerucation; sxmcommunicate; effor-
ences; encompl, survey; office; entertainment; epitaph; equiva-
lence; septet; forbid; pardon; hieroglyphics.

3. Write a theme on each of the following subjects:

1. Joseph and his brethren. 2. A May morning. 3. The Invincible
Armada. 4. The Solar System. 5. The chief river in the neighbour-
hood where you live, and any objects of interest on or near its
banks.
LESSONS IN PENMANSHIP.—XIX.

In Copy-slips Nos. 67 and 68 the learner will see how the letters v, w, and b are joined to letters that precede and follow them, and in these he will also find examples of the method of bringing the final curve to the right, which terminates the letters that have just been named, in a downward direction, in order to carry it with greater facility into the line that forms the loop of the letter c, which would be greatly curtailed in size and robbed of its proper proportions if the final curve of the v, b, or w that precedes it were carried to the right midway between the lines a, a, c, c; in the ordinary way, instead of being brought downwards as far as the line c, and then turned into the loop of the letter c.

The four remaining letters of the writing alphabet—namely, r, f, k, and g—each exhibit a peculiarity of form that is not to be found in any other letter. The elementary strokes which are combined to form the letter r are shown in Copy-slip No. 69, and the letter r itself in a complete form in Copy-slip No. 70. An inspection of these elementary strokes will show that the letter r is formed of the top-turn, with the addition of a fine hair-stroke brought upwards along the right-hand side of the thick down-stroke of the top-turn as far as the line c, when it is carried out to the right, in a graceful curve, as far as the line a, a. The pen is then brought downwards, and the letter is terminated by a curved or hooked stroke, resembling in a great measure a small bottom-turn. When the letter r is followed by e, the finishing turn, as in the case of the final curve terminating the letters v, w, and b, is made larger in order to carry it into the fine up-stroke commencing at e, which forms the loop of the letter c.

An example of the letter r, in conjunction with letters preceding and following it, will be found in Copy-slip No. 71, in the word roller. The elementary looped stroke, turned at the top, which generally forms the upper part of the letter r, is given in Copy-slip No. 72. It resembles the loop-stroke, turned at the bottom, which enters into the composition of the letters j, g, and y, in a reversed position.
LESSONS IN GERMAN.—XVIII.

SECTION XXXII.—PECULIARITIES IN VERBS, ETC.

1. The infinitive of the active voice, in certain phrases, is, especially after the verb sein, often employed in a passive signification, as: “Gr ist es mein, he is to be honoured.” Gr ist es sein, he is to be praised. 4. Sind ihn rufen, let him be called. This use of the infinitive prevails to some extent in English. Thus we may translate literally the following examples:—Hier heute ich zu verüben; this house is to let. Diefer Sache ich zu taten, this boy is to blame.

2. The sign signifies “to name, to call;” also, sometimes, “to command.” In the sense of naming or calling, it is most generally used in a passive signification, as: “Sie sagen, how are you called?” or, what is your name? Se die Nacht, I am called Ralph, or, my name is Ralph.

VOCABULARY.

Se in name (R. 2), quickly, rapidly.
Verstellen, to restore, re-establish.
Singen, (m.) the heavens.
Sagen, (m.) James.
Selbst, or je-ther, the (Sect. XXX.
Funfert, (m. work of art.
Menge, f. pains, toil.
Durch, (m.) without.

Résumé of Examples.

Gin besten Gewissen ist nicht zu be. An evil conscience is not to be ignored.
Gin Kinder ist fecher zu über. A learned man is easier to convince, than a stupid (one).
Weisheit ist nicht wie eine Saare. Wisdom is not to be bought.
Die Reicht ist die Königin. The rose is called the queen of flowers.
Der Vater leit vor König. The lion is called the king of the beasts.

EXERCISE 60.

1. Diese großen, schönen Blumen sind alle zu vertrieben.
2. Das eine Haus ist zu vermeiden.
3. Es ist nicht zu glauben, dass er uns verführt hat.
5. Ein einiger Eten wird am ganzen Munde nach den Mengen zu fragen.
9. Das Feuer brannte so schnell, das nichts im Schaffen zu retten war.
10. Niemand Verbotenes ist ohne Wche zu gewinnen.
11. Dieser schöne Gegen ist nicht zu erfühlen.
12. Diefes alte Haus ist nicht mehr zu bewohnen.
14. Er ist wert, zu überzeugen, und zu überreden.
15. Ein Betragen ist gar nicht zu vergessen.

EXERCISE 61.

1. The pronunciation of foreign words is only to be acquired through practice.
2. Nothing is to be learned without pains.
3. Perfect felicity is not to be found in this world.
4. You speak so quick, that you are not to be understood.
5. Health is not to be bought with money.
6. The peace of the town was not to be restored through severe orders.
7. How do you call these flowers? 8. They are called tulips.
9. The intelligent scholars are to be praised. 10. The difference between to buy and to sell, is this time, to know the time.
11. This book is to be had of the bookseller C. in London.
12. A valuable work of art cannot be made without much toil.
13. The rose and the violet are valued for their perfume, the tulip for the brilliancy of its colours.
14. James is going to

Brunswick to-morrow. 15. The heavens declare the glory of God.

VOCABULARY.

Wenn, about, around.
Wie, to depart.
Sagen, (m.) the instruction on the piano.
Gärten, (m.) gardener.

EXERCISE 62.


EXERCISE 63.

1. He was beginning to tell us what he had written, but he was interrupted by the arrival of a stranger. 2. When did your sister start for France? 3. She left the day before yesterday.
4. Has she taken little Mary with her? 5. It will be very difficult to make his conduct agree with the principles that he professes.
6. You, who have forsaken your friends, are entitled to no confidence.
7. Good women are the most charming class of society; they comfort us, raise our minds, constitute our happiness, and have no vices but those which we communicate to them.

SECTION XXXIV.—PECULIARITIES IN VERBS, ETC.—(continued).
PLUPERFECT.
Ich war genervt. I had become: wir waren genervt, I had become.
Du warst genervt, thou hadst ifr waren genervt, you had become.
Er war genervt, he had been. We waren genervt, they had become.

FIRST FUTURE.
Ich werde werden. I shall become. wir werden werden, we shall become.
Du wirst werden, thou wilt become. Ihr werdet werden, you will become.
Er wird werden, he will become. Sie werden werden, they will become.

SECOND FUTURE.
Ich werde sein. I shall be. ich werden sein, we shall be.
Du wirst sein, thou wilt be. Ihr werdet sein, you will be.
Er wird sein, he will be. Sie werden sein, they will be.

IMPERSERV.
Werde zu, become thou; werde ist, become you.
Werde er, let him become. werde ist, let him become.

3. Often, when repeated or customary action is implied, the genitive of a noun is made to supply the place of an adverb, as: — Der Vergang's fehlst, der Mittags lief, und des Abends spät er, he sleeps in the morning, reads at noon, and plays in the evening. (§ 101.)

4. Als (as), after (vom), to (zu), etc., is frequently omitted, but must be supplied in translating, as: — Se viel ich, so far as I know. So gut ich kann, as well as I can. Schön er, as soon as he comes, etc. For other uses of als, see Sect. LX.

VOCABULARY.

RéSUMÉ OF EXAMPLES.
Seibst er das habe, danke er auf. As soon (as) he heard that, he stood up (got up).
Se viel ich weiß, ist es er furchtbarem Mann. As much (as) I know (so far as I know), he is an honorable man.
Seebt die Nachricht von dem Ver- rat der Gere's eintracht gibt der Mut, der langsam. As soon as the report of the treachery of Görgey arrived, the courage of the Hungarians sank.


EXERCISE 65.
1. The present (Gegenwart) we know, the future [Zukunft] we know not of, and honour to that man who can quietly await [twieg geniert] the future. 2. Became your sister suddenly ill? 3. No, she felt a violent head ache eight days previously. 4. Do you intend to become, and the group. The second, one, becomes. 5. Most people become ill through neglect [sinn Herausgabe]. 6. Many a man [Mann] has become quite another man, after he has received a more careful education. 8. Most people become slaves of wealth instead of masters of it. 9. As soon as it becomes spring, the whole of nature revives again [twieg sich wieder].

OUR HOLIDAY.

GYMNASTICS.—VI.

The construction we have next to notice among the appliances of the Gymnastics is that known as THE VAULTING HORSE.

This consists in a fignture made of wood, something in the form of the body of a horse, and the character of which will be seen by our illustration (Fig. 19). It is desirable that the block which forms the body of the horse should be covered with leather and well padded, and this is not indispensable. The legs, which must be very firmly fixed in the ground, should be so contrived as to be capable of elevating or lowering the body of the horse at pleasure, and the pommels also should be movable, so as to be adjusted at the most convenient distances for the performance of the different exercises.

In some gymnasias a more simple kind of construction, named a Vaulting Buck, is employed for the use of learners in the preliminary exercises among the Vaulting Horse series. The buck is a solid block, in form an oblong square, and supported either on four legs, or on one stout one, so fixed in the centre that the body of the buck revolves upon it. But as the first few of the exercises we have now to mention closely resemble those which are performed on the vaulting buck, we need not here make more than a passing allusion to the latter.

The body of the vaulting horse is divided into three portions, the neck, the saddle, and the pommel. The saddle is, of course, the space between the two pommels; the neck, the narrower portion in advance of the pommels; and the group, behind them. Near side is the side on your left hand, looking towards the neck from behind; and off side, the side on your right.

1. The first position for the learner to practise is that rest (Fig. 20). You must sit into this position from the ground, either with or without a running. Placing the hands on the pommels of the horse you spring lightly until the thighs rest on the body of the horse, as in the illustration. Then descend to the ground, and, without leaving your hold of the pommels, spring up again and again several times in succession.

2. Still in the position of the rest, practice the free movement of the legs: first one and then the other, sideways as far as you can extend them. Afterwards move both together in the same way. The object of this exercise is to prepare the learner to mount the horse in a free and easy manner.

3. The saddle mount is performed in the following manner: Go into the rest on the near side, then throw the right leg upward, and let it pass over the crown; remove the right hand at the same time, and place it either upon the saddle or upon the front pommel, when you can come down easily astride the horse. This position is said to be crossovers to the horse, and you are sideways when in the rest.

4. For the crown mount, you raise both legs upward from the
rest, and, opening them when they are above the croup, you come lightly down into the seat.

5. In the neck motion you start as with the saddle mount, but throw the right leg over both croup and saddle, removing both hands as the leg passes.

6. In dismounting from the saddle seat, the right hand rests upon the pommel in front of you, and the left is placed upon the saddle; you then throw the left leg backward over the croup, and, at the same time, grasp the back pommel with the left hand. This brings you back to the position of the rest, but on the off-side of the horse, and you then spring lightly to the ground. In dismounting from the croup, you throw up both legs backwards, and come to the ground on the off-side, without an intermediate position. From the neck you dismount as from the saddle, by swinging the left leg backwards, or you may occasionally descend to the ground by the direct leap forward.

There are various other ways of mounting and dismounting, more or less fantastic in their nature, but it would require too much space, and serve no practical purpose, to describe them here.

7. In descending from the horse, both in the exercises just described and in the more advanced of the series, the backward swing off may be performed with advantage, as follows:—When the position of the rest is reached, grasp the pommels firmly, throw up the legs backwards, and, at the same time, loosen off lightly with the hands, you descend to the ground some distance from the horse. In descending in this manner, you may also either turn to the right or to the left before coming to the ground, or completely round, so that the back is towards the horse when the feet touch the earth.

8. Balancing upon the horse is performed in a variety of ways, but in these exercises the legs must not touch the horse. One form of balancing is shown in Fig. 21. In executing this balance you start from the croup seat, and throw your legs gradually behind you, leaning well forward upon the hands at the same time, the weight of the body resting upon them. In this way you raise the legs to the position shown in the illustration, and, as you become more expert and confident, you may continue the upward movement until you stand upon the hands. But when attempting to perform this feat, it is necessary for some one to be close by the gymnast to render assistance in case it is required.

9. The same kind of movement may be performed from the position already described as the rest (Fig. 20), but in this case the legs, even from the moment of starting, may be kept entirely clear of the horse. Grasping both pommels firmly, gradually raise the legs from the ground until the knees pass between the arms, but without touching the saddle. Then you may continue the movement until the legs are thrust entirely through the arms, and extended straight before you, when you are, as it were, in a sitting position, but resting entirely upon the hands. This is a capital exercise, and, with a little care, may be performed in perfect safety. When weary of the position, spring forward to the ground, descending on the other side of the horse, but without allowing any portion of the body to touch it in passing. Remember here the rule already given in our paper on leaping exercises to alight on the balls of the feet, bending the knees slightly as you touch the earth, and you thus come down without a violent shock.

10. Starting from the saddle seat, grasp the forward pommel, and then, keeping the legs just clear of the horse, raise the back until it forms almost a straight line with the head, the legs extending straight downwards on either side. After you can do this with ease, you may bring the head downward until it touches the horse, and stand on your head, the hands of course, grasping the pommel; but here, again, it is necessary to have one or two persons by to assist you in case of a slip.

11. The balancing movement will assist you in changing readily from one seat to another. Thus, from the croup seat you raise the body as in Fig. 21, the legs being close together; you then throw the legs downward and forward along the side of the horse, and, when level with the saddle seat, pass one leg over; then removing the hands to the front pommel, the change of seat is complete. The change from the saddle to the neck may be made in the same manner.

12. In changing from the croup to the neck without the intermediate seat, you first grasp one pommel in each hand, then raise the legs (Fig. 21), and swing them forward as before, but as you pass one leg over, the neck you face about, and come into the seat with the forward pommel in front of you. These exercises may be done on both the near and off-sides of the horse in turn.

13. Sit on one side of the croup, and grasp one pommel in each hand, then raise the body and pass it completely over and round the horse until you reach the neck seat, and descend into it, facing about as before. In this exercise the body describes a complete semicircle, the weight resting upon the hands.

14. There are various ways of vaulting over the horse, one of which is shown in Fig. 22. Grasp both pommels before taking the spring, but relinquish the hold of one hand as the body passes over. A run of a few paces will give an additional impetus for the spring, but the movement should also be practised from the standing position.

15. Vault straight over the horse, after a short run, by placing the hands upon the pommels and springing upward, the legs passing between the arms, and the knees being raised towards the chest as you pass over. This exercise may afterwards be done with the knees lowered and the legs bent straight behind in taking the jump, which will give variety to the movement. But these vaults should be practised only by an expert gymnast.

Other vaults are taught in our gymnasia, some of a much more difficult and daring character. Among these may be mentioned the leap over the horse without touching it with any part of the person, technically known as the free leap. It is usual to prepare for this exercise by vaulting from the ground on to the saddle, resting one foot thereon; and after the gymnast can accomplish this, he is allowed to attempt the free leap. There is a still more hazardous feat, known as the tiger leap, which is performed by springing from the ground with the head thrust forward and the arms extended, and so clearing the horse something in the manner in which a cat would perform the movement—whence its name. Again, somersaults over the horse are practised occasionally, generally starting from the position of the rest; but we cannot commend any of these performances to the emulation of our readers. In the gymnasia in which they may occasionally be seen, only advanced gymnasts are allowed to attempt them, nor is even the expert performer left without the aid of one or more attendants, who stand by in readiness to give any assistance that may be required. Even in the simpler performances upon the horse caution is requisite, as in many other gymnastic exercises.
LESSONS IN BOTANY.—X.

SECTION XX.—FURTHER CLASSIFICATION OF VEGETABLES.

All the general principles we have discussed and taken advantage of hitherto have merely furnished us with the means of dividing vegetables into three sections; the question, therefore, presents itself, how we are to continue the division, how we are to arrange the classification of the hundreds of thousands of plants which exist? Various methods have been at different times proposed for accomplishing this. We shall not mention them in order of their organisation, nor shall we fully describe them, such not being the object with which these papers are written. We shall mention the general principles involved in effecting some of these classifications, and shall point out in what respects certain classifications are better than others.

Of all the different schemes of classification which have ever been proposed or carried into execution, that of the celebrated Swede, Linnaeus, undoubtedly attained to the greatest popularity. Indeed, so firm is the hold which it took of popular appreciation that no inconsiderable number of those who even now study Botany fancy they have nothing more to learn than the number of plants and stamens which are contained in different flowers, totally unconscious of all natural alliances. Suppose that some eccentric ethnologist should adopt the grotesque idea of classifying human races according to the number of wives the individuals of each race were in the habit of marrying. Suppose that in reference to this master-idea the ethnologist should arrive at the conclusion that as much as Mussulman Turks, and Mussulman negroes, and Mussulman Kalmuce, and Malays, all marry a great many wives, that for this reason Turks, and negroes, and Kalmuce, and Malays, must all belong to the same race of men. Would not such a classification awaken a smile at its grotesque whimsicality? and would it not be considered an eminently false classification, not to say absurd?

Yet this is almost a parallel arrangement to that of Linnaeus, who effected his celebrated artificial division of plants according to the number and position of the male and female parts (stamens and pistils) of flowers.

Nevertheless, the artificial classification of Linnaeus has acquired a celebrity so great, and is so interwoven with popular botanical ideas, that it cannot be dismissed with the casual notice we have already afforded it. Let us, therefore, proceed to examine the general principles on which it is based.

In the first place, Linnaeus divided plants into cryptogamous and flowering, as we have done. The department of cryptogamie botany was, however, very imperfectly known to Linnaeus; it was to the classification of flowering plants that his chief efforts were directed, and it is his mode of effecting this that we have to examine. Linnaeus arranged all flowering plants under twenty-three classes, founded on the number and arrangement of the male parts (stamens) of the flower.

The names of his twenty-four classes, including cryptogamic plants as the twenty-fourth, are as follows:—


In the annexed illustration, a representation is given of the edible rhizome, leaves, and flower of the Iris florentina, or White Iris, a beautiful species of the family Iridaceae, and a native of Southern Europe. It flowers in May. According to the division adopted by Linnaeus, this plant belongs to the family Iridaceae (having one pistil), of the third class Triandria (having three stamens).

From an inspection of this arrangement, we observe that up to the eleventh class the number of stamens alone furnishes the distinctive sign, after which other circumstances are taken cognisance of. These circumstances are sufficiently indicated in the list of classes given above; but it is desirable to present the reader with the derivation of the names. It will be remembered that the stamens are the male organs of the flower, and the names given to the first eleven classes are compounded of the Greek words for the numerals, one, two, three, four, five, six, seven, eight, nine, ten, and twelve, and the Greek noun ἀνθρ (an-ther), genitive ἀνθρος (an-thro-)."
connection with each class a corresponding flower, in which the characteristic mark of distinction may be recognised:—

<table>
<thead>
<tr>
<th>Classes</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Centranthus</td>
<td>Monandria</td>
</tr>
<tr>
<td>2. Veronica</td>
<td>Diandria</td>
</tr>
<tr>
<td>3. Iris</td>
<td>Triandria</td>
</tr>
<tr>
<td>4. Plantain</td>
<td>Tetrandria</td>
</tr>
<tr>
<td>5. Pimpernel</td>
<td>Pentandria</td>
</tr>
<tr>
<td>6. Lily</td>
<td>Hexandria</td>
</tr>
<tr>
<td>7. Horse Chestnut</td>
<td>Heptandria</td>
</tr>
<tr>
<td>8. Hollyhock</td>
<td>Octandria</td>
</tr>
<tr>
<td>9. Bay-Laurel</td>
<td>Nonandria</td>
</tr>
<tr>
<td>10. Pink</td>
<td>Monodia</td>
</tr>
<tr>
<td>11. Houseock</td>
<td>Diadephia</td>
</tr>
<tr>
<td>12. Strawberry</td>
<td>Polypetala</td>
</tr>
<tr>
<td>13. Ranunculus</td>
<td>Polyolopha</td>
</tr>
<tr>
<td>14. Foxglove</td>
<td>Polygynia</td>
</tr>
<tr>
<td>15. Wall-flow</td>
<td>Polygynia</td>
</tr>
<tr>
<td>16. Mallow</td>
<td>Polygynia</td>
</tr>
<tr>
<td>17. Pea</td>
<td>Polygynia</td>
</tr>
<tr>
<td>18. St. John's Wort</td>
<td>Polygynia</td>
</tr>
<tr>
<td>19. Blue Corn-Flower</td>
<td>Polygynia</td>
</tr>
<tr>
<td>20. Orehis</td>
<td>Polygynia</td>
</tr>
<tr>
<td>21. Aesculus</td>
<td>Polygynia</td>
</tr>
<tr>
<td>22. Nettles</td>
<td>Polygynia</td>
</tr>
<tr>
<td>23. Pellitory of the wall</td>
<td>Monocotyle</td>
</tr>
</tbody>
</table>

With respect to further divisions of these classes, the first thirteen of them are divided into orders founded on the number of single carpels or styles entering into the composition of the pistil. In the order monogyne the pistil is formed of one carpel, or many carpels united into one single body by their ovaries or their styles; in trigynia there are two distinct ovaries, or styles; in tritygina, three; in tetragynia, four; in pentagynia, five; in hexagynia, six; in polygynia, a number exceeding ten. The fourteenth class includes two orders: gymnospermia, in which the pistil is composed of four achenes, having the appearance of naked seeds; angiospermia, in which the seeds are included in a capsule. The fifteenth class, or teladephia is divided into two orders, stigmatic or stipitatus, according to the fruit happening to be broader, or less long. The sixteenth, seventeenth, eighteenth, twentieth, twenty-first, and twenty-second classes, have their orders established in conformity with the number and the mode of connection of the stamens and the styles (triandria, pentandria, polyantra, monogynia, polypetala, monadelphos, etc.). The fourteenth order is sub-divided into polygynia equata, in which all the flowers of the head contain both stamens and pistils; polygynia superflua, in which the central flowers of the capitalum contain both stamens and pistils, and those of the circumference pistils only; polygynia frustraes, when the flowers of the circumference have neither stamens nor pistils; polygynia necessaria, when all the central flowers contain stamens, and those of the circumference pistils.

The botanist who sets about applying the principles of Linnaeus soon finds that the same class is made to contain plants of different natural families, whilst others having affinities to each other are widely separated.

It would be unjust to the memory of Linnaeus not to say that he recognised the desirability of classifying vegetables according to their natural alliances, if this could be done; but at the time when he lived a sufficient number of facts to admit of this and not be collected. "All plants," remarks Linnæus, in his botanical philosophy, "are allied by affinities, just as territories come in contact with each other on a geographical chart. Botanists should unceasingly endeavour to arrive at a natural order of classification. Such natural order is the final aim of botanical science. The circumstance rendering such a plan defective now is the insufficient knowledge we have of plants, so many species of them being yet undiscovered. When these species are discovered and described, a natural classification will be accomplished, for nature does not proceed abruptly, as it were by leaps."

These sentiments, made known by the great Swede himself, prove to us that he only intended his artificial classification to be a provisional arrangement.

Waiving the question of its intrinsic utility, the artificial system of Linnaeus is not always so easy of application as it might at first glance be thought. The characters of the stamens and the pistils necessary to be made out before the class and order of any particular vegetable can be determined, are not so easily discriminated as might be supposed. Dodecandria, iccoandria, and polyandria, are occasionally very difficult to distinguish one from the other. In didynamia and tetradynamia the stamens are sometimes equal, whilst in other classes, in which they form two series, their inequality is manifest; such is the case in pinks and geraniums. Monadelphos and diadelphos are frequented with continual mistakes; many plants called monadelphos in the system of Linnaeus are really diadelphos, in the system of his contemporaries; when the juncture of the stamens is fancifully celebrated by the sound of a series, they are really monadelphos. Synge Sanctus should as fairly include the cyclamen as the violet. Monocotyle and dioecia furnish many characteristic appearances which are not taken cognisance of; and many other objections might be readily cited.

**READING AND ELOQUENCE.—X.**

**ANALYSIS OF THE VOICE. (continued.)**

**V.—TRUE TIME.**

By true time in elocution is meant an utterance well-proportioned in sound and pause, and neither too fast nor too slow. We should never read so fast as to render our reading indistinct, nor so slow as to impair the vivacity, or prevent the full effect, of what is read.

Everything tender or solemn, plaintive or grave, should be read with great moderation. Everything humorous or sprightly, everything witty or amusing, should be read in a brisk and lively manner; there should be generally equable and moderate; there should be nothing abrupt or precocious; there should be alternately rapid, whereas, dignity, authority, sublimity, reverence, and awe, should, along with deeper tone, assume a slower movement. The movement should, in every instance, be adapted to the sense, and free from all hurry on the one hand, or dragging on the other. The pausing too, should be carefully proportioned to the movement or rate of the voice; and no change of movement from slow to fast, or from the reverse, should take place in any clause, unless a change of emotion is implied in the language of the piece.

The "slowest" and the "quickest" rates of utterance have been exemplified under the head of "versatility" of voice, and need not be repeated here. They occur in the extremes of grave and gay emotion.

There are then important applications of "time" in connection with the "rate" or "movement," which frequently occur in the common forms of reading and speaking. These are the "slow," the "moderate," and the "lively." The first of these, the "slow," is exhibited in the tones of awe, reverence, and solemnity, when these emotions are not so deep as to require the slowest movement of all: the second, the "moderate," belongs to grave and serious expression, when not so deep as to require the "slow" movement; it belongs, also, to all unimpassioned communication, addressed to the understanding more than to the feelings; and it is exemplified in the utterance of moderate, subdued, and chastened emotion: the third rate, the "lively," is perhaps sufficiently indicated by its designation, as characterising all animated, cheerful, and gay expression.

All the exercises on "time" should be repeated till they can be exemplified perfectly and at once. Proceed to practising the following exercises, the student will be aided in forming distinct and well-defined ideas of "time," by turning back to the example under "versatility," marked as "very slow," and repeating it, with close attention to its extreme slowness. He will observe that, in the repeating of this example, the effect of "time," or proportion of movement, is to cause a remarkable lengthening out of the sound of every accented vowel; an extreme slowness of the voice should belong to this rate of treatment, and words: and along with all this, an unusual length in the pauses. It is this adjustment of single and successive sounds and their intermissions, which properly constitutes the office of "time" in elocution; although the term is often indefinitely used rather as synonymous with the word "movement," as applied in music.

The "slow" movement differs from the "slowest," in not possessing the same extreme prolongation of sound in single vowels, or the same length of pause. The slow succession of sound is, however, a common characteristic in both.
Example of "Slow" Movement.
Thou, who didst put to flight
Primal silence, when the morning stars
Exulting shouted o'er the rising ball;
O Thou, whose word from solid darkness struck
That spark, the sun, strike wisdom from my soul!
"Moderate."

There is something nobly simple and pure in a taste for the cultivation of forest trees. It argues, I think, a sweet and generous nature, to have a strong relish for the beauties of vegetation, and a friendship for the hardy and glorious sons of the forest. There is a grandeur of thought connected with this part of rural economy. It is worthy of liberal, and freeborn, and aspiring men. He who plants an oak looks forward to future ages, and plants for posterity. Nothing can be less selfish than this. He cannot expect to sit in its shade, and enjoy its shelter; but he exalts in the idea that the acorn which he has buried in the earth shall grow up into a lofty tree, and shall keep on flourishing, and increasing, and benevolently mankind, long after he shall have ceased to tread his paternal fields.

"Lively."
How does the water come down at Lodore?

Here it comes sparkling,
And there it lies darkling;
Here smoking and frothing,
Its tumult and wrath
In this rapid race
On which it is bent,
It reaches the place
Of its steep descent.
The cataract strong
Then plunges along,
Striking and raging,
As if a war raging,
Its caverns and rocks;
Rising and leaping,
Sinking and creeping,
Swelling and sweeping,
Showering and springing;
Flying and flinging,
Writhing and wriggling,
Eddying and whirling,
Spouting and frisking,
Turning and twisting;
Around and around,
With endless rebound;
Smiling and fighting,
A sight to delight in;
Confounding, confounding.
Dazzling and deafening the ear with its sound.

And so never ending, but always descending,
Soundless its motions for ever and ever are blending,
All at once and all o'er, with a mighty uproar;
And this way the water comes down at Lodore.

VI.—APPROPRIATE PAUSES.

The grammatical punctuation of sentences, by which they are divided into clauses by commas, although sufficiently distinct for the purpose of separating the syntactical portions of the structure, are not adequate to the object of marking all the audible pauses, which sense and feeling require, in reading aloud. Hence we find, that intelligible and impressive reading depends on introducing many short pauses not indicated by commas or other points, but essential to the meaning of phrases and sentences. These shorter pauses are, for the sake of distinction, termed "rhetorical."

Powerful emotion not unfrequently suggests another species of pause, adapted to the utterance of deep feeling. This pause sometimes takes place where there is no grammatical point used, and sometimes is added to give length to a grammatical pause. This pause may be termed the "controversial," or the pause of "effect."

The length of the rhetorical pause depends on the length of the clause, or the significance of the word which follows it. The full "rhetorical pause" is marked thus ||, the "half-rhetorical pause" thus |, and the short "rhetorical pause" thus .

Rules for "Rhetorical" Pauses.
The "rhetorical" pause takes place, as follows:—
1. Before a verb when the nominative is long, or when it is emphatic:
   Life || is short, and art | is long.
2. Before and after an intervening phrase:—
   Talents | without application | are no security for progress in learning.
3. Wherever transposition of phrases may take place:—
   Through dangers the most appalling || be advanced with heroic intrepidity.
4. Before an adjectival following its noun:—
   Here was a soul || exults with every noble quality.
5. Before relative pronouns, prepositions, conjunctions, or adverbs used conjunctively, when followed by a clause depending on them:—
   A physician was called in || who prescribed appropriate remedies.
   The traveller began his journey || in the highest spirits || and with the most delightful anticipations.
6. Where ellipsis, or omission of words, takes place:—
   To your elders manifest becoming deference, to your companions | frankness, to your juniors | condensation.
7. Before a verb in the infinitive mood, governed by another verb:—
   The general now commanded his reserve force || to advance to the aid of the main body.

Exercise on "Rhetorical" Pauses.

Industry || is the guardian || of innocence.
   Honour || is the subject || of my story.
   The prodigal || lose many opportunities || for doing good.
   Prosperity || gains friends, adversity || tries them.
   Time || once passed || never returns.
   He || that has no rule || over his own spirit, is like a city || that is broken down, and without walls.
   Better || is a dinner of herbs || where love || is, than a stalled ox || and broken corn.
   The veil || which covers || from our sight || the events || of succeeding years, is a veil || woven by the hand of Mercy.
   Blessed || are the poor in spirit.
   Silver || and gold || have I none.
   Mirth || I consider || as an act, cheerfulness || as a habit || of the mind. Mirth || is short || and transient, cheerfulness || fixed || and permanent. Mirth || is like a flash of lightning, that glitters || for a moment: cheerfulness || keeps up a kind of daylight || in the mind.
   Some || place the bliss || in action, some || in ease;
   Those || call it pleasure, and contentment || these.

The habitual tendency of young readers being to hurry, in reading, their pauses are liable to become too short for distinctness, or to be entirely omitted. In most of the above examples, the precision, beauty, and force of the sentiment, depend much on the careful observance of the rhetorical pauses. The student may obtain an idea of their effect, by reading each sentence first, without the rhetorical pauses—secondly, with the pausing as marked.

Rule on the "Oratorical" Pause.
The "oratorical" pause is introduced into those passages which express the deepest and most solemn emotions, such as naturally arrest and overpower, rather than inspire utterance.

Examples.

The sentence was—death! There is one sure refuge for the oppressed, one sure resting-place for the weary—THE GRATE.

It was the design of Providence, that the infant mind || should possess the germ || of every science. If it were not so, the sciences could hardly be learnt. The care of God || provides || for the flower of the field || a place || where it may grow, regale the sense || with its fragrance, and delight the soul || with its beauty. Is his providence || less active || over those, to whom this flower offers its inaccess—is—No. The soil || which produces the vine || in its most healthy luxuriance, is not better adapted to that end, than the world we inhabit, to draw forth the latent energies of the soul, and fill them || with life || and vigour. As well || might the eye || see || without light, or the ear || hear || without sound, as the human mind || be healthy || and athletic || with-

Is there aught in Eloquence || which warms the heart? She draws her fire || from natural imagery. Is there aught in Poetry || to enliven the imagination? There || is the secret || of all her power. Is there aught in Science || to add strength || and dignity || to the human mind? The natural world || is only the body, of which || one || is the soul. In books, Science || is presented to the eye of the pupil, as if were, in a dried || and preserved || state. The time may come, when the is-
The Popular Educator.

**LESSONS IN GEOMETRY.—X.**

In our last lesson we considered the various series of data necessary for the construction of an isosceles triangle; we will now do the same for any kind of scalene triangle, or triangle of which all three sides are unequal.

A scalene triangle, as it has been stated, may be an acute-angled, an obtuse-angled, or a right-angled triangle. To determine any scalene triangle, it is plain that we must have one of the following series of data.

I. With regard to the sides without the angles:
   1. The length of each of the three unequal sides.
   2. The length of two sides and the altitude of the triangle.

II. With regard to the angles without the sides:
   3. Any two of the angles of the triangle.

III. With regard to the sides and angles combined:
   4. The length of any two of the sides of the triangle and one of its angles.
   5. The length of one side of the triangle and two of its angles.
   6. The length of one side of the triangle, its altitude, and one of its angles adjacent to the given side.

As in the construction of the isosceles triangle, the first case is met by Problem VIII. (pago 191), but the second brings us to

**Problem XXIV.—To draw a triangle of which the length of two of its sides and the altitude are given.**

Let $\mathcal{A}$ and $\mathcal{B}$ (Fig. 32) represent the length of two of the sides of the triangle required, and $c$ its altitude. In any straight line, $DE$, of indefinite length, set off $FG$ equal to $B$, and by Problem X. (pago 192), draw the indefinite straight line, $H$, parallel to $DE$, at a distance from it equal to $c$, the altitude of the required triangle. Then from $F$ as centre, with a radius equal to $A$, draw an arc cutting $H$ in the point $L$. Join $LF$, $LG$; the triangle $LFG$ is a triangle answering the requirements of the data, for its sides, $LF$, $FG$, are equal to $A$ and $B$ respectively, and its altitude shown by the dotted line $LN$ is equal to the given straight line $c$. The triangle $MFG$, drawn in the same way, is also a triangle which meets the requirements of the data, for its sides, $MO$, $OF$, are equal to $A$ and $B$ respectively, and its altitude, shown by the dotted line $MO$, is equal to $c$.

The triangles $\mathcal{A}$, $\mathcal{B}$, $\mathcal{A}B$, $\mathcal{A}B$, $MO$, $OF$, are equal to each other in every respect, namely, the lengths of the sides, their altitude, and their superficial area. They are upon the same base, $FG$, and between the same parallels, $DE$, $HK$, and they are what we may term symmetrical triangles. From this we learn that symmetrical triangles on the same base and between the same parallels are equal to one another; and this is true, not for symmetrical triangles only, but for any triangles, whether symmetrical or not, that are upon the same base and between the same parallels.

Thus, the triangles $LFG$, $MFG$ are each of them equal to the triangle $FFG$, which is on the same base, $FG$, and between the same parallels, $DE$, $HK$, and each of them would be equal to any triangle that may be formed by drawing lines from the points $F$ and $G$ to any point in the straight line $HK$, produced both ways indefinitely.

Triangles also which stand upon equal bases and between the same parallels are equal to one another. Thus, the triangles $LNO$, $MPO$, which stand on equal bases, $XO$, $YO$, and between the same parallels, $DE$, $HK$, are equal to one another, as are also the triangles $LNK$, $MOG$, which are between the same parallels and stand on equal bases $NX$, $OG$. And this is also true of unsymmetrical triangles as of symmetrical triangles, for if we join the dotted line $NF$, the triangles $LNF$, $MNF$, are equal to one another, because they are on the same base, $NF$, and between the same parallels; and since the triangle $NMF$ is equal to the triangle $NBK$, it must also be equal to the triangle $PNE$.

In Case 3, when two of the angles of the required triangle are given, it is manifestly necessary only to make at two points in the same straight line, and on the same side of it, two angles equal to the given angles, each having its opening turned towards the apex of the other, and then, if necessary in order to complete the triangle, to produce the sides of the angles that are prolonged to the side that is common to both. The student must notice that when two angles of a required triangle are given without any special requirement as to their relative position, an endless number of pairs of symmetrical triangles may be drawn, similar in form but of different superficial areas, all satisfying the general requirements set forth in the data.

Thus, in Fig. 33, if $A$ and $B$ represent the given angles of the triangle required, it is plain that to make a triangle having two angles equal to the given angles $A$ and $B$, we have only to make at any point, $C$, in a straight line, $XY$, of indefinite length, the angle $YCE$ equal to $A$, and at another point, $D$, in the same straight line, the angle $XDE$ equal to $B$, each having its opening opposite or turned towards the apex of the other. As, in this figure, the opening of the angle at $C$ is opposite the apex $D$ of the angle at $B$, and in the case of the triangles $ABC$, $DEF$, the angles at $C$ and $D$ are inclined to the common side, $CD$, until they meet. If we reverse the position of the angles, making the angle at $C$ equal to the angle at $B$, and the angle at $D$ equal to the angle at $A$, the triangle assumes the form shown by the triangle $FCD$ in the figure. The triangles $\mathcal{ECD}$, $\mathcal{FCD}$, are symmetrical and equal in every respect. The triangles $\mathcal{A}$, $\mathcal{B}$, $\mathcal{A}$, $\mathcal{B}$, shown by dotted lines, are also equal and symmetrical in every respect, and satisfy the general conditions of the data, although their superficial area is greater than the area of the triangles $\mathcal{ECD}$, $\mathcal{FCD}$, because the points $C$ and $H$, at which the angles necessary for the construction of the triangle required are made equal to $A$ and $B$, are taken on the indefinite straight line, $XY$, at a greater distance apart than $C$ and $D$.

**Problem XXV.—To draw a triangle of which two sides and one of the angles are given.**

First, let the given angle be included between the given sides, and let the straight line $BC$ represent the length of the given sides of the triangle required, and $A$ the given angle included between them (Fig. 34). Draw any straight line, $XY$, of indefinite length, and at any point, $D$, in $XY$, make the angle $YDB$ equal to the given angle $A$. Along $DY$ set off $DF$, equal to $c$,
and along \( DE \) set off \( DQ \), equal to \( b \). Join \( OF \); the triangle \( ODF \) answers the requirements set forth in the data, as does also the triangle \( KDH \), obtained by setting off \( DH \) along \( DY \), equal to \( b \), and \( DK \) along \( DE \) equal to \( c \).

The triangles \( ODF \) and \( KDH \) are symmetrical and equal in every respect; but if the position of the given angle had been required to be opposite to one of the given sides, instead of being included between them, a very different result would have been obtained.

We will suppose, firstly, that it is required to place the angle opposite the shorter of the two given sides. At the point \( L \) in the straight line of indefinite length, \( x, y \), make the angle \( xLM \) equal to the given angle \( A \), and as this angle is to be opposite to the shorter side, set off along \( LX \) the straight line \( LN \), equal to \( c \); and from \( N \) as centre, with a radius equal to \( b \), describe an arc meeting the straight line \( LX \) in \( E \). By joining \( EN \), we get a triangle \( ENL \), that satisfies the requirements of the data, the sides \( LE, NQ \) being equal to \( b \) and \( c \) respectively, and the angle \( LEQ \), which is equal to the angle \( A \), opposite to the longer side \( EQ \).

The learner may make an endless variety of practical exercises on this problem, by varying the length of the given sides and the opening of the given angle. Practice of this kind will be found to ensure neatness and accuracy in geometrical or mechanical drawing, and will tend to render the draughtsman skilful in the use of his compasses and parallel ruler.

**Problem XXVI.**—To draw a triangle of which one side and two of the angles are given.

Let \( A \) represent the length of the given side of the required triangle, and \( B \) and \( C \) the given angles, and first let both of the given angles be adjacent to the given side, or in other words, let them be at its opposite extremities, on the same side of it.

Draw any straight line, \( x, y \), of indefinite length, and in it take \( DE \) equal to \( A \). At the point \( D \) make the angle \( DFE \) equal to \( C \). Let the sides \( DF, EF \) meet in the point \( F \); the triangle \( DEF \) satisfies the requirements of the data; as also will the triangle \( ODE \), constructed by making the angle \( ODE \) equal to \( C \), and the angle \( OED \) equal to \( B \).

Next, let one of the given angles be opposite to the given side, as, for example, when the angle equal to the larger angle \( b \) is required to be in this position. Take \( HK \), in the straight line of indefinite length, \( x, y \), and at the point \( H \) make the angle \( KHL \) equal to the angle \( C \). Through \( K \) draw \( KM \) parallel to \( HL \), and at the point \( K \) in the straight line \( HK \) make the angle \( MKN \) equal to the angle \( B \), and let the straight line \( KN \) meet the straight line \( HL \) in \( N \). The triangle \( KNK \) has the angle \( KHN \) equal to \( C \), and the angle \( HKN \) equal to \( B \) (for it is equal to its alternate angle \( NKM \), which was made equal to \( B \)), and the larger angle \( HNK \) is opposite to the side \( HK \), which is equal to \( A \). If it be required to have the smaller angle opposite to the given side, the angle \( KHO \) must be made equal to the larger angle \( B \), and the same method of construction followed as indicated by the dotted lines in the figure.

**Problem XXVII.**—To draw a triangle of which one side, its altitude, and one of its angles adjacent to the given side, are given.

Let \( A \) represent the length of the given side of the required triangle, \( B \) its altitude, and \( C \) the given angle. Draw any straight line, \( x, y \), of indefinite length, and, by Problem X. (page 152), draw the straight line \( DE \), also of indefinite length, parallel to it, at a distance from it equal to \( B \). Set off \( PQ \) in \( XY \) equal to \( A \), and at the point \( F \) in the straight line \( OF \) make the angle \( OFH \) equal to the given angle \( C \). Let \( FH \) meet \( DE \) in \( H \). Join \( OH \). The triangle \( OPQ \) answers the requirements of the data, for it has a side \( PQ \) equal to \( A \), an angle \( OFH \) equal to \( C \), and it is of the altitude \( BK \), which is equal to the given altitude \( B \). A triangle equal to the triangle \( OPQ \) in every respect, and symmetrical with it, may be obtained by making an angle at \( O \), in the straight line \( PQ \), equal to \( C \), and following the same process of construction.

If the given angle be an obtuse angle, as \( C \), the line which represents the altitude of the triangle required will fall on a point in \( XY \) without the line which is set off upon it equal to the given side. If it be an acute angle, as \( C \), the line representing the altitude of the triangle may fall between the extremities of the line set off equal to the given side, as \( NC \) in the triangle \( NLM \), which is drawn having the side \( LM \) equal to \( A \), and the angle \( MLN \) equal to the given angle \( C \); but whether this be the case or not depends entirely on the size of the angle and the relative proportions of the altitude and given side.

In the construction of right-angled triangles, as one angle is always necessarily known, less data are required than in the construction of obtuse-angled and acute-angled triangles; thus any right-angled triangle may be constructed if we know—

1. The length of either of the sides containing the right angle (as \( AB \) and \( AC \) in Fig. 37).
2. The length of either of the sides containing the right angle, and the side which subtends the right angle (as \( AB \) and \( AC \), or \( AC \) and \( BC \), in Fig. 37).*
3. The side which subtends the right angle, and the perpendicular let fall on it from the right angle (as \( AD \) and \( BC \) in Fig. 37).

Thus, if the sides that contain the right angle be equal to \( F \) and \( x \), draw \( AF \) at right angles to each other \( AB \) and \( AC \), and make \( AB \) equal to \( F \), and \( AC \) equal to \( x \), and join \( BC : AB \) will be the triangle required.

Again, if one of the sides containing the right angle be given equal to \( F \), and the side that subtends the right angle equal to \( x \), draw \( BC \) equal to \( x \), bisect it in \( E \), and from \( E \) as centre, with the distance \( EB \) or \( EC \), describe the semicircle \( BAC \). Then from \( E \) as centre, with a radius equal to \( F \), draw an arc cutting the semicircle \( BAC \) in \( A \). Join \( AB, AC \); the triangle \( ABC \) will be the triangle required.

If the side which subtends the right angle be given equal to \( s \), and the perpendicular let fall on it from the right angle equal to \( q \), draw \( BC \) equal to \( s \), bisect it in \( E \), and draw the semicircle \( BAC \) as before; through \( E \), draw \( EF \) perpendicular to \( BC \), and along it set off \( EG \) equal to \( q \). Through \( O \) draw \( OA \) parallel to \( BC \), cutting the circumference \( a, \) and from \( A \) draw \( AB, AC \), to the points \( B \) and \( C \). The altitude, \( AD \), of the triangle \( ABC \) is equal to \( q \).
LESSONS IN GERMAN.—XIX.

SECTION XXXV.—PEculiarities in Verbs, etc.—
(continued).

For “any” and “some,” as generally used before a noun, the
German has no corresponding word, as:—Sagen Sie Brot? have
you some bread? Sagen Sie Brot? have you any silk? Ich habe
Brot. I have some books.

1. The indefinite adjective pronoun “some” is expressed in
German by weicher, weite, weichet, as:—Sagen Sie Brote? Ich habe
weichet; I have some one.

For the genitive of weichet—which, however, is usually left out—we employ the personal pronoun preceded by “of,” as:—Sagen Sie viel Brote? have you much water? Ich habe viel, I have much of it (literally, I have of it much).

From these examples it will be seen that the partitive word
in German is placed after the pronoun, while in English it is
placed before it. In this use it is declined like the relative weiche.

DECLENSION OF WEICHER AS A PARTITIVE.

Singular.

Masculine. Feminine. Neuter.

A. Weicher, weichet, weichet; weichet, weichet, weichet, weichet.

O. Der, der, der, der, der, der.

D. M. Weichet, weichet, weichet, weichet, weichet.

A. Weichet, weichet, weichet, weichet, weichet.

2. Genus, like “enough,” is indeclinable, and generally follows
its noun, or stands independently. Siet and weichet are frequently
used without declension. (§53.)

3. Dat. as also rief (ief being a contraction of the neuter rief) is
frequently used in referring to nouns of both numbers and all
genders, as:—Ber if l[s]t, and for that? Siet if mein Brot. This is my bread.
Dat and rief, however, never precede and qualify a noun, except
of the neuter gender. (§134. 1.)

4. Diet, like its English equivalent, may refer to nouns of both
numbers and all genders, as:—G es if mein Brot, it is my bread.
When diet refers to a noun in the plural, the verb must agree in
number with the noun, while in English it agrees with the
pronoun, as:—G es fand die Brote, die leugen Semmern haben, it is
(German finds) the liars who have overpowered (conquered)
Hungary. (§57. 8.)

5. Diet sometimes answers to our word “so” or “one,” as:—
Er if gedei, er is ein Stift zu sein, he is healthy, or appears to
be so. Diet if Stift, aber er if ein Stift, neither I am a soldier, but I am
not one. Diet is likewise rendered by “there” (§104. XXXVI.), as:—G es
fand in alter Zeit ein Stift so wie eine Stadt. We also use Diet in
certain times, a castle so high and lofty.
Diet war ein Riese in Lateinisch, there was a king in Thilio.

(§57. 8.)

6. Diet is often so used as to have no equivalent in English, as:—G es fand in alter Zeit ein Stift wie eine Stadt von fünfzig Erzhalter (Stifter), men talk and dream much of better futures, Diet wie es, das er sei war, I know it, that he was there. Diet leiten die Stadtkinder, (long) live the champions of liberty. Diet leiten die Stadt, (long) live the republic.

VOCABULARY.

Art. m. physician. Arzt, m. doctor. Arzthre, m. pharmacy.


Clause, m. grief, affliction, sorrow. Traur, m. grief, sadness.

Feld, m. field. Feldl, m. farmer. Feldf, m. field worker.

Stadt, m. town. Stadt, m. city. Stadt, m. village.

Stern, m. anxiety. Stern, m. star. Stern, m. distress.

Résumé of Examples.

Hier sitzt ein Arzt aus meinem Gebiete.

Wellen Stift oder Stift haben ge®

Sagen Sie ein schönes Brot?

Sagen Sie ein schönes Löffel?

Set der Brot genug, oder hat er
eine Tasse?

Hat der Brot genug, oder hat er
eine Tasse?

Hat er Brot genug, oder hat er
eine Tasse?

Sagen Sie aus schönes Löffel?

Hat er Brot genug, oder hat er
eine Tasse?

Hat er Brot genug, oder hat er
eine Tasse?

Hat er Brot genug, oder hat er
eine Tasse?

Sagen Sie aus schönes Löffel?

Hat er Brot genug, oder hat er
eine Tasse?

Hat er Brot genug, oder hat er
eine Tasse?

Hat er Brot genug, or hat er
eine Tasse?

Hat er Brot genug, or hat er
eine Tasse?

Hat er Brot genug, or hat er
eine Tasse?

Hat er Brot genug, or hat er
eine Tasse?

Hat er Brot genug, or has he
eaten?

Has he money enough, or has he
money?

Has he money enough, or has he
money?

Has he money enough, or has he
money?

Has he money enough, or has he
money?

Has he money enough, or has he
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Has he money enough, or has he
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Has he money enough, or has he
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Has he money enough, or has he
money?

Has he money enough, or has he
money?

Has he money enough, or has he
money?

Has he money enough, or has he
money?
There was once a sage who maintained that there was no better possession than a sound understanding in a sound body.

Some maintain that there are no Mortals more unfortunate than he (that one) who never endured reverses of fortune.

There is no mortal more unfortunate than he (that one) who never endured reverses of fortune.

There was a cry in Christendom that the heathen had entered in and had despoiled His holy places. Stories the most pitiable were told of what the infidels had done to those who went up to Jerusalem to worship; how, that none more the wicked had given the dead bodies of God's servants to be meat for the fowls of the air, and the flesh of His saints to the beasts of the land. A thrill of horror went through men as they listened to the accounts, most likely exaggerated, which were repeated from mouth to mouth, and the sensation was perhaps the heart of Europe.
a dungeon, in order that he might be induced to procure the large ransom demanded of him. These and other tales came to Europe of the wayworn and pitiful-looking objects who returned from their pilgrimage with life, and the effect of them was to arouse in the minds of all men the feelings of indignation and pity which have been already referred to—feelings akin to those, though far more ecstatic, which were felt in England when the story of the Indian mutiny came over, or, in a less degree, which were felt when the refusal of Abyssinian Theodore to give up his captives was made known.

Men's minds were ripe for action. They only wanted, as they ever want, some master-mind to take the lead. That mastermind was found in Peter the Hermit, who marched barefoot through Europe, preaching up a holy war, and exhorting Christians to do not suffer infidels to crucify the Lord afresh in the persons of His children, and to put Him to an open shame. Peter, who adorned the hermit with all his influence, and Christendom roused as one man. "It is the will of God! It is the will of God!" the people shouted on the plains of Auvergne, when Peter stirred up many thousands of them with the burning words of his eloquence. A vast mob, numbering over 500,000, possessed with plenty of enthusiasm, but little military knowledge, marched forth, under the guidance of Peter the Hermit and Walter the Moneyless; but they melted like snow under the hardships of the journey and by reason of the divisions which sprang up among them. Before they reached Constantinople, then the capital of the Christian Empire (Constantinople was not taken by the Turks under Mahomet II. till 1453), they became a mere rabble, and went no farther. Other hordes, under military leaders, and in numbers 700,000 strong, marched to the Crusades notwithstanding. Princes, barons, knights, esquires, yeomen, priests, hastened to enrol themselves under the banner of the Cross, and streamed eastward, possessed with the one idea of rescuing the Holy Land from the infidels, happy if only they might tread the land which had been trod by holiest feet. There were many of these crusades, the most notable being that led by Richard the Lion-hearted in the year 1190.

It is not surprising that such desperate enthusiasm should have succeeded in doing something. Jerusalem was taken by the Crusaders. The Mussulmans were driven to the mountains, and a Latin kingdom, based upon the feudal principle (for an account of this principle see "Historic Sketches," I, p. 9), was established in their place.

The dangers surrounding this kingdom were great and perennial. The Turks, conninged now with their Saracen brethren in faith, were ever on the watch to inflict injury on the invaders, and to play the part of the enemy who sowed the tares, if perchance at any time the Christians slept. For a while the conquerors were reinforced by numerous additions from home, held their own, and kept up their own invasions with the sea; but grims disembarked, was full of peril. Numbers of travellers were cut off even in sight of the Holy City, and the King of the place was not able to succour them. Afflicted beyond measure at the sight of so much woe and despair, they, as far as in them lay, the injuries suffered by the pilgrims, nine knights bound themselves by a solemn vow to devote themselves wholly and unreservedly to the sacred duty of shielding the pilgrims and of punishing their oppressors. A brotherhood of arms was formed under the most solemn circumstances, and vows were taken by the nine in the presence of the Patriarch, to the effect that they would devote themselves to this work; that they would be chaste, poor, and obedient, and do all to the glory of God. They called themselves The poor Fellow-soldiers of Jesus Christ.

They acted as the police of the Latin King in the matter of Turks, infidels, and heretics; and the idea on which the brotherhood was founded, coupled with the reputation their prowess soon acquired, made the service of the Poor Fellow-soldiers very popular in Europe. A humorous writer has thus analysed the motives which induced men to go to the Crusades,
showing that "for sake of the party" most men were most moved:

Religion ......................................... 1 Because it's the fashion ........... 4
Hatred of Turks ................................. 2 Love of bloodshed .................. 5
The wish of my lady-love ................. 3 For the sake of the party ......... 5

It may have been so with those who joined the brotherhood. Certain it is the number of the order soon exceeded the original number, and some of the "best blood" and the first military talents were to be found among its members. Baldwin II., King of Jerusalem in the year 1118 (nineteen years after the conquest of the Holy Land), granted the knights a dwelling-place in the enclosure of the Temple of Mount Moriah, the re-edified Temple of Solomon, and from that time the knights were known as the Knighthood of the Temple of Solomon.

Ten years afterwards, the knights having formed themselves into a body of military monks, bound by the same rule as monks, and yet soldiers still, obtained recognition from the Pope (Honorius), and were favoured with many honours of an ecclesiastical kind. St. Bernard, Abbot of Clairvaux (author, among other things, of the hymn "Jerusalem the Golden"), himself drew up the rules of the order, which are exceedingly curious and sufficiently stringent.

Constant attendance on prayer, self-mortification, complete self-surrender, fasting—these were the principles on which the rules were framed. The twentieth rule prescribed white dresses for the knights. "To all the professed knights, both in winter and summer, we give, if they can be procured, white garments; that those who have cast behind them a dark life, may know that they are to commend themselves to their Creator by a pure and white life. For what is whiteness but perfect chastity, and chastity is the security of the soul, and the health of the body. And unless every knight shall continue chaste, he shall not come to perpetual rest, nor see God, as the Apostle Paul has taught us, if he would see Christ in His glory."

Witnesseth: Follow after peace with all men, and chastity, without which no man shall see God." Esquires and retainers were to be clothed in black cloth, or, failing that, of brown or some mean colour; "it is granted to none to wear white habits, or to have white mantles, excepting the above-named knights of Christ." Gold or silver was forbidden to be worn on the harness and trappings of the knights—simplicity and unrichness were to be the order of the brotherhood. All money and all gifts were to be in common. There was not to be any communication with the outer world except through the master, and sporting of all kinds was strictly forbidden. For the purposes of the brotherhood it was permitted the knights to possess lands and husbandmen, "and the customary services ought to be specially rendered unto you." Rule 66 says, "It is, moreover, exceedingly dangerous to join sisters with you in your holy profession; for the ancient enemy hath drawn (St. Bernard spake as a monk) many away from the right path to paradise through the society of women." In the last clause of the rules this warning is repeated, with a prohibition:

"Lastly, we hold it dangerous to all religion to gaze too much on the countenance of women; and therefore no brother shall presume to kiss neither widow nor virgin, nor mother nor sister, nor aunt, nor any other woman. Let the knighthood of Christ shun feminine kisses, through which men have very often been drawn into danger, so that each, with a pure conscience and secure life, may be able to walk everlastingly in the sight of God."

These rules were confirmed by the Pope, and Hugh de Payens was chosen Master of the Knights. De Payens travelled through Europe, amassing gifts, and getting recruits for the brotherhood. In England he was well received in the year 1128, and there he founded a branch establishment of the Knights, under the wardenship of a Prior, who was, on the appointment of sub-priors over other branches in England, called the Grand Prior, and subsequently Master of the Temple, the title of the supreme head in Palestine being at the same time changed into that of Grand Master.

On the spot where "now the stolidous lawyers have their bowers," the English Templars dwelt, their Master a peer of Parliament. At first, however, they lived in the Old Temple without Holborn Bars, close to the spot where Southampton Buildings now stand; and it was not till many years after the establishment of the order in England that they bought the ground on which they built the New Temple, the site of the present law colleges. Numerous branch depots in the country sent up men and money to the central body in London, and the Master and Knights in London supplied the wants of the order at Jerusalem. In other countries, especially in France, the Templars took deep root, and enormous possessions in land and money were bestowed upon them.

The order became very popular, and its numbers increased so that the grand-master of the Knights included the names of many thousands of warriors, picked men from the flower of European chivalry. In the course of a few years they rose into such prominence that kings were glad to court their favour; to the King of Jerusalem they were in the stead of a standing army, and upon them devolved the never-ceasing warfare which was necessary to defend the Latin settlement from destruction.

About the year 1146, when the second Crusade was being prepared, the Templars assumed, by permission of the Pope, a red cross, which was worn on the left breast of their mantles, and which obtained for them the name of Red Friars, or Red Cross Knights. They also obtained, at the same period, large additional bencches. Their work was not all rose-water; however; far from it—they had rough and constant employment against enemies both to race and religion, men embittered by years of mutual injury, by fanaticism, by every strong impulse. At times they conquered, at others they fell—even their Grand Master on one occasion being taken and kept in prison till he died. Saladin, the hero of many a romance, a most able warrior and statesman, was the great foe of the Christians; and as under his auspices the Crescent grew, the light of the Cross became pale in Palestine. At one time he made portraiture at Jerusalem having been captured, and offered the alternative of death or the Koran, elected the former, and were beheaded accordingly. By way of reprisal for these things, it often happened that the Knights forgot the Christian quality of mercy, and involved in one common destruction the whole of their captives; indeed, in the end the war between Cross and Crescent became a war to the knife. The Templars were a terror to all but the best of the Turkish soldiers, and rode through their lines in splendid charges, which made the earth quake beneath them.

The Knights Templars had been instituted as a rival order to that of the Knights of St. John of Jerusalem, which was organised as a military body about 1099. This order was never at any time of its existence so wealthy and powerful as that of the Templars, and on this account always held a higher position in popular favour. The Templars, on the other hand, were being spoiled by prosperity, and their wealth was now beginning to stir up the envy and desire of the needy. In every country in Europe they had property either in land or money—nine thousand manors in all, besides other riches; and their privileges,
obtained both from kings and from the pope, were calculated to arouse the jealousy of the people. Riches, too, in the hands of the "Poor Fellow-soldiers of Jesus Christ," the men who had taken vows of poverty, did not cause their possessors to prosper; the military monks grew less and less chary of going to fight in the Holy Land; and when, in 1187, Saladin re-conquered Jerusalem, and put all the Templars there, together with the other defenders of the place, in prison, the rest of the fraternity were still less inclined to make an effort to rescue the city, and to re-found the Latin Kingdom in the East. They remained, therefore, at home, living upon their property, jealously preserving the rights granted to them under widely different circumstances, and making themselves obnoxious by their pride and worldliness. The annual income of the order was estimated at 260,000 pounds.

A society so rich and so powerful could not but have enemies. It began to be whispered that not only did they visibly neglect the obligations of their vows, but secretly they conducted themselves in the most abominable manner; that they worshipped the devil, and dealt in magic, and that one part of the ceremonial on admission to the order was the act of spitting on an image of the Saviour. These and other grave charges were brought against them, but their pride would not allow of their making any reply, till colour having been given to them by the irregularities of some of the brethren, Philip the Fair, of France, who had an eye to confiscations, resolved, in 1296, to proceed against them. As they had no friends, he thought he might safely kick them. After a splendid defence of each one of their posts in Syria, which they lost in succession, overthrown by great numbers of the infidels, they, after the death of their last notable Grand Master, and after their final expulsion from the Holy Land, their influence diminished with the disgrace that had come upon them.

Philip gave ear to the scandal bruiting concerning the Knights. James de Molay, of a noble Burgundian family, was Grand Master. He was an illustrious warrior, who had fought in all the latest battles in Palestine, and had, in conjunction with the Perseverers, been made Prelate himself, resident at Paris, for a while the lost ground in Syria. He had held King Philip at the baptismal font. He was approved an honest man as well as a noble soldier in the sight of all men, and the voice of calumny was not able to speak against him. Yet Philip, having invited him from Cyprus, his stronghold, flung him into prison, and kept him there five years and a half. Meantime information, much of it of an absurd and ridiculous character, was ladly received from any quarter by the King. Pope Clement V., who was wholly under French influence (the Papal Court was then at Avignon), issued bulls ordering inquisition to be made into the conduct of the monks. In France this inquiry was made under torture, and more than a hundred Knights died under the tormentors' hands. Some confessed, under the smart of pain, to foul and unnatural crimes, which they were ready to confess, and upon evidence of the vilest kind, and other evidence quite as unsatisfactory, several hundreds of Templars were burned at slow fires—more than a hundred and ten in Paris on one occasion. France was the only country in which this excessive barbarity was practised, but as in all countries the wealth of the order was a great crime, the fate of the order itself was decided simultaneously everywhere. Templars were arrested throughout Europe, and given to part, to the rival orders of the Knights of St. John of Jerusalem, part to the princes who had seen them to their end; and the Pope, in 1327, issued a decree abolishing the whole order.

James de Molay, the Grand Master, having endured five years and a half of rigorous confinement, and having probably suffered torture therein, was led out in company with three of his companions, to be burnt at the stake in 1313, to revenge in the hearing of the people of Paris the charges he had confessed while under torture. The Bishop of Alba read the confessions, and then called on the prisoners to affirm them. Two of the unhappy Knights, worn out by torture and suffering, assented, but the Grand Master, loaded with chains, called out with a loud voice that for him to affirm an untruth was a crime of which he would not be guilty; and he added, "I do confess my guilt, which consists in having, to my shame and dishonour, suffered myself, through the pain of torture and the fear of death, to give attendance to falsehoods imputing scandalous sins and iniquities to an illustrious order, which hath nobly served the cause of Christianity. I disdain to purchase such a wretched and disgraceful existence by engraving another lie upon the original falsehood." Guy, the Grand Preceptor, having said something to the same effect, Philip became enraged, and that same evening, at dusk, the two unfortunate Knights, the last Grand Master, and the last Grand Preceptor, were taken to a spot outside Paris, and slowly roasted to death.

Fuller says, "The chief cause of ruin of the Templars was their extraordinary wealth. As Nabal's vineyard was the chiefest ground of his blasphemy, and as in England Sir John Cornwall, Lord Fanhope, said truly, not lie, but his stately house at Amphilth, in Bedfordshire, was guilty of high treason, so certainly their wealth was the principal cause of their overthrow.

In England, while much of the property of the Knights was seized by the King (Edward III.), a large portion, including the Temple in London, was given to the Knights of St. John of Jerusalem, who let it to the lawyers, and continued to do so down to the time of the suppression of monasteries in 1539, when the Knights of St. John, in common with all other conventual institutions in England, ceased to exist. The property of the Knights was assumed by the Crown, and various noblemen enjoyed the grant of the Temple in London, until the reign of James I. That monarch granted it to the executive members of the two law societies which had flourished there since the downfall of the Templar Knights, and they still hold it by virtue of King James's grant, on condition of paying a quit rent of ten pounds a year.


<table>
<thead>
<tr>
<th>Event</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>Crusades suggested by Peter the Hermit, and sanctioned by Pope Urban II.</td>
<td>1094</td>
</tr>
<tr>
<td>First Crusade under Godfrey de Bouillon and others (temp. William II.)</td>
<td>1099</td>
</tr>
<tr>
<td>Jerusalem taken July 35</td>
<td>1099</td>
</tr>
<tr>
<td>Latin Principalities of Jerusalem, Antioch, and Edessa founded</td>
<td>1109</td>
</tr>
<tr>
<td>Milord Order of the Knights of St. John of Jerusalem founded</td>
<td>1109</td>
</tr>
<tr>
<td>Order of Knights Templars founded by Baldwin II. of Flanders</td>
<td>1118</td>
</tr>
<tr>
<td>Templars establish themselves in England</td>
<td>1153</td>
</tr>
<tr>
<td>Edessa conquered by the Saracens</td>
<td>1154</td>
</tr>
<tr>
<td>Fresh Crusade preached by St. Bernard of Clairvaux</td>
<td>1146</td>
</tr>
<tr>
<td>Second Crusade under Conrad II. of Germany and Louis IX. of France (temp. Stephen) unsuccessful</td>
<td>1147</td>
</tr>
<tr>
<td>Jerusalem taken by the Saracens under Saladin</td>
<td>1187</td>
</tr>
<tr>
<td>Order of the Templars founded by Frederick Barbarossa, Emperor of Germany</td>
<td>1189</td>
</tr>
<tr>
<td>Carried on by Richard I. of England and Philip II. of France</td>
<td>1193</td>
</tr>
<tr>
<td>Fourth Crusade under Henry V. of Germany (temp. Richard I.)</td>
<td>1205</td>
</tr>
<tr>
<td>Order of Knights Templars founded by Baldwin II. of Flanders</td>
<td>1209</td>
</tr>
<tr>
<td>Order of Knights of St. John of Jerusalem established</td>
<td>1212</td>
</tr>
<tr>
<td>Knights of St. John retire to Cyprus</td>
<td>1217</td>
</tr>
<tr>
<td>Rhodes occupied by Knights of St. John</td>
<td>1310</td>
</tr>
<tr>
<td>Order of Templars suppressed in England</td>
<td>1322</td>
</tr>
<tr>
<td>Grand Master, James de Molay, burned in Paris</td>
<td>1314</td>
</tr>
<tr>
<td>Templars suppressed in England</td>
<td>1340</td>
</tr>
<tr>
<td>Rome occupied by Bonaparte</td>
<td>1799</td>
</tr>
<tr>
<td>Knights of St. John retire to Sicily</td>
<td>1823</td>
</tr>
<tr>
<td>Malta given to the Knights of St. John by Charles V. of Germany</td>
<td>1530</td>
</tr>
<tr>
<td>Order of Knights of St. John finally suppressed in England</td>
<td>1539</td>
</tr>
<tr>
<td>Master of the Temple engaged in a plot against Flanders, who stopped at Constantiople instead of going to the Holy Land (temp. John)</td>
<td>1504</td>
</tr>
</tbody>
</table>

**CHRISTIAN KINGS OF JERUSALEM.**

<table>
<thead>
<tr>
<th>Sovereign</th>
<th>Reign</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Godfrey de Bouill</td>
<td>1099</td>
<td></td>
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<tr>
<td>Baldwin I. (bro-</td>
<td>1099</td>
<td></td>
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<td>ther of God-</td>
<td>1099</td>
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<td>frey)</td>
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<tr>
<td>Baldwin II.</td>
<td>1113</td>
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<tr>
<td>John de Cham-</td>
<td>1192</td>
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<td>pagne</td>
<td>1192</td>
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<tr>
<td>Baldwin III.</td>
<td>1144</td>
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</tr>
<tr>
<td>Amasya</td>
<td>1142</td>
<td></td>
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<tr>
<td>Byzantium</td>
<td>1142</td>
<td></td>
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<tr>
<td>Sisyl</td>
<td>1145</td>
<td></td>
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<tr>
<td>Baldwin V.</td>
<td>1145</td>
<td></td>
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<tr>
<td>Guy de Lusignan</td>
<td>1186</td>
<td></td>
</tr>
<tr>
<td>Henry de Cham-</td>
<td>1192</td>
<td></td>
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<tr>
<td>pagne</td>
<td>1192</td>
<td></td>
</tr>
</tbody>
</table>

This King was expelled by the Turks. | 1259 | | |
LESSONS IN FRENCH.—XX.

SECTION XXXII.—UNIPERSONAL VERBS.

1. By unipersonal verbs is simply meant those verbs which are used only in the third person singular. Having, properly speaking, no personal subject, they are sometimes called impersonal; for the third person singular, used in English, is neuter, and in French, though it be used, it is understood and translated as neuter by the word it. Those verbs express chiefly an abstract opinion or sentiment; most frequently they denote the state or change of the weather; and they generally precede or announce the occurrence of an event, as, it happened.

2. The unipersonal verb is conjugated only in the third person singular of a tense. Its nominative pronoun it, it, is used absolutely, i.e., it represents no noun previously expressed.

Il pleut aujourd'hui.

3. The unipersonal verb assumes the termination of the class or conjugation to which it belongs. Some verbs are always unipersonal, and will be found in § 62. Others are only occasionally so, and if irregular, will be found in the personal form in the same § 62.

4. PRESENT OF THE INDICATIVE OF THE UNIPERSONAL VERBS.

Y avoir, to be there.

Il y a, there is, there are.

Y pluvoir, to rain.

Il pleut, it rains; it is raining.

S'enner, to snow.

Il neige, it snows; it is snowing.

Geler, to freeze.

Il gèle, it freezes.

Dejouer, to thaw.

Il dégèle, it is thawing.

5. Il y a means there is, or there are, and may be followed by a singular or plural noun [§ 61 (2)].

Il y a du gibier au marché.

Il y a des pommes dans votre jardin.

6. In relation to the weather, the verb fair is used unipersonally in the same manner as the English verb to be.

Il fait beau temps aujourd'hui.

Il fait chaud, il fait froid.

RéSUMÉ OF EXAMPLES.

Pluvoir ce matin?

Y pluvoir pas, il neige.

Y va pluvoir ce matin?

Il ne pluvait pas, il neige.

No gelé-t'il pas ce matin?

Il n'y a pas de la neige.

Y a-t-il du sucre chez vous?

Il y a un peu de sucre chez mon frère.

Y a-t-il plusieurs personnes chez moi?

Il y a plus de cent personnes.

N'y a-t-il personne à l'église?

Il n'y a personne.

Est-il trop froid?

Est-il trop froid, il est trop tard.

Fait-il froid ou chaud aujourd'hui?

Il fait froid et humide.

Fait-il du vent ou du brouillard?

Il fait un temps très désagréable.

Vocabulary.

Assemblée, f. / ensemble, pty.

Bibliothèque, f. / library.

Brouillard, m. / fog.

Chambre, f. / room.

Cinquantaine, ffty.

Couvert, o. / cloudy.

Courir, t. / to run.

Cæur, t. / heart.

Épais, so. / thick.

Foil, m. / hay.

Gibier, m. / game.

Humide, damp.

Livre, m. / book.

Manuscrit, m. / manuscript.

Ministre, m. / minister.

Chapitre, m. / chapter.


Savoir, v. / to know.

麻将, m. / man.

Vent, m. / wind.

Volaille, f. / poultry.

Exercise 59.


Exercise 60.

1. Are you cold this morning? 2. I am not cold, it is warm this morning. 3. Is it foggy or windy? 4. It is neither foggy nor windy, it rains in torrents (à verse). 5. Is it going to rain or to snow? 6. It is going to freeze, it is very cold. 7. It is windy and foggy. 8. Is there anybody at your brother's-to-day? 9. My brother is at home, and my sister is at church. 10. Is there any meat in the market? 11. There is meat and poultry. 12. Is it too warm or too cold for your sister in this room? 13. It is not so warm in this room as in your brother's library. 14. Are there any good English books in your sister's library? 15. There are some good ones. 16. Are there peaches and plums in your garden? 17. There are many. 18. Do you remain at your brother's when it snows? 19. When it snows we remain at home. 20. Are there ladies at your mother's? 21. Your two sisters are there to-day. 22. Have you time to go and fetch them? 23. I have no time this morning. 24. Is your horse in the stable? 25. It is not there, it is at my brother's. 26. Does it halt this morning? 27. It does not halt, it freezes. 28. What weather is it this morning? 29. It is very fine weather. 30. Is it too warm? 31. It is neither too warm nor too cold. 32. Is it going to freeze? 33. It is going to snow. 34. Does it snow every day? 35. It does not snow every day, but it snows very often.

SECTION XXXIII.—PLACE OF THE ADVB [139].

1. In simple tenses, the adverb generally follows the verb, and is placed as near it as possible.

Votre commis écrit très-bien.

Votre client écrit très-mal.

Votre jeune fille écrit très-bien.

That young lady writes very well.

Votre commis écrit très-bien.

Votre client écrit très-mal.

Votre jeune fille écrit très-bien.

That young lady writes very well.

2. When a verb is in the infinitive, the two negatives ne and pas, ne and rien, should be placed before it.

Ne pas parler, ne pas lire,

Not to speak, not to read.

3. The adverb assez, enough, tolerably, precedes generally the other adverbs. It precedes also adjectives and nouns.

Vous écrivez assez correctement.

You write pretty correctly.

Vous avez assez de livre.

Cet enfant est assez attirant.

That child is attractive.

4. Voici means here is; voici, there is.

Voici le livre que vous aimer.

Here is the book which you like.

Voici le moniteur dont vous parlez.

Here is the gentleman of whom you spoke.

5. Dans is used for in or into, when the noun which follows it is preceded by an article, or by a possessive, demonstrative, or numeral adjective [§ 142 (2)].

On crony est dans le papier.

The pencil is in the desk.

Mettez cette lettre dans votre tronk.

Put this letter into your trunk.

6. En, after the verbs to be, to go, to reside, followed by the name of a part of the earth, a country, or province, gives the preposition to the force of in or into.

Notre ami est en France.

Our friend is in France.

Vous allez en Italie.

You go to Italy.

7. The preposition à is used for the words au or in or into, before the name of a town, city, or village, preceded by the verbs mentioned above.

Il va à Paris le mois prochain.

He is going to Paris next month.

8. The same preposition is used in the expressions à la campagne, à la ville, à la chasse, à la pêche, etc.

Nous allons à la campagne.

We go into the country.

Vous n'allez pas à la ville.

You do not go to the city.

Je vais à la chasse à la pêche.

I go hunting and fishing.
Vocabulary.

Exercise 61.


Exercise 62.

1. Does your clerk write as well as your son? 2. He writes tolerably well, but not so well as my son. 3. Have you books enough in your library? 4. I have not books enough, but I intend to buy some more. 5. Here is your sister's letter, will you read it? 6. I intend to read it. 7. Does your son like to go fishing? 8. He likes to go fishing and hunting. 9. When does he like to go fishing? 10. When I am in the country. 11. What do you do when you are in the city? 12. When I am in the city, I read and learn my lessons. 13. Do you intend to go to France this year? 14. I intend to go to Germany. 15. Will you go to the city if it rains? 16. When it rains I always remain at home [R. 1]. 17. How many friends have you in the city? 18. I have many friends there. 19. Are there many English in France? 20. There are many English in France and in Italy. 21. Are there more English in Germany than in Italy? 22. There are more English in Italy than in Germany. 23. Is it fine weather in Italy? 24. It is very fine weather there? 25. Does it often freeze there? 26. It freezes sometimes there, but not often. 27. Does that young lady read as well as her sister? 28. She reads better than her sister, but her sister reads better than I. 29. Is there any one at your house? 30. My father is at home. 31. Is your brother-in-law absent? 32. My brother-in-law is at your house. 33. There is no one at home to-day.

Section XXXIV.—The Indefinite Pronoun on, etc.

1. The indefinite pronoun on has no exact equivalent in English. It may be rendered by one, some, they, people, etc., according to the context. On has, of course, no antecedent, and seldom refers to a particular person [§ 41 (4) (5), § 113].

On doit honorer la vertu, We should honour virtue.

On nous apporte de l'argent, Money is brought to us.

2. As may be seen in the last example, on is often the nominative of an active verb, which is best rendered in English by the passive [§ 113 (1)].

On dit que votre épouse est ici, They say that your wife is here.

On monte des histoires singulières, Singular histories are related.

On récolte beaucoup de blé en France, Much wheat is harvested (grown) in France.

3. Avoir lieu answers to the English expression to take place.

Ou a lieu tous les jours, That takes place every day.

4. Au lieu de answers to the English instead of.

On cherche beaucoup d'or en Californie, Much gold is found in California.

5. Do you ever answers to the English how often.

Do they (people) say anything new? Nothing new is said.

6. Recevoir des nouvelles means to hear from.

Devez-vous recevoir des nouvelles de votre sœur? Are you to hear from your sister?

7. Understand parlar answers to the English phrase to hear of or about.

Entendez-vous souvent parler de vos amis? Do you often hear of your friends?
LESSONS IN PENMANSHIP.

The simplest method of writing the letter \( \mathbf{f} \), and that which is most generally used in writing large-hand copies, is shown in Copy-slip No. 73. In this form, which is repeated in Copy-slip No. 74, where \( \mathbf{f} \) is given in conjunction with other letters, it is commenced with a fine hair-stroke a little above the line \( cc \), which is carried upwards until it reaches the line \( kk \), where it is turned towards the left and brought downwards across the fine up-stroke, the pressure on the pen being gradually increased until a thick down-stroke is formed, which terminates at the line \( gg \). The letter is finished with a hair-stroke carried out from the back of the letter, about the line \( cc \), to the left, and then brought to the right in a curve across the down-stroke. In small-hand writing, the lower part of the letter \( \mathbf{f} \) is generally made in the form of a loop, the pressure of the pen being relaxed, and the down-stroke narrowed gradually until it is turned at the bottom in a hair-stroke, which is carried upwards and across the down-stroke about the line \( cc \), or centre of the letter, in a small loop. Sometimes the loop at the upper part of the letter is omitted, the down-stroke being commenced at the line \( ee \) (see Copy-slip No. 10, p. 60, for the height of this line above \( a \)), and thickened very gradually until it reaches its thickest part about the line \( bb \), when the pressure on the pen is immediately lessened to narrow the stroke into the fine line that forms the loop below the line \( bb \). Examples of the methods of making the letter \( \mathbf{f} \) that have just been described will be found in future copy-slips. In Copy-slip No. 75 the learner will find the elementary strokes that form the letter \( \mathbf{k} \).
LESIONS IN ARITHMETIC.—XIX.

SQUARE AND CUBE ROOT (continued).

9. The square root of a fraction is obtained by taking the square root of the numerator for a numerator, and the square root of the denominator for a denominator. This follows at once from the consideration that the multiplication of fractions is effected by multiplying the numerators for a numerator, and the denominators for a denominator. When either the numerator or the denominator is not a complete square, the fraction itself evidently has no exact square root, instead of finding an approximate root of both numerator and denominator in decimals, and then dividing one by the other, it will be better first to reduce the fraction to a decimal, and then to take the square roots.

EXAMPLE.—To find the square root of \( \frac{297}{4} \).

Reducing \( \frac{297}{4} \) to a decimal, we find it to be \( 73 \) (see Lesson XVI, Art. 21).

Hence we should find by the previous method the square root of \( 73 \) by \( \frac{297}{4} \). Hence we should find by the previous method the square root of \( 297 \) by \( \frac{27}{4} \). Hence we should find by the previous method the square root of \( 297 \) by \( \frac{27}{4} \).

Similarly, in finding the square root of \( \frac{297}{4} \), we should proceed thus: \( \frac{297}{4} = 4 \), and then find the square root of 400, etc., to as many decimal places as we please, by continually taking in more and more figures of the recurring periods.

Observe that we do not follow that because the numerator and denominator of a fraction are not complete squares, that the fraction has no square root; for the division of numerator and denominator by some common measure may reduce them to perfect squares. Thus, \( \frac{3}{4} \), when numerator and denominator are divided by 7, gives \( \frac{3}{4} \), the square root of which is \( \frac{3}{4} \). A fraction must be reduced to its lowest terms to determine whether it be a complete square or not.

10. Abbreviated Process of Extraction of Square Root.

When the square root of a number is required to a considerable number of decimal places, we may shorten the process by the following

Rule for the Contraction of the Square Root Process.

Find by the ordinary method one more than half the number of figures required, and then, using the last obtained divisor as a divisor, continue the operation as in ordinary long division.

EXAMPLE.—Find the square root of 2 to 12 figures.

\[
\begin{array}{c|cccccc}
2 & 0 & 0 & 0 & 0 & 0 & 0 \\
24 & & & & & & \\
--- & & & & & & \\
2811 & 400 & & & & & \\
--- & & & & & & \\
2824 & 11000 & & & & & \\
--- & & & & & & \\
2828 & 06000 & & & & & \\
--- & & & & & & \\
282841 & 385600 & & & & & \\
--- & & & & & & \\
2828423 & 10075900 & & & & & \\
--- & & & & & & \\
2828423 & 2452069 & & & & & \\
--- & & & & & & \\
15906510 & 14142115 & & & & & \\
--- & & & & & & \\
17941050 & 19790538 & & & & & \\
--- & & & & & & \\
6714120 & 6566446 & & & & & \\
--- & & & & & & \\
10572740 & 8485209 & & & & & \\
--- & & & & & & \\
20674710 & 19790538 & & & & & \\
--- & & & & & & \\
1073749 & & & & & & \\
\end{array}
\]

Here, having obtained by the ordinary process the first seven figures, we get the rest by dividing as in ordinary division by the last divisor, 2828423.

11. We might extract the square root of a perfect square by splitting it into its prime factors, but unless the number is not large this would be a tedious method.

EXAMPLE.—Find the square root of 441.

Following the method given in Lesson VIII, Art. 5—

\[ \text{441} \]

\[ \text{441} \]

\[ 49 \]

Therefore 441 = \( 3 \times 7^2 \); of which the square root is \( 3 \times 7 \), or 21.

Observe.—Unless a number is made up of prime factors, each of which is repeated an even number of times, it is not a perfect square.

Exercise 39.

1. Find the square root of the following numbers:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>529</td>
<td>11,909</td>
<td>3,172,811</td>
</tr>
<tr>
<td>2</td>
<td>529</td>
<td>11,909</td>
<td>3,172,811</td>
</tr>
<tr>
<td>3</td>
<td>781</td>
<td>10,249</td>
<td>1,000,000</td>
</tr>
<tr>
<td>4</td>
<td>4761</td>
<td>10,000,000</td>
<td>3,172,811</td>
</tr>
<tr>
<td>5</td>
<td>17,649</td>
<td>100,000,000</td>
<td>11,909</td>
</tr>
<tr>
<td>6</td>
<td>5,9049</td>
<td>1,000,000</td>
<td>10,249</td>
</tr>
<tr>
<td>7</td>
<td>27,889</td>
<td>1,000,000</td>
<td>10,000,000</td>
</tr>
<tr>
<td>8</td>
<td>961</td>
<td>10,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>9</td>
<td>97 to 4 places of decimals.</td>
<td>100,000,000</td>
<td>11,909</td>
</tr>
<tr>
<td>10</td>
<td>199 to 5 places.</td>
<td>100,000,000</td>
<td>10,000,000</td>
</tr>
</tbody>
</table>

2. Find the square root of the following numbers by the abbreviated method:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>565</td>
<td>565</td>
<td>11 figures in the root.</td>
</tr>
<tr>
<td>2</td>
<td>2 to 12 figures.</td>
<td>11 figures in the root.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Extract the square root of 2116, 21316, and 7056, by splitting them into their prime factors.</td>
<td>11 figures in the root.</td>
<td></td>
</tr>
</tbody>
</table>


To extract the cube root of a given number is the same thing as resolving it into three equal factors.

As in the case of the square root, we must content ourselves with giving, without explanation of the reason of its truth, the

Rule for the Extraction of the Cube Root of a given number.

Mark off the given number into periods of three figures each, by placing a point over the figure in the unit's place, and then over every third figure to the left (and to the right also, if there be any decimals). Put down for the first figure of the cube root the figure whose cube is the greatest cube in the first period, and subtract its cube from the first period, bringing down the next period to the right of the remainder, and thus forming a number which we shall call a dividend. Multiply the square of the part of the root already obtained by 3 to form a divisor, and then, having determined how many times this divisor is contained in the dividend without its two right-hand figures, annex this quotient to the part of the root already obtained. Then determine three lines of figures by the following processes:—

1. Cube the last figure in the root.
2. Multiply all the figures of the root except the last by 3, and the result by the square of the last.
3. Multiply the divisor by the last figure in the root.

Set down these four in order, under each other, advancing each successively one place to the left. Add them up, and subtract their sum from the dividend. Bring down the next period to the right of the remainder, to form a new dividend, and then proceed to form a divisor, and to find another figure of the root by exactly the same process, continuing the operation until all the periods are exhausted.

13. In decimals, the number of decimal places in the cube root will be the same as the number of points placed over the decimal part, i.e., as the number of periods in the decimal part.

Observe.—If, finally, there be a remainder, then the given number has no exact cube root, but, as in the case of the square root, an approximation is carried to any degree of nearness by adding ciphers, and finding any number of decimal places.

The rule will be best understood by following the steps of an example.

* It will be found necessary sometimes, as will be seen by the example given in Art. 15, to set down as the next figure in the root, one less than this quotient.
Example.—Find the cube root of 78314601.

\[
\begin{align*}
78314601 & \quad (427) \\
48 & \quad 143,14 \\
16 & \quad 99 \\
10088 & \quad \\
5292 & \quad 42266,01 \\
343 & \quad \\
6174 & \quad \\
37944 & \quad \\
3766483 & \quad \\
460118 & \quad 
\end{align*}
\]

Placing the points as indicated in the rule, we observe that the cube of 4 is the greatest cube in the first period 78. Subtracting 4, or 63, from 78, we get a remainder 14, to the right of which we bring down the next period 514, to form a dividend. Multiplying the square of 4 by 3, we get for a divisor 48, which will go 3 times in 143 (the dividend without its two right-hand figures). We set down 2, therefore, to the right of 4 as the next figure in the root, and then proceed to form the three lines according to the rule.

1. 8 is the cube of 2.
2. 48 is \(3 \times 4 \times 2^2\).
3. 98 is the product of 2, the last obtained figure in the root; and 48, the divisor.

Placing these three lines under each other, but advancing each successively one place towards the left, and adding, we get 10088, which we subtract from the dividend 14314, leaving a remainder 42266. To the right of this we bring down the next period 001, thus forming another dividend.

The next divisor 5292 is \(3 \times 421\), and is contained 7 times in 42266. Putting down, then, 7 as the next figure in the root, we form three lines as before:

1. 343 is the cube of 7, the last figure in the root.
2. 6174 is \(48 \times 7^2\).
3. 37944 is \(7 \times 5292\).

Adding these up when properly placed, we get 3766483, which we subtract from the previous dividend 4226601, leaving a remainder 460118.

There are now no more periods left: Hence 427 is the number whose cube is the nearest cube number to the given number, and less than it. If there were no remainder, the root obtained would be the exact cube root of the given number.

14. In such an example as that worked out above, we could place a decimal point and as many periods of cipher as we may wish after the original number, and thus, by continuing the process according to the rule, get as many decimal places as may be required as an approximation to the cube root.

In finding the cube root of a decimal, the periods must be completed by adding ciphers, if necessary.

15. When the cube root of a fraction is required, the cube root of the numerator and the cube root of the denominator will be the numerator and denominator respectively of the fraction which is the cube root of the original fraction. If the numerator and the denominator are not both perfect cubes when the fraction is reduced to its lowest terms (vide 9, Obs.), the best plan generally will be to reduce the fraction to a decimal, and then to find the cube root of that decimal. In the case of mixed numbers, they must be reduced to improper fractions, in order to see whether the resulting improper fraction has its numerator and denominator both perfect cubes. Thus, \(\frac{\sqrt{3}}{\sqrt{4}}\) reduced to an improper fraction gives \(\frac{\sqrt{3}}{2}\), of which the cube root is \(1\), or \(\frac{1}{3}\). But if, when so reduced, the numerator and denominator are not perfect cubes, then it will be better to reduce the fractional part of the mixed number to a decimal, and placing the integral part before it, find the cube root by the above rule.

Example.—Find the cube root of \(\sqrt[3]{44}^2\) to two places of decimals.

\[
\begin{align*}
44 & = 44.0 \\
27 & = 17600 \\
37 & = 125 \\
25 & = 225 \\
15 & = 1525 \\
64 & = 4226601 \\
42 & = 10218313 \\
9 & = 2515456 \\
7 & = 6174 \\
3 & = 343 \\
2 & = 1680 \\
1 \quad & = 14700 \\
& = 1468684 \\
\end{align*}
\]

And so on to as many more decimal places as we may desire.

Obs.—Exactly as in the case of the square root, when one more than half the number of figures required of the root have been found by the rule, the rest may be found by simply dividing, as in ordinary division, by the last divisor.

16. Obs.—It will be observed that although 27, the first divisor, is really contained 6 times in 176, we only put down 5 in the root. The reason is that, on examination, we find that 6 would be too large for it, would make the sum of the three lines which we add up greater than the dividend 17600. This explains the note at page 318. We must, therefore, always be careful to observe whether the figure put down in that root will or will not make the sum of the three lines too large. The dividing the dividend without its two last figures by the divisor is not, therefore, an infallible guide to the next figure of the root.

Exercise 40.

Find the cube root of the following numbers:

1. \(2107\) 2. \(5125\) 3. \(57127\) 4. \(2515456\) 5. \(10218313\)

Where the given number is not a complete cube, the root may be found to seven decimal figures in each case, attention being paid to Obs. of Art. 16.

Lessons in Architecture—I.

Architecture is the art of planning, constructing, and adornning public or private buildings according to their intended use. The word architecture is derived from the Greek αρχιτεκτονική (architektonikh), literally, building, and τέκτων (tekton), a workman. This etymology indicates the active, engaged in the building on the one hand, and the leader or chief, the man of science and practical skill, putting in action all his resources in order to execute his plan on the other. Such a division as this was, no doubt, established from the beginning of the art. According, therefore, to the literal meaning of the etymology, mankind must have, at the origin of architecture, possessed a degree of civilisation sufficient for the organisation of different kinds of industrial operations, and acquired a degree of skill in the art, which enabled some of their experience to be the leaders or directors of others. In this way, we may suppose that the art itself, or rather the symmetry, the harmony of proportions, and good taste in structures, at first began to be developed.

Before arriving at this point, mankind must have overlept ages. One of the first wants of society was a covering or shelter from the inclemency of the weather, whether of heat or of cold. Simple was the art employed in constructions of this kind. Grotesques or caves hollowed in solid rock to make them more habitable, and cottages constructed of branches of trees and blocks of stone—such were the primitive constructions in wood and stone which formed the rudiments of architecture. From the simplicity of early structures men passed to the study of proportions:
they then dared to attempt the grand; and, at last, reached the sublime.

The origin of architecture cannot be assigned to any particular country. Every nation produced its own art, or style, by employing the various materials within its reach, and by giving to them such forms as their wants required. Proceeding as at first from the high table-lands of Asia, in order to people the earth, the early fathers of our race could have but little idea of architecture, or of a well-established system of construction. As wandering and pastoral tribes, like the Hottentots of the present day, they lived in tents or wretched huts, which had no pretensions to architecture. It was not until they became more settled that they sought the means of rendering their buildings more durable, by employing in their construction wood or stone, and bricks baked in the sun.

From the differences in the materials, and from the variety of tastes and feelings, arise the varied appearances which the monuments of different nations present, and which constitute their peculiar style of architecture. Thus the Egyptian, born in the hot climate of Africa, in a country destitute of wood fit for building, and near the mountains of the valley of the Nile, containing large blocks of freestone and granite, created for himself a vigorous style of buildings which completely sheltered him from the burning rays of the sun. These buildings were formed of colossal masses, which were easily transported along the waters of that famous river. The Greek, inhabiting a milder climate, surrounded by forests and quarries, gave a lighter form to his edifice, and employed wood in their erections which harmonised well with the marble—a material of which the fineness admitted of a greater delicacy of structure and arrangement. The Chinese, surrounded by rivers bordered with bamboo, had only a meagre and tortuous species of architecture, as ephemeral in its duration as it was fragile in its origin and construction. The very different character exhibited in local architecture enable us to judge of a country by its monuments, inasmuch as the buildings themselves are the expression of the various wants of the people who constructed them. It is easy to understand how their different arrangements of structures are but the reflection of the religion or the manners of the people. The general style of the monuments of a country is a durable image of the different phases of its civilisation. In these, we see it in its primitive, refined, or degraded state, as civilisation arose, approached to perfection, or decayed.

Nations naturally established great divisions in their architecture. They first built their private dwellings, then their public buildings, and these, in their numerous subdivisions, constituted civil architecture. Religion caused them to build temples and other edifices, attaching to them ideas of duty and moral obligation: thus arose sacred architecture. The fortification of their frontiers, their towns, and their conquered countries, gave birth to military architecture. In this hasty sketch, we see how extensive is the series of buildings which cover the face of the globe, some of which belong to the first ages of its history, and others of which are being re-discovered in our own day. The study of these will be duly appreciated by the historian, the philosopher, the archaeologist, and the artist, who, each with his own particular view, knows how to find a great lesson in these silent witnesses of past civilisation, as well as in those existing in full vigour around us.

Architecture is founded upon three great principles, which ought to be immutable: 1, the useful, without which states and private individuals would be led into superfluous and ruinous expenses; 2, the true, because it ought to express in all its varied forms the great principles of construction upon which it rests; 3, the beautiful, which is the end of all the arts depending upon design, and no less of architecture the most useful. On these principles, every style of architecture has the same value; and an artist should not curb his genius by confining himself to the study of one particular style. It is only the man of talent, to whom the construction of an edifice is entrusted, who can combine the different arrangements and forms, harmonise the various parts, and particularly express by plans, skilfully worked out, the disposition of the whole or of every part of the building. Upon these arrangements and plans rests the reputation of an architect, and science demands of him a well-grounded assurance of the good construction and durability of his work.

Architecture is not an imitative art, like her sister arts, sculpture and painting. We see nothing in nature like our buildings as a whole; or rather nothing which could serve to guide us in its applications, or in the harmony of its lines. In this art, man has done everything himself. He has employed matter; he has invented forms and plans which produce in the minds of his fellow-creatures ideas correlative of order, harmony, grandeur, richness, and durability. He has been enabled, by the force of art, to give, as it were, thought to matter, without being indebted for his ideas to any of the external forms of nature. Like the poet and the musician, the architect can transport the spectator into an ideal world, by creating forms and effects formerly unknown; but, very different from them in results, he renders his creations palpable, and gives them durability. Moreover, the useful, the true, and the beautiful, must be ever present to his view; and, however fruitful his imagination may be, he cannot emancipate it from science, the eternal basis of all the productions of his art.

The architect should therefore spend his youth in the study of his art, and of the splendid examples left on the face of the old world by ancient civilisation. In conjunction with these studies he should make himself master of the exact sciences, in order that he may execute his plans with precision, and study the nature of their construction. He should also become familiar with the physical sciences, in order that he may understand the nature of the materials which he must some day employ, and be able to calculate their effects. In short, he should devote himself to practical experience, and to the working part of architecture, in order to render himself capable of executing public or private buildings, and to make himself responsible for the stability of edifices entrusted to him.
ANIMAL PHYSIOLOGY.—X.

THE ORGAN OF TASTE (concluded).

In treating of the objects which excite the sense of taste, we must draw attention to the distinction between taste proper, and the alimentary sensation of relish. That these sensations are different, will appear from the consideration that many things which are very appetising, and in the eating of which there is great pleasure, have but little distinctive taste. Butters and animal flesh are good instances of this. The tip of the tongue applied to these would give but little indication of the presence of sapid bodies; but the succeeding parts of the organ and the mouth declare them very good. On the other hand, sweet, sour, and bitter principles are detected at once by the tip of the tongue, though they be entirely indifferent to the sense of relish. Alum is thus sweet to the sense of taste, but disgusting to the sense which we have called alimentary. The sense of taste proper, or the appreciation of what is sweet, bitter, sour, etc., is more connected with the intellect than the sense of what is savoury; and hence it is less dependent on the state of the body, and it leaves behind it a multitude of distinct ideas which can be held in the memory. Thus a person when suffering from sea-sickness can well discriminate between sugar and quinine; but he would be a very indifferent judge of the flavour of a beefsteak at such a time.

The multitude of flavours which can be distinguished is truly remarkable; for not only do the apricot, plum, cherry, and apple each have a characteristic taste, though they all belong to the same order of plants, but a hundred varieties of apples all challenge recognition from this sense. The grape produces a thousand wines, each with a bouquet of its own, even though alcohol and water are the main constituents of them all, and that which causes the difference is so small in quantity, that the chemist cannot separate it. Some sensations described as tastes, are but little removed from those of touch; thus, the taste of nutgalls, called an astringent taste, and the fiery taste of alcohol, are probably caused by mechanical action on the outer skin. In the first case a very forcible contraction of the parts occasioned a roughness; and spirit will produce a burning sensation on any delicate part of the body.

We have now to apply our experimental knowledge of the sensation derived through the tongue and mouth to the inquiry—How far do brutes participate in these sensations? In order to answer this question we must observe the gestures and exhibitions of animation of animals while feeding on those substances whose tastes we are ourselves acquainted with. Observation seems to lead to the conclusion which we should naturally have arrived at from reasoning on the question. The conclusion is this, that the sensation which we have called the alimentary feeling, and which is of a more animal character, is enjoyed in a greater degree in the brute than in man; while the true gustatory sense, being more connected with the exercise of the mental powers of comparing and distinguishing, is certainly weaker in the lower animals.

Brutes may be roughly divided into two great divisions, the carnivores, or flesh-eaters, and the herbivores, or vegetable-eaters. The type of the first class is the tiger, or, to give a more familiar example, the cat; while the other is represented by the ox. In each of these, the whole body seems to have been constructed in relation to the food. The tiger has jagged teeth, and pointed side fangs which lock deeply into one another, but have no grinding surface. The jaws that wield these are short, strong, and can play only to and from one another. It can therefore grip and hold, but cannot chew. The stomach is small and intestines short, because flesh is very nutritious, and needs but little digestion. The fore limbs can move freely in all directions, and are furnished with claws to strike and seize. The ox has long jaws, rough but flat, with a long tooth, and a closely-fitting row of front ones in the front of the lower jaw, playing on a pad in the upper, and the lower jaw can swing sideways and so grind the food. He can therefore clip and chew, but cannot grip.

This comparison might be carried into almost every detail of structure. We cannot, then, in speaking of the two objects of taste in animals, speak of the class as a whole, because the objects of the sense are so distinct in the two divisions of the class. It must not be supposed that this division of brutes is sharply drawn; for between the two types of tiger and ox, animals of every grade of intermediate structure are found. Moreover, the division is not a good one for the purposes of zoological classification; for though both the tiger and the Tasmanian devil eat flesh, and the kangaroo eats grass like the ox, yet even the tiger is more like the ox, and the Tasmanian devil more like the kangaroo, than are those animals when cross-coupled, as in the first sentence. Further, some brutes made on the flesh-eating type, eat all kinds of vegetables, as the bear does; and others built on the plan of the ox, will eat flesh, as the pig will. In fact, the division is a false one when we are treating of the classification and structure of animals, but is nevertheless a useful one when we are writing of their powers and functions. In other words, it is a good physiological but a bad anatomical division. We have entered so far into the question, not only because it bears on our special subject, but also because it explains the term "physiology," with which these lessons are headed.

Of carnivorous animals, it may be stated that the alimentary sense, which is associated not only with the tongue, but with the throat and palate, is keen and pleasurable in the extreme,
while the other branch of the sense of taste is feeble. That
which we call ravenous hunger in a dog or lion, is not the un-
canny feeling of privation, which we associate with excessive
hunger, but is an all-engrossing desire to gratify the sense of
taste, and this is altogether distinct from a dainty apprecia-
tion of flavor.
These animals can endure privation from food for consider-
ables periods without manifesting any signs of starvation; but the
smell, sight, and, most of all, the partial taste of flesh, excite
them to eager, and even ferocious craving. Hence the popular
notion of the dangerous nature of wild beasts which have once
tasted human flesh. When a creature, whose papillae, when it is
once obtained, is torn to pieces, flung to the back of the
mouth, and swallowed with a rapidity which altogether forbids
the idea that these animals possess to any extent the faculty of
discrimination in their tastes.
This view of the question is also borne out by an inspection
of the tongue. In the illustration, the reader will find a repre-
sentation of a cat's tongue, and indeed of the tongue of any
number of animals. It is divided backwards, and towards the mid.
line. The circumvallate papillae, again, are but four in number, two on each side.
It is this point of papillae which makes the cat's tongue feel rough when she licks.
The covering of these papillae is so dense, hard, and the tip of the tongue is
so flexible, that we are justified in thinking them mechanical
only in function; and yet they cover the whole tongue almost to the exclusion of the other kinds.
In the larger members of the cat family, these pointed papillae
are quite like hard thorns or spines; and with them the lion,
tiger, and leopard can rasp away the last adhering fragments of
flesh and ligament from the bones. A patch of these papillae from a leopard's tongue are represented in the engraving.
They are two-lobed and rounded, and have from their back part
a single sharp spine running directly backwards, and they are set in
a very regular pattern, alternating in each row. On the
summit of the leopard's tongue a number of papillae were found
without spines, as though worn off, or perhaps not developed,
lest the palate should be injured by them.
The musculature of the tongue, then, give an incident.
A gentleman had reared a tame leopard from a cub, and having
always fed it on bread, etc., the animal was very docile, and
showed no sign of savageness. It was often caressed by
its master, and returned the blandishments after its manner.
While thus engaged, it one day took its master's hand into
its mouth, and began to lick it gently, but owing to the roughness
of its tongue, the gentleman felt some pain, and doubt feeling some pain, tried to withdraw his hand, but, to his
surprise, the beast for the first time in its life began to growl.
With great presence of mind the gentleman relieved from
his effort to release his hand, rang the bell, asked his servant for
his loaded pistol, and then shot his now dangerous favourite
through the head.
In browsing animals, while the sense is far less keen, so far as
the alimentary sensation is concerned, we have no reason to
suppose that the distinguishing gustatory sense is in any degree
stronger.
The ruminating tongue is a long, coarse fleshy organ, in
which an ox indulges constantly with the avidity with which a carnivorous animal feeds.
The tongue of a ruminant is very long and flexible. It is
often twisted round the herbage to tear it up, or break it off;
and the qualities which fit it for this use are manifested in the
highest degree in the tongue of the camelopard. This animal
can, by the aid of its tongue, reach any part of its vast
powers of reaching high, and thus hook down the branches of
the palm. Well might this animal suggest to Lamarck that its
whole organism had been modified by a constant endeavour to
reach higher and higher.
The position of the large walled-round papillae is very various
in different animals. The reader will have observed their posi-
tions in their chimaeras, in one long line of about twelve
in number down the middle of the tongue, with a few scattered
ones on each side. In the pig, otter, and seal they have the
V-shaped arrangement which they have in man, but are fewer in
number. In the sheep they form a thick, raised ridge on each
side at the back of the tongue.
One of the most singular uses to which the tongue is put in
the class of mammals, is in the raspers, which have long, thin
tongues are used to thrust into ants' nests, so that when they
are retracted into their long tubular mouths the ants are carried
with them, adhering to the mucous.
If this article had been headed "The Tongue," instead of
"The Organ of Taste," we should have a long task before us to
describe the various shapes of the organ in toads and reptiles,
by which the tongue has been developed in this peculiar way.
This small organ has been applied has a wonderful diversity of form,
and many interesting peculiarities; but in most cases its main office is
to seize or to masticate the food, and the function of taste is
subordinate to this.
In birds the tongue is almost as diversified in form as the beak;
but it is usually cased in horn at its fore part, and there are
very few of the poles which would be compared with the tongue of our
own. The tongue has been termed the "ring of savageness." It is,
and these birds seem to have more of the sense of taste than most birds, for they will turn a lump of sugar or a nut
about in their beaks for some time to test its qualities before
eating it. It is certainly singular that birds, whose proper food
is fruit, should be so little endowed with a sense to appreciate
its delightful and delicate flavour; nevertheless, it seems as
though the tongue were only applied to test the softness, and
do not the ripeness of the fruit. Under the circumstances, it
represent that of the fieldfare, may be taken as the typical tongue of
a bird. The small triangular tongue of the ostrich, supported
on its slender arch of bone, is given because of its singular
shape and shortness. The length of the tongue has but little
relation to the length of the beak. Thus both the pelican and
the toucan have enormous beaks; but the former has a tongue
as large as its head, while the latter has been reduced to a
nearly neutral state, and such as to represent that of the fieldfare,
may be taken as the typical tongue of a bird.
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nearly neutral state, and such as to represent that of the fieldfare,
may be taken as the typical tongue of a bird.
skulls before devouring the animal contained within, its function must be considered as other than that of food. This is as a member is composed entirely of a horny substance and stiff hairs, it cannot be used to taste the sweet compound elaborated by the flowers. An internal cavity to hold food during the time necessary to its digestion is so generally present in animals, that it almost serves as a character whereby to out them off from the vegetable kingdom. A prompting to fill this cavity is of course always associated with the organ; but whether that prompting is automatic, instinctive, or rational, it is difficult to say. A sense that may be pleasurable or painful seems to imply some power of reasoning to make it useful. A sense which is neither pleasurable nor painful may stir but a blind instinct. There is, however, a lower impulse to action than even this, in which both intelligence and sense may not be at all involved. When the contact of food causes the sea anemone to close its arms around it, and force them into its mouth, it is probable that sense is no link in the chain of causes of this act, but the whole process of ingestion is parallel to that part of the action of swallowing which takes place in us after the senses have done their work, and the throat seizes the morsel of food and carries it down to the stomach by an involuntary act. Automatic and consensual acts are often as violent as those prompted by desire and reason, so that cagerousness in lower animals is nothing but obliviousness of taste in the lower animals. We abate, therefore, from describing those various and interesting organs which lie in such a relation to the entrance of the alimentary canal of snails, flies, bees, etc., as to have been called tongues, as though they were organs of sense.

LESSONS IN GERMAN. XX.
SECTION XXXVII.—REFLECTIVE VERBS.

Reflective verbs (§§ 86, 1, 2, etc.) are those that represent the subject as acting upon itself, as:—Gr besinn't sich, he bo-
thinks himself, etc.

Verbs of this class are much more numerous than in English, and are variously translated, as:—Gr macht sich über mich lustig, he makes himself merry over me (i.e., he ridicules me). Gr hart sich über einen Verlust, he mourns over (or on account of) his loss. Gr traut sich über sein Glück, he rejoices at his prosperity. Gr unter-sucht sich über Tröstungen, he opposes (himself to) the com-
mands of the tyrant. Das Buch hat sich gefunden, the book has been found. Gr nimmt sich der Welt, the sky is covered with clouds. Sel-ters stern sich über einen Augenblick! shall the outrage be ac-
complished before our eyes? Gr fällt sich in Berlin auf (holds himself up) stops in Berlin. Gr fällt sich über die Arbeit zu lange aufge-
geblasen, he has (kept himself) remained too long at the work. (See §§ 80, 87.)

Sich unterset über signifi once to find fault with, to sneer at, to criticize, to blame, as:—Gr fühlt sich immer über Kleinigkeiten auf, he is always finding fault about trifles (stopping over trifles). Gr fällt sich über eine Geste auf, he criticizes your letter. Gr fällt sich über die ganze Geißelhaft auf, he sneers at the whole company.

VOCABULARY.

Alter, n. age.
Ahnung, to appro-
priate.
Ansehnlich, f. atmo-
sphere.
Aufsätzen, to sojourn,
lodge.
Aufstellen, to extend, expand.
Aufziehen, to make, to distinguish (one's self).
Begeister, n. want, necessity.
Begehren, to reward.
Beängstigend, continually.
Beugen, to move.
Bauern, m. steam, vapour.

Regierung, f. government.
Rieke, f. row, range.
Sammel, to gather, con-
Lilien, n. alpines.
Lichter, evil.
Leben, to exercise.
Lieber, n. afflication.
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able, as: — It fails, 6, er er war, it is questionable whether he was there. E.g. it及时, 6, or, 6, etc., are of the same character. — It fails, 6, you cannot get the entire thing. If you cut it, it becomes something that destroyed the entire harvest. E.g. it is not a question of trifles. (See also § 86. 6.)

Vocabulary.

Résumé of Examples.
It sometimes happens that an underground grotto with the most splendid talents are concealed. It often happens that the men who have rendered themselves most deserving of their (the) native country wander about homeless. A great misfortune has happened to my nephew. He related this to me as he accidentally met me to-day in the street.

Exercise 72.

Exercise 73.
1. It is proper that the children should respect their parents. 2. It becomes not a wise man to follow the multitude. 3. Most young people wish to appear great in the world. 4. You should under all circumstances say the truth. 5. It is questionable whether we shall accept your invitation. 6. It is questionable whether you are right or wrong. 7. It happens sometimes that the best man fails. 8. The government asks obedience from its subjects. 9. The inhabitants of London increase enormously every year. 10. My brother devoted himself more to science than to pleasure. 11. Do you know to what extent your friend has counselled you? 12. He has counselled you to do that of which he spoke yesterday.

SECTION XXXIX.—PECULIAR IDIOMS.
Safeti is often employed in the sense of causing or ordering, like the English verbs “have” and “get,” as: — Er läßt seine Stifter in Paris mäden (Sect. XXXIII. 1), he gets his clothes in Paris. Er läßt ein Haus bauen, they are having a house built.

Exercise 75.
1. Which of those physicians will you send for? 2. I shall send for neither. 3. Let me be quiet, for I am not well. 4. He was cowardly, and was not a good commander-in-chief in the church. 5. Why did you not let your little sister come? 6. She could not, for she was at school the whole morning. 7. He has sent for a dentist to have a tooth extracted. 8. For what have you sent your servant? 9. I have sent her for paper and ink. 10. Let us act humanely. 11. Pray let us go to school. 12. Let us not follow the examples of the wicked.

LESSONS IN PENMSHIPS.—XXI.
In our last lesson in Penmanship, in Copy-alip No. 57 (page 317), were given the elementary strokes of which the letter k is made; and in the Copy-alip No. 76, and the Copy-alip No. 75 and 76 (page 261), the learner will find this letter in its complete form. In writing the letter k, a straight-stroke is first made, and then a stroke of peculiar form is added to it, which somewhat resembles a brace —, and which may be considered to be a modified form of the top-and-bottom-stroke, made by turning the pen in to the left just before reaching the line c, and then, after forming a very small loop, out towards the right, and finishing as in the ordinary bottom-stroke, as shown in Copy-alips Nos. 75 and 76. In Copy-alip No. 77, in the word kath, the letter k is shown in conjunction with a letter that follows it. There is no necessity for giving an example of the method of joining it to any letter that precedes it, since, as it begins with a straight-stroke, the method of connecting letters with others into whose composition the straight-stroke enters, may be seen from Copy-alips Nos. 59 and 60 (page 261). It may be remarked, for the benefit and satisfaction of such of our readers who may not have met with the word before, that the "Katha" are a fine and
intelligent, but ferocious race of savages that are found in Southern Africa, and who, at times, have given considerable trouble to our settlers and British troops in Cape Colony. The word “Kafir” is also spelt “Kafr” and “Caffra.” Copy-slip No. 77 will also be found useful by the self-teacher, in showing

brought downwards in a slanting direction towards the left. On reaching the line b b, it is turned once more in a loop over the fine down-stroke, and again carried along in a serpentine form from left to right. In the second form the letter is commenced in the same manner, but the down-stroke on reaching

him how the letter f is connected with letters that precede and follow it when it stands in the middle of a word.

The letter z is formed in two ways, as shown in Copy-slip No. 78. The first form consists chiefly of hair-strokes in the shape of the italic printed letter s. It is commenced with a hair-line a little below the line e a, which is carried along in a serpentine form from left to right. The pen is then turned to the left in a loop over the first part of the stroke, and the line is the line b b is turned in a larger loop towards the right, and brought downwards towards and as far as the line h h, the letter being finished with a loop, resembling, in a great measure, the loop of the letter j. In Copy-slips Nos. 79 and 80, examples are given of the letter z in combination with other letters.

We will now say a few words in recapitulation of the instruction in the art of writing, and the directions for forming the small letters of the writing alphabet that have been given in this and
the preceding lessons on Penmanship. In our first lesson, we
devoted to explain to students who are seeking to teach
themselves how to write, or trying to improve their handwriting,
the proper position of the body, the hand, and the pen; and in
subsequent lessons we showed how each letter was formed of
such elementary elements and their modifications, the
proportions of each letter being regulated by horizontal
lines placed at certain distances from each other; thus creating
a system which has never before been attempted in teaching
writing, and which possesses the merit of enabling the self-
teacher to test by actual measurement how much he knows of
the regular proportions of the letters in relation to each other,
which are inclined to the horizontal lines in proper proportion
to the height of each letter or as the leading-strings in
which copies are written may be appropriately termed—and
efforts to write on a blank sheet of paper, with no other
guide to the form, connection, and proportion of the letters than
that which is furnished by memory, of the copies he has written
in lines for practice, and the instructions which have been given
in our lessons.

The copy-slips, numbered from
1 to 6, were traversed by fine diagonal
lines running from right to left, in
a downward direction. These lines
served to show the proper slope or
inclination of the letters for writing.
They are inclined to the horizontal
lines in proper proportion to the
height of each letter, and to one point
below, at an angle of 60 degrees. This
inclination is shown in the
annexed diagram by the diagonal
lines running upwards from the
point b, in the left-hand column of
letters, from left to right, and
crossing the perpendicular line on
the right side of b, in the
right-hand column of letters.

The horizontal lines that cross
the copy-slips from side to side, and which are shown at one
view in the accompanying diagram, are designed, as it has been
told, to fix the proper proportions of the letters in height and
depth. Starting from the centre line c, the line a a above it,
and the line b b below, show the common level of a, a, and
that are written within these lines, and do not extend beyond
then either above or below. The letters that are contained
within the lines a, a, b, b, are n, c, e, i, m, n, o, r, s, u, v, w,
x, or exactly half the alphabet. Of the remaining thirty, six—namely, b, d, h, k, l, t—extend above the upper
common level a a, five—namely, g, j, q, y, z—extend below the lower
common level b b, while the remaining two, p, f, extend both
above a a and below b b. Of the last named thirteen letters, t
is included between the lines d, d, b, b; b, d, h, k, l, between
the lines e, e, f, f; q, between the lines a, a, g, g; g, j, y, z,
between the lines a, a, h, h; f, between the lines k, k, g, g;
and p, between the lines f, f, g. The student is advised to rule a piece
of paper in this manner, and write the alphabet upon it.
He will then have all the letters together at one view, in their
relative proportions. The distances of the lines from the central
line c, on either side of it, are shown by the numbers
annexed to the diagram. Those on the left-hand side represent
the distances in sixteenths of an inch; those on the right-hand
side, in fractional parts of an inch. These are the proper
proportions for large-hand writing; but in small-hand, the space
between the lines a, a, b, b is considerably reduced, while the
length of the letters that extend above a, a, and below b, b,
are greatly extended in proportion, as will be seen from our
future copy-slips in small-hand.

The width of the letters contained within the lines a, a, b, b,
and indeed the width of all letters used in large text, except
i, m, and w, should be exactly one-half of that part of the
diagonal line that is intercepted between them. In the annexed
diagram, the width of the letter c is shown by the line intercepted
between a in the left-hand column of letters, and o, the point in which the line a a is crossed by the diagonal.
It measures exactly seven-twenty-fourths of an inch in width.
The elementary forms of which the small letters of the writing
alphabet are composed, in large-hand writing, are ten in number,

1. The "bottom-turn," which in its simple or modified form
enters into the composition of nine letters, namely, a, b, d, i,
l, q, t, u, and w. Of these i and t are formed of the bottom-
turn, without any modification; while l and l consist of the
bottom-turn slightly modified.

2. The "top-turn," which enters into the formation of three
letters of the alphabet, namely, m, n, and r. This elementary
stroke, unlike the bottom-turn, does not form a complete
letter without some other elementary stroke being joined to it.

3. The "top-and-bottom-turn," which enters into the
composition of six letters of the alphabet, namely, h, i, m, n, y,
and V. This elementary stroke requires no modification.

4. The "straight-stroke," which enters into the formation of
eight letters of the alphabet, namely, g, j, and y; and in
a modified form into the formation of four additional
letters, namely, G, J, and Y.

5. The letter c, which is a complete letter in itself with no
any addition, which, as an elementary stroke, enters into the
composition of four letters of the alphabet, namely, g, d, q;
and in a modified form into the formation of four additional
letters, namely, c, e, s, and x.

6. The elementary looped form turned at the bottom, which
enters into the composition of three letters, namely, g, j, and
y; and in a modified form into the composition of z.

7. The elementary stroke, that completes the formation of
letters, namely, b, v, and w, in combination with the
bottom-turn or top-and-bottom-turn.

8. The elementary stroke that is added to the top-turn to
form the letter r,

9. The "elementary looped form turned at the top, which
enters into the composition of the letter f, which is finished
below the line b, with the straight-stroke. In small-hand
writing, this form is used instead of the straight down-stroke
for those portions of the letters, b, h, and j, which extend above
the line a a.

10. The elementary stroke that may be called a modification
to the top-and-bottom-turn, added to the "straight-stroke," to
form the letter k.

The following table shows at a glance the formation of all
the letters of the alphabet in reference to the numbers attached
to the recapitulation of elementary forms that has just been given:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>5.1</td>
</tr>
<tr>
<td>b</td>
<td>1.7</td>
</tr>
<tr>
<td>c</td>
<td>5.1</td>
</tr>
<tr>
<td>d</td>
<td>5.1</td>
</tr>
<tr>
<td>e</td>
<td>5.1</td>
</tr>
<tr>
<td>f</td>
<td>5.1</td>
</tr>
<tr>
<td>g</td>
<td>5.1</td>
</tr>
<tr>
<td>h</td>
<td>5.1</td>
</tr>
<tr>
<td>i</td>
<td>5.1</td>
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<tr>
<td>j</td>
<td>5.1</td>
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<tr>
<td>k</td>
<td>5.1</td>
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<tr>
<td>l</td>
<td>5.1</td>
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<tr>
<td>m</td>
<td>5.1</td>
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<tr>
<td>n</td>
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<tr>
<td>o</td>
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<tr>
<td>p</td>
<td>5.1</td>
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<td>q</td>
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<td>r</td>
<td>5.1</td>
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<tr>
<td>s</td>
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<td>t</td>
<td>5.1</td>
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<td>v</td>
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<td>x</td>
<td>5.1</td>
</tr>
<tr>
<td>y</td>
<td>5.1</td>
</tr>
<tr>
<td>z</td>
<td>5.1</td>
</tr>
</tbody>
</table>

LE  S  O  N  S  I  N  E  N G L  I  S  H.

DERIVATION: PREFIXES (continued).

Meter, metro, with the signification of "mother," of Greek
origin (μητρα, pronounced meet-e-er, a mother), enacts as the
first two syllables into the word metropolis (μητροπλος, pronounced
met-pol-is, a city), a mother city, the capital of a country, the
chief city of a province.

"By consent of all churches, the preconady in each province
was assigned to the bishop of the metropolis, who was called the first
bishop, the metropolitan."—Barrow.

Micro, of Greek origin (μικρος, pronounced mi-kros, little), is
seen in microcosm (Greek, μικροσμος, pronounced kos-mos, the
world), that is, a little world.

"Because in the little frame of man's body there is a representation
of the universal, and (by allusion) a kind of participation of all the
parts there, therefore man was called microcosmos, or the little world."
—Ralph, "History of the World."

Micro appears also in microscope (Greek, σκωπας, pronounced
skop-as, I look at, see).

"The works of art do not bear a nice microscopical inspection; but
the more helps are used, and the more nicely you pry into natural
productions, the more do you discover of the fine mechanism of
nature."—Berkeley, "Siris."

Mid, of Saxon origin (compare middle), halfway, makes a part
of several English words, as midland, midnight, midday, mid-
ship, midsummer; the meaning of which is very plain. Midright
(rf, rib, Saxon, division) is the disphragm, the skin or membrane
which separates the heart and lungs from the lower belly.
Mid, though belonging to the Saxon, is an Indo-Germanic word. It appears in the Greek, in μουσ (monos), middle; μορ (mor), in the midst of, among; in the Latin, in medius, medio, mediano, the middle, the means, or mediums; in the German mitt, mit, with; in the Sanscrit, madhya.

The term midwife is given, by Richardson, as "med-wife, a woman hired for need or reward." But how does the need distinguish the midwife? Are not all servants hired for need or reward? And do not all professions receive a need or reward?

The proper meaning of "mid-wife" is evidently, from our preceding remarks, medium-wif, a woman who, from having been married herself, which the word wife denotes, becomes useful as a medium or means of assisting other married women at childbirth.

"Nor need I claim the Musea' midstry."
"To bring to light so worthless poetry."—Bp. Hall.

Milo, of Latin origin (mille, a thousand), appears in millennium and its derivations. Millennium (Latin, annus, a year) properly signifies a period of a thousand years.

"When at your second coming you appear,"
"(For I foretell the millenary year)"
"The sharpened abat shall ver the soil no more,"
"But Earth unhidden shall produce her store."—Dryden, "Psalms and Ariadne."

Misc, of Saxon origin, found in the verb to misc, and in the adverb omnis, denoting something wrong, forms a prefix to many words, as miscellaneous, misbecome, misconceive, misjudge, mislike, misrepresent. Mischief (French, achever, to accomplish) is a bad or wicked deed; the second syllable is not the same as our word chief, that is, head. What we now call mischievous was formerly pronounced, according to the vulgar error, mis-chi-vous.

"And every one forth reproaches rife,
Of his mischievous deeds, and sayd that he
Was the disturber of all civil life,
The enemy of peace, and author of all strife."

Spenser, "Faerie Queene."

Miscible is used in the derivative sense of yielding, weakly yielding, and as yielding weakly, so improperly, the notion of impurity lying in the mix.

"Great joy he promised to his thoughts, and new
Schemes in her return, so long delayed;
Yet off his heart, divine of something ill,
Misplace him."—Milton, "Paradise Lost."

Moll, of Latin origin (modus, manner, limit), appears in mollify (Latin, facio, I make), to state with some restriction or qualification; to alter slightly; also in modest, moderate, commodious, commodity, etc.

Mollis, of Latin origin (mollis, soft), appears in mollify, to make soft, to appease, render gentle; mollifier, mollification, mollifiable, etc.

"While the vocal flute,
Or numbered verse, by female voice endeared
Crowns his delight and molifies the scene."—Shakespeare.

Monos, mon, of Greek origin (monos, pronounced mon'-os, alone), gives rise to monachs, a monk, one who lives alone; monachism, the society of monks; monas, a monad, a single object, a unit; monarch (Greek, archon, pronounced ar'-kon, government), one who rules alone; monogamy (Greek, γαμος, pronounced gam'-os, marriage); monoplyse (Greek, μπλα, pronounced po-lle'-o, I sell), to have the sole power of selling; monothelism (Greek, θελος, pronounced the'-os, God), the belief in one God; monomorphic, a word of one syllable.

"To stamp new vigour on the nervous line;"
"In monopolable his thunders roll,"
"He, she, it, and we, ye, they, fright the soul."—Churchill, "Rosewell."

Mort, of Latin origin (mors, death, genitive mortis), forms the basis of mortal and immortal. Mortgage is a dead gage or pledge; that is to say, something is pledged, as what is called deeds or writings, so that it cannot be used for raising money.

"Mortem medium, a dead pledge, mortgage, is when a man borrows of another a special sum,—e., £200, and grants him an estate in fee, on condition that if he, the mortgager, shall repay the mortgage the said sum of £200 on a certain day mentioned in the deed, then the mortgager may re-enter on the estate granted in pledge."—Blackstone.

"Mortmain (Latin, mortus, man, in a dead hand) is explained thus:
"'All purchases made by corporate bodies were said to be purchases in mortmain; for this reason, those purchases were usually made by ecclesiastical bodies, the members of which being professed in orders, were reckoned dead persons in law; and, therefore, holden by them might, with great propriety, be said to be held in mortmain."

Mull, of Latin origin (multa, much), appears in multifarious, of many sorts; multiformal, of many shapes; multiply (Latin, plus, a fold), to take many folds, etc.

"The haughtie lake
The plines wide-braching, falls of water clear,
The multiform glow on Floraslip
Lose all attraction."—Glover, "Leonidas."

Neo, of Greek origin (νεος, pronounced no'-es, new), doubless the same as our new, which thus appears to be Indo-Germanic. Neo forms the first syllable in ecology, or new-science, new-doctrine—terms that might be used as fittingly as the Greek word neology. Neo is found also in neophyte (Greek, φυτος, pronounced fu'-tos), a new-born person, a recent convert.

Nos, of Latin origin, not, stands before words of historical importance, as, non-conformist, non-juror.

"By that Act (the Five Mile Act), passed in the Parliament held at Oxford, October 9, 1665, and entitled, 'An Act for restraining New-conformists (to the Established Church) from inhabiting Corporations,' the non-conforming ministers were prohibited, upon a penalty of forty pounds for every offence, to come, unless only in passing upon the road, within five miles of any city, corporation, etc."—Locke.

Non-juror is a term usually applied to those persons who refused to take the oaths of allegiance to William III. at the Revolution.

"The non-juring prelates were Sancroft, Turner, Lake, Ken, White, Lloyd, Thomas, and Frumpton."—Swift, "History of England."

Obo, of Latin origin (as a preposition, on account of), has the general meaning of towards, and hence of, near, and varies with the word with which it is connected, the meaning of which it sometimes merely strengthens. In object' (Latin, jacie, I throw), to throw before or against, it conveys the idea of obstruction, an idea which it expresses more fully in obstruction (Latin, strino, I build), which, according to its constituents, signifies a building or blocking up. In obiliterate (Latin, lites, an erasure), to blot out; it has an augmentive force. In the matter of its principal, ob comes as, in occasion (Latin, cado, I fall), a suitable fall, a fall before you so as to suit your purpose, something reasonable and convenient, by which you may profit. Ob passes also into of, as in offer (Latin, ferre, I bear). This of must not be confounded with of or signify-sounding, and from found in off-sounding and offspring.

"Our prayer hath
No power to pass; and thou hast made us fail,
As refuse and off-sounding to them all."—Dowce.

"Whether it follows that these were nations not descending from us, but born with us; not our off-spring, but our brethren."—South.

Oct, also octo, of Latin origin (octo, eight), appears in octagen, eight-angled; octosyllable, of eight syllables; octotench (Greek, οκτωτενχ, pronounced tu-te, a fold or volume), the first eight books of the Old Testament.

LESSONS IN DRAWING.—XI.

No one, we presume, will question our statement when we say, that in giving these instructions in drawing, there are two great and important considerations to fulfil, both of which are indispensable and cannot be treated independently of each other: the one is to lay down data or rules for practical use, the other is to direct the pupil in what way he may ascertain for himself the principles upon which rules are founded, as well as to guide him in his method of observation. The root of all knowledge of any real value, is found in the capability of giving a satisfactory answer to the simple questions, why and wherefore. One man, who takes for granted all facts as they are given to him, may gain a great deal of information upon many subjects; another, who stops to inquire into the truth or foundation of those facts—that is, to satisfy himself thoroughly respecting the why and
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therefore—will be the better educated man of the two, and his information, though not so extensive as the other, will be found in every way to be more serviceable to himself and to those who employ him. The latter can boast of possessing a few coins of the true metal; the larger stock of the former is merely electro-plated. After the above remarks, we hope our pupils will be anxious to accompany us into a little inquiry respecting the laws which regulate the disposition of shadows as they occur under various circumstances. The extent of the shadow is ruled by the position of the source of light. On any

Fig. 76.

day at noon, when the sun is high in the heavens, the shadows of our own figures are shorter than in the morning or evening, when the sun is lower; this, then, suggests the consideration, how are we to regulate or decide upon the extent of the shadow of an object in a picture according to the sun's inclination. This may be said to be the statement of the question relating to all shadows under whatever conditions they may be found. We propose now to take it up with reference to a few cases only, as it will be more thoroughly answered in the lessons on Geometrical Perspective. Sometimes the position of the sun may be

Fig. 77.

behind us, at other times before us, and again it may be, as it is technically termed, "in the picture;" that is, the sun is either on our right hand or on our left, meaning by that neither before us, nor behind us: consequently the rays are parallel with the picture. Sometimes the source of light is a lamp or candle, and although the rules for constructing the shadows under this light are very much the same as those we employ for shadows resulting from the effects of sunlight, yet there is this characteristic difference: the sun's rays are always considered to be parallel on account of its remote distance from the earth, whilst the light from a lamp or candle radiates above, below, and on all sides, and consequently the rays are not parallel.

Fig. 78.

angle a b c (45°) may be made anywhere on the ground line, as it is only so placed for the purpose of drawing the dotted lines, d e, f g, etc., parallel to a b, to ensure the given inclination of the sun's rays, by which the extent of the shadows are determined. Our purpose then in introducing this problem is to prove that the edges of the shadows of objects in a horizontal position have the same vanishing point as the lines of the object itself have when in parallel perspective. It will be seen that the shadow, g h, of the upper edge of the wall, h, as well as the wall itself, are directed towards the point of sight, also the shadow of the top of the doorway, and e f, of the end of the wall A, are subject to the same rule. We should like to go

Fig. 79.
further into this very interesting inquiry, but refrain, from a desire not to present too many difficulties at present. Fig. 80 is an example of the rule set forth by Fig. 79. It will be observed that the dotted lines representing the sun's inclination, determine the extent of the cast shadow on the ground; and accordingly to the heights of the buildings, so is the extent of their shadows; the shadow of the chimney is on the roof, which being above the eye cannot be seen. Let us again remind the pupil that the tone of the cast shadow on the ground is darker than the broad shadow on the walls. Observe when the shadow of a perpendicular object is cast horizontally on the ground, and is found to be equal in length to the height of that object, then the inclination of the sun's rays is at an angle of 45º. Therefore, to determine the extent of a shadow caused by the sun's inclination at 45º, we have simply to make the object and its shadow of the same length; should the sun's rays be at any other angle, the method, as shown in the problem Fig. 79, of first constructing the angle, must be adopted. The dotted horizontal retiring lines from the shadows in Fig. 77 and Fig. 78, mean that the vanishing points for the shadow and the sun's direction; whilst the inclined dotted lines from the top of the post to the extremity of the shadow, are drawn from the vanishing point of the sun's elevation, in one case above, in the other below, the line of sight. We merely mention this, and purposely decline giving any further rules at present for the construction of shadows, asking the pupil patiently to wait until a more appropriate place. Cast shadows on perpendicular planes, such as upright walls, will be worked out in detail. As a general rule, we may decide that the working of a shadow should always be with especial reference to the position or inclination of the object upon which it is cast, whether it be perpendicular, horizontal, or inclined, so that the lines of the shadow, though representing the shadow, should also represent the character of the ground, object, or plane upon which the shadow is cast.

LESSONS IN LATIN.—XI.

Substantives of the fourth declension have in the nominative two case-endings, one in us, the other in ets. The nouns which end in us are for the most part masculine; those which end in ets are feminine. With this us, belong to a stem. With us ets belong to the stem. Under us ets, the us are blended the case-endings of the genitive and ablative singular, and the nominative and accusative plural; thus us and ets become ets in the genitive singular; and us becomes ets in the ablative singular; ets and ets becomes ets in the nominative and accusative plural. The fourth conjunction, then, is only a contracted form of the third; contracted, I say, that is shortened, as when and are merged together to form ets, the case-ending of the genitive singular.

FOURTH DECLENSION.
Signis ets in the Genitive Singular.

<table>
<thead>
<tr>
<th>Case</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>us</td>
<td>us</td>
</tr>
<tr>
<td>Nom.</td>
<td>gus</td>
<td>gus</td>
</tr>
<tr>
<td>Acc.</td>
<td>us or us</td>
<td>us</td>
</tr>
<tr>
<td>V.</td>
<td>us</td>
<td>us</td>
</tr>
<tr>
<td>Ab.</td>
<td>us</td>
<td>us</td>
</tr>
</tbody>
</table>

The following words have in the dative and ablative plural ets instead of etsus; namely, hucus, f., a needle; arus, m., a bow; artus, m., a limb; putus, m., a birth or offspring; icus, m., a lake or inland sea; quercus, f., an oak; specus, m., a cave or grotto; tribus, f., a tribe; poes, n., cattle; verus, n., a spit.

As ets belongs to the stem, etsus is the regular form in the dative and ablative plural; but ets has been set aside by the connecting vowel a, as in fructibus, et locis.

**Example.** Fructus, m., fruit; corus, n., a horn.

**Vocabulary.**

- Ambra, -um, biter. 
- Bestia, -m, f., a beast. 
- Evito, 1, m., I avoid. 
- Francus, 3, 1, break, I break. 
- Genus, -ris, n., a race. 
- Gratia, -um, pleasant, thankful. 
- Indulgo, 2, I indulge ets (with the dative). 
- Liberat, adv. willingly. 
- Lucet, -as, m., grieve. 
- Sagitt, -as, f., arrow. 
- Sapiens, sapiens, as an adjective, wise; as a noun, a sage. 
- Succumbere, 1, I yield, I yield to (with the dative).

**Exercise 35.—English-Latin.**

1. Labrus, -us, m., pauper. 
2. Varia sunt genera ets. 
4. Nunc pauperus gratus est ets. 
5. Labrus est mili gratus. 
6. Tidi est ets venemaster ets. 
8. O ets, quam suavis animus pueros decelerat! 
9. Reges non deceleraturus ets pueri. 
10. Simus sunt diversas. 
11. Accepit milias et semenas. 
12. Estina sensum vis magna. 
13. Viri fortissim se dicunt. 

**Exercise 36.—English-Latin.**

1. The feeling of pain is bitter. 
2. Is not the feeling of pain bitter to thee? 
3. The feeling of pain is bitter to all men and to all animals. 
4. The power of grief is great. 
5. The sage is not overcome by the power of the senses. 
6. A brave (fortis) man yields not to grief. 
7. Do brave men yield to the power of the senses? 
8. Do brave men yield more than the gods than overcome the minds of men? 
10. (There) are many kinds of play. 
11. Plays (games) of all kinds are pleasant to boys and girls. 
13. Men are not delighted by boyish plays. 
15. How greatly is grief avoided by children. 
16. Boys delight in bow and arrows. 
17. Girls delight in needles.

There are no adjectives which follow the fourth declension, as there are none which follow the fifth declension. Adjectives follow exclusively the first, the second, and the third declensions. Yet nouns of the fourth and of the fifth declensions are sometimes united with adjectives. In declining nouns and adjectives so united, you must take care to preserve the proper forms of both, and not allow the one to influence the other. I need not repeat the rules for making the necessary distinctions, I only add you to the present instance for practice.

**Nouns and Adjectives of Various Declensions.**

**Example.** Maturus fructus, m., ripe fruit; frequens catus.
LESSONS IN LATIN.

m, a full assembly; matura fiscus, f., a ripe fig; dubile genn, n., a weak knee.

<table>
<thead>
<tr>
<th>Cases</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>maturus fructus</td>
<td>frequentus catus</td>
</tr>
<tr>
<td>G.</td>
<td>maturus fructus</td>
<td>frequentis catus</td>
</tr>
<tr>
<td>D.</td>
<td>maturum fructum</td>
<td>frequentum catum</td>
</tr>
<tr>
<td>Ac.</td>
<td>maturus fructus</td>
<td>frequentus catus</td>
</tr>
<tr>
<td>Ab.</td>
<td>maturum fructum</td>
<td>frequentum catum</td>
</tr>
</tbody>
</table>

Here observe, that the regular form of the dative and ablative plural would be ficusbus or ficibus; but only fiscus is found in good Latin authors, which shows that fiscus, like domus, is a noun which takes of the second as well as the fourth declension.

VOCABULARY.

<table>
<thead>
<tr>
<th>Antecedo, 3, I go before.</th>
<th>Indico, 1, I point out.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atestaneo, 3, I fear.</td>
<td>Supplexe, supply, put.</td>
</tr>
<tr>
<td>Photio, 3, I bend.</td>
<td>Assis, a, um, much</td>
</tr>
<tr>
<td>Premioso, -as, m., a roaring.</td>
<td>Permevo, 2, I move greatly.</td>
</tr>
<tr>
<td>Fuluens, tus, n., lighting.</td>
<td>Prounymo, 3, I fall down.</td>
</tr>
<tr>
<td>Genus (fuscinable in sing. num.), n., a knee.</td>
<td>Resono, 1, I resound, I echo.</td>
</tr>
<tr>
<td>Horribilis, -e, frightful.</td>
<td>Robor, -or, n., strength; also an oak.</td>
</tr>
<tr>
<td>Horribilis, -e, frightful.</td>
<td>Validus, -a, -um, strong.</td>
</tr>
<tr>
<td>Horribilis, -e, frightful.</td>
<td>Vigor, -oris, m., vigor.</td>
</tr>
</tbody>
</table>

EXERCISE 37.—LATIN-ENGLISH.


EXERCISE 38.—ENGLISH-LATIN.

1. The man's knee is strong. 2. Strong knees have vigour. 3. Are thy knees strong? 4. The woods resound with the horrible sound of thunder. 5. The sound of thunder greatly moves the animals. 6. Thunder is feared by strong beasts. 7. I have weak knees. 8. Has your father weak knees? 9. No, my father has strong knees. 10. I am greatly moved by much lightning. 11. The roaring of thunder greatly moves the suppliants. 12. The supplicant points out the beautiful house.

Summus, highest; modius, middle; immus, lowest; reliquis, remaining; ultimus, extremus, last, etc. These adjectives agree in number, case, and gender, though in English they appear to have the force of nouns, and consequently to require the construction of nouns. Thus, the Latins say, summus mons, that is, the highest mountain; meaning, the top of the mountain, the highest part of the mountain, the mountain, that is, where it is highest. I subjoin some instances, with forms for practice.

<table>
<thead>
<tr>
<th>Nouns</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summa aqua, the surface of the water; intima philosophia, the recesses of philosophy; reliquis Egyptians, the rest of Egypt. Decline each of these instances according to their proper models; thus:</td>
<td></td>
</tr>
<tr>
<td>Singular</td>
<td>Plural</td>
</tr>
<tr>
<td>N.</td>
<td>summa mons</td>
</tr>
<tr>
<td>G.</td>
<td>medius mons</td>
</tr>
<tr>
<td>D.</td>
<td>summo monte</td>
</tr>
<tr>
<td>Ac.</td>
<td>summum montem</td>
</tr>
<tr>
<td>Ab.</td>
<td>summum montis</td>
</tr>
</tbody>
</table>

So in English, instead of "the middle of summer," we say, after the Latin manner, midsummer, that is, middle summer; also, mid-day; mid-night; mid-way, etc.

The student is required to find out English words derived from the Latin words just used; and the Latin words that are the sources of derivation of the English words which follow:—

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Acute.</td>
<td>Parturition.</td>
</tr>
<tr>
<td>Gen.</td>
<td>Latin</td>
<td>Domestic.</td>
</tr>
<tr>
<td>English</td>
<td>Acute.</td>
<td>Puerilis.</td>
</tr>
<tr>
<td>Latin</td>
<td>Gen.</td>
<td>Voluntary.</td>
</tr>
</tbody>
</table>

With these English words other English words are connected, so that when you know the import of these, you easily learn the import of the connected or related terms. Thus from the adjective acute comes the adverb acutely and the noun acuteness; with the verb alienate is connected the noun alien; voluptruous has corresponding forms in voluptuous and voluptuounes: grateful also has gratitude and gratefully.

Find the Latin terms which occur in the instructions in the third declension, from which are derived these English words, namely:—

Aerid. | Totry. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adactua.</td>
<td>Terrry (the ly reprensents the Latin facu).</td>
</tr>
<tr>
<td>Aqua.</td>
<td>I do or cause.</td>
</tr>
<tr>
<td>Accius.</td>
<td>To err.</td>
</tr>
<tr>
<td>Acustuc.</td>
<td>To judge.</td>
</tr>
<tr>
<td>Decorous.</td>
<td>To reign.</td>
</tr>
<tr>
<td>Erectuc.</td>
<td>Virtue.</td>
</tr>
</tbody>
</table>

Commit to memory these lines, which comprise the feminine nouns of the fourth declension:—

Feminines: these nouns in us: tribus, acus, portus.

Domus, nurae, oecus, annua; fileus, quomus, ficus, manus.

KEY TO EXERCISES IN LESSONS IN LATIN.—X.

EXERCISE 33.—ENGLISH-LATIN.

1. A soldier ought to fight with a brave mind. 2. Men have mortal bodies, immortal minds. 3. Have not men mortal bodies? 4. I am delighted with the sweet voice of birds. 5. Art thou delighted with the sweet voices of birds? 6. Boys should apply to learning with an eager mind. 7. Why, O boys, do you not apply to knowledge with an earnest mind? 8. The prayer of saints consists in good characters and severe industry. 9. With earnest industry my father applies to literature. 10. Piety is the basis of all the virtues. 11. Thy virtue, O mother, delight me. 12. Brave men are not overcome by severe evils. 13. We do not yield to daring enemies. 14. Every voice (sound) is well heard by thy mother. 15. Thy voices (words), O sister, are sweet to me.

EXERCISE 34.—ENGLISH-LATIN.

THE POPULAR EDUCATOR.

ESSAYS ON LIFE AND DUTY.—III.

TRUTH.

The love of truth is one of the main elements in all honourable characters. To preserve a keen and delicate edge of feeling in their most local and private regards, and to observe the happiness, as well as the excellency of character. Where there is little self-respect there can be little real blessedness, and the consciousness of habitual untruthfulness cannot co-exist with any moral satisfaction in ourselves. To be true, as it ranks us amongst the noblest, so it ranks us with the happiest of men. To be false is not only to be despised, but to despise ourselves.

There is no other passion and prejudice which is associated in existence in all men of that moral sense which is able to discern the true when presented to it, nor will their investigations have been carried on without the discerning of another faculty closely connected with it, and that is a sensation of pleasure in the perception of it.

Truth is meant to meet not only the eye which perceives, but the instinct which admires and approves. In other words, truth means not only a mental perceptivity in us, but has a moral affinity with us. In all human relationships we see how valuable is the possession of a love of truth, and how difficult it is to preserve at all times a strict adherence to its behests.

Unquestionably it is our duty always to be obedient to the truth without dread of consequences. Inasmuch as likes and dislikes may meet us in the way, we shall often have to conquer ourselves. Inasmuch as prejudiced and on one hand we are the truth, and the solicitation of the former may be so strong as to make it very hard work to comply with the commands of the latter. Moreover, to act according to truth brings with it sometimes disadvantage—loss, for instance, of pecuniary profit, or of flattering reputation; but in the end these gains if secured would be counterbalanced by the after-loss of our character and the amount of risk and ruination that upon which we might succeed ultimately as well as our ultimate happiness alike depend.

Lying is of many kinds and degrees, but all lies are hateful and injurious. There is the suppressio veri, or the hiding of truth, the keeping back that which, if the jury knew it, or if our neighbour knew it, would altogether alter the value of the bargain and the complexion of the whole matter; consequently, though in such cases we remain silent, we may yet all the time be denying the truth by the reservation which keeps back that which is essential to its claims. There is also the speaking falsely for the sake of supposed good ends, a doctrine which has been of old defended by some casuists, but which has not one word to be said in its favour, inasmuch as it leaves open to every man's judgment the decision of what is the end will be best; a doctrine apart from all other considerations is only too likely to fall in with his own selfish desires and inclinations. There is no more immoral doctrine than this, as it cuts at the very root of an immutable morality. There is also one more form of falsehood which demands exposure, and that is the acts of the untruth, where the lips indeed are silent, but where the look and the manner give assent to the falsehood. We must ever remember that there is a speech of the glance and the gesture as well as of the lips and the voice, and that it is as base to deceive with the one as with the other.

It is proper, however, to draw a distinction which does seem to exist between the two English words truth and veracity. Truth is always truthful, whether we know it to be so or not; whereas veracity seems to relate to the connection between what a man says and what he means to be true. Two very veracious men may sometimes err from the truth. He may have been misinformed or mistaken; he is veracious in respect to his own consciousness of what was done, whilst in regard to the actual truth of things he is wrong. It is not true that the sun moves round the earth; but astronomers of the Ptolemaic school, who declared it did, were still veracious men. They spoke accurately of the laws of the apparent movement of the sun. Fidelity to truth has much to do with the stability and prosperity of nations. The just payment of bonds, the righteous adjustment of claims, and the earnest adherence to a course of conduct marked by persistent rectitude, constitute one of the surest guarantees of progress. Empires suffer most severely from all fraudulent breaches of trust towards others in the great community of nations. That which is true of peoples is true of indivi-
8. The reflexive pronouns in the imperative of reflexive verbs follow Rule 4 of Sect. XXVI., and Rules 3, 4 of Sect. XXVII., and also § 100 (2) (3).

Assouyez-vous; asseyez-vous; Ne nous assoyez pas.

RéSUMé DE EXempLAIRES.

À qui appliques-tu ?
Je m'occupe de mes affaires.
Je m'adresse à mes amis.
Vous adressez-vous à votre père ?
Je m'adresse à lui (§ 100 (4)).
Comment se porte Monsieur votre père ?
Si je porte passablement bien.
Poursuez-vous vous assoyez-vous ?
Je me sens quand je suis fatigué.
J'oublie pas le temps de m'assoir.
Vous promenez-vous tous les jours ?
Je me promène en voiture aujourd'hui.
Vos siésse promené-tils à cheval ?
N'aiméz-vous pas à marcher ?
J'aime beaucoup aller à cheval.
Aimez-vous à promener ?
Asseyez-vous, s'il vous plaît.
Ne nous assoyez-vous pas ?
Ne nous assoyez-vous pas, il est trop tard.
Combien coûte ce vend-il le yard ?
Je me vingt-cinq francs le mètre.
Comment cela s'appelle-t-il ?
Vous promenez-vous à cheval ?
Comment vous appelez-vous ?

Vocabulary.

Banquier, m., banker.
Cheval, m., horse.
Comment, how.
Drap, m., cloth.
Fatigué, -é, tired.
Partir, to set out.

Exercice 65.


Exercice 66.

1. Does your sister walk every day ? 2. She takes a walk every morning. 3. She likes riding on horseback and in a carriage. 4. What is that little girl called ? 5. She is called L. 6. Is not that gentleman called L. ? 7. No, Sir, he is called G., and his cousin is called H. 8. How is your brother ? 9. My brother is very well, but my sister is not well. 10. How are you doing today ? 11. I am somewhat well to-day. 12. Will you not sit down, gentlemen ? 13. We are much obliged to you, Madame, we have not time. 14. Does that book sell well ? 15. It sells very well. 16. How is that silk sold an ell (Panne) ? 17. It is sold at six francs an ell. 18. Is it fine weather to-day ? 19. It is very fine weather, will you not take a walk ? 20. I have no time to walk. 21. To whom does your brother apply ? 22. He applies to his brother. 23. Is his brother at home ? 24. No, Sir, he is at Paris. 25. When does he intend to go to France ? 26. He intends to go to France in one month. 27. Is your sister to leave to-morrow morning ? 28. She is to leave to-day if (s'il) it is fine weather. 29. What do people say of this ? 30. Nothing is said about it (Sect. XXXIV.).

Section xxxvi.—Reflexive pronouns.

1. The reflexive pronoun is often used in expression possessive, instead of the possessive adjective. In such cases the article takes the place of this adjective before the noun (§ 77 (9)).

Vous chargez-vous les pieds ? Do you wear your feet ?
Je me charge les mains et les pieds. I warm my hands and feet.

2. Se souvenir [2, ir.; see § 62], se rappeler [§ 49 (4)], correspond to the English verb to remember. Se rappeler takes a direct object, that is, no preposition intervenes between the verb and its object, if the same be a noun or a pronoun.

Vous rappelez-vous ces demoiselles ? Do you remember those young ladies ?
Je ne me rappelle pas, I do not remember them.

3. Custom seems, however, to sanction the use of the preposition de between the verb se rappeler and an infinitive.

Nous ne nous rappelons pas d' vous. We do not remember having been acquainted with (Connell), deprived of it.

4. Se souvenir takes the preposition de before a noun or pronoun, as well as before an infinitive.

Vous souvenez-vous de cette affaire ? Do you remember that affair ?
Je ne m'en souviens pas, I do not remember it.
Je me souviens de lui avoir écrit, I remember having written to him.

5. Se cocher corresponds to the English verbs to retire, to go to bed.

Je me couche de bonne heure, I retire early.

6. Se lever [§ 49 (6)] means to rise, to get up.

Je me lève au point du jour, I rise at the break of day.

RéSUMé DE ExempLAIRES.

Vous cochez-vous les ongles ? Do you cut your nails ?
Je me coupe les ongles et les cheveux.

Vous cochez-vous les doigts ? Do you cut your fingers ?
Je me coupe les doigts quand je taille ma plume.

Vous rappelez-vous [§ 49 (4)] vous les malheurs du frère de votre ami ?
Je me rappelle ses malheurs.

Vous souvenez-vous de cela ?
Je n'ai souviens pas de tout. All that he you could recall ?
Nous couchons tous les jours au couche du soleil.

Nous nous couchons de bonne heure que vous—au lever du soleil.

Il se lève à cinq heures du matin, et il se couche à dix heures et demie du soir.

Exercice 67.


* The English a or an before a measure is rendered into French by the article le or la, etc.

EXERCISE 68.
1. Do you rise early when you are well ? 2. When I am well I rise every morning at five o’clock. 3. Do you remember your cousin L. ? 4. I remember him perfectly well. 5. Do you go to bed early ? 6. We go to bed at ten o’clock. 7. Does not the tailor burn his fingers ? 8. He does not burn his fingers, his iron is not warm. 9. Does the carpenter cut his thumb ? 10. He cuts neither his thumb nor his hand. 11. Why do you not warm yourself ? 12. I do not warm myself, because I am not cold. 13. Is it not very cold to-day ? 14. It is not cold to-day, it rains. 15. Does your hairdresser rise at sunrise ? 16. The carpenter rises at sunrise and goes to bed at sunset. 17. Do you rise earlier than I ? 18. We rise every morning at the break of day. 19. Do you cut your hair often ? 20. I cut my hair and my nails every month. 21. Do you remember that getting up early is very well. 22. Why do you not remember him ? 23. Do you cut your fingers when you mend a pen ? 24. I cut my hand when I work. 25. Do you know what you learn ? 26. I do not remember all that (tout ce que) I learn. 27. Do you know if your father is well ? 28. He is very well to-day. 29. Is not your mother well ? 30. She is not very well.

SECTION XXXVII.—USES OF SOME REFLEXIVE VERBS.
1. The verb tromper, conjugated actively, corresponds to the English verb to deceive.
Il trompe tout le monde, He deceives everybody.
2. Conjugated reflectively, so tromper means to be mistaken; literally, to deceive one’s self.
On se trompe bien souvent, One is often mistaken.
3. Emnuyer [§ 49 (3)], used actively, means to weary the mind, to tease, to bore.
Cet homme ennuye ses auditeurs, That man wearies his hearers.
Vous nous ennuyez par vos demandes, You tease or weary us by your questions.
4. S’ennuyer has no exact equivalent in English. It signifies generally to be, or to become mentally weary of any thing or place; to be dull (weary).
Nous nous ennuyons ici, We are weary of being here.
Vous ennuyez-vous à la campagne ? Are you weary of being in the country?
5. Je m’ennue means, in fact, I am mentally weary, I want change, amusement, occupation, etc.
Je m’ennue partout, I find no amusement anywhere.
6. S’amuser answers to the English expressions to amuse one’s self, to take pleasure in, to spend one’s time in, to find amusement in, to enjoy one’s self.
Nous nous amusons à la campagne, We enjoy ourselves in the country.
Vous vous amuses à des bagatelles, You spend your time in trifles.
RéSUMÉ OF EXAMPLES.
On se trompe souvent soi-même en cherchant à tromper les autres. We often deceive ourselves while seeking to deceive others.
Votre commis a trompé-t’il pas ? Is not your clerk mistaken ?
Il se trompe bien rarement. He is very rarely mistaken.
Vous se trompez-vous pas fréquemment ? Are you not frequently mistaken ?
Tout le monde est sujet à se tromper. Every one is apt to be mistaken.
Sa conversation nous ennue. That merchant wearies everybody. His conversation wearies us.
Vous ennuiez vos amis par vos plaintes. You weary your friends by your complaints.
Est-ce que je te ennue pas ? Do you not weary you ?
Vous vous ennuyez chez nous ? You are weary of remaining with us.
Je m’ennue à la ville et je m’amuse à la campagne. I become weary of the city and find amusement in the country. Quel est le plaisir de vous amuser ? In what do you amuse yourself ?
Je m’amuse à lire Paléologue. I am amusing myself in reading German.

VOCABULARY.

Apprend-錫, 4, ir., to learn.
Banquer, m., banker.
Ceruttement, cest, certainly.
Client, m., client, customer.
Demeure, vr., to dwell.
Emuery, 1, to tire.
Langue, f., language.
Malo, s., sick.
Mémoire, m., bill.
Prédéces, 1, to prefer.
Quand, v., when.
Rec-voir, 3, to receive.
Res-enir, 2, ir., to come back.
Récit, m., story.
Tort, m., wrong, injury.
Truemp-er, 1, to deceive.

EXERCISE 69.

EXERCISE 70.
1. Are you not mistaken ? 2. I am not mistaken. 3. Is not the banker mistaken ? 4. He is not mistaken, but his clerk is certainly mistaken. 5. Do you not deceive your friends ? He does not deceive me, he deceives nobody. 6. Are you not wrong to deceive your father ? 7. I do not intend to deceive him. 8. Does not the merchant make a mistake ? He makes a mistake in the bill which he writes. 11. Do you like the country or the city ? 12. I prefer the city; I soon become weary of the country. 13. Does not that child weary you by his questions ? 14. Does not that long story weary you ?

RECREATIVE NATURAL HISTORY.

THE MOLE.

Is this a well-known animal? A countryman will smile at the question; he knows full well the mole-hills which obstruct his scythe in badly-kept meadows, and has often seen the dark culprit gibbeted on the top of a eel’s stick. But how many people in London have seen a mole? There is no Registrar-General who will answer this question, and we therefore promise never again to propose such a query. Is the mole clever or stupid? What do the majority of our readers say? Some declare that “the little gentleman in velvet” is a decided genius, and his less enthusiastic friends claim for him a considerable degree of respect.

The creature has the reputation of being a most skilful engineer, in which he is a self-taught and natural genius; yet he is the least bun of the finest workers in the kingdom. He never has any money, yet always wears a beautiful coat, for which he has no thanks are due to any tailor in Great Britain. The mole is, though small, a great eater, hard work giving him a capital appetite; yet he generally contrives to provide very good dinners at all seasons of the year. The bee-tellers speak of him with respect, though none of his children belong to the “Band of Hope,” nor has he less the house of his maternal. His love for water-drinking amounts to a passion, but this is perhaps not to be accounted among his eminent merits. He meddles little with politics, yet politicians have made use of him, and he has, at once, at least, though without intending it, shattered all the schemes of a famous warrior and statesman. Some men very much dislike him and all his family; but he bears them no malice, and asks only to be let alone. Some charge him with possessing
a fiery temper, and much pugnacity of spirit, but even these people admit that he is a good husband and devoted father.

Such are some of the qualities ascribed to the mole, and we will now take the liberty of looking a little into his mode of life, that we may see whether the truth has been told about him. But first, a word or two respecting his names, which are three in Great Britain, mole, want, and moundswine. The second of these seems to have been derived from the old Danish word, and the third from two Saxon words signifying a "thrower up of mounds." Learned men, of course, call our little friend talpa, and he is thus designated in natural history.

Is the mole a true-born Briton? We venture to answer "yes," but not as a Cornish lapland-fowl how the first mole came into existence, and we must not venture entirely to pass over this wonderful history. The story must be well known to some readers, but these may not object to a repetition, which will bring the tradition to the knowledge of others. Be it then known to all, that many ages ago there lived inCornwall a beautiful damsel named Gwenda. She was fair, as became a Briton, tall, and gifted with a pair of blue eyes of the soft, loving, and poise type. Every unmarried gentleman in Cornwall wished "to make her happy," of course. But Gwenda was so proud of her beauty that she scorned all advances, and for a long time loved her own sweet self only. But at last the hour of her fate came; she fell in love with a famous knight, by name Sir Aymeric. Will our readers believe the astounding statement, that the gentleman did not return the love? Perhaps he did not; but not to love, and consequently longed for beauty; perhaps he wanted a learned lady, who would study with him in winter evenings the poems of the bards and the philosophy of the Druids; perhaps he wanted a musical lady, who would sing soothing ballads to the knight when out of temper through indigestion, or worried with politics; perhaps—but we give up guessing. The simple fact was, that the unwilling Sir Aymeric did not return the love of Gwenda. She, however, did not desert him; she remained by his side, and, at last, not in her sense, her education, or goodness, but in her beauty. A great feast was to be given on a certain day by the Prince of Cornwall, at Tintagel, to which Gwenda, her mother, and Sir Aymeric were invited. The damsel procured the "most lovely" dress which Cornish taste could design, and, thus adorned for heart conquest, took a last look at her mirror before leaving for the feast. She uttered one exulting exclamation of certain triumph, her mother heard, and "bombed" her beautiful daughter might succeed. "I am sure to conquer," was the bold and self-confident answer of the haughty lady. What followed? A piercing scream was heard; the startled mother looked round, and lo! Gwenda had vanished. They "sought for her high and they sought for her low," but Gwenda was never seen again. All Cornwall was in a panic; other fair ladies might disappear in the same unaccountable manner, and the King's small island was surrounded by the nobility, the gentry, and lovers. Was there clue ever discovered? One day, while the old gardener was at work, he picked up a richly jewelled ring, which he knew had belonged to the long-lost Gwenda, and which she had worn on the night of her disappearance. The ring was discovered close to a hillock from which the gardener often saw a mole emerge, and then run up and down the garden path with a strangely melancholy cry. A "wise woman" was called for, but the meaning of the facts was not to be found. It was declared, in mystic words, that Alice had been turned into that very mole, as a punishment for her pride, by the happy spirits of Fairy Land. Such was the origin of the first mole in Cornwall, and this became the mother of all the moles in England. The legend does not inform us where the first gentleman mole came from, and we must leave this matter in a tearing obscurity.

Let us now consider the mole's works and ways. Has the reader ever thought how many thousands of little creatures have known little of the creature's engineering skill. Its fortress resembles some of those ancient camps found in various parts of England, where a central stronghold is surrounded by two or three circles of earthwork. The innermost home of the mole may be called his citadel; round this runs the first circular gallery, bored through the earth by the active engineer. The central house is connected with this first gallery by three roads running from the citadel. Round the first circle stretches a second, and to this four or five roads run from the first gallery. From the second circular work seven or eight tunnels extend far under ground, opening up a large hunting domain to the subterranean Nymrod. Readers will thus see that all the roads are connected with the central house, and form one combined system of animal engineering. One "highway" runs straight from the fort to the extremity of the hunting ground, and in this the trap is set by the experienced mole-catchers. Most of these galleries are just large enough to allow the animal to pass, and the speed with which he can gallop through such close tunnels is amazing.

Experiments were made on this point by a French gentleman, named Le Court, who devoted many years to the study of the mole's habits. He often frightened the creature when feeding by sending the blast of a trumpet into its dining-room. Of course the horrified quadruped set off at full speed through the long tunnels, without care as to the path he would take.

How could the speed be ascertained when the animal was hidden? Le Court and his helpers, having ascertained the direction of the "highway," inserted bits of straw into the long passage while the mole was out feeding, and at the top of each straw was a small paper flag. As the startled creature dashed along the gallery each straw was of course forced aside, and the corresponding motions of the paper banners indicated the pace of the little racer.

The mole, we may well suppose, has a nursery, which he does not place in the citadel, but at a distance, where a special apartment is formed for the education of his five or six babies. When the infants are able to run about there is plenty of playground, the nest being usually at a spot where three or four roads cross. Each reader will now admit the mole to be an engineer; but they may ask, where is the plan? In the first place, it is a patent pickaxe, a shovel, and a boring machine, so beautifully made that the most famous engineers have never been able to equal them. These tools are all combined in one piece, and the reader may see them whenever he takes up a mole. Look at the two fore feet, how like hands they are; see how they are turned sideways, so that as the earth is scooped out it is all drawn to one side. Each infant mole is a bit of a miner. Notice, in the next place, what an admirable miner's dress the mole wears, and how suited it is to his work! As the passages through which he moves are but just the size of his body, rapid motion would be hindered if the earth stuck to the fur. But no soil can cling to a coat which has the softness and smoothness of the finest velvet, combined with a peculiar surface, repelling the most adhesive mould. The mode in which the fur is inserted in the skin is worthy of notice. Each hair grows from the skin in such a direction that the fur will lie even and close, whether rubbed forwards or backwards, without irritating the mole. But while the fur is thus soft and yielding, the skin itself is hard, and so tough that a very sharp knife is needed to cut through it. A tender skin would have been liable to constant injury by friction against rough ground. See, then, how little the little creature is subject to injury from the ground engineer. A hand or foot adapted for boring, scooping, and shovelling back the earth; while the fur and skin are beautifully fitted for subterranean operations.

Has the mole eyes? How do our readers answer the question? The ancient Greeks, Romans, and many moderns, have replied by a "No." Let the reader examine for himself. He will find two little black, shining points deeply fixed in the head, and, however little they may impede the animal's work before a bit of earth, the creature really see by these minute organs? The same question occurred to Le Court, and he answered in the proper way by an experiment. Some moles were placed in disused water-pipes, open at the end. If none of the observers stirred, the animals soon made their escape, but if even a finger was put before the opening, they instantly retreated. This seemed to prove the existence of vision. How, then, will his little organ be able to perform as the human eye? The explanation is easy. There is a species of mole in the South of England which has the eyelids quite closed, and which is of course blind. The ancients were probably acquainted with this mole only, and many of the moderns carelessly applied the observations of the old writers to all kinds of moles. Shakespeare describes the animal as "blind," following the notions of his age. But what can a subterranean worker want eyes for? Perhaps one use may be to give notice to the animal of its approach to the surface, the first gleam of light warning the mole back to deeper recesses. Sometimes, too, our underground labourer does leave his dark caves for a moonlight hunt, his
object being to catch and eat as many fat snails as he can find.

It is during these nightly rambles that the mole is sometimes snappèd up by a hungry owl, in want of a supper for herself and ravenous family. The owl and owlets have, probably, little cause for rejoicing; a severe fit of indigestion must surely be their fate after swallowing the tough skin of the mole.

This animal is a great eater; in what food does he most delight? Earth-worms form the daintiest dinners of the hungry little fellow. But he is a bit of an epicure, objecting to eat the worms until they have been skinned. He is said to perform this operation for himself in the neatest manner. Those who are acquainted with the structure of the earth-worm will not be surprised at the mole's objection to the skin. Even a hungry man would object to a mutton chop with 120 bits of gristle in it. The earth-worm has that number of grizzly rings in its body, and the epicure mole is therefore quite justified in separating them with the skin.

Of course it is very bad for the worm, but then it is very good for the mole.

We have called this quadruped a teetotaller, for in respect to water, the little fellow may well be called "a thirsty soul." So incessant is the desire to drink, that it actually constructs a series of tanks for collecting and holding water, unless a stream or pond be near.

A mole has what may be called "a bit of a temper," and will fight most desperate battles with its own kind. Especially does this occur when one happens to bore into the gallery of another. The two pugnacious engineers meet; there is no room for passing; perhaps neither will go back; all the dignity of mole nature forbids that; and there is nothing left but "a set to." This is no joking matter to either of the warriors, for the mole's bite is like that of a bull-dog, as any reader may test for himself whenever he catches one of our black little friends alive.

Our mole has the character of being an affectionate husband; in truth, many of his most furious battles are fought in defence of widows and orphans. He will often die rather than desert his spouse. The lady mole is sometimes caught in traps, and the devoted husband has been known to perish rather than abandon her. What a nice text this would be for a sermon addressed to certain bipeds!

Politicians have sometimes used the mole in their partisan fights. How so? Surely his name would not make a good party cry; he could never aid in blinding the eyes of voters, nor is he valuable enough for a bribe. Will the reader be kind enough to imagine himself present at a dinner party of Jacobite gentlemen in the reign of Queen Anne? What toast is that which excites such upbraiding applause? They all drink it; every glass is emptied at the words, "Here's to the little gentleman in velvet." What can be meant? One of the party explains that "the little gentleman" refers to the mole which raised the hill against which the horse of William III. stumbled, breaking the royal rider's collar-bone, and thus causing the death of the king. The delighted Jacobites expressed their frantic joy by thus toasting the unknown and unconscious mole. What if the very animal which raised that hillock had been discovered? Surely he would have been feasted on the fattest earth-worms off silver plates while living, would have been embalmed when dead, and preserved as a precious mummy in a golden shrine with rushlights burning round it day and night.

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Sectional View of a Mole's Nest and the Subterranean Galleries and Tunnels Surrounding It.

Here some may turn from politics to more prosy matters, by asking whether the mole does not do a great deal of mischief. The farmers certainly bring heavy charges against him, but these accusations may be reduced to two—eating or injuring the roots of crops, and disfiguring the meadows by the numerous "hills" which the busy animal throws up. This last result would be in reality a benefit; if the agriculturist would level the hillocks, and thus distribute a surface-dressing of rich soil over his land. The reader will see how small are the evils produced by the mole.

A war of extermination has, however, long been waged against our active engineer. In this contest mole-catchers are the field-marshals, the artillery consisting of cleverly devised traps, which only moles of first-rate talent are able to avoid. Great has been the slaughter of the quadrupeds; one "catcher" summed up his own slain at 40,000 moles, and even their enthusiastic historian, Le Court, captured 6,000 in five months. The mole has, we think, made a good fight for life, or not a single one of his race would be now alive. He seems still determined to keep up the "battle of life," and has not given the slightest hint of surrender, or even of emigration. We cannot help honouring such pluck, and wish him all the success he deserves.
LESSONS IN GEOMETRY.—XI.

PROBLEM XXVIII.—To draw a triangle of which the base, the sum of its remaining sides, and one of the angles at the base are given.

Let the straight line $a$ represent the length of the base of the required triangle, $b$ the sum of its remaining sides, and the angle $c$ one of the angles at its base. Draw any straight line, $x y$, of indefinite length, and at any point, $d$, in it, make the angle $y d e$ equal to the given angle $c$. Then set off $d e$ equal to $a$ along $d y$, and $d o$ equal to $b$ along $d e$, and join $e f$. At the point $f$ in the straight line $o f$ make the angle $f e g$ equal to the angle $d e f$, producing $f h$, if necessary, until it meets the side $d o$ of the triangle $d o f$ in the point $h$.

The position of the point $h$ in the straight line $d g$ may also be found by bisecting $f g$ in $e$, and drawing $e l$ perpendicular to $f g$, and cutting $d o$ in $h$.

PROBLEM XXIX.—To draw a triangle having its angles equal to the angles of a given triangle and its perimeter, or the sum of its three sides, equal to a given straight line.

Let the straight line $a b$ represent the length of the perimeter, or sum of the three sides of the required triangle, and $c d e$ the given triangle to whose angles the angles of the required one must be equal. At the extremity $a$ of the straight line $a b$ make the angle $b a f$ equal to the angle $b d c$ of the triangle $c d e$, and at its extremity $b$, the angle $b a g$ equal to the angle $b d c$. Bisect the angles $b a f, b a g$ by the straight lines $a h, a k$, and let these straight lines be produced far enough to intersect in the point $t$. From the point $t$ draw $l m n$ parallel to $a b f$, meeting $a k$ in $m$, and $l m$ parallel to $b d e$, meeting $a h$ in $n$. The triangle $l m n$ thus formed in the triangle required, for it is manifest that its angles at $l, m,$ and $n,$ are equal to the angles at $c d e$, and of the triangle $c d e$, for the angle $l m n$, by Theorem 2 (page 156), is equal to the angle $b a f$, which was made equal to the angle $c d e$, and the angle $l m n$, by the same Theorem, is equal to the angle $a b g$, which was made equal to the angle $c d e$; and if there be two triangles each one of which has two angles which are equal to two angles of the other, the remaining angle of the one must be equal to the remaining angle of the other, since the three angles of every triangle, whether greater or smaller, are together equal to 180 degrees; and as in the triangle $l m n$ there are two angles $l m, l m n$, equal to the angles $c d e, c d e$ of the triangle $c d e$, the remaining angle $m l n$ of the triangle $l m n$ must be equal to the remaining angle $d c e$ of the triangle $c d e$. Now the side $l m$ is equal to $a b$, because the angle $m l a$ is equal to the angle $d e f, m l a$ being equal to $l a f$ or $a f$, because they are alternate angles, and $l a f$ being the construction equal to $m a h$. For the same reason the side $n l$ of the triangle $l m n$ is equal to $c d e$. Therefore the perimeter of the triangle $l m n$, or the sum of its sides $l, m, n, l$, is equal to the given straight line $a b$.

PROBLEM XXX.—To describe a square that shall be equal in superficial area to the squares of the described on two given straight lines.

Let $a$ and $b$ be the two given straight lines; it is required to describe a square that shall be equal in superficial area to the squares of the described on these lines. First draw two straight lines of indefinite length, $p q, r s$, intersecting each other at right angles in the point $t$. On $t p$ and $t q$ set off $c d, c e$, each equal to $a$, and on $t r$ and $t s$ set off $o c, o c$, each equal to $b$. Complete the squares $c d e, c f k g$, by Problem XVII (page 255) and join $o e$. Upon $o e$ construct the square $g e l m$, also by Problem XVIII. The square $o e l m$ is equal in superficial area to the squares $c d e, c f k g$, described on the given straight lines $a$ and $b$ respectively.

Now at first sight it is difficult for any one who is endeavouring by self-tuition to acquire a knowledge of practical geometry whether for an agreeable change from other pursuits and a useful mental exercise, or to aid him in the pursuit of his calling—and there are many callings, such as those of the carpenter, mason, gardener, wheelwright, etc., in which a knowledge of geometry is indispensable, if he who chooses any one of them as the avocation by which he must earn his daily bread wishes to rise among his fellows, and so deservedly command the reward of his industry and intelligence—may, we say, seem at first difficult to perceive that the large square $o e l m$ is exactly equal in superficial area to the two smaller squares $c d e, c f k g$, taken together. We will, therefore, first give him the means of proving to his satisfaction, and to the rest of the class, by compasses and parallel ruler, that it is, and then endeavour, as in former cases, to deduce from a consideration of Fig. 40 several geometrical facts that may be gleaned from this problem, without the necessity of treating them in separate problems.

And first, for proof positive from ocular demonstration that the area of the large square $o e l m$ is equal to the joint area of the smaller squares $c f k g, c d e$. An inspection of the appended figure, which is drawn on rather a smaller scale than Fig. 40, but in precisely the same proportions, will show the truth of the assertion. The two larger squares are divided into their component parts in the following manner. Through $c$ draw $a b$ parallel to $c m$, meeting $e o$ in $t$, in order to fix the point $t$. Then through $t$ draw $t u v$ parallel to $c e$, and $v w$ parallel to $c g$. Along $t u$ set off $t o$ equal to $c g$, and through $o$ draw $o x$ parallel to $t v o c$, meeting $m l$ in $x$, and through $v$ draw $v w$, parallel to $t u o c$, meeting $o x$ in $w$. Next, for the necessary division of the square $c d e$, through $c$ draw $c z$, parallel to $e o$, and produce $l e$, to meet the straight line $d t$ in the point $y$. If this figure be drawn on a piece of paper, and the squares $c d e, c f k g, c d e$ be cut out and divided, and the pieces put together on the square $o e l m$, so that the pieces numbered 1, 2, 3, 4, 5, in the smaller squares, be placed on the divisions similarly numbered in the large square, it will be found that the area of the large square is exactly equal to the joint area of the smaller squares.

It will be noticed that the straight lines $f q, q s$ in Fig. 40 were drawn at right angles to each other, and that the straight lines $c c, c e$, that were set off along $c q, c s$ are at right angles to each other necessarily. This is the point in the construction on which the solution of the problem depends, whatever may be the length of $a$ and $b$, and to effect it we have only to draw a line equal to $a$, and at right angles to one end, make a line equal to $b$, and join the extremities of the
lines which have been thus put together at right angles. The triangle formed in this manner, as the triangle $CEO$ in Fig. 40, is a right-angled triangle; and as in the case of this triangle it has been shown practically that the square $GLEM$, described on $G$, the side which subtends the right angle $C$, is equal in superficial area to the squares $CDEG$, $CGDE$, $CDGE$, described on the sides $C$, $D$, $G$, which contain the right angle $C$, so it is true that in any and every right-angled triangle the square described on the side which subtends the right angle is equal to the squares of the sides by which the right angle is contained.

But there are yet other facts that may be gathered from an examination of Fig. 40, and a consideration of the dotted lines that form the dotted figure. One of these is that the straight line $CN$ is drawn parallel to $GM$ or $EL$, intersecting the straight line $EG$, in the point $T$, and dividing the square $GLEM$ into the unequal rectangles (see Definition 27, page 53) $TEL, TGMN$. Of these the rectangle $TEL$ is equal to the square $CDHE$, and the rectangle $TNMG$ is equal to the square $CGFK$, as we will proceed to show.

The reader will remember that in Problem XXIV (page 309) it was shown that triangles on the same base and between the same parallels are equal to each other, and that triangles on equal bases and between the same parallels are also equal to one another. Now in the trapezoid (see Definition 31, page 53) $CDHE$, of which the sides $C, D, H, E$ are parallel, there are two triangles, $DHE, GHE$. These triangles stand upon the same base $HE$, and between the same parallels $CD, HE$, and are therefore equal to one another. But the dotted line $HC$ is diagonal of the square $CDHE$, and divides it into two equal parts; therefore the triangle $DHE$ is equal to the triangle $CDE$, or, in other words, the square $CDHE$ is double of the triangle $DHE$, and as the triangle $DHE$ is equal to the triangle $GHE$, the square $CDHE$ is also double of the triangle $GHE$; and this brings us to the fact, that when a square and a triangle happen to be on the same base, and between the same parallels, the square is equal to two sides of the triangle.

Now let us turn to the trapezoid $GLEN$, of which the sides $C, E, L$ are parallel, and which contains the rectangle, or rectangular parallelogram $LEN$ within its limits. In this there are also two triangles, $CEL, LE, GN$, standing on the same base, $EL$, and between the same parallels, the parallel sides $E, L, G, N$, of the trapezoid $GLEN$, and these triangles are consequently equal to one another. Now the rectangle $LE, GN$ is divided into two equal parts by the diagonal $EN$, and the triangle $LEN$ is therefore equal to the triangle $ETN$, or in other words, the rectangle $LE, GN$ is double of the triangle $LEN$, and as the triangle $LEN$ is equal to the triangle $CEL$, the rectangle $LEN$ is double of the triangle $CEL$. And this teaches us that when a rectangle or right-angled parallelogram and a triangle are upon the same base, and between the same parallels, the area of the rectangle is double the area of the triangle.

And as it is true that when a square and a triangle, or a rectangle and a triangle, are upon the same base and between the same parallels, the area of the square or rectangle, as the case may be, is double that of the triangle, so it is equally true that when a square and a parallelogram, or a rectangle and a parallelogram, are upon the same base and between the same parallels, the areas of the square and rectangle, or the areas of the rectangular parallelogram, thus situated, are equal to one another, as may be seen by drawing the straight line $H$, parallel to $EG$, when we have the square $CDHE$, and the parallelogram $CDHE$ on the same base $HE$, and between the same parallels $H, E, G, D$, equal to one another, and by drawing the straight line $LV$ through $L$, parallel to $EG$, when we get the rectangle $LEN$ and the parallelogram $CDH'G$ equal to one another.

Parallelograms also on the same base and between the same parallels are equal to one another, and when a parallelogram and a triangle are on the same base, the area of the parallelogram is double the area of the triangle; and more than this, as triangles on equal bases and between the same parallels are equal to one another, so also rectangles and parallelograms on equal bases and between the same parallels are equal to one another.

But to proceed to show that the rectangle $LEN$ is equal to the square $CDHE$, let us look at the triangle $GHE$, which was proved to be equal to half the square $CDHE$, and the triangle $CEG$, which was proved to be equal to half of the rectangle $LEN$, and compare their sides and angles. On inspecting them we find that the side $EL$ of the triangle $CEL$ is equal to the side $GH$ of the triangle $GHE$, each being also a side of the square $GLEM$, and that the side $CE$ of the triangle $CEL$ is equal to the side $EH$ of the triangle $GHE$, each of them equal to $CEG$, and the angle $CEG$ is bisected by the sides $CE$, $EL$ of the triangle $CEL$, is equal to the angle $GHE$ contained by the sides $GE$, $EH$ of the triangle $GHE$, for each of these angles is composed of a right angle and the angle $CEG$, which is common to both, the angle $CEG$ being composed of the right angle $LEG$ and the angle $ECE$, while the angle $GHE$ is composed of the angle $CEH$ and the right angle $GHE$. Here, then, we have two triangles, each having two sides of the one, namely, $G, H, E$, equal to two sides of the other, $L, E, C$, and the angles contained by these sides equal, namely, the angle $GHE$ to the angle $CEG$; and this being true, it is plain that their bases or third sides are also equal, namely, $H, G, C, L$; and the areas of the triangles are equal, as we may prove practically by cutting out the triangle $CEL$, and turning it, as on a pivot, round the point $E$, until it rests on the triangle $GHE$.

The square $CDHE$ has been shown to be double of the triangle $CEL$, and as things which are double of equal things must be equal to one another, the rectangle $LEN$ must be equal to the square $CDHE$. In the same way it may be shown that the rectangle $TGNM$ is equal to the square $GFKE$, and the learner is recommended to work out the proof of this as a useful exercise.

**READING AND ELOCUTION.**—XI.

**ANALYSIS OF THE VOICE** (continued).

**VII.—RIGHT EMPHASIS.**

**Emphasis** distinguishes the most significant or expressive words of a sentence.

It properly includes several functions of voice, in addition to the element of stress. An emphatic word is not unforcibly distinguished by the peculiar "time," "pitch," "stress," and "inflection" of its accented sound. But all these properties are partially merged, to the ear, in the great comparative force of the sound. Hence it is customary to regard emphasis as merely special force. This view of the subject would not be practically incorrect, if it were understood as conveying the idea of a special force superadded to all the other characteristics of tone and emotion, in the word to which it applies.

**Emphasis** is either "absolute" or "relative." The former occurs in the utterance of a single thought or feeling, of great energy; the latter, in the correspondence or contrast of two or more ideas.

"Absolute" emphasis is either "impassioned" or "distinctive." The former expresses strong emotion, as:

"Foul wizard, avaunt!"

But the latter designates objects to the attention, or distinguishes them to the understanding, as:

"The fall of man is the main subject of Milton's great poem."

"Relative" emphasis occurs in words which express comparison, correspondence, or contrast, as:

"Cowards die many times; the brave once."

**Rules on Emphasis.**

**Rule 1.**—Exclamations and interjections usually require "impassioned" emphasis, or the strongest force of utterance, as in the following examples:

Woo! to the traitor, WOE!

UP! concedes, UP!

AWAKE! ARISE! or be for EVER FALLEN!

Ye tearful!

Moltenless torrents! silent cataclysms!

Who made you glorious as the gates of heaven,

Beneath the keen full moon—

Goo! GOD! the torrents, like a shout of nations,

Utter; the ice-plain bursts, and answers, GOD!

The silent snow-mists, hoisting, thunders, GOD!

* Three degrees of emphasis are usually thus denoted in type: the first by Italic letters; the second, by small capitals; and the third, by large capitals. Thus, "You shall DIE, bare foot!" and that before you cloud has passed over the sun!"—Sometimes a fourth, by Italic capitals, thus:—NEVER, NEVER, NEVER!
LESSONS IN MUSIC.

Rule 2.—Every new incident in a narration, every new object in a description, and every new subject in a didactic passage, requires "distinctive" emphasis, or a force of utterance sufficient to render it striking or prominent.

Examples.

Their frail bark was, in a moment, secret, and a watery grave seemed to be the inevitable doom of the whole party. The eye rested with delight on the long, low range of beautifully tinted clouds, which skirted the horizon. The power of faith was the subject of the preacher's discourse.

Rule 3.—All correspondent, and all antagonistic, or contrasted words, require a force sufficient to distinguish them from all the other words forever to countenance, and to make them stand out prominently. When the comparison or contrast is of equal force in its constituent parts, the emphasis is exactly balanced, in the words to which it is applied: when one of the objects compared or contrasted is meant to preponderate over the other, the emphasis is stronger on the word by which the preponderance is expressed.

Examples.

The gospel is preached equally to the rich and to the poor. Charity is the mark of wise men, and the idol of fools. The man is more knave than fool.

Exercises in "Relative" Emphasis.

Virtue || is better than riches. Study || not so much to show knowledge, as to acquire it. What went out from us, but they were not of us. || He that cannot bear a jest, should not make one. It is not so easy to hide one's faults, as to mend them. || That death and life will go together. You have done that || you should be sorry for. Why beholdest thou the mote || that is in thy brother's eye, but considerest not the beam || that is in thine own eye?

As it is the part of justice || never to do violence, so it is the part of modesty || never to countenance vice. A friend || cannot be known || in prosperity, and an enemy || cannot be hidden || in adversity.

Emphatic clauses (those in which every word is emphatic) are sometimes pronounced on a lower, sometimes on a higher key, but always with an intense force.

Examples.

Heaven and earth will witness—

Is it Rome! Is must! Fall—that we are innocent.

This state had then not one ship—No! not one! One Wall.

But youth, it seems, is not my only crime: I have been accused || of acting a theatrical part.

As to the present ministry, I cannot give them my confidence. Pardon me, gentlemen: Confidence is a plant of slow growth.

General Remark.—Young readers are commonly deficient in emphasis, and hence feeble and unimpressive, in their style of reading. Students should exert much vigilance on this point. At the same time, an overdose emphasis is one of the surest indications of defective judgment and bad taste. Faults which result from study are always the most offensive.

Exercises.—The Duty of a True Christian.

The true Christian must show that he is in earnest about religion. In the management of his worldly affairs, he must let it clearly be seen, that he is not influenced by a worldly mind; that his heart is not upon earth; that he pursues his worldly calling from a principle of duty, not from a sordid love of gain; and that, in truth, his treasures are in heaven. He must, therefore, not only "provide things honest in the sight of all men;" not only avoid everything which is fraudulent and unjust in his dealings with others; not only openly protest against those impious practices which the custom of trade too frequently countenances and encourages, but also, he must "let his meeknesses be known unto all men." He must not push his gains with seeming eagerness, even to the utmost lawful extent. He must exercise forbearance. He must be content with moderate profits. He must sometimes even forego advantages, which, in themselves, he might innocently f alst, lest he should seem to give any ground for suspecting that his heart is secretly set upon these things.

Thus, also, with respect to worldly pleasures: he must endeavour to convince men that the pleasures which religion furnishes, are far greater than those with which the world can yield. While, therefore, he conscientiously keeps from joining in those trifling, and too often, profane amusements, in which ungodly men profess to seek their happiness, he must yet labour to show, that, in keeping from these things, he is, in respect to real happiness, so loser, but even a gainer by religion. He must avoid everything which may look like worldliness and gloom. He must cultivate a cheerfulness of spirit. He must endeavour to show, in his whole deportment, the contemplative and tranquility which naturally flow from heavenly sensations, from a mind at peace with God, and from a hope full of immortality.

The spirit which Christianity exalts and produces is so widely different from the spirit of the world, and so immensely superior to it, that, as it cannot fail of being noticed, so it cannot fail of being admired, by those who are driven to the present. Do you ask in what particulars this spirit shows itself? I answer, in the exercises of humility, of meekness, of gentleness; in a patient bearing of injuries; in a readiness to forgive offences; in a uniform endeavour to overcome evil with good; in a self-denial so consistent and constant, as in solemnness and courtesy; in an unswerving regard to or to speak evil of others; in a forwardness to defend, to assist, and to commend them, in loving our enemies; in forgiving them that curse us; in doing good to them that hate us. These are genuine fruits of true Christianity.

In Christian morals, he light shines before men, by discharging in a faithful, a diligent, and a consistent manner, the personal and particular duties of his station.

As a member of society, he must be distinguished by a benevolent and an unimpassioned conduct; by a simplicity and an unassumingness of character, free from every degree of guile; by uprightness and fidelity in all his engagements.

As a neighbour, he must be kind, friendly, and accommodating. His discourse must be mild and inoffensive. He must labour to prevent questions which may produce the occasion for offensive remarks.

In short, he must be "ready for every good work;" and all his dealings with others must show the heavenly principle which dwells and works in his heart.

Exercises.—The Benefits of a Popular Government.

The real glory and prosperity of a nation does not consist in the hereditary rank or titled privileges of a very small class in the community; in the great wealth of the few, and in the great poverty of the many; in the splendid palaces of nobles, and the wretched huts of a numerous and half-sated pauperism. No! such a state of things may give pleasures to proud, ambitious, and selfish minds, but there is nothing hereon in which the eye of a patriot can rest with unmixed satisfaction. In his deliberate judgment:

"It forces the land, to hastening ill a prey,

Where wealth accumulates, and men decay;

Princes and lords may flourish or may fade;

A breath can make them, as a breath has made;

But a bold and constant spirit, that never can be stopt."

It is an intelligent, virtuous, free, and extensive population, able by their talents and industry to obtain a competent support, which constitutes the strength and prosperity of a nation.

It is not the least advantage of a popular government, that it brings into operation a greater amount of talent than any other. It is the acknowledged producing by every occurrence of talents awakens the dormant energies of the human mind, and calls forth the most splendid and powerful abilities. It was the momentous question, whether your country should be free and independent, and the declaration that it was so, overruled, outlived, and generals, whichRanges all future ages will delight to honour.

The characters of men are generally moulded by the circumstances in which they are placed. They seldom put forth their strength, without some powerful exciting motives. But what motives can they have to qualify themselves for stations, from which they are to be ever excluded on account of Peruvian extraction? How can they be expected to prepare themselves for the service of their country, when they know that their services would be rejected, because, unfortunately, they do not from the established religion, and have no interest to stow it.

But in a country like ours, where the most enterprising individuals in society may, by their talents, virtue, and public services, rise to the most honourable distinctions, and attain to the highest offices which the people can give, the most effectual inducements are provided. It is indeed true, that only a few who rise in the most distinguished rank, can obtain the prizes. But, although many come short, yet the services and the progress which they make, are not lost either on themselves or society. The suitableness of their talents and characters for some other important station may have been perceived; at least the cultivation of the offices, and the efficient regulations, may render them active and useful members of the community. Those are some of the benefits peculiar to a popular government; benefits which we have long enjoyed.

LESSONS IN MUSIC.—VI.

For Exercise 15, in the following page, the pupil will pitch his own key-note as indicated in the title. If, however, he has not got a tuning-fork, let him take down at a rather low pitch. A stroke beneath two or more notes shows that they are to be sung to one syllable of the words, or, "slurred." The comma after a note gives
it a quarter of an aliquot; the dot and comma, three quarters. Be careful in singing this correctly. Exercise yourself in singing the two notes, first with a dot only, and then with a dot and comma between them. The tune is Mr. Burnet's copyright. It may be found harmonised for four voices in "People's Service of Song." All the early exercises in this course are given in two-part harmony, because we are persuaded that, by two-part harmony, the ear is best taught to understand that which is more complex. These exercises should be sung by "equal voices;" that is, by two male voices, or by two female or children's voices. It will not sound quite so well if the air (or upper part) being sung by a female voice, the lower part is sung by a male, for the male and female voice are naturally an octave apart, and the intervals cannot be so "close" and sweet.

When you have traced and sol-fa'd this tune from the modulator perfectly, your next step will be to "figure" it; that is, sing it to the words "one, two, three, four, five, six, seven, eight; one, two, three, four, five, six, seven," etc. As you know these words very familiarly, your attention will not be disturbed by them (as it might be by other words), while you try to strike the intervals correctly, without that help to the memory which the sol-fa syllables give. You may afterwards sing the words; but remember that this tune must be sung with spirit (abrupt decision), or not at all. A curve over or under two or more notes, indicates a slur. In previous exercises we have had a black note (crotchet) to correspond with an aliquot or pulse of the measure. In this tune we have used an open note (a minim) for the aliquot. We prefer using the crotchet as the standard aliquot; but, as it is not always so used, we have made this change to indicate that fact. It makes no difference to the music. There are still four pulses to the measure, and they move at the rate indicated by the metronome.

Exercise 15.—GRIFFIN. Key F. Metronome, Minim = 58.

(Music by H. Burnet, Esq., of Manchester. Words by Longfellow.)

Dust thou art, to dust returnest,
Life is real, life is earnest,
And the grave is not its goal,

Was not spoken of the soul.

Funeral marches to the grave.

2 Not enjoyment and not sorrow
Is our destined end or way,
But to act that each to-morrow
Finds us further than to-day.

3 Art is long, and time is fleeting,
And our hearts, though stout and brave,
Still, like muffled drums, are beating
Funeral marches to the grave.

4 Trust no future, how e'er pleasant;
Let the dead past bury its dead;
Act, act in the living present;
Heart within, and God over head.

5 Let us, then, be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labour and to wait.

The proper management of the voice in singing is of great importance, and will require a few suggestions from us. First, notice that a sound of the voice in singing is distinctly held and continues the same from the beginning to the end. It is thus distinguished from the speaking voice, each sound of which has a change in it called an "inflection." A sound of the singing voice is commonly called a "note"—though the word note is more properly limited to the mark upon paper—the sign of a sound. With a violin you can produce either a "note" or an "inflection." Press your finger steadily on the upper part of a string, while you draw the bow, and that will give you a clear and beautiful note. But if, instead of that, you move your finger up or down the string, while you draw the bow, that will give you an inflection. You perceive, therefore, that a note ought to have nothing of the inflection about it—no "scraping" up or down as some sing—but it should be clear, steady, and distinct.

To produce a good note, the singer should be in an easy posture, with his head upright and his shoulders back, so as to allow the muscles of the chest and the larynx (that little box in the throat which we can feel with our fingers) to have free movement. His mouth should be moderately open. His tongue should lie down, just touching the roots of the lower teeth; and his lips should have the position most easily explained by referring to that of a gentle smile, but really expressing no smile, and giving no emotional expression. Some teachers require a small cork of the thickness of a little finger, or the little finger itself, to be placed between the back teeth during the earlier exercises. We have a friend who, to improve his voice for speaking, used to read aloud for half an hour before breakfast every morning with a large cork between his front teeth. Of course this did not cultivate his enunciation—his words were curiously pronounced—but it strengthened the larynx and lungs, and prevented his over-exertion of the throat, so that he could speak in public with the greatest ease, and without the slightest fatigue of voice, as we have had ample proof, nearly a whole day long.

The pupil who would learn to sing without fatigue, should practise, for a few minutes every day, the taking a full inspiration into the lungs, and then giving out the air very slowly and steadily. This will give him command of the muscles of the chest. He will be surprised, at first, to discover the difficulty of a slow and steady expiration. But let him persevere, making this the first of his exercises for the improvement of his voice, every morning. The next of his morning exercises should be in singing the chord and scale, holding the notes as long and
steadily as possible, and ascending as high as his voice will allow (with the cork, if necessary, to keep his mouth open), and with the most careful observance of the following directions. Expand the ribs, so that they press against the dress of the sides, and, by drawing in the muscles of the lower belly, keep the ribs thus expanded. This will allow free and easy play to the lungs.

For courses of exercises on these subjects, see the two small books named in Lesson V.

The sounds of the voice, in singing, should be delivered promptly and easily. If the voice is given out carelessly, it comes rough through the throat, and is called guttural; and if produced in a forced manner, it is driven through the nose, and so becomes nasal. Correctness in singing depends upon mental effort, for it is the mind which commands the delicate muscles of the larynx and throat. Lazy singing is always flat and miserable; hence we always sing musically better when our hearts are most engaged in the song.

A note may be loud or soft. The loudness or softness of the voice is called its force. It is very important to cultivate the habit of using a medium force of voice, so that it may be always easy to sing a note or strain more loudly or more softly than the rest. This habit is important to comfort and pleasure in singing, and absolutely necessary for expression and refinement. The medium voice of one person is, of course, different from that of another, according to the size of the larynx and the strength of the lungs.

The suggestions given above must be kept constantly in mind in every daily practice. If you enjoyed the advantage of a private teacher, such points as these would be constantly in his mind, and he would see to it that you observed them. Indeed, one of the chief uses of a private teacher is to keep us to our work. The self-educator, however, must summon to his aid study determination and steady perseverance. A lady went to a distinguished teacher of singing, to receive a course of costly lessons in the art. For a large proportion of these lessons, in the early part of the course, he did not permit her to sing a single note, but made her simply pace the room, expanding her lungs, and taking breath in every way which was required to give her command of the material of which voice is made. We have heard that even the great public singers do not think of omitting the daily practice of the scale and chord in long "holding" notes, as we have recommended.

Exercise 16.—LEYBURN. Key D. M. Crotchet = 66, beating only twice in a measure.

(An old English Ballad Tune. Words by M. A. Stodart, from "Poetry" by the Home and Colonial School Society.)

If your friend gives you "pattern" with an instrument, tell him to play in the key of B flat (with two flats), or in that of B (with five sharps), whichever he prefers; one is as easy as the other to you. Take care to point on the modulator without book, and to "figure" the tune (one, two, three, four, five, six, seven; one, two, three, four, five, six, etc.) before you sing it to words. Indeed, no song is rightly learned till both tune and words are learned "by heart." You will observe the various "signs of repetition" which are explained in the preceding lesson. A second line of words is given, in each case, for the repetition of the music. The tune is harmonised with a bass in "School Music."
LESSONS IN FRENCH.—XXII.

SECTION XXXVIII.—USES OF REFLECTIVE VERBS (continued).

1. The reflective verb so passer is used idiomatically in the sense of to do without. It is followed by the preposition de, when it comes before a noun or a verb.

Voilà s'eloigner,

Je ne puis m'en passer,

2. To serve [2, ir.; see § 62], to use, also requires the preposition de before its object.

Je ne mers de votre canif,

Je ne m'en ser pas,

3. The second example of the two rules above shows that, when the object of those verbs is a thing, it is represented in the sentence by the pronoun en.

Je m'en serais; je m'en passe,

4. The pronoun used as indirect object of a reflective verb, if representing a person, follows the verb [§ 100 (4)].

Je puis moi passer de lui,

Je t'adresse à vous et à elle,

5. S'endormir [2, ir.; see § 62], to fall asleep, and s'éveiller, to awake, are also reflective.

Je m'endormis aussitôt que je me

II m'endormis six heures du matin, Je m'endors

6. S'approcher, to come near, to approach; s'éloigner, to draw back, to leave, take the preposition de before a noun. Their object, when a pronoun, is subject to Rules 3 and 4 above.

Votre fils s'approche-t-il du feu?

Il ne s'en approche pas,

Il s'éloigne de moi et de vous.

RÉSUMÉ OF EXAMPLES.

Vous servez-vous de ce couteau?

Je ne m'en ser pas, il n'y en pas pour.

De quel couteau vous servez-vous?

Nous nous servons de couteaux d'acier.

Pouvez-vous nous passer de l'argent?

Nous ne nous nous en passer.

Vous passez-vous de votre maître?

Nous ne passons de lui.

Vous adressez-vous à ces messieurs?

Nous nous adressons à eux et à vous.

Vous vous endormez facilement.

Je m'endors de très-bonne heure.

Pourquoi vous approchez-vous du feu?

Je m'en approche parce que j'ai

Nous nous éloignons du feu.

Nous nous en éloignons.

Nous nous approchons de notre père.

Nous nous approchons de lui.

VOCABULARY.

Aussi, also.

Assistante,—as soon as soon as.

Canif, m. penknife.

Démiselle, young lady.

Domestique, m., servant.

Exercice 71.


EXERCISE 72.

1. Will you lend me your penknife? 2. I cannot do without it, I want it to mend my pen. 3. Do you want to use my book? 4. I want to use it, will you lend it to me? 5. What knife does your brother use? 6. He uses his father's knife, and my brother's fork. 7. Will you not draw near the fire? 8. We are much obliged to you, we are warm. 9. Is that young lady warm enough? [Sect. XXXIII. 3.] 10. She is very cold. 11. Tell her (elle-là) to come near the fire. 12. Why do you go from the fire? 13. We are too warm. 14. Does your brother leave the window? 15. He leaves the window because he is cold. 16. To whom does that gentleman apply? 17. He applies to me and to my brother. 18. Why does he not apply to me? 19. Because he is ashamed to speak to you. 20. Do you awake early every morning? 21. I awake early when I go to bed early. 22. Why do you go to sleep? 23. I go to sleep because I am tired. 24. Are you afraid to go near your father? 25. I am not afraid to approach him. 26. Can you do without us? 27. We cannot do without you, but we can do without your brother. 28. Do you want my brother’s horse? 29. No, Sir, we can do without it. 30. Do you intend to do without money? 31. You know very well that we cannot do without it. 32. Is your brother weary of being here? 33. He is not weary of being here. 34. Come near the fire, my child.

REFERENCES.

1. In comparing two numbers or magnitudes with each other, we may inquire either by how much one is greater than the other, or how many times one contains the other. This latter relation, namely, that which is expressed by the quotient of the one number or magnitude divided by the other is called their Ratio.

Thus the ratio of 6 to 2 is 6 ÷ 2, or 3. The ratio of 7 to 5 is 7 ÷ 5, or, as it would be written, the fraction 7/5. The two numbers thus compared are called the terms of the ratio. The first term is called the antecedent, the last the consequent. It will be seen that any ratio may be expressed as a fraction, the antecedent being the numerator, and the consequent the denominator. A ratio is, in fact, the same thing as a fraction. When we talk of a ratio, we regard the fraction from rather a different point of view, namely, as a means of comparing the magnitude of the two numbers which represent the numerator and the denominator, rather than as an expression indicating that a unit is divided into a number of equal parts, and that so many of them are taken.

2. The ratio of two numbers is often expressed by writing two dots, as for a colon, between them. Thus the ratio of 6 to 3 is written 6 : 3; that of 3 to 5, 3 : 5, etc. The expressions $\frac{3}{4}$ and $\frac{5}{3}$, it must be borne in mind, mean exactly the same thing.

A direct ratio is that which arises from dividing the antecedent by the consequent.

An inverse or reciprocal ratio is the ratio of the reciprocals of the two numbers. Thus, the inverse ratio of 2 : 3 is the ratio of $\frac{2}{3}$ : $\frac{1}{2}$, or otherwise expressed $\frac{5}{3}$, which is the same as $\frac{5}{3}$, or otherwise expressed, $\frac{5}{3}$ : $\frac{3}{5}$.

Hence we see that the inverse ratio of two numbers is expressed by inverting the order of the terms when the ratio is

* The reciprocal of a number or fraction is the number or fraction obtained by inverting it. Thus, the reciprocals of $\frac{3}{4}$, $\frac{5}{3}$, etc., are respectively $\frac{4}{3}$, $\frac{3}{5}$. 

POPULAR EDUCATOR.

RATIO AND PROPORTION.

LESSONS IN ARITHMETIC.—XX.
expressed by points, or by inverting the fraction which expresses the direct ratio.

A ratio is said to be compounded of two other ratios when it is equal to the product of the two ratios. Thus, 3 is a ratio compounded of the ratios \( \frac{3}{4} \) and \( \frac{4}{3} \).

8. Proportion.

Different pairs of numbers may have the same ratio. Thus, the ratios \( \frac{3}{4}, \frac{5}{6} \) are all equal.

When two pairs of numbers have the same ratio, the four numbers involved are said to form a proportion; and they themselves, in reference to this relation subsisting among them, are called proportionals. Thus, 3, 4, 12, 16, are proportionals, because the ratio \( \frac{3}{4} \) or \( 3 \cdot 4 = 12 \cdot 16 \).

A proportion is expressed either by writing the sign of equality (=) between the two equal ratios, or by placing four dots in the form of a square, thus: :- between them.

Thus, the proportionality of 3, 4, 12, 16, might be expressed in any one of the three following ways:

\[
\frac{3}{4} = \frac{12}{16}; \quad \frac{3}{4} = \frac{12}{16}; \quad \frac{3}{4} = \frac{12}{16}.
\]

The last expression would be read, 3 is to 4 as 12 is to 16.

The first and fourth terms of a proportion are called the extremes; the middle two, the means.

4. If four numbers be proportionals, the product of the extremes is equal to the product of the means.

Take any proportion, \( \frac{3}{4} : 9 : 12 : \), for instance. Expressing this in the fractional form, we have \( \frac{3}{4} = \frac{9}{12} \), and reducing these fractions to a common denominator \( 12 \cdot 4 \), we get:

\[
\frac{3}{4} \cdot \frac{12}{4} = \frac{3}{4} \cdot \frac{9}{12} = \frac{1}{4} \cdot \frac{9}{12} = \frac{3}{4} \cdot \frac{12}{4}.
\]

Now, 12 and 3 are the extremes, and 4 and 9 are the means, of the given proportion.

Conversely, if the product of two numbers is equal to the product of any other two numbers, the four numbers will form a proportion. Thus, since:

\[
8 \cdot 3 = 6 \cdot 4, \quad 8, 4, 6, 3 \text{ form a proportion;}
\]

or:

\[
8 \cdot 4 = 6 \cdot 3, \quad 8, 4, 6, 3 \text{ form a proportion;}
\]

or:

\[
4 \cdot 8 = 3 \cdot 6, \quad 4, 8, 3, 6 \text{ form a proportion.}
\]

Thus we see that either product may be separated to form the extremes, and that, the order of either the means or the extremes being interchanged, the numbers still form a proportion.

5. If three numbers be given, a fourth can always be found which will form a proportion with them.

This is the same thing as saying that if three terms of a proportion be given, the fourth can be found.

Take any three numbers—3, 4, 5, for instance. Then we have:

\[
3 : 4 :: 5 : \text{fourth term.}
\]

Therefore:

3 \times \text{fourth term} = 5 \times 4 \text{ (since the products of the means and extremes are equal).}

Therefore, dividing both of these equalities by 3—

Fourth term = \( \frac{5 \times 4}{3} \), the required number.

Here we have found the fourth term, but we could, in the same way find a number which would form a proportion with the three given numbers when standing in any of the terms. For instance, for the second term we should have:

\[
3 : \text{second term} :: 5 : 4,
\]

and therefore—

\[
4 \times \text{second term} = 5 \times 3.
\]

Hence, dividing both of these equalities by 4—

\[
\text{second term} = \frac{5 \times 3}{4}.
\]

and similarly for the other two terms.

The most important application of proportion is the solution of examples of this kind, where three terms of a proportion are given to find a fourth. This is what is usually called Rule of Three, which will be dealt with in a future lesson.

6. It is evident that if the two terms of a ratio be multiplied or divided by the same quantity, the ratio is unaltered.

Any set of numbers are said to be respectively proportional to any other set containing the same number when the one set can be obtained from the other by multiplying or dividing all the numbers of that set by the same number. Thus, 3, 4, 5 are proportionals respectively to 9, 12, 15, or to \( \frac{1}{3}, \frac{1}{4}, \frac{1}{5} \).

7. To divide a given number into parts which shall be proportional to any given numbers.

Add the given numbers together, and then, dividing the given number into a number of parts equal to this sum, take as many of these parts as are equal to the given numbers respectively.

Example.—Divide 420 in proportion to the numbers 7, 5, and 3.

\[
7 + 5 + 3 = 15;
\]

and therefore the respective parts are:

\[
\frac{7}{15} \times 420 = 190; \quad \frac{5}{15} \times 420 = 140; \quad \frac{3}{15} \times 420 = 84.
\]

These parts are evidently in the proportion of 7, 5, and 3, and their sum 190 + 140 + 84 = 420.

8. The same method will apply if the given number or quantity is to be divided proportionally to given fractions.

Example.—Divide 266 into parts which shall be respectively proportional to \( \frac{1}{3}, \frac{1}{4}, \) and \( \frac{1}{5} \).

Following exactly the same method as before, the answer, without reduction, would be:

\[
\frac{1}{3} + \frac{1}{4} + \frac{1}{5} \times 266 = \frac{1}{3} \times 266 + \frac{1}{4} \times 266 + \frac{1}{5} \times 266.
\]

Or we may proceed thus:

Reducing the fractions to their least common denominator, which is 60, we get:

\[
\frac{1}{3} \times 266 + \frac{1}{4} \times 266 + \frac{1}{5} \times 266.
\]

Now these fractions are proportionals respectively to 40, 45, 48. Hence we have to divide 266 in the proportion of 40, 45, and 48, to which the required answer is, since 40 + 45 + 48 = 133,

\[
\frac{1}{3} \times 266, \frac{1}{4} \times 266, \text{ and } \frac{1}{5} \times 266,
\]

or 90, 90, and 96.

Exercise 41.

Find in their simplest form:

1. The ratio of 14 to 7, 26 to 9, 8 to 32, 54 to 6.
2. The ratio of 924 to 61, 982 to 69.
3. The inverse ratio of 4 to 12, and of 42 to 6.
8. Find a fourth proportional to 213, 579, and 314129, correct to 5 places of decimals.
9. Divide 100 in the ratio of 3 to 7.
10. Two numbers are in the ratio of 15 to 34, and the smaller is 25; find the other.
11. What two numbers are to each other as 5 to 6, the greater of them being 240.

* * *

As tests by which the correctness of the processes of addition, subtraction, multiplication, and division may be ascertained, were given in Lessons in Arithmetic, II. to V. It has not been thought requisite to give answers to the Exercises already given in abstract Arithmetic. These answers will, however, be supplied to future examples in concrete Arithmetic.

MECHANICS.—IX.

THE STEELYARD.

Another weighing instrument is the steel yard, which (Fig. 54) is a lever of the first order, to the short arm of which is attached at \( \delta \) a hook from which the substance, \( w \), to be weighed is suspended, while on the long arm slides the movable counterpoise \( v \). The object aimed at in this instrument being that a small weight, \( v \), should balance a large one, \( w \), on the hook, it is clear that there must be a corresponding dis proportion in the arms—the fulcrum, \( c \), must be near one of the ends of the beam. Further, since it is necessary that the steel yard should take an horizontal position, both when loaded and unloaded at its hook,
it is essential that its own centre of gravity should lie somewhere on the short arm; for then the counterpoise can balance it when placed in some position on the other arm, such as that marked O, in the figure. For this reason steelyards are made heavy at one end.

To Graduate a Steelyard.—The centre of gravity of the beam being on the hook side of the fulcrum, let it be brought into an horizontal position, no weight being on the hook. Then, as proved in Lessons VII. and VIII., the moment of \( P \) is equal to the moment of the beam, that is, the weight of the beam multiplied into the distance of its centre of gravity from a vertical line through the fulcrum, is equal to \( P \) multiplied into the distance of \( O \) from that line. At the point \( O \) so found draw a line across the beam; that line represents the zero division of the long arm, or the division at which \( P \) produces equilibrium, the weight on the hook being nothing, either, or zero.

Now, supposing that any number of weights, or substances, are hung on the hook, while \( P \) is shifted to the left until, as in the figure, the arm is again horizontal, we have \( P \) multiplied by the distance of its ring from the fulcrum \( a \) equal to \( w \) multiplied by \( a b \) (this line \( a b \) being supposed horizontal), together with the moment of the beam. But \( r \) multiplied by the distance of the zero division from \( a \), is equal to the moment of the beam, as already proved; therefore it follows that \( r \) multiplied by its distance from the zero division is equal to \( w \) multiplied by \( a b \). Now, in order to graduate, let us suppose \( P \) one pound and \( w \) seven. Then we have in numbers seven times \( a b \) equal once the distance of the counterpoise from \( O \), which tells us the exact position of \( P \) for 7 pounds on the hook, namely, that you find it by measuring from \( O \) to the left seven pieces each equal to \( a \). Let \( w \) be 13 pounds or 3 pounds, then in like manner you measure 13 or 3 pieces equal to \( a b \). It thus appears that the subdivisions for the successive poundages are equal to each other; and we may therefore lay down the following rule for graduating a steelyard:

Find first the zero subdivision by bringing the unloaded instrument into an horizontal position by the counterpoise. Put then on the hook, or in the pan, such a number of even pounds as will push the counterpoise to the greatest distance it can go on its arm for even pounds, and divide the distance on the hook by two to get the last position and the zero point into as many equal parts as there are then pounds on the hook. The points of division so obtained are the positions of the counterpoise for the several pounds up to that number.

For half and quarter pounds these divisions must be subdivided; and for greater weights than one pound will balance on the long arm, the counterpoise must be doubled or trebled, etc. If the steelyard be intended for weighing small objects, such as letters, the counterpoise may be ounces, or tenths of an ounce, or even smaller weights, as occasion requires. It thus appears that the construction of a steelyard is very simple, and that any handy person of a mechanical turn may make one of steel or iron, or even of a piece of hard wood, without much trouble.

THE DANISH BALANCE.

This is a species of steelyard, in which (Fig. 55) the fulcrum is movable, and the counterpoise is the weight of the beam acting at its centre. It is often the case that a small weight is suspended from a hook or placed in a pan, at the extremity, \( P \), on the other side of the fulcrum. The question is, how may you graduate such an instrument? To do this, let us suppose the beam to weigh 1 pound, and that 1 ounce of some substance is placed in the scale; then it is evident that the fulcrum, \( P \), must be shifted to the point in which \( P \) is to \( P \) in the proportion of 16 to 1, there being 16 ounces in the pound. This comes to dividing the distance \( P \) (which is known) into seventeen equal parts, as proved in Lesson IV., and taking the first point of division next to \( P \) for the fulcrum. If there be 2 ounces in the pan, \( P \) must be to \( P \) as 16 to 2; that is, you divide \( P \) into 18 parts, and take the fulcrum 2 from \( P \). If there be 7 ounces, you divide into 23 parts, and take 7 next to \( P \); and so on for all the ounces from 1 to 16 you may determine the several positions of the fulcrum, marking them as you proceed. If the beam be of any other weight, you follow a similar course, dividing \( P \) into as many equal parts as there are ounces in the sum of the weights of the beam and substance, and counting off as many divisions from \( P \) as there are ounces in the latter.

From all this it is evident, first, that the subdivisions are not equal to each other, as in the steelyard; secondly, that the operation of graduation is more troublesome than in that instrument. The Danish balance, however, has the advantage of not being encumbered with a movable counterpoise; it carries its own imperial standard weight within itself.

THE BENT LEVER BALANCE.

The principle of this instrument, a species of which is largely sold for weighing letters, may be understood by the aid of the accompanying Fig. 56. On an upright stand is placed a quadrant or arm, \( O \), on which \( C \) is the centre. Bound to this arm is a lever, usually bent, in the figure represented as formed of two arms at right angles to each other. The arm \( O \) is generally of small weight, being lightly constructed, while the other, \( C G \), called the "index arm," is heavily weighted at its lower end, the centre of gravity of the whole lever thus being nearly at some point, \( O \), on that arm. On some substance, \( w \), to be weighed, the zero division of the beam is taken from \( n \), the index moves from its zero point, \( O \), up the quadrant until the weight of the lever acting at \( C \) balances \( w \) at \( b \), that is, until the moment of these forces are equal, which will be when \( w \) multiplied by \( b \) is equal to the weight of the lever multiplied by \( a \). The divisions of the quadrant corresponding to the several weights 1, 2, 3, 4, etc., suspended from \( B \) are, however, best determined by experiment for each weight.

THE LEVER WHEN THE FORCES ARE NOT PARALLEL.

In all the cases of levers and weighing instruments we have so far considered, the forces were supposed parallel—in weighing instruments necessarily so. The treatment of the subject is, however, not complete until the condition of equilibrium is determined for levers the forces acting on which are not parallel. This is the most general case that can occur, and indeed it includes all the others. To clearly understand it, let a lever be defined a mass of matter of any shape which has one fixed point in it. It may be a bar straight, or simply bent, or bent and twisted, or it may be a solid block. So long as there is one point fixed, we may treat it as a lever, that point being the fulcrum.

Moreover, the two forces which act on it are supposed to be such that their directions when produced meet, and that their plane passes through the fulcrum. In cases where the two forces do not meet, or their plane does not pass through the fulcrum, there cannot be equilibrium. For example, the outstretched right arm of a man is a lever, of which the fulcrum is in the right shoulder. Suppose, as he stretches it before him in a horizontal position, one force is applied to the hand obliquely from him towards the left to the ground, while another acts horizontally at his elbow towards the right and at right angles to the arm; these forces cannot meet, and therefore would not under any circumstances keep the arm in equilibrium; further, even were they to meet, they would not so keep it unless their plane passed through the fulcrum in the shoulder socket. Supposing the forces, therefore, to be as described, namely, that their directions meet and their plane passes through the fulcrum,
what is the condition of equilibrium? In order that you may clearly understand this, the knowledge of the following geometrical principles is necessary.

FURTHER PROPERTIES OF A PARALLELOGRAM AND TRIANGLE.

1. The area of a triangle is half that of any parallelogram which has its base for one side, and a line drawn through its vertex parallel to that base for the side opposite. This appears from Fig. 57, where \( \triangle ABCD \) and \( \triangle ABE \) are any parallelogram and any triangle drawn from \( A \) and \( B \) any two parallel lines \( AB \) and \( AC \) to meet the parallel \( DC \) to \( AB \) through \( E \). Fig. 57.

2. The area of a triangle is, in numbers, half the product of its base and the perpendicular from its vertex on that base. This follows from the previous principle. Let the number of inches or feet, say inches, in \( AB \) (Fig. 58) be 6, and in the perpendicular, \( VE \), be 7, and construct on \( AB \) a parallelogram, \( ABCD \), whose sides are parallel to this perpendicular. Such a parallelogram is formed of a rectangle, on account of its angles being right angles. Mark out the inches on \( AB \) and \( VE \), and draw the dotted lines in the figure parallel to \( AB \) and \( VE \), and cutting this rectangle into the smaller ones the sides of which are all equal to one inch, and which are therefore so many square inches. Now there are seven rows of these squares, one row above the other, and there are six squares in each row; and therefore there are altogether 7 times 6, or 42, square inches in the rectangle. But the triangle below the half of the rectangle, is half of 42 square inches, that is, \( \frac{1}{2} \times 42 \), or 21 square inches. To prove the areas of the triangles are equal. Draw \( EF \) and \( GH \) through \( E \) and \( H \), parallel to \( AB \) and \( CD \). Then we have a parallelogram \( EFGH \), which is divided into four smaller ones by \( AB \) and \( CD \). But since \( AB \) is bisected at \( E \), making \( ME \) equal to \( MD \), and therefore \( AE \) equal to \( AF \), the parallelograms \( AEGB \) and \( AHER \) are equal to each other. But, as proved above, the triangles \( ADE \) and \( ABD \) are half of these parallelograms, and therefore are equal to each other, as was required to be proved.

We now return to our Mechanics, applying these geometrical principles to determine

THE MOMENTS IN THE LEVER OF FORCES NOT PARALLEL.

Two such forces, \( A \) and \( O \) (Fig. 60), being supposed to meet at some point, \( A \), to which they are transferred, and there compounded into a resultant \( A \), represented by the diagonal of the parallelogram, \( APOQ \), and \( O \) being a point taken at random on that diagonal, we can prove the following proposition:

The moments of two intersecting forces in reference to any point on their resultant are equal to each other. Now the moment of a force in reference to a point, as has been already explained, is the product of the force by the perpendicular dropped on it from that point. In Fig. 60, therefore, the moment of \( AP \) in reference to \( O \), a point on the resultant, is \( AP \) multiplied into \( OX \), the perpendicular from \( O \) on \( AP \). So likewise is the moment of \( OQ \) in reference to \( O \) equal to \( OQ \) multiplied into \( OY \), the corresponding perpendicular. What I have then to prove is that these products are equal. But they are equal, for, from the second geometrical principle above, the areas of the triangles \( AQO \) and \( AOQ \) are equal to these products; and, by the third, since these triangles stand on the common base \( AO \), and the line \( PQ \) joining their vertices, being a diagonal, is bisected by \( A \), that is, by that base, their areas are equal. The moments of \( A \) and \( O \) therefore, in reference to \( O \) are equal, as I undertook to prove.

Now, to apply this to the lever, using the same figure, let us suppose the two forces to be \( AP \) and \( OQ \), meeting, as I have stated, to be necessary, at some point \( A \). Then it is evident, since there is but one point fixed in the body, that there cannot be equilibrium unless the resultant of \( AP \) and \( OQ \) passes through that point, and is there resisted by the supports that fix it. The fulcrum, therefore, you see, must be on the resultant, and therefore taking \( O \) to be the fulcrum, we must have \( AP \) multiplied into \( OX \) equal to \( OQ \) multiplied into \( OY \), that is, the moments of the forces in reference to the fulcrum must be equal. We arrive thus at the two following modes of state or condition of equilibrium in a lever, either of which may be selected for use as the occasion requires:

1. In a lever, the forces not being parallel, the power multiplied by the perpendicular from the fulcrum on its direction is equal to the resistance multiplied by the perpendicular on its direction.

2. The power and resistance are to each other inversely as the perpendiculars dropped from the fulcrum on their respective directions.

THE WHEEL AND AXLE.

This useful mechanism, of which several forms are given in Figs. 61, 62, and 63, is a kind of lever, or succession of levers, revolving round an axis, from which they project at right angles. Corresponding to this central axle line is a cylindrical axle of some thickness, round which winds the rope which bears the resistance, or weight, to be raised. In Fig. 61 is the simplest form of the instrument, consisting of an horizontal axle and four levers, which are worked in succession by the power. In the ship's capstan for raising the anchor (Fig. 62), the resistance acts horizontally, a man pushing also horizontally at the end of each lever, the power being multiplied in the proportion of the number of levers and men. We have in Fig. 63 another form, where the levers are the spokes of a wheel, and the power \( A \) works in succession on them along the tire as they come round.

The principle in all is the same, whether the resistance and power be parallel or not, and may be understood from Fig. 64, which represents a transverse section, the outer circle being the wheel and the inner the axle. The central line of the axle, which you must conceive perpendicular to the paper at the centre of these circles, is the fulcrum, represented by the point \( O \). The line \( AB \) thus is seen to be the lever, at the ends of which the power, \( P \), and resistance, \( W \), act; and, as already proved, these forces must be inversely as \( OA \) to \( OB \), which lines are the radii of the wheel and axle respectively. When the power and resistance act parallel to each other this is evident; but the same holds good were they not so to act, as in the capstan, where the power is continually changing direction as the sailors go round; for, referring again to Fig. 64, if the power were to act not in the
line a \( r \), but along any other tangent to the large circle, the perpendicular from the fulcrum \( o \) on its direction would still be the radius of the wheel; and, by the general principle of the lever established in this lesson, the power and resistance would be still inversely as the radii of wheel and axle.

A particular form of the windlass, which was first invented in China, and which may therefore be called the "Chinese windlass," is seen in Fig. 64. Here, however, only the axle is represented, consisting of two parts, one thicker than the other, but both forming one solid piece. The winch handle, or wheel, is to the right connected with the larger axle. The weight to be raised is suspended from a hook attached to a pulley, round which the lifting rope passes, one part winding round the thick axle while the other unwinds from the thin. The weight with each turn of the wheel ascends by the difference of the length of the rope that winds and unwinds, that is, by the difference in the circumferences of the two axles. Moreover, since the weight is equally divided between the two ropes which ascend from the pulley, the force acting at the circumference of each axle is half the weight. In the Chinese windlass, the power applied to the winch handle has to balance the difference of the actions of these forces at the axle, or the moment of the power must be equal to the difference of the moments of these forces. But each force being half the weight, its moment is half the weight multiplied by the radius of the axle at which it acts; and therefore their difference is equal to half the weight multiplied by the difference of the radii of the axles, or, which comes to the same thing, to the weight in the circumference of these radii. But the moment of the power being that force into the radius of the wheel, we immediately learn that—

In the Chinese windlass the power multiplied by the radius of the wheel is equal to the resistance multiplied by the difference of the radii of the axles.

THE COMPOUND WHEEL AND AXLE.

This is a combination of wheels and axles, of the kind already explained, made for the same purpose as the similar combination of levers in Lesson VIII., namely, the mechanical advantage of a multiplication of the effect of the power. The wheel and axle being once clearly understood to be a lever, there can be no difficulty in extending the rule which holds good of the compound lever to this combination. In Fig. 65 is such a combination. By cogs or teeth the axle of each wheel works on the circumference of the next succeeding, the power, \( r \), being applied by a rope to the circumference of the first wheel, which does not require teeth. It is evident that, as explained of the compound lever, the condition of equilibrium must be that—

In the compound wheel and axle, the power is to the resistance as the product of the radii of the axles is to the product of the radii of the wheels.

LESSONS IN GERMAN. XXI.

SECTION XL PECULIAR IDIOMS. (continued.)

Was für ein (§ 65, 5), literally, what for a, answers to the English "what kind of," or simply "what" as:—Was für ein Bäcker haben Sie? what kind of a baker have you? Was für ein Messer ist das? what kind of a knife is that? For in this connection, loses its propositional character, and may precede any case, as:—Was für Bäcker sind die? what kind of bakers are there? Was für Bücher haben Sie? what kind of books have you? Mit was für ein Buche Sie sichiaj? with what kind of a book are you employed?

1. Was für is likewise used in the way of explanation, corresponding to "what," as:—Was für ein Mann? what a man! Der Siehe from, or einen jenen, or eines jenen sind ges, the death of every man is certain. Ein Seer muss festen, every one must die.

2. Seer and sejther are often preceded by the indefinite article, and are then, accordingly, inflected after the Mixed Declension. (Sect. X.) They are never used in the plural, as:—Der Seer jet Stocj, or eines jeten Stocjen sind ges, the death of every man is certain. Ein Seer muss festen, every one must die.

3. Als or all, in some elliptical phrases, is equivalent to our "all gone," "no more," and the like, as:—Ein Seet if all, his money is all gone.

4. Mancher answers to "many a," as:—Mancher Strick if unglüudt, many a rich man is unhappy.

5. Sejther is often preceded by the indefinite article, as also by other, as jeteter is like jeten and jetisjer; inflected after the Mixed Declension, as:—Er if einer jeten Wendt mit wüt. he is not worthy of such a (such) life. Als habe ich jene Bäcker, I have no such book.

6. Allies, mancher, sejther (and wether, see R. 1) often drop the last syllable, and are then declined. Thus, after, when it precedes a pronoun, is often abbreviated to all, mancher, when it precedes an adjective, often becomes manch; sejther (as also nether) becomes the singular. Thence it precedes the indefinite article, as also, sometimes, when it precedes an adjective, as:—Als habe ich miten Seet verirrt, I have lost all my money. Als habe ich die Bäcker gelaufen, I have bought all these books. Mancher Seeter Mann if arn, many an honest man is poor. Esett ein Tag if angen, such a day is agreeable. Sejther fä dere Russ, such beautiful paper is clear, etc. It should however be noted, that, as in the above example, the abbreviated form is followed by an adjective, this latter, instead of being inflected after the New Declension (Sect. IX. 2), follows that of the Old (§ 29).

7. Gilischer and etische are regularly declined. They are nearly synonymous, and answer to our words "some, a few," etc., as:—Er nehr nur einige Bäcker, he spoke only a few words. Er hat nehr etische freunde in Derigliana, he has still some friends in Germany. Er wohnt in einer etischen Wohnung in der Stadt, he resides at some, or a little distance from the city. Man gilischer fiert in, after some time he came. Als habe ich etische Bäcker, I still have got some flour. Gilischer fiert zu tre, one fell by the wayside (Mark iv. 4).

8. Great, besides the signification noticed in Sect. XIV. 2, has also an adverbial use, and answers to "somewhat," as:—Er if ein etischer alter, als ihm, he is something (or something) older than I. Als if ein etischer vieh, es is somewhat colder than the day before yesterday.

VOCABULARY.

Blind, blind.

Weisten about it.

Daran, of it, thereof.

Denné, still, notwithstanding.

Günstige, to employ.

Wäter, to lay aside.

Von, of.

Vorsicht, care, precaution.

Gebrauchen, to use.

Bürsten, to form, compound.
LESSONS IN BOTANY. XI.

SECTION XXI.—ON THE NATURAL ORDERS OF FLOWERING PLANTS.

In these papers we shall not enter on the consideration of cryptogamic plants until we have noted the peculiarities that distinguish the different natural orders of flowering plants. Those which possess flowers are far more likely to arouse the young botanist's attention; they are more useful, and are those members of the vegetable world which botanists know most about.

We shall select the Crow-Foot tribe, termed by botanists Ranunculaceae, as the one first to be considered. Let us see, then, in how few words a botanist defines the characters of Ranunculaceae—

RANUNCULACEAE.

Characteristics.—Calyx polysepalus; petals hypogynous, in form various, sometimes absent; stamens ordinarily numerous; anthers usually adnate; carpels one or numerous, never combined; ovule reflexed; embryo dicotyledonous, small, at the base of a horned albumen; fruit asecporous.

A very pretty collection of hard names, is it not? and sufficiently unintelligible. Nevertheless, the reader, we are sure, will admit that if the characters of the Ranunculus, or Crow-Foot tribe, admit of description in so few words, it is worth while to learn the meaning of these words. Well, then, let us set about it; let us analyse the definition clause by clause.

First then: calyx polysepalus; what is the meaning of that? The reader, by this time, knows the meaning of calyx; it is the outside greenish-yellow whorl of which the butterfly flower is composed; and being made up of several parts (septae) in the Greek, and thus a calyx is polysepalus, or many-leaved, the calyx being divided into several petals, the calyx is defined as polysepalus, a somewhat important characteristic thus easily conveyed in one word. Now for the second clause, petals hypogynous. As for the word petal, the reader knows its meaning already; but hypogynous, what is the meaning of that term? Complex words, like complex plants and complex animals, require dissection. Hypogynous being dissected into hypo and gynous, we shall call it. Hypogynous, in the first place, hypo is an Anglicised form of the Greek word hypo, (un-po), under; and gynous is evidently a derivation from another Greek word gynos (gu-no), woman. When, therefore, it is said that the petals are hypogynous, the sense meant to be conveyed is, that they spring from underneath the carpels or female parts of the flower. A very slight examination of a dissected buttercup will show that the arrangement of petals is as
Thus we have almost got through our analysis of the various terms applied to designate the natural order Ranunculaceae.

The reader will admit each term has had a meaning; and that, when understood, these terms are very expressive. Perhaps he may think that the remarks concerning the manner of adhesion and the number of the petals are all well enough, but he may, at the same time, think that the microscopic examination of the seed and its fruits are a little far-fetched. Nevertheless, the reader will find, when his botanical studies have been a little further prosecuted, that the shape and disposition of the embryo constitute some of the most reliable distinctive marks of various orders. We admit, however, that these other grave signs are, for the most part, unavailable to the botanical student, who must content himself with broader characteristics.

**Fruit apocarpous.** This is a proper opportunity for making ourselves acquainted with certain general facts in botany, not necessarily connected with the Ranunculaceae, but which a member of that family of plants may serve to illustrate. Referring to the carpels, or the central or female parts of the flower, these will be found scarcely to alter in appearance, except in size, from the first period of inflorescence to the last, when the perianth or floral envelopes fall off, and the fruit is developed. This fruit, in point of fact, consists of nothing but ripe carpels. In any other addition, the fruit of Ranunculaceae furnishes us with the simplest conditions under which a fruit can exist. All fruit may be defined in strict botanical language to be the mature carpels, and in most instances of all plants, with the fruits ripened, the carpels are the fruits. It would appear that the fruit of a buttercup is said to be apocarpous (Greek, 

*from,* in the sense of apart; and *karpos,* karpos, fruit), or non-adherent. Had the carpels been united, then a syncarpous (Greek, syn, same, together, and karpos, fruit) fruit would have resulted.

Several other distinctive signs of the natural order Ranunculaceae might be mentioned; but even fewer than those already enumerated might serve pretty clearly to separate it from all others. These essential characteristics are the hypogynous stamens and apocarpous fruit. If the student meets with any plants having these characteristics, no matter how different the general appearance of such plant may be from the general appearance of the buttercup, no matter whether the size is different, the shape or colour of the flower different; still it is almost sure to be a Ranunculus. But what is the use of this classification? the reader may ask. Take a supposed case. You are shipwrecked on some unknown island, or you are a farmer in some unexplored land, and you meet with some gay-looking flowers and tempting-looking herbs; the fruit is apocarpous and the stamens are hypogynous; take care of such plants, neither eat them nor permit your cattle to eat them. They are, most likely, poisons, this being a leading physiological characteristic of the tribe; and in certain species the poisonous principle is so extremely virulent that death would speedily result from swallowing a small portion. Such knowledge constitutes the really useful part of botany, not a mere classification of plants without reference to the properties of the members falling under each group.
LESSONS IN PENMANSHIP.

Having thus studied the general characteristics of the Ranunculus order, taking the buttercup as our standard of comparison, let us see how far general appearances may alter without the essential characteristics being interfered with.

What plant is apparently more unlike the buttercup than the Larkspur? Nevertheless, it will be found on dissection to present the essential characteristics of a ranunculaceous plant.

How seemingly different, again, from the buttercup are the hepaticas! Yet their structure at once points out the family to which they belong.

But the Larkspur tribe, including the Delphinium, differ so greatly in appearance from the yellow buttercup, that none but the botanist can see any alliance between them. To his educated eye, however, the affinity is evident. The circumstance in reference to which the term larkspur is given depends upon a curious formation of one of the sepals of the calyx, something like the spur on a bird's foot; but it is a condition of less botanical importance, thus assisting to indicate a genus, not an order; and colour is of still less botanical importance. Inside the sepals or calyx of a larkspur are four petals strangely shaped, two of them having long tails. Thus the larkspur wears a complete mask; but the botanist at once recognises the order by the essential signs of apocarpous fruit and hypogynous stamens; and once recognised, once referred to Ranunculaceae, larkspurs would be justly held in suspicion as poisonous plants, a character which they richly deserve.

Agincourt, 1415.

COPY-SLIP NO. 81.—AGINCOURT, 1415.

Bathurst in Africa.

COPY-SLIP NO. 82.—BATHURST IN AFRICA.

Canada was discovered, 1497.

COPY-SLIP NO. 83.—CANADA WAS DISCOVERED, 1497.

Devonport, a royal dock-yard in Devon.

COPY-SLIP NO. 84.—DEVONPORT, A ROYAL DOCKYARD IN DEVON.

LESSONS IN PENMANSHIP.—XXII.

In our new and advanced series of Copy-slips, in addition to the small letters of the writing alphabet in four different sizes, the reader will find examples of all the various kinds of capital letters in general use, as well as the forms of the numerals or symbols used to denote numbers. It is impossible to classify the different elementary forms of which the capital letters of the writing alphabet are composed, as we did in the case of the small letters given in our first series in large text; but it will be seen, on comparing the different capitals, that the prevailing strokes are the long curved up-stroke with which the letter A is commenced, the thick down-stroke with which it is completed, the thick down-stroke with which the letters B and D are commenced—a stroke which enters into the composition of the majority of the capital letters—and the curved down-stroke turned at the top and bottom, of which the letter C is mainly composed. The learner should practise writing each capital by itself in order to gain facility in forming them, as the sweeping curves of which these letters are composed differ materially from the somewhat stiff and regular succession of up-strokes and down-strokes, all on the same inclination or slope, that he has hitherto been in the habit of making. Instead of giving our readers a simple name or word to copy in the larger hands, or a precept or proverb in the smaller hands, as is generally done in copy-books, we have endeavored to set before him in each copy-slip some fact that he will do well to bear in memory. Thus, after copying Copy-slip No. 81 some dozen times, he will never forget when the battle of Agincourt took place; while Copy-slip No. 82 will, in all probability, cause him to turn to his "Gazetteer" or "Atlas," if he has one, to find whether there be any more Bathursts on the world's surface besides that which happens to be the principal settlement in the British colony, at the mouth of the river Gambie, in Western Africa.
HISTORIC SKETCHES.—XI.

SIMON DE MONTFORT, AND THE FIRST ENGLISH PARLIAMENT.

On the 12th of December, 1264, a great act was done for England, though by the hand of a rebel—Simon de Montfort, Earl of Leicester, son of that stern, capable soldier, and inexorable bigot, who commanded the crusade against the dissenting Albigenses in 1206-8, took upon himself to recognise the existence of a power that was being rapidly developed in this country, namely, the power of the towns and townsmen. He wrote letters in the king's name to all the barons and high clergy, bidding them assemble in Parliament, or in Grand Council, as Parisians called it, and for the first time he invited the counties and all the important towns to send representatives to London, in order to confer with the lords and the clergy upon the affairs of the kingdom. It is much to be regretted that none of these letters are extant. Few historical documents could possess more interest for a people who have for 600 years recognised a political constitution with king, lords, and commons, than the acts by virtue of which borough members first took their seats.

But how came the Earl of Leicester to write the letters on his own responsibility, though in the king's name? and what was the object which the earl sought to attain when he sent the writers out? The writing happened on this wise. Ever since the beginning of the young king's (Henry III.) reign, in 1210, there had been a perpetual insurrection, or in Grand Council, as Parisians called it, and for the first time he invited the counties and all the important towns to send representatives to London, in order to confer with the lords and the clergy upon the affairs of the kingdom. It is much to be regretted that none of these letters are extant. Few historical documents could possess more interest for a people who have for 600 years recognised a political constitution with king, lords, and commons, than the acts by virtue of which borough members first took their seats.

From this reign sprang the novelty of motions known as the Barons' wars. The barons were too nearly equal in rank and power to admit of one set being in the government while the others were excluded, and the matter was made worse by the ill-advised proceedings of those in power, who availed themselves of the opportunity to annoy and oppress their peers. Besides these causes of disunion, there was another in the fact that the French Dauphin (the eldest son of the French king was always called so, from Dauphiné, of which he was Count) claimed the crown by virtue of an invitation he had received from some of the barons, when King John misgoverned the land. The discontent among the English barons made use of the Dauphin for a time, till the growing unpopularity of the French interference obliged the prince to quit England, which would not have had him at any cost.

For the king was but a bridle into the barons' mouths, for they were not disposed to render allegiance to Rome, the Pope declared Henry to be of full age when he was but fifteen, just after the Great Charter, which John had given, had been confirmed by the regent and the barons in a council at Oxford. Soon after this Henry was persuaded to claim the Duchy of Normandy, which his father had lost for the English crown; and the French king (Louis VIII.), who had won it, very naturally refusing to give it up, war was declared, and a campaign followed, which nearly had the effect of losing for England the remainder of her French provinces, Poitou, Gascony, and Guienne; and this, of course, did not tend to make Henry's government more popular. But, to make things worse, just at this time (1231) Henry, who was now twenty-four years old, began to commit an error which Englishmen have never forgiven the kings. He began to cherish foreigners and to neglect his own subjects.

This conduct in the king was soon resented by the English barons, who, for a time, laid aside their intestine quarrels, and openly declared their intention to dethrone Henry unless he dismissed his foreign friends. Divided counsels among the confederates, however, helped Henry, and he took occasion to punish some of the rebels, and to bestow their property on the French allies, in order to make more of them for himself, and more of the Frenchmen. He married, clandestinely it is said, the widow of Pembroke, sister to Henry III., and the prominence which this alliance gave him forced him to take his place in the ranks of English nobles, with an English nobleman's responsibilities and interests.

Bitter and deep was the exasperation of the English, nobles and otherwise; and the irritating method adopted by the king to defray the expenses of his extravagant court, and of his liberality to the strangers, served to heighten it. He exacted loans from private persons whom he never repaid; and he levied taxes and imposed quite regardless of the Great Charter which he had ratified, and which forbade him to do so without consent of Parliament. He was so driven for money after an unsuccessful French war in which he lost Poitou, that he had to sell his jewels and plate to the citizens of London. But things grew ever worse and worse. The clergy were at length disgusted, as well as all other ranks, for the king filled those English benefices which he could control with Italians and Frenchmen.

His chaplain, a foreigner, had seven hundred livings at one time.

At length the people, backs'd up secretly by the nobles, took the matter in hand. They resisted the exactions of the royal officers, and they burned the estates of the foreigners, and the king, knowing who were behind them, was afraid to punish. But resistance unchecked is fatal to authority, as Henry found to his sorrow. Those Frenchmen, who had contented themselves with keeping aloof from the court, and so discouraging the king's practices, now came to the front, having a strong force to support them, in the shape of an angry and jealous town population, besides their own tenantry and dependents. They had attempted, some years before, to get the appointment of the Chancellor, and of the Great Justiciary (this office is now extinct, but at this time it was the highest in the kingdom), into their hands, but they had not succeeded; now they revived the proposition with additions to it, and wished to take all power, direct and indirect, out of the king's hands. In unmeasured terms they reproached him in Parliament for his extortions and his misconduct, and flatly refused to give him any money till he should have sworn once more solemnly to observe the Great Charter. They were not to be taken in by a sham request for the supply under the plea of the king's intention to go to the Crusades. Henry had to swear in the presence of the assembled prelates and barons that he would govern according to the charter before he could touch a farthing of the money of which he stood in so great need.

Chief among the barons who resisted the king was Simon de Montfort, Earl of Leicester. Something has been said of him above, with the beginning of his career; and we have more than once dwelt on the characters and services of his family, and filled in the details which are wanting. His father was a French count, whose name is too well known in the history of religious persecution; his mother was a Montmorency; and he himself, the child of French parents, was also born out of England, so that in no sense was he an Englishman except by adoption. The adoption of England as his country came about in this way. Simon's paternal grandmother was Petronilla, sister and co-heiress of Robert Beaumont, last Earl of Leicester, and husband of the Countess of Warwick. The English barony thus devolved, in default of issue born to Earl Robert, upon the descendants of Petronilla. Simon de Montfort the elder was thus Earl of Leicester, in addition to his other honours, and he did homage for it, and the lands belonging to it, to King John. In consequence of some dispute with that king, he lost both title and lands, and afterwards gave back the lands, he never renewed the title. When the elder Simon died, his son, Simon de Montfort, succeeded him; but the English king refused any longer to receive a homage half of which was owed to the King of France, and Amauri, therefore, was obliged to come to an arrangement by which he should be the liege man of the King of France, while his younger brother Simon was admitted to homage for the honour and lands of the barony of Leicester. Another fact of importance was to make the barons sure of less loss than the Frenchmen. He married, clandestinely it is said, the widow of Pembroke, sister to Henry III., and the prominence which this alliance gave him forced him to take his place in the ranks of English nobles, with an English nobleman's responsibilities and interests.
HISTORIC SKETCHES.

But the marriage, clandestine or not, of a princess of the blood-red was an act which did not escape the constant vigilance already mentioned, pass su8 silicento. The barons were furious that their consent had not been sought; the people beheld in the marriage one more notable instance of the king's partiality for foreigners; and the clergy professed to be scandalized at the marriage of one who, after the death of her husband, had vowed to remain single, and had betaken herself to a convent as a reli
giess. On the bursting of the storm off went Simon de Montort to the court of St. Denis to deliver his final appeal to his enemies say, by the free use of his money, obtained the Pope's consent to what he had done. He came back, was received with great joy by the king, and in 1239 was created Earl of Leicester in his own right. Then came disgrace, for reasons upon which it is difficult to speculate; indeed, there seems at the present day to have been so little reason that it is not unwarrantable to attribute the disgrace to the caprice of the king. Simon de Montfort left the country, and continued to reside abroad for several years. One lesson, and a useful one, he had learned during his short experience of political life, namely, that he should not put his trust in princes. He never forgot that lesson, and the fact that he had to learn it loosened considerably the ties which bound him to the king, though it does not appear to have diminished his sense of the personal duty he owed him. Thus we find him lending his services to Gascons, who had been Henry during the short and inglorious campaign that which king

made against Louis IX. (Saint Louis) in 1242, and in the course of which De Montfort, by his own prowess, saved Henry from being taken prisoner.

For six years after this the Earl of Leicester lived almost all his time abroad. To him, as to the fittest man, was committed the government of Gascony, and the arduous task of fighting and subduing the rebellious Gascons who laid claim to the lands of the Gascons, and the king had recovered the province for Henry, and laid it once more at his feet, it was only to be rewarded with charges of dishonesty and malversation in his office as seneschal, or governor. De Montfort had obliged the king too much, served him too well, and the king resolved therefore to charge him with claims to gratitude together. But for the unanimous voice of the barons against the step, the earl would have been sent to the Tower, and probably thence to his death; but Henry, thwarted in this, abused the earl before the whole court for his misconduct. De Montfort replied by reminding the king of his great services, and of the broken promises with which they had been required.

"I will never keep promises made to a traitor," said the king.

When he was unable to control himself, gave him the lie, and told him that but for his royalty he should not have lived to repeat the word. "Who can believe that you are a Christian?" he continued. "Have you ever confessed?"

"Certainly," replied Henry.

"To what end have you done so, since you have neither repented nor made amends?"

"I never repented of anything so much," returned the king; "as of suffering you to set a foot in England, or to hold land or honour in the realm."

Thus a great gulf was fixed between Henry and his powerful subject, a gulf which, as will be seen, could not be bridged over during their respective lives. De Montfort went his way and Henry went another, and the former waited for an opportunity to settle his accounts with his debtor. Something has been said of the way in which Henry went. Read what an eminent writer, who was not a writer of stones, said of it:---"He aimed at making the crown virtually independent of the barons. The sons of the men who had extorted the Great Charter were told that it was their business to find money for every rash enterprise which the interests of the king's Continental relations and advisers might suggest; but that they must not presume to demand the resignation of one officer of state, or to question the non-payment of fines at important cities and the first places in the state, were committed to the hands of aliens. In all this his connection with Louis IX., whose brother-in-law he became, was certainly a misfortune to him. In France the royal power had during the last fifty years been steadily on the ad
vance; in England it had as steadily receded; and Henry was ever hearing from the other side of the Channel maxims of vigorous and ideas of royal authority which were utterly in

applicable to the condition of Henry."

The straits to which this policy, vehemently opposed as it was by the English barons, brought the king had been partially shown. To the council at which Henry had been represented as having to satisfy the Great Charter before he could get a supply, the barons came armed, and with armed followers. Simon de Montfort was the guiding spirit among them, and his influence

acted upon his suggestions, they demanded, in addition to previous requests of his own kingdom. "The rest of the kingdom should be entrusted to a council of twenty-four barons, who should continue to govern until the flagrant abuses which had crept in should be reformed; and Henry, unable to say "No" with effect, was obliged to listen while the barons fixed the 11th of June (1258) at Oxford for the time and place of a meeting at which arrangements should be made for carrying this resolution into effect. In the interim De Montfort and his friends seized the Cinque Ports (Dover, Hastings, Hythe, Romney, and Sandwich), as a precaution against the king's foreign friends; and when the 11th of June came they appeared at Oxford in arms, as their fathers had appeared at Run
ymede when they presented the Great Charter for signature.

This council, for it was not a parliament, in the modern acceptation of that word, has been called "the mad parliament," for it proposed a resolution which was ever more, than because the measures agreed to by the members were of a monarchical revolu

tionary and "thorough" character than were usually debated in such assemblies. Henry was obliged to submit, and the barons proceeded to draw up their resolutions, called the Pro

visions of Oxford, to the observance of which they required the oath of every lord. By these provisions it was declared that four knights from each county should attend the next parliament in order to represent them; that the duration of the sessions of the parliament in a year; that the election of sheriffs (officers having much more power than than now) should be annual, and by the votes of the freeholders; that the power of the sheriffs should be curtailed; that no new forests should be made; that the revenues of the counties should not be farmed; and, last, not least, that no foreigner should be guardian of any English ward, or be allowed to hold any English castles. It was also arranged, as previously determined, that council of twenty-four barons, with the Earl of Leicester at their head, should take upon themselves temporarily the government of the kingdom. The royal power was completely subverted.

Had the barons only chosen to act unitedly, and with a single eye to what they had undertaken, they would have had the popular feeling wholly with them, and would have been the means of conferring a lasting benefit on their country. But the barons, with such spirit as they had, in the old hatreds were revived, and the cause which the barons in hand was well-nigh lost on the rock on which the friendship of the Earls of Leicester and Gloucester split. Instead of carrying out the much needed reforms, the barons wasted the precious time in striving, after the old fashion, which should be the greater. The king was unkinded, and the twenty-four kings who proposed to reign in his stead could not arrange how they should do so. De Montfort was disliked because he was a foreigner, and because he was too clever for his companions, though as regards his alien origin he set a good example to other aliens by being the first to give up the English castles which had been committed to his care. Unable to settle matters with the other lords, he threw up in disgust and went abroad.

In his absence things grew worse. Little was done by the council of government after the first four months, and the people began to tire of the sorry plight to which Henry was reduced. After three years the king was so strong in friends that he determined to resume his authority, and the barons, deprived of the Earl of Leicester's influence and ability, were without the means of thwarting him. The Pope, too, was induced to annul the Provisions of Oxford, or rather he released from the obligation of their oaths all who had sworn to respect them, and, armed with these powers, Henry, in the early part of 1262, resumed his authority by means of a sort of coup de main.

Simon de Montfort refused to accept the terms offered by the king when he returned to power, and accepted by the majority of the barons. His rival, the Earl of Gloucester, having died
in July of 1262, he returned secretly from his voluntary exile in October following, and immediately assumed the leadership of the barons' party. Patiently, artfully, he laboured to reorganize their ranks, and he appeared at the same moment to their patriotism and their pride when he showed them that the Provisions of Oxford were as important to the nation as the Great Charter itself; and when he pointed out that their deliberate act had been ostentatiously set aside by a foreign bishop whose authority in such matters they could not possibly recognise. Under Leicester's skilful guidance the barons reunited as one man, and demanded in the spring of 1263 a ratification of the Provisions. Henry refused, the barons drew the sword, which was once more the scene of domestic violence and civil war. But the barons had it all their own way. Combining their forces with those of Llewellyn, Prince of Wales, they carried all before them, captured the royal castles, imprisoned the obnoxious aliens who were in posts of authority, and laid that part of the country which was devoted to the king under heavy contributions. London opened its gates, and received them with bells ringing and with fagots tied to the king, who had retired to the Tower, was compelled to be a witness of their triumph. There was no resisting them, and at a Parliament, holden in September, 1263, the Provisions of Oxford were solemnly confirmed by the king, and by Edward, the crown prince (afterwards Edward I.).

In a few weeks only all De Montfort's work had to be done over again. Henry ignored his own solemn act so soon as the barons had been dispersed, and, when the barons, who were once more the French arbitration (the alien question excepted), should be settled. Arrangements were in progress for the new arbitration when the Pope interfered, excommunicated the Earl of Leicester and the barons, and declared Henry free to do as he liked.

The declaration must have sounded rather like a mockery to the king, who was a close prisoner to his own subjects, and it seemed to him that DeMontfort had in some steadiness of knowing that he had nothing to hope for short of success. He did what in him lay towards doing justice to those under him who were most oppressed by the prevailing system. He tried to free the Anglican Church from the tyrannical authority which the Roman Church arrogated to have over her, and he tried to let the voice of all those who were obliged to contribute towards the burden of the state, heard in the councils where their political fate was decided. Nor was it merely because he wanted their help, but because he deemed they were entitled to them as of right, he sent summonses to the chosen of the counties, to the chosen of the towns, and to the chosen of the inferior clergy, to meet him in Parliament assembled. As the exponent of the popular will he could do no less, and he acted as he did out of conviction that he ought to do so.

On 15th December, 1264, the writs went out, directed in the king's name, to the barons and prelates as heretofore, to an extra number of abbots, to the deans of cathedrals, and to every county and every important town. Each county and each town addressed sent up two representatives apiece to the Grand Council of the realm, and their members, in common with the lords of Parliament, settled the affairs of the nation. For himself, De Montfort took nothing; he even allowed another, an Englishman, to be made Grand Justiciary, or chief officer of the kingdom, by a Parliament of his own creation.

What was the upshot of it all? Simply this. The barons, weakened by their own mutual jealousies and distrusts, and by the glittering promises of the king, fell away like water from their best friend, and left De Montfort to fight out their quarrel, not only alone, but against their own opposition. The final result of it all was, that when Simon de Montfort, with his eldest son, and a few good men and true who remained to him, saw that Prince Edward approached his army at Evesham, there was nothing for it but to fight to the death against men whom he himself had trained to discipline and war. "May God have mercy on our souls, for our bodies are Prince Edward's," exclaimed the earl as he saw the enemy advancing against him in force, and he entered on the battle with a full conviction that it was his last.

Henry III, the eldest son of King John, by his second consort, Isabelle of Angoulême, was the eighth king of England after the Norman Conquest, and the fourth of the Plantagenet Dynasty.

Born at Winchester, Oct. 1, 1277
Began to reign Oct. 18, 1276
Revision of Magna Charta
French defeated in a battle called the "Fair of Longchamp," May 17, 1270
French quit England
Grand Council summoned at Westminster
Ratification of previous charters
Marriage of Simon de Montfort to the Countess of Pembroke
Death of Simon de Montfort
Disputes between the King and Great Council
Gold coin first issued in England
The "Mad Parliament" at Oxford
The "Barons' War" commences
Battle of Lewes, May 14, 1264
First regular representative Parliament meets
Battle of Evesham, Aug. 4, 1265
Henry dies at Bury St. Edmunds, Nov. 16, 1272

SYNOPSIS OF EVENTS IN THE LIFE AND REIGN OF HENRY III.

Henry III, the eldest son of King John, by his second consort, Isabelle of Angoulême, was the eighth king of England after the Norman Conquest, and the fourth of the Plantagenet Dynasty.

Born at Winchester, Oct. 1, 1277
Began to reign...
When any part is disordered, a general feeling of depression cannot be shaken off. The sense of touch is allied to this general consciousness, but it differs from it in that its impressions are distinctly referred to the parts from which they proceed—the mind is able to localise them with precision. With regard to the locality of the impressions which proceed from the viscera, we know but little except by reason. Hence ignorant people will refer maladies very wrongly. Thus we hear of heartburn and stitch in the side. Nervous people will attribute rheumatic muscular pain to the lungs, stomach complaints to the heart, and lumbago to the kidneys. This wrong reference is made even when the pain or inconvenience is occasioned by a mechanical cause, as by distension or pressure; but directly the cause of these obnoxious sensations reaches the skin, we can at once fix on the locality. Thus we learn that the sense of touch is distributed over the surface of the skin, and to these extensions of it which proceed from it to line the interior of the passages leading from the exterior of the body. The organ and sense of touch does not go far as we proceed into the interior of the body by these passages. Thus the throat is only sensitive to touch at its top part. The sensation of heat and cold proceeds further down towards the stomach, and below this all localised tactile sensation ceases.

In describing the organ of touch, we must therefore explain the nature of the integument and its appendages, although in so doing we are aware that this integument has many other functions, and is intimately blended with other structures which have nothing to do with the sense, but which we are compelled to notice.
The skin consists of two layers. The outer one is called the cuticle or scurf-skin, and the deeper layer the cutis. The cuticle has neither blood-vessels nor nerves, but consists of a more or less viscous little skin which is formed at the inner surface (epithelium) of the epidermis. The cutis or true skin, on the other hand, is pushed outward as fresh strata are successively formed below them. When first formed, these cells are filled with fluid; they are oval, and longer in the direction perpendicular to the surface than in the other. As they are thrust outward, they become flattened in the contrary direction, so that at the surface they form dry, transparent layers, which are capable of being stripped off and stripped off and without leaving any fragments by the ordinary work and tear to which the outer surface is subjected.

The office of this part of the skin is simply protective; and in relation to this office of clothing and defending the blood-bearing skin, it is found thickest where there is the greatest friction, and thinnest where there is least. It is, however, thin everywhere, varying from 1/3 of an inch in the palm of the hand to .0008 of an inch in less exposed parts. As, however, this scurf-skin is in continual process of being rubbed away, it is not only thicker in much-used parts, but is much more rapidly formed on those parts. Moreover, if any peculiar movements make the wear and tear excessive, unwearyed nature still supplies the demand, and an excessive manufacture of fresh cells is stimulated from below. Thus, in the polishing of Japan-ware, a surface of a smoothness and of the finest fabric of which the skin is sufficiently delicate to produce the shining surface. The finest wash-leather will scratch; and hence women are employed to scour trays, etc., all day long; and yet they never wear down to the true skin so as to make the fingers sore, except during the first few weeks. The provision for the repair of this closely-fitting vestment is even carried beyond this, for if the whole cuticle be stripped off, so as to leave the cutis naked and sore, there is an upward overflowing of fluid from the blood, which forces itself into a scurf-skin.

As this scurf-skin has no blood-vessels running into its substance, it has no means of self-repair; so that in proceeding from the deeper layers to the surface, the cells go through all the processes of birth, death, decay, and dissolution, though the membrane is so thin. Since, also, this skin has no nerves entering it, it can be placed on the body and sewn to it without affecting the sensation of touch must be felt through it in the same way—though in a much more perfect manner—as we feel anything which touches us through our clothing. It will be seen, then, that it must fit very accurately and closely to the sensitive skin beneath, or the sense would be dull and imperfect. The skin below has an immense number of small hillocks, and each one of these is closely surrounded by, and inclosed in, the inner layer of the blood which at the moment is filled with blood. The cutis is stripped off after being long soaked in water, it shows an infinite number of small pits, out of which the hillocks or papilla have been dragged. If the whole be torn away before maceration, i.e., from the living skin, it usually tears away the papilla with it, leaving a bleeding surface.

In providing at once for the protection of the cutis, and also for the preservation of the acuteness of the sensation of touch, there is this difficulty: those parts which are most used to gain information by touch, are necessarily those which are most subject to friction. In such situations, then, the cuticle must be thick; yet a solid thick sheet would be liable to make us confound impressions made by two points near together which were in contact with the skin. There is a beautiful arrangement of these points, as is found in the curtain, to leave the tips of the fingers, palm of the hand, etc. Here the surface of the skin is seen to be thrown into small ridges and furrows, which run in curved lines parallel to one another, so that an impression made on the surface, or top of the ridges, is only conveyed down to the papilla immediately beneath it, and does not press sideways on those of the other ridges. A more examination of the tip of the finger with a lens, will show that these wavy ridges are subdivided into square-shaped masses by cross furrows, which occur at regular intervals, so as to leave the thickest part between of the same width as the ridge. Each one of the square-shaped masses has in its centre a little pit, which is the opening of a sweat-gland. No such definite arrangement of ridge and furrow occurs in other parts of the body, where the sense of touch is comparatively obtuse, or rather, not nicely distinguishing.

The cutis, or blood vascular skin, is tough and elastic, and consists in its deeper layers of interlaced fibres which hold in position the sweat-glands, oil-glands, and hair-bulbs, with hairs proceeding from them through the blood-surface. It is also perforated with nerves, arteries, and veins. This, therefore, is a structure having all the endowments of life, and with the faculty of self-sustenance and sensitiveness. The true seat of the sense of touch is, however, its external portion, that which lies immediately under the cuticle. Towards the surface the fibres become closer and denser, and the various bodies which make up the cutis and its very thin; but nerves are more numerous. In order to increase the touching surface, and to bring the nerve-threads closer to the exterior, the outer surface of the true skin is, as we have seen, raised at intervals into papilla. Each of these is well supplied with vessels and nerves. Under the ridged surface of the palm side of the hand, these papilla run in lines corresponding to the ridges, there being two rows to each ridge, and their points is slightly smaller ones between. In other parts they are scattered irregularly, and are much fewer in number. That these papilla are the true seats of the sense of touch, appears not only from the fact that nerves are traced into them, but because there is a strict relation between their number in a given space and the delicacy of the sense of touch in those parts. Thus in the space of one square (1½ inch) there are 198 on the tip of the finger, 40 on the second joint, and only 15 or 20 in the middle of the hand, so that the decrease in number is in direct proportion to the sensitiveness of the surface to touch. Where the sense of touch is most acute and discriminating, little oval-shaped bodies have been found, one lying in the centre of each papilla, and these have been called the "little bodies of touch." It must not be supposed, however, that each of these papilla is capable of transmitting a true impression, or that the entire surface is also tactile. Nerves do not enter all of them, and they are concerned in secreting the substance to form the cuticle. It would seem as though each nerve which conveys a single distinct impression to the mind, had a certain definite space of surface of skin, over which its final branches spread themselves; so that if two objects touch the skin at two different points within this area, they feel like one. In order to be felt separately, the objects, one near each other, one and a half inch apart, etc., and on another. The size of the special spaces allotted to each nerve-unit is very different in different parts of the body. The determination of the size of these areas, and, by consequence, the accuracy of the sense of touch in various parts of the body, was effected by Weber. His method was at once so ingenious and so simple, that it is curious it should not have been adopted in other cases. He took a piece of paper, whose breadth was as large as the area, or who gave their points very small globules of sealing-wax, opened them to a small distance, and applied them to the surface of the body where the sense of touch was to be tested. The impression produced was as of a single point. He then opened them more and more until two distinct impressions were felt; and then measured the distance on a scale of inlines and lines. He thus arrived at very definite and, it seems to me, among many other measurements of the least distances at which two points could be distinctly felt, we quote the following:

<table>
<thead>
<tr>
<th>in lines</th>
<th>in lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip of the tongue</td>
<td>0.03</td>
</tr>
<tr>
<td>Tip of the forefinger</td>
<td>0.01</td>
</tr>
<tr>
<td>Breast</td>
<td>2</td>
</tr>
<tr>
<td>Second joint of forefinger</td>
<td>1</td>
</tr>
<tr>
<td>Middle fingers</td>
<td>1.5</td>
</tr>
<tr>
<td>Palms of the hands</td>
<td>0.05</td>
</tr>
<tr>
<td>End of the great toe</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The reader may verify these estimates for himself, but it is better to try them on some other person, because the impressions produced upon the eye and the mind by the sight and knowledge of the open compasses, have a tendency to bias the information received from the sense alone. The legs of the compasses must be bent both at the same instant, and having placed them, and not moved before the estimate is given. If they are moved, very different results will be given. From these statistics it will be seen that the tip of the tongue is the most discriminating part of the whole body. An easy verification of this will occur to every one when they remember how small a flaw in the teeth the tongue can detect—a flaw which is quite unnoticed by the tip of the finger, if that be applied to it. At first thought, it may seem strange that such acuteness of touch should be bestowed on an organ which is
LESIONS IN FRENCH.—XXIII.

1. The verb aller [1, irr.; see § 62], conjugated reflexively, and preceded by the word en, i.e., s'en aller, corresponds to the English expressions to go away, to leave.

2. Indicative Present of the Verb s'en Aller, to Go Away.

<table>
<thead>
<tr>
<th>Subject (Enclitic)</th>
<th>Verb Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Je s'en vais</td>
<td>I go away</td>
<td>Nous nous en allons, We go away.</td>
</tr>
<tr>
<td>Tu s'en vas</td>
<td>Thou art going away</td>
<td>Vous vous en allez, You are going away.</td>
</tr>
<tr>
<td>Il s'en va</td>
<td>He goes away</td>
<td>Ils s'en vont. They go away.</td>
</tr>
</tbody>
</table>

3. The Same Tense Conjugated Interrogatively.

<table>
<thead>
<tr>
<th>Subject (Enclitic)</th>
<th>Verb Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Est-ce que je</td>
<td>Do I go away?</td>
<td>Nous en allons, Do we go away?</td>
</tr>
<tr>
<td>Je</td>
<td>Do I go away?</td>
<td>Nous?</td>
</tr>
<tr>
<td>Tu</td>
<td>Do you go away?</td>
<td>Vous en allez.</td>
</tr>
<tr>
<td>Il</td>
<td>Do you go away?</td>
<td>Vous?</td>
</tr>
</tbody>
</table>

4. So fâcher, to be or become angry, requires the preposition con or do before the noun or pronoun following it.

S'il te fâche, tu dis, for example, to say, Do you get angry?

5. Si réjouis, to rejoice, is followed by the preposition de.

Si vous réjouis, for example, to say, Do you rejoice?

6. So plaîr, to please, to delight in anything, to like to be in a place, takes à before its object.

Je vous plaîs, for example, to say, Do you like you?

7. So dépechez, so hâter, to make haste, take do before their object.

So dépechez-vous, for example, to say, Do you make haste?

Résumé of Examples.

<table>
<thead>
<tr>
<th>Subject (Enclitic)</th>
<th>Verb Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nous en allons</td>
<td>We are going away</td>
<td>Nous vous plaîs, We please you.</td>
</tr>
</tbody>
</table>
| Je m'en vais quand je suis fatigué | I go away when I am tired. | Vous vous dépechez-vous | Do you make haste?
| Il | We take pleasure in reading, We take pleasure in studying. |

THE POPULAR EDUCATOR.

Nous nous dépêchons d'écrire.
Nous nous plaisons en Angleterre.
Nous ne nous plaçons pas à Paris.
Nous ne nous y plaisons pas.
Vous plaîsez-vous à New-York?
Nous nous y plaisons.

VOCABULARY.
Ambassadeur, m., ambas-
seur.
Arrivé, f., arrivé.
Arrivé, m., autres.
Avoc., with.
Courir, 2, ir., to run.
Damais, never.
Jonc, 1, to play.
Malheur, m., misfortuné.
Midi, m., noon.
Mieux, better.
Ouvrage, m., work.
Paroisse, because.
Prochain, -e, next.
Retourner, 1, return.
Semaine, l., week.
Tanto, l., until.
Ture, turque, Turkish.

EXERCISE 73.
1. Vous en allez-vous bientôt ?
2. Je m'en vais la semaine prochaine.
3. Parlez-vous en allez-vous ?
4. Paroisse que je ne me plais pas ici.
5. Vous plaîsez-vous mieux chez votre tante qu'ici ?
6. Je m'y plaîs mieux.
7. N'avez-vous pas tort de vous en aller si tôt ?
8. J'ai raison de m'en aller.
9. Ne vous réjouissez-vous pas des malheurs d'autrui ?
10. Nous ne nous en réjouissons point.
11. Cet homme se fâche-t-il contre le jardinière ?
12. Il se fâche contre lui parce qu'il ne veut pas se dépecher.
13. Soit fâché-t-il bien souvent ?
14. Il se fâche à tout moment, il se fâche d'un rien.
15. Ne vous dérapez-vous jamais ?
16. Je me dérape toujours quand j'ai quelque chose à faire.
17. Ne vous plaîsez-vous pas à courir et à jouer ?
18. Je me pâle à jouer et mon frère se plait à lire.
19. Vous réjouissez-vous de l'arrivée de l'ambassadeur ture ?
20. Je m'en réjouis.
21. Ne vous plaîsez-vous pas en Amérique ?
22. Je m'y pâle beaucoup mieux qu'en France.
23. Votre écolier ne se plait-il pas chez vous ?
24. Il se plait chez moi, mais il déteste retourner chez son père.
25. Dérapez-vous, il est déjà midi.

EXERCISE 74.
1. At what hour does your friend go away ?
2. He goes away every morning at nine o'clock.
3. Do you go away with him ?
4. I go away with him when I have time.
5. Will you make haste to finish your letter ?
6. I make haste to finish it.
7. Does the gardener get angry with his brother ?
8. He gets angry with (contre) him when he does not make haste.
9. Make haste, my friend, it is ten o'clock.
10. Why do you not make haste ?
11. I like to play, but I do not like to study.
12. Do you like to stay at my house ?
13. I like to stay there.
14. Are you pleased at the arrival of your mother ?
15. I rejoice at it.
16. Is not your brother wrong to go away so soon ?
17. He is right to go away, he has much to do at home.
18. Do you rejoice at other people's misfortunes ?
19. I do not rejoice at them.
20. I rejoice at your success.
21. Does not your brother draw near the fire ?
22. He goes from the fire, he is too warm.
23. Does that young lady get angry with you ?
24. She gets angry at trifles (de rien).
25. Do you like to be in Paris ?
26. I like to be there.
27. Can you do without me to-day ?
28. We cannot do without you; make haste to finish your work.
29. Do you want your penknife ?
30. I want to use it.
31. Make haste to rise, it is six o'clock.
32. Is it fine weather ?
33. No, Sir, it rains.
34. Is your father well this morning ?
35. Yes, Sir, he is very well.

SECTION XI.—THE PAST INDEFINITE [§ 121].
1. The past indefinite is composed of the present of one of the auxiliary verbs, avoir or être [§ 45 (9)], and the participle past of a verb. See the different paradigms of verbs, § 47, and following sections.

J'ai parlé; je suis arrivé,
I have spoken; I have arrived,

2. The past indefinite is used to express an action entirely completed, but performed at a time of which a part is not yet elapsed, or at a time entirely past, but not specified [§ 121 (1) (2)].

J'ai vu votre père ce matin,
I have seen your father this morning,
Je n'vois pas encore parlé,
I have not yet spoken to you.

3. The past indefinite may also be used when the time is specified [§ 121 (3)].

Je lui ai écrit la semaine dernière,
I wrote to him last week.
Je lui ai envoyé une lettre le mois dernier,

Vos nœuds nous ont parlé.
Vous avez parlé à votre père.
Le tailleur a-t-il fait mon habit ?
La boulanger a mis son chef.
Le cordonnier a été ses souliers.
Votre frère a dit quelque chose.
Votre cœur a-t-il dit ?
Hiez-vous rien dit à mon cousin ?
Je ne lui ai rien dit.
Je ne l'ai jamais rencontré.
Je ne leur ai jamais parlé.
Qu'avez-vous fait aujourd'hui ?
Hier n'avez-vous pas travaillé ?
Lors e avez-vous souvent parlé ?
Je leur en ai souvent parlé.
Je ne la leur ai pas encore dit.

4. In this tense, and in other compound tenses, the adverb is generally placed between the auxiliary verb and the participle [§ 130 (5)].

Vous nous avez souvent parlé,
You have often spoken to us.
Je ne l'ai pas encore vu,
I have not yet seen him.

5. The adverbs aujourd'hui, to-day; dimanche, to-morrow; hier, yesterday; polysyllabic adverbs of manner ending in -ment, and all adverbs generally, do not come between the auxiliary verb and the participle, but follow Rule 1, Sect. XXXIII. [See § 130 (5).]

Vous avez lu dernièrement,
You read lately.

6. The unpersonal verb y avoir [Sect. XXXII. 3, 4], placed before a word expressing time, corresponds with the English word ago.
J'ai reçu une lettre il y a huit jours,
I received a letter a week ago.
Vous avez acheté une maison il y a huit jours.
You bought a house a year ago.

EXERCISE 75.
1. Qui vous a dit cela ?
2. L'avocat me l'a dit. 
3. Lui avez-vous parlé de cette affaire ? 
4. Il ne lui a pas encore dit.
5. L'avocat vous l'a-t-il dit dernièrement ?
6. Je l'ai vu il y a quelques jours.
7. N'avez-vous pas écrit hier ?
8. Nous avons écrit et écrit toute la journée. [Sect. XXX. 9.]
9. N'avez-vous pas été vos gants et vos souliers ?
10. Je n'ai pas été mes gants, mais j'ai été mon chapeau.
11. Le tailleur m'a-t-il pas mis son chapeau ?
12. Oui, Monsieur, il a mis son chapeau.
13. Qu'avez-vous fait à ce petit garçon ?
15. Il ne lui avez parlé point qui me suis lait.
16. Je ne la lui ai pas encore dit.
17. Qu'avez-vous étudié ce matin ?
18. Nous avons étudié nos leçons et nous avons nos livres.
19. Le jardinier du ministre a-t-il planté le poirier ?
20. Il l'a planté il y a plus de huit jours.
21. Avez-vous acheté un habit de drap noir ?
23. D'avez-vous porté aujourd'hui ?
24. Je ne l'ai pas encore porté.

VOCABULARY.
Avoit, m., barrister.
Cela, ceci, that, this.
 Dit, from dire, said.
Gory, m., boy.
Hir, yesterday.
Journe, l. day.
La, from lire, read.
Mano, m., minister.
Miseri, m., minister.

EXERCISE 76.
1. Have you studied to-day ?
2. We have no time to study, we have read a page.
3. Have you not written to my brother ?
4. I have not yet written to him.
5. Has not the German written to my mother ?
6. Has he not written to her.
7. Have you told (d) my mother that I have taken (prise) this book ?
8. Have you not taken (prise) this book ?
9. What have you done this morning ?
10. We have done nothing.
11. Have you taken off your coat ?
12. I have not taken off my coat, it is too cold.
13. Has the bookseller written to your brother ?
14. He wrote to him a long time ago.
15. Did he write to him a month ago ?
16. He wrote to him more than a year ago.
17. Have you planted a pear-tree ?
18. We have planted several.
Lessons in Penmanship.

Lessons in Penmanship.—XXIII.

The copy-slips that accompany this lesson contain two examples of a kind of writing that we have not yet brought under the notice of our readers. Hitherto the turns of the letters in our copy-slips, both at top and bottom, have been curved; but in Copy-slips Nos. 89 and 90 it will be noticed that the turns of the letters are angular or pointed. For this reason this elegant style of writing is called "Angular Hand." It is also called "Ladies' Hand," because this pointed kind of writing is commonly adopted by ladies, and taught in ladies' schools; while in the handwriting of men, for the most part, the letters are more rounded in the manner exhibited in Copy-slip No. 83. Roundness on the one hand, and angularity on the other, will be found to be the most essential marks of difference in the writing of men and that of women; the former being also distinguished by the neatness and compactness of the letters and the shortness of their loops and tails, while the latter is usually larger and spreads over much space, while the tails and loops of the letters are long and straggling. It must be remembered that in pointing out these as the chief points of difference in the handwriting of men and women, we are only speaking generally and directing attention to the more striking characteristics of the different styles of writing usually adopted by
the opposite sexes. Our readers will notice that, in pursuance of the plan laid down in the last lesson, our copy-slips convey the knowledge of some fact, scriptural, historical, geographical, or chronological. We may suppose, too, that this characteristic vowel e appears in all the cases. The ablative ending in ẹ is blended with the ẹ of the stem. All the nouns of this declension are feminine, except dies, a day, and its compound, meridies, mid-day, the south. Dies, in good prose, is used as a feminine only when it signifies generally a time, or duration, or a fixed day, an appointed time; as dies dicta, dies constituta, an appointed day; longa dies, a long period; damnosa dies, a time of suffering; dies perexigna, a very brief period. In the plural, dies and meridies are masculine.

FIFTH DECLENSION.

Sing ẹ in the Genitive Singular.

Case-ending and Example.

<table>
<thead>
<tr>
<th>Case</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.</td>
<td>-ẹ</td>
<td>-ẹ</td>
</tr>
<tr>
<td>G.</td>
<td>-ẹ</td>
<td>-ẹ</td>
</tr>
<tr>
<td>d.</td>
<td>-ẹ</td>
<td>-ẹ</td>
</tr>
<tr>
<td>Ac.</td>
<td>-ẹ</td>
<td>-ẹ</td>
</tr>
<tr>
<td>V.</td>
<td>-ẹ</td>
<td>-ẹ</td>
</tr>
<tr>
<td>Ab.</td>
<td>-ẹ</td>
<td>-ẹ</td>
</tr>
</tbody>
</table>

In the genitive and dative singular—namely, ẹ—the ẹ is short when it follows a consonant, as ẹt, ẹd; and long when it follows a vowel, as ẹt, ẹd.

Only two words in this declension—namely, res and dies—have all the cases in both the singular and the plural; all other words are without the genitive, dative, and ablative plural.

Species is commonly added to res and dies, as having all the cases, but Goeres pronounces the genitive and dative of species as not good Latin.

Of the following nouns, only the nominative and accusative plural are found in good prose writers:

| Aedes, an edge, line, or score | Facies, an appearance, face | Series, a series |
| Glacies, glass | Glacies, glass | Series, a series |
| Effigies, an effigy or likeness | Progenies, a progeny or offspring | Spies, hope |

VOCABULARY.

Adventus, -a, -um, advent, coming.
Amicitia, -ae, friendship.
Avōn, 1, I fly away.
Cito, adv., quickly.
Conspicuous, 3, I am at peace.
Cupido, 1, I call together.
Ruris, -a, -um, rural.

EXERCISE 41.—LATIN-ENGLISH.

EXERCISE 42.—ENGLISH-LATIN.
1. True friends keep fidelity in the miseries of life. 2. The fidelity of friendship is not a vain hope. 3. Is the fidelity of an incorrupt friend a rare example? 4. In adversity we owe (are indebted for) a port to true friends. 5. The solace of true friendship calls together friends. 6. Fine days quickly fly away. 7. On a certain day the gods called together (their) soldiers; and the soldiers were led together by the king on an appointed day. 8. I await the coming of spring desirously. 9. A sad day in spring is rare.

We have now gone through the five declensions; and here present, in a tabular view, the several variations:

<table>
<thead>
<tr>
<th>DECLENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
</tr>
<tr>
<td>Nom.</td>
</tr>
<tr>
<td>Gen.</td>
</tr>
<tr>
<td>Dat.</td>
</tr>
<tr>
<td>Acc.</td>
</tr>
<tr>
<td>Voc.</td>
</tr>
<tr>
<td>Abl.</td>
</tr>
</tbody>
</table>

In this summary view, many facts regarding gender, number, and case, are of necessity omitted. The greater number of them may be found in the lessons on the declensions of nouns that have already been given. It seems, however, desirable to add, that grammarians recognise in Latin what is called a common gender. Those nouns are said to be of the common gender (c.), which may be applied indifferently to either a male or a female. Such nouns are:

Bos, a bull or a cow.
Canis, a dog or a bitch.
Hospes, a guest.
Hostis, an enemy.

General Exercises on the Five Declensions.

VOCABULARY.

Acutus, -a, -um, sharp.
Avarus, -a, -um, avaricious.
Barbarus, -a, -um, barbarous.
Caeceus, -a, -um, blind.
Catus, -a, -um, an animal.
Cedrus, -a, -um, Cedar.
Clarus, -a, -um, clear, distinguished.
Commodus, -a, -um, convenient.
Contentus, -a, -um, satisfied.
Creticus, -a, -um, a Cretan.
Divinus, -a, -um, divine.
Elegans, -a, -a, handsome.
Eximius, -a, -um, eminent, remarkable.
Exopius, -a, -um, wished for, desired.
Faciles, -i, -ae, easy.
Felix, felix, happy.
Frigidus, -a, -um, cold.
Galactus, -a, -um, cold.
Glacies, -i, -ae, glazed.

EXERCISE 39.—LATIN-ENGLISH.

EXERCISE 40.—ENGLISH-LATIN.
1. The hope of life is uncertain. 2. The hope of a long life is vain. 3. I refresh my mind with hope. 4. The wise man is not easily beaten down in wretchedness. 5. Adversity beats down the minds of brave men. 6. The minds of brave men are beaten down by adversity.

EXERCISE 40.—ENGLISH-LATIN.
1. The hope of life is uncertain. 2. The hope of a long life is vain. 3. I refresh my mind with hope. 4. The wise man is not easily beaten down in wretchedness. 5. Adversity beats down the minds of brave men. 6. The minds of brave men are beaten down by adversity.

EXERCISE 40.—ENGLISH-LATIN.
1. The hope of life is uncertain. 2. The hope of a long life is vain. 3. I refresh my mind with hope. 4. The wise man is not easily beaten down in wretchedness. 5. Adversity beats down the minds of brave men. 6. The minds of brave men are beaten down by adversity.
LESSONS IN DRAWING.

POTASSIA...POTASSIA.

1. Play is pleasant to boys. 2. There are various kinds of play. 3. Boys willingly indulge in play. 4. Is not play pleasant to boys? 5. Play is pleasant to me. 6. Play is exceedingly pleasant to them. 7. Grave men avoid boyish plays (as games). 8. O ye angels, how delightful are the boys' minds! 9. Kings are not delighted with boyish play. 10. The senses are keen. 11. I have keen senses. 12. Great is the power of the senses. 13. Is the power of the senses great? 14. Since the senses are not keen, do not the senses have great power? 15. O ye senses, how great pleasure you procure for (occasion) men! 17. The animals are endowed with senses.

EXERCISE 36.—ENGLISH-LATIN.


EXERCISE 37.—LATIN-ENGLISH.

1. The terrible thunder greatly moves the minds of men. 2. Is not the sound of thunder frightful? 3. The roaring of thunder is frightful. 4. Thunder is frightful. 5. Lighting precedes thunder. 6. Many men fear thunder. 7. Thunder is feared by many men. 8. O thunder, how frightful is thy roaring! 9. The house resounds with the thunder. 10. Men's knees tremble. 11. The vigour of the knees indicates the strength of the body. 12. Suppliants fall on (their) knees. 13. O knees, how much you trouble! 15. In the knees there is great strength.

EXERCISE 37.—ENGLISH-LATIN.


LESSONS IN DRAWING.—XII.

In the last two lessons we have dwelt altogether upon the treatment of shadows, which belong more especially to flat surfaces, as they come more commonly under our general observation, and are found to be under the most simple conditions. We now take up one kind of surfaces connected with convex and concave or curved surfaces, where we have to represent the relief and rotundity of an object. These require a different style of treatment to those on a flat or evenly-shaded surface. For flat shadows—namely, those on the sides of walls, or on the ground—we have employed straight lines only, without crossing them with other straight lines, and thus produce either dark or light shades by making the lines broader, or closer together, or wider apart, as the tone of the shadow required; but with rounded forms we must adopt the practice of crossing lines by others, straight lines by straight, and curved lines by curved, making the lines to follow the course of curvature, which, independently of the tone employed, materially assist us in producing the effect of rounded forms. The first essay will be a flat tint, for which the pupil must use a b or b pencil with a tolerably broad point. For 52 in a series of regular perpendicular lines crossed over with inclined lines at a very acute angle with the perpendicular; the angle of inclination may be understood by referring to the crossed lines, a (we canton the pupil at present against crossing the lines at right angles, thereby producing a kind of rectangular network); this first example must be repeated over and over again until it is mastered. The first difficulty will be to draw the lines equally spaced from each other, so that the intervals between them are uniformly regular, both with regard to the first-drawn perpendicular lines and those which cross them. In the next place, the beginner will at first be almost certain to make some of his lines broader, some darker than others. To avoid this, he must endeavour to use equal pressure; and then again, probably, they will not be parallel with each other. To overcome all these
little impediments to progress, he will require very considerable practice before he thinks of attempting the next step in shading, which differs from that already explained in the manner of drawing the line.

It will be noticed that in Fig. 82 the learner placed the pencil upon the paper before he began to draw each line, nor was it taken off until the line was finished; in fact, it was very much like drawing a number of downward strokes like the "straight stroke" in Copy-slip No. 25, in our Lessons in Penmanship (page 117). The kind of line we are now considering is one that must have no perceptible beginning or ending, where the pencil either commences the movement for drawing the line before it touches the paper, as a (Fig. 83) or as b, where, at the termination, the pencil is gradually raised from the paper; or as c, where the manner of a and b is combined; that is, where the line commences imperceptibly and ends imperceptibly, first, by lowering the pencil in an inclined direction to the paper at the commencement, and by raising it gradually at the end before leaving off, so that the strength of the line when completed is in the middle. Curved lines drawn in the same way must also be repeatedly practised. The straight lines (Fig. 82) are for flat tints, back grounds, etc.; the curved lines are employed for rounded forms. After the pupil has mastered the manner of drawing these various kinds of line, he may then proceed to cross them, as in
Fig. 84, observing again that he must not as yet cross them at right angles. Perhaps he may ask, why not as yet? Is there any decided objection to lines crossed at right angles? Certainly not, when done by an experienced hand; but the reason why we object to his crossing them in that way at present is because he will have first to acquire the power of making all his lines equal in tone, thickness, and strength, and at regular intervening distances; and this we know will demand all the thought and care he can bestow for a while before he must attempt to cross them in any direction.

The reason for commencing the line (as shown at b, Fig. 83) firmiy, and then gradually lifting up the pencil when drawing lines for an even tint of shade of some extent is, that we may continue the line by the manner of c, so that the extremities of these lines as they lap over one another may form an even line without any perceptible joint. Very probably it may be necessary to repeat the example c many times successively (but this depends upon the extent of the shadow), and then we finally end with the example a. Let the pupil draw a square of about four or five inches' side, and fill it up by this method of making an even shade tint. If he were to work the whole space with continued portions similar to Fig. 82, the joints of these portions would show, and spoil the tint; the edge, b c (Fig. 82) would be shown across the shadow as many times as the portion was repeated.
Believing the pupil now to be master of the method of drawing a single line under any one of the conditions above named, we shall proceed to show him how to make a whole line by putting two or three lines together, rather than to combine them so as to form tints required in shading. Of course we do very little for the pupil towards helping him in his judgment regarding the tones of shadows; his own observation must be his guide in deciding how dark or how light a shadow is. Shadows and tones must be compared with one another, because the circumstances surrounding them will so far influence their intensity that it would be impossible to give rules for shadows under all conditions. They are so varied and so changeful that we can do no more than give him a few general principles to guide his practice.

We have said before that cast shadows are, for certain reasons already given, generally darker than broad shadows; we will add now that the highest light and darkest shadow are together; and that the light shade upon the object or collection of objects gradually diminishes, so the depth or intensity of the shadows diminishes also. Take an example:—Place a chair near to a window, and another chair in the part of the room farthest from the window; the light which falls upon the chair near to the window will be much stronger than that which falls upon the farther chair. Observe the broad shadows and the cast shadows from the legs upon the ground, the latter especially, of the first being more distinct. The shading is done with all the subtlety the painter can think of. The high tone of the window, the second chair, or that farthest from the window. We venture to say, without more comment, that the pupil will have seen enough from this experiment to satisfy him upon this point. This principle of the darkest shadow being near to the highest light is found to be the same respecting the shadow on a ball (Fig. 85), or on the side of a column (Fig. 80), and in thousands of cases beside that. We will now consider a few varied examples. The great difficulty in shading is the management of the high tones. Any one can make an extreme shade of black; and if the right feeling for half tints and semi-tones is not a natural one—something analogous to that of a good ear for music—it can be to a great extent acquired, though in some cases it will demand a much greater amount of practical experience and observation than in others before they begin to perceive the many varieties of tone which are possible, and to represent them by touch. The shadow, for instance, of a leg will be different from that of a back, or that of a hair or feather. The leg is shaded in such a way as to make the joints and muscles very apparent. The back is shaded so as to make it appear soft. The hair and feathers are shaded so as to make them appear as if they were fine things. The shadow of a window, or a round window, or a window opening, is a combination of straight and curved lines. What do these lines represent? A combination of sounds. What do the combination of sounds represent? A state of mind; a mental conception. What does the mental conception represent? An external object; an external object that has the quality of being a father, or that bears the relation which we designate by the term father. So the whole connection between an external object and a mental conception, that is, the way in which these things are related, is not here described. This book may be set forth thus:—Lines make letters; letters make syllables; syllables make words; words represent sounds; sounds represent ideas; ideas represent outward objects—that is, persons or things. Consequently, objects are the basis of language; ideas are its essence; sounds are its medium, and lines are its forms. These outward objects, and internal realities, are set forth by means of language, by means of words. The lips, then, and the fingers are the interpreters of the person. What progress in civilisation is implied in this connection of the pen with the mind and with the universe; the pen describing, and the press diffusing, so as to be universally understood, the most subtle of all essences; states of thought and feeling; and the widest, as well as the wisest of all generalisations which we term the laws of God, or God's revelations in the Scriptures, or the operation of the mind, of language, thus viewed, is the study of the mind of man, as well as the study of the works and the will of God. Deep and mysterious study, worthy of our best powers, and sure to be attended by an ample reward! And if the study of language is the study of the human mind, and the Divine mind in their activity and their utterances, then no one who has not made some progress in the study of language, or who has not been expounded man's will or God's will, profane or sacred literature. To resume our subject:

Olig, of Greek origin (ολυγος, pronounced ol'-i-gos, a few), is the first part of oligarchy (Greek, αρχη, pronounced ar'-ke, government), government by a few; oligarchy, one of a small number of rulers. Omnis, of Latin origin (omnis, all), is seen in omniscient (Latin, scio, 1 know), all-knowing; omnipotent (Latin, potens, powerful), all-powerful; omnipresent, existing everywhere; omnivorous, all-devouring.
Ortho, of Greek origin (Greek, ὁποδ, pronounced of-thos, straight, right), as in orthodoxy, right opinion; orthogonal, right-angled; orthodactyl, right-footed, etc.

Athanasius is commonly accounted the very ruler of orthodoxy in this point.”—Culpeper, “Intellectual System.”

This prefix forms part also of orthography (Greek, ὅγραφω, pronounced of-roh-faw, writing), right writing, that is, in the spelling of words; as orthography (Greek, ὁγραφώ, pronounced o-graf-oh, a word) is right pronunciation.

Over, of Saxon origin, as in overarch, overbalance, overbear, overcharge, overboard, over-boat, over-bounteous, frequently denoting too much, as over-careful, that is, careful to excess. Overcome has two significations, to conquer, and to come over or upon.

“... He found the means to subdue both the one and the other, combating as it were, as his predecessors as the overcomer to be his tributary.”—Bunyan, “Quaints Curiosa.”

Mac. Can such things be.

And we overcome as if a summer’s cloud, Without our special wonder?”—Shakespeare.

Over when employed for above, as “over two hundred,” is to be avoided as an Americanism. To overtake is to come up with in walking or running.

And had he not in his extremest need
Been helped through the swiftness of his steed,
He had him overtake in his flight.”—Speckter.

In the passive voice, to verb overtake seems to denote the being suddenly surprised in its action; surprise is from the French surprendre (consisting of sur, above or over, and prendre, to take), whence surprise is the same as overtake in both derivation and meaning.

“Brethren, if a man be overtaken in a fault.”—Gal. vi. 1.

It is not difficult to see how to overtake may mean to get over, overcome, surprise, but how it means to come up with is less easy to conceive. The notion of over; or of superiority may, however, lie in the act by which you succeed in coming up to the person you wish to overtake; thus, by walking more quickly than he, you overtake your friend, you take a step over his, and get beyond him.

Out, of Saxon origin, beyond a certain limit, is a very common prefix, as in outbid, outdo, outface, outlive, outlaw, outstrip, etc. Outrage has nothing to do with out. Outrage comes from the mediæval Latin word outragium, through the French outrage, outrage. Ultragium, from ultra, beyond, denoted a surpluses paid to the lord by his subject on failure of paying his dues in proper time, whence outrage came to signify something in excess and to have an offensive meaning.

Over, of Greek origin ( overrun, as, pan, n., as, par, as; as, pan, n., all), is used in various cases (Greek, εὑρέω, pronounced a-ke-o-mi, I hear), all-heal, a universal remedy; in pancreas (Greek, παρενέ, pronounced kr-o-nas, flesh), all-flesh—that is, the sweetbread; and in pandects (Greek, πανδέκτης, pronounced dek-o-mi, I receive), a common title of the Greek misscellians. The term is known in history in its application to a digest of the civil law published by the Emperor Justinian. Again, pan occurs in pantheism (Greek, πανθεύμα, pronounced pan-the-um, God), all-goodness—that is, the system which regards God and the universe as the same. Pan forms the first part of pantomime (Greek μιμος, pronounced mi-mos, a mimic; and the word mimic is from mimos, all-mimicry, because the performance consisted solely of imitation.

“The pantomimes who maintained their reputation from the age of Augustus to the sixth century, expressed, without the use of words, the various fables of the gods and heroes of antiquity; and the performance, which sometimes dissolved the gravity of the philosopher, always excited the applause and wonder of the people.”—Gibbon, “Roman Empire.”

Pare, of Greek origin (παρε, pronounced par-ra, by the side of, as in parallels, i.e., parallel lines), has in English various acceptations. In parable (Greek, παράβολα, pronounced bal-oh, I throw), something put by the side of another thing, a comparison, a similitude. In Scripture, the parables of the Old Testament are short, pithy, and weighty sayings; the parables of the New Testament are short tales, setting forth religious truth under similitudes; the former are apostomes; the latter allegories. Pare appears in paraclete (Greek, παράκλητος, pronounced par-klih-toh, to call), the Advocate or Comforter (John xiv. 16).

Paradise is a Persian word, denoting a park, and has no connection with the Greek para; in Hebrew, par-od, a garden.

Per, of Latin origin (pars, partis, a part), appears in participles (Latin, causa, to cause, to partake. This word participle is a hybrid, being formed of an English and a Latin word; it is therefore a cross in the breed between Latin and English.

Pent, or penta, of Greek origin (πεντάς, pronounced pen-tah, fives), as in pentagon, a figure having five sides; pentastemum (πεντάστεμον), the name given to what are called the “five books of Moses” — namely, Genesis, Exod, Lev, Numbers, and Deutonomies.

Per, of Latin origin, through, by as, parvenure, by chance. It is found in parvenum (Latin, ambulo, I walk), to walk through, over.

“The ancients used to crown virgins with the flowers of this plant (milkwort) when they parvenuted the fields, to implore fertility thro’.”—Miller, “Gardener’s Dictionary.”

The per passes into pole in potolote (Latin, pollino, per, and latum, mud). Pot is found also in pollicet, a promising, from the Latin pollicere, I promise.

Peri, of Greek origin (περί, pronounced per-ri), meaning around; as, periphery (Greek, περιφέρα, περιφέρο, I bear), a circumference; also in periphrasis (Greek, περιφράση, fra-sis, a phrase, a jargon, a circumlocution, or roundabout mode of utterance; as, the laws of life, for death.

Phil and phile, of Greek origin (φίλος, fil-los, a lover), as in philologer, a lover of science (particularly the science of language); philosopher (Greek, φιλόσοφος, sof-oh, wisdom), a lover of wisdom; philomel (Greek, μελος, mel-los, a song), applied to the nightingale; philanthropy (Greek, φιλανθρωπος, an-throh- pos, a man), the love of mankind.

Phys, of Greek origin (Greek, φυσις, fu-sis, nature), physico, and physico, originally meant natural philosophy and a natural philosopher; but derivatively, the word came to refer to a knowledge of such natural objects as were held to conduce to the art of healing. Physics, plural, still means Natural Philosophy; and the French word physicien means a Natural Philosopher, or one acquainted with the laws of nature.

Physiognomy consists of the Greek words φυσις, fu-sis, nature, and γνωσις, gno-sis, I know; and so properly denotes a knowledge of nature by outward appearances; but, as employed, the word signifies a knowledge of a man’s character, as gained from his countenance. Physiology is the science of nature, but in a particular way; a science, that is, of the structure and laws of the human frame in particular, and of animal organisation in general.

“I find that the most eminent and original physiologist of the present age (M. Cuvier) has been led, by his enlightened researches concerning the laws of the animal economy, into a train of thinking strikingly similar.”—Dugald Stewart, “Philosophy of the Mind.”

Pleni, of Latin origin (plenus, full; hence plente), is found in plenipotentiary (Latin, potens, powerful), one who has been entrusted with full power or authority.

“Let the plenipotentiary sophists of England settle with the diplomatic sophists of France in what manner right is to be corrected by an infusion of wrong, and how truth may be rendered more true by a due intermixture of falsehood.”—Burke.

The Greek word πλεος (ple-ohs) is the same as the Latin plenus, found in our “plente.” This word supplies the first syllable in plenism, a fulness of expression so as to become excessive.

“It is a plenism, a figure used in Scripture, by a multiplication of expressions, to signify some one notable thing.”—South.

Poly, of Greek origin (πολυς, pol-ye, many, much), appears in polyanthus (Greek, πολυάνθως, an-thes, a flower), so called from its many flowers; and in polygamy (Greek, γαμος gam-oh, marriage), having many wives.

“Polygamy was not commonly tolerated in Greece, for marriage was thought to be a conjunction of one man with one woman.”—Iow., “Antiquities of Greece.”

Poly is also the first syllable of polyglot (Greek, πολυγλωττος, glos-tah, a tongue), one who knows many languages; also a book written in all the languages, as the “Polyglot Bible.”

Post, of Latin origin, after, afterwards, appears in postdate, to date after the time of writing, at some later time; in postpono (Latin, po-nu, I place), to put off; in postscript (Latin, scriptum, a writ), something added to a letter.
Posthumous, erroneously spelt posthumous, from the Latin post-
humus, the same as postremus (from post, after), signifies late, very
late, the latest, the last. This word is applied to a child born
after the father's death, or a book published after the author's
death.

Sometimes the word is spelt postume, for posture. We have
here an instance of the effect on spelling of a supposed etymology.
Postume was thought to be composed of post, after, and
humus, the ground, and hence the word was written post-
humus. It is, however, the superlative of the Latin postremus
and is used in the Latin language with the same applications as
in English. Richardson is wrong in the etymology which he
gives of this word.

Pre, of Latin origin, before, as in precession (from Latin,
cavere, to beware), forethought.

*Precaution, though all about
To see the candles fairly lit,*
Churchill, "The Ghost."

Pre is found in precede (Latin, cedo, I go), in precipitans (Latin,
caput, the head), headlong; in precessans (Latin, coquere, to
cook), cooked before, forward, too soon ready.

"I had heard of divers forward and precous youths, and some
I have known, but I never did either hear or read of anything like to
this sweet child."—Evelyn, "Memoires."

LESSONS IN GEOGRAPHY.—XI.

In our last lesson it was stated that it is generally believed
by geographers in the present day that the southern pole of
the axis on which the earth revolves once in the course of
every twenty-four hours, is situated a considerable distance
outside the earth. It is forbidden by the weight of ice
that fringe its coasts, and the steep rampart of volcanic
mountains that rises abruptly from the very edge of its shore.
The northern pole of the earth's axis, on the contrary, is
supposed to be in the midst of an open ocean, navigable by
vessels, if a ready and practicable means of entrance to its
waters could be found through the ice-fields that encircle it.
Possibly we are on the eve of solving this problem, and,
covered with certainty what may be the condition of the
regions that lie around the North Pole, for an expedition
thither is preparing under the auspices of the French
Government, which will in all probability set out for its destination
in 1869, under the command of its originator, M. Gustave
Lambert. It is M. Lambert's intention to avoid the routes
taken by former explorers, and to push his way to the north
through Behring Strait.

To tell the story of Arctic explorations since Sir John
Franklin left England on his third expedition of discovery to
the north in 1844, to die three years after on the dreary wastes
of King William Land, hard by Point Victory—an apt name for
the last resting-place of a man to whom belongs the merit and
honour of having discovered the north-west passage from
England to the shores of Asia by Owing barren continent, and
is and must be to all save himself and his companions, as its dis-
covery can never be attended with results useful to commerce—
would occupy too much space. It will, therefore, suffice to
say that of late years the most active and successful explorers of
the regions that lie north of the line of waters that stretch from
Baffin Bay on the east to Banks Strait on the west, are Dr.
Elisha Kent Kane and Dr. Isaac J. Hayes. Both of these
travellers are Americans, and both have received a gold medal
from the Royal Geographical Society as an acknowledgment of
the eminent services rendered to geography by their discoveries
—the former having received the Founder's Gold Medal in
1856, for his services in connection with the American
expeditions sent out in search of Franklin in 1856 and 1853,
and the latter the Patron's Gold Medal in 1867, for his memorable
expedition in 1866-67, towards the supposed open polar sea, in
which he attained lat. 81° 35' in Smith Sound, a more northern
point of land than has been reached by any previous navigator.

Coming southward from Smith Sound, up which Dr. Hayes
penetrated to within 9° 28', or somewhat less than 600 miles of
the North Pole, we have Greenland or Danish America on our
right, which was visited by Mr. Edward Whymper, a well-
known Alpine explorer, in 1827. Owing to an epidemic, which
had carried off more than ten per cent. of the population, this
explorer was not successful in penetrating as far into the
interior as he intended, and another journey will be necessary
unless the coast is traversed by a boat. The coast line is derived
by the heaps of deer that come from the interior of the country to
the coasts at certain periods, and after a short stay return once
more to their yet undiscovered haunts. In Alaska Mr. Frederick
Whymper, an artist attached to the late Russo-American Tele-
graph Expedition, has been more successful, having advanced
more than 1,900 miles into the heart of the country along the
coast from the town of Youson River, a magnificent stream that
discharges its water at the entrance of the great Inland Sea of
the Island of St. Lawrence, that lies like a breakewater across
the entrance to Behring Strait, between the opposing coasts of Asia
and America.

Mr. Frederick Whymper's journey into the interior of Alaska
was made in 1866-7. He travelled by sledge from Norton
Sound, a deep inlet to the south-east of Behring Strait, to the
banks of the Yoonkon River, spending the winter months at
Nulato, the last of the trading ports that the Russians have
established along the course of the river and the interior of the
country. In the spring he re-commenced his journey, and made
his way up the stream in a boat, consisting of a framework
covered with skins, to a point about 600 miles distant from
Nulato, where the Porcupine River enters the Yoonkon. He then
travelled on foot along the shoreline of the lake, which is
The Yoonkon is navigable for 1,900 miles from its embouchure
during the summer months, but for at least eight months of the
year it is frozen over. The natives on the coast are Esquimaux,
while in the interior, and on the banks of the river, parties of
Indians are occasionally met with. Public attention has recently
been directed to Alaska, formerly Russian America, on account of
its sale by the Russian government to the United States in
1867, for a sum of $7,200,000.

Some hundreds of miles lower down the west continent
of North America, a little to the north of the boundary line
between the British dominions and the United States, lies a
broad belt of forest land and fertile pasture ground, watered
by the head-streams of the Saskatchewan and the Red River,
which stretches from the western confines of the new dominion
of the Westward to the Rocky Mountains. This region we visit
the Viscount Milton and Dr. Chedale in 1861-63; the expedition
being "undertaken with the design of discovering the most
direct route through British territory to the gold regions of
Cariboo (in British Columbia), and exploring the unknown
country on the western flank of the Rocky Mountains, in the
neighbourhood of the sources of the north branch of the Thomp-
son River." This expedition has furnished us a mass of fresh
information, the hitherto been entirely abandoned to Indians and
trappers, but which contains upwards of 65,000 square miles of land, of unsurpassed fertility,
abounding in mineral wealth, and which is destined to become,
at no very distant period perhaps, one of the principal centres
of British colonisation, affording the true north-west passage
by land from Europe, through our colonies of Canada and British
Columbia, to the splendid harbours of Vancouver Island and the
great coal-fields of Vancouver Island, which offer every advantage for
the protection and supply of a merchant fleet trading thence to
India, China, and Japan. Our illustration* will give the reader
some idea of the beauty and grandeur of the scenery on the eastern
slope of the Rocky Mountains. It is a view of the valley near
Jasper House, or Fort Assiniboine, a little trading station on the
bank of the Athabasca or Elk River, and looking up the Rocky Mountain stream through a narrow gorge near this
point, and expands into a lake about three or four miles long,
the shores of which are beautifully wooded with clumps and
clusters of dark-green pines, and covered with luxuriant verdure.

In the background, on the right of the picture, is the ice-capped
conical mountain called the Priest's Rock, which forms a pro-
minent feature in the landscape, while on the left the sharp
fists of a steep ascent rising almost perpen-
dicularly from the plains below, called the Roche A Myctte.

Passing still southwards through the United States—the
western parts of which are now being opened up by strong
and resolute backwoodsmen from the outlying districts of the Central

* This illustration is taken, by permission of the authors, from the
"North-West Passage by Land," by Lord Milnot, M.P., and Dr.
Chedale. Illustrations from Cassell, Petter, and Galpin.
a continent of whose central regions little more is known with any degree of certainty than has been yet learnt of the unexplored heart of Africa. But even here travellers have been busy in collecting facts to add to our limited knowledge of these parts of the world’s surface, for Mr. Henry W. Bates, the present assistant secretary of the Royal Geographical Society, explored the countries on either bank of the mighty river Amazonas between the years 1848 and 1859, giving us a series of vivid and animated descriptions of the habits of animals, sketches of Brazilian and Indian life, and aspects of nature under the equator, during eleven years of travel, in his work entitled “The Naturalist on the River Amazonas.”

Mr. Bates’s researches have been ably supplemented by Mr. W. Chandless, who received the Patron’s Gold Medal in 1866 for his exploration of the river Purus, one of the southern affluents of the Amazonas, which he ascended for a distance of 1,800 miles, making, by observations as he proceeded, an accurate map of the windings of the river. Previous to this journey of discovery Mr. Chandless had travelled through South America from the head-streams of the Paraguay—a river which rises in the Brazilian province of Matto Grosso, and joins the Parana near the town of Corrientes, in the Argentine State of that name—to the mouth of the Amazonas, down and Messrs. Ritchie and Lyon in the present century. The labours of Messrs. Denham and Clapperton, and Dr. Oudney, in exploring the interior of this continent in 1822, added considerably to our knowledge of North-Central Africa. When we look upon a modern map of Africa, all the geographical positions which are laid down in Bornou, round Lake Chad, the lake itself, the direction of the course of rivers in this region, the rectification of the course of the rivers, and other topographical details, such as the position of mountains, etc., are due to the last-mentioned travellers. Clapperton closed his successful career by reaching Sockatoo from the Gulf of Benin, and died in 1826, leaving his labours unfinished, after having accomplished the remarkable journey from Tripoli to Benin, and enriched geography with a vast collection of new and accurate discoveries. Timbuctoo, that singular object of African travellers, was reached by Major Leing in the same year, but at a later period, when he also paid the debt of nature. In 1830, Richard and John Lander undertook to resolve the problem of the direction of the Niger from the point to which it had been traced by Park and Clapperton. They proposed to descend the river along its course from Bonnse, where it had so far been traced, and to follow its course to the Atlantic Ocean, in order to

THE UPPER LAKE OF THE ATHABASCA RIVER AND THE PRIEST’S ROCK.
ascertain its embouchure. After encountering many and great dangers, they reached the sea by the central or principal branch of the Niger, which is the river called Num, and which disembogues itself into the Atlantic Ocean, between the Bight of Benin and the Bight of Biafra. The source of this river, as determined by Lāing, is at the foot of Mount Loua, in the Kong Mountains. From this point to Timbuctoo its course was known; but the brothers Lander made it known from Bousa to the ocean, and so solved a part of the geographical problem which had so long existed without a satisfactory solution.

LESSONS IN ARITHMETIC.—XXI.

CONCRETE OR COMMERCIAL ARITHMETIC.

1. We have hitherto been concerned with what are called abstract numbers—that is to say, numbers abstracted from their connection with any special thing, object, or magnitude; and we have established all the principles connected with them which are necessary to be known by the student of elementary arithmetic. We now proceed to apply these principles to concrete numbers—that is to say, to numbers which indicate some actual magnitude, object, or thing—as, for instance, time, money, length, etc.

Theoretically, we are already in possession of principles which enable us to perform any calculation with reference to any concrete number. Take length, for instance. Suppose that we fix upon a certain length, and call it a mile. By means of this mile we could measure any other length whatever. For by fractions or decimals we could express any part or parts of a mile whatsoever; we could add, subtract, multiply, or divide any number of miles or parts of a mile, etc., etc. But it is manifest that, although this could be done, great inconvenience would arise from the cumbrous nature of the operations. In treating, for instance, of fractional parts of a mile, it would be often very difficult to realise the length indicated. What idea would most people have of \( \frac{1}{2} \) of a mile? But if they were told that this length is very nearly indeed equal to a foot, they would form a very clear conception of the length. Hence, in measuring all magnitudes, the method of subdivision has been employed. Certain magnitudes have been fixed upon and named, and then these again divided and subdivided, and names given to the divisions, as convenience best suggested.

Quantities expressed in this way by means of different subdivisions are called compound quantities. Thus, a sum of money, expressed in pounds, shillings, and pence, is a compound quantity. The names of the various subdivisions are generally called denominations.

2. Accurate Standard or Unit.

On proceeding to measure any magnitude or quantity, it is evident that it is of the utmost importance to come to an exact definition of some one fixed magnitude of the same kind, with which we may compare all such magnitudes. Such a fixed magnitude is called a standard. When this has been done, then the standard can be subdivided, or multiples of it can be taken, as we please, and names given to the subdivisions or multiples.

The subdivisions which are employed in England in the coinage and weights and measures are, as might be expected, not founded upon one carefully prepared and philosophical system, but have gradually grown up during long centuries, having often been suggested by some special convenience of usage. The subject has of late received much attention, and the possibility and advantage of establishing a uniform decimal system of coinage, weights, and measures, have been discussed with considerable warmth.

On July 29th, 1854, an Act of Parliament was passed to render permissive the use of a decimal system of weights and measures called the "Metric System." Contracts and transactions, therefore, based on this system are now legal. We shall, however, return to this subject hereafter.

We proceed now to treat of the subdivisions of various concrete quantities which are now generally in use.

MEASURES OF TIME.

3. The time of the revolution of the earth in its orbit can be shown by the calculations of astronomical science to be an unvarying quantity, or, at any rate, to be subject to no appreciable variation for an immense number of centuries. Now, it is found that this time is 355:25224 (i.e., about 355.25, or 355) mean solar days, a solar day being the interval which elapses between noon and noon—that is, between the times when the sun is successively highest in the heavens."

The year is made to consist of 365 days—i.e., about \( \frac{1}{4} \) of a day less than the time of the revolution of the earth in its orbit. To every fourth year (Bissextile or leap year, as it is called) one day is added, and thus at the end of every four years the earth is again very nearly in the same part of its orbit as it was at the beginning of them. We say very nearly, because the earth actually revolves round the sun in 356:25224 days, which is less than 365 days by \( 0.0076 \) of a day. This error in excess amounts to a day in about 128 years, or nearly 3 days in 4 centuries. Hence, to make our reckoning still more accurate, we omit 3 days in 4 centuries; and this is done by making the year which completes every century not a leap year, except such centuries as are divisible by 4. Thus A.D. 1700, 1800, and 1900 are not leap years, but A.D. 2000—i.e., the year completing the twentieth century—is a leap year.

The establishment of the leap year is due to Julius Caesar; that of the omission of the leap year three times in 400 years to Pope Gregory XIII., who, in the year A.D. 1582, when the error amounted to ten days, caused the ten days which followed October 4th to be omitted in the reckoning. October 5th consequently was called October 15th.

This latter system, the New Style, as it is called, was not adopted in England until A.D. 1752, when the difference between the old and the new system amounted to about eleven days. The difference between the Old and New Style amounts at present to about twelve days. Thus any fixed day—Christmas Day and Lady Day, for instance—Old Style, would occur twelve days later than our present Christmas and Lady Day. Russia is now the only country in Europe which retains the Old Style.

Having, then, established a fixed invariable standard whereby to measure time, we are enabled to make any further subdivisions for convenience.

DIVISIONS OF TIME.

| 60 seconds | = 1 minute, written thus, 1 min., or 1' |
| 60 minutes | = 1 hour |
| 24 hours | = 1 day |
| 7 days | = 1 week |
| 4 weeks | = 1 common month |
| 365 days | = 1 immoral year |

Any number of seconds are written either thus—35', 23", or 35' 23" sec.

It is better, however, in indicating time, to use the abbreviations sec. and min. for seconds and minutes, inasmuch as the same names and the marks ' and " are used for certain divisions of the circle (Art. 18).

The Calendar months into which the year is divided do not each contain the same number of days. The number in each month, however, may be remembered by the following lines:

| Thirty days has September, |
| April, June, and November; |
| February twenty-eight alone— |
| All the rest have thirty-one; |
| But leap year comes one year in four, |
| And February then has one day more. |

MEASURES OF LENGTH.

4. Having determined, as above explained, an exact measure of time, we are enabled, curious as it may appear, to deduce from it a fixed and invariable measure of length. We might, of course, take any object—a piece of metal, say—and, giving to this length a particular name, thus obtain a means of measuring all very magnitudes or lengths. This object, whatever it might be, and however carefully preserved, would be liable to be lost, to alteration from decay, variation of temperature, etc. It is therefore very desirable to have some invariable and independent
means to which we can always have recourse, to give us an exactly accurate standard of length with which to compare all other lengths.

Now, the interval of time called a second being invariable, it is found that a pendulum which, in the latitude of Greenwich, under certain conditions, oscillates in one second, is of a certain length. It is further proved, from mechanical and mathematical principles, that this length must always be exactly the same, whatever the experiment is tried under exactly the same conditions. This accurate and scientific method, however, as might be expected, was not the way in which a measure of length was first determined. A certain measure called a yard having been established, and this yard divided into 36 equal parts, called inches, it was found that the length of the pendulum oscillating in one second of time at Greenwich contained 39,125 such inches. We thus see that we have a means of recovering ancient standards of time in vacuo at the level of the sea, which is 39,125 inches.

This standard, however, was, in fact, destroyed in 1834, at the fire of the House of Commons, before the Act passed. The Astronomical Society, however, had carefully prepared a standard yard, which is calculated to differ from the old one by not more than 1/256th of an inch.

We cannot here touch upon the ingenious and refined processes by which such standards are made when such accuracy is required, as, for instance, in determining a new standard length from the old one, or in finding to what amount of variation a given measured length is subject, from unavoidable external causes. The reader may consult the article Standard in the "Cyclopaedia," which will give him a good general idea of the subject.

SUBDIVISIONS OF LENGTH, OR LINEAR MEASURE.

5. The smallest measure is a barleycorn, or one-thousandth of an inch; so called because, originally, the inch was obtained by placing together lengthwise three barleycorns taken from the centre of the ear. Little more, however, than the name of this subdivision remains, measurements being generally conducted in decimal or fractional parts of an inch.

<table>
<thead>
<tr>
<th>TABLE OF LINEAR MEASURE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 barleycorns = 1 inch</td>
</tr>
<tr>
<td>12 inches = 1 foot</td>
</tr>
<tr>
<td>3 feet = 1 yard</td>
</tr>
<tr>
<td>54 yards = 1 rod, perch, or pole</td>
</tr>
<tr>
<td>40 rods, or 220 yards = 1 furlong</td>
</tr>
<tr>
<td>8 furlongs, or 339 yards = 1 mile</td>
</tr>
<tr>
<td>3 miles = 1 league</td>
</tr>
<tr>
<td>60 geographical miles, or miles = 1 degree*</td>
</tr>
<tr>
<td>691 common miles = 1 degree</td>
</tr>
<tr>
<td>390 degrees = 1 great circle of the globe</td>
</tr>
</tbody>
</table>

Other measures of length are sometimes used, having reference to special descriptions of magnitudes. For instance, 12 lines make 1 inch; 4 inches make 1 hand; 9 inches 1 span; 18 inches make 1 cubit; 6 feet 1 fathom. In many string roads and lands, 1 chain, 22 yards or 4 rods long is used, called, from its inventor, Gunter's chain. It is divided into 100 links, each of which therefore contains 1/10 of a red, or 7-92 inches.

CLOTH MEASURE.

In the measurement of cloth, linen, etc., the following lengths are sometimes used:---

24 inches = 1 nail
4 nails, or 9 inches = 1 quarter (of a yard)
3 quarters = 1 Frenshill
3 quarters = 1 English ell
6 quarters = 1 French ell

The last three measures are now very seldom used in England.

* A degree is in reality an angle; but, in measuring the earth's circumference, we give the name of degree to that portion of it which subtends an angle of one degree at the centre. See "Angular Measure," in Lesson 23.
We come now to the preparation and allotment of the cricket ground preparatory to play, confining our remarks at present to the ground of a double wicket. If only an ordinary field is available for the game, the most level portion of it, as near the centre as possible, is selected for the purpose of pitching the wickets. These must be directly opposite each other, and at a distance of twenty-two yards apart. A line six feet eight inches in length is drawn with chalk upon the ground at each wicket, so that the stump stand in its centre. This is called the bowling crease. At each end of it another but short line is drawn at right angles behind the wicket, and this is named the return crease. The object of these lines is to mark out the space within which the bowler must be standing when he delivers the ball. In front of the wicket, four feet from it, and parallel with the bowling crease, another line, called the popping crease, is drawn. No precise length is defined for the popping crease, save that it must be at least as long as the bowling crease behind it. Within the space marked by these two creases is the batsman’s proper ground, passing out of which he risks being put out of the game, by a touch of the wicket with the ball by one of the opposite side. The nature of the creases, and the ground marked out by them, will be made clear by diagram No. 1.

Before commencing the game, the two parties—divided, we will suppose, into the ordinary number of eleven on each side—select two umpires, whose duty it is to see that the rules of the game are adhered to, and settle disputed points that may arise in the course of the play. The umpires pitch the wickets, and the leading members of the two elevens toss for innings; that is, which side shall first take the bat in the play. The winner’s party generally go first, the bowling crease to the wickets. The order in which they shall take the bat is decided by their captain. Two of the party station themselves, bat in hand, behind the wickets, facing each other; and they are then ready for the game.

The opposite side select their bowler, and the captain of this eleven stations his men at the various points of the ground, according to his knowledge of their particular aptitude in fielding—that is, in catching the ball, stopping it, etc. The positions in which the fielders as a body shall be placed are fixed by custom, which is founded on experience of where they are most likely to be effective. These positions are occasionally varied to suit the character of the bowling, whether fast or slow; but as a rule the men are stationed for medium bowling nearly in the positions indicated by diagram No. 2.

All being now in readiness for the game, the bowler takes the ball, and, after calling “play” before starting, delivers the ball in the direction of the wicket farthest from him. The object is to strike it with the ball, and if he succeed in the attempt, the batsman stationed at that wicket is out. The object of the batsman obviously is to keep the ball off his wicket, and also, by striking it to a distance, to make one or more runs towards the game for his party. A run is scored when the batsman is able to get from one wicket to wicket without being put out before he comes fairly behind the popping crease, or places the end of his bat within it. If the batsman runs from one wicket to the other, and then returns to the wicket he started from, he counts two runs for his party, and so on.

When the ball is struck, the fielders, waiting in eager expectation, strive to catch it or otherwise stop it, and return it immediately to the wicket-keeper or bowler, that he may strike the wicket with it before the batsman reaches it. If this be done, or if the ball be caught in the first instance, the batsman is out, and another of his party succeeds him, until all the eleven have taken the bat in turn. The number of runs they have made between them is then counted up, and their opponents, now taking their innings, try to get a higher number if possible. Usually, in a game of double wicket, each side has two innings, and the party that has beat the highest total at the end of the play wins the game.

This is a brief explanation of the mode and the object of the play; but it may be as well to remark here that, besides the runs gained by the batsman in the manner before mentioned, the number which has the innings are sometimes allowed to score runs through the negligence of their opponents. Thus, if, after a batsman has been fairly bowled, is thrown or jerked towards the wicket, it is called a “no ball,” and the batsman’s party score a run for it. Again, if the ball, instead of being thrown, be not stopped by the fielders, the batsmen may score a “wide ball” or “wide ball,” and the batsmen make a run. The “off” or “side score one. On the other hand, if the ball be struck in their play, and count as many runs as they can make.

There are also other ways of the batsman’s being put out beyond those mentioned in the foregoing description; but these will be found fully detailed in the laws of the game, which will be given in another paragraph. In this we shall also give a little practical advice to the young player, with illustrations of the proper attitudes in batting, bowling, etc.
LESSONS IN ARCHITECTURE.—II.

BUILDINGS IN UNHEWN STONE.

We will now proceed to trace briefly but distinctly the progress of architecture amongst the different nations of antiquity, for the purpose of reaching our own times in chronological order. Before entering into details, we may point out the particular features which characterise the grand periods of the art, and the different systems in which its resources were developed in order to satisfy the numerous demands of the civilisation in which it originated.

Architecture, like all the productions of the human mind, presents at first only simple rudiments, quite in accordance with primitive manners. From the earliest ages we find three great divisions established amongst all nations: first, private buildings; secondly, religious edifices; and thirdly, military constructions of a defensive character.

The first care of a people, as we remarked before, would be to construct individual habitations; but being at first hunters and shepherds, they would be necessarily wanderers, and their dwellings would be tents constructed of the skins of animals, or cottages made of branches of trees. When they dwelt on the borders of rivers they would employ reeds; Asia and Egypt present us with examples of this kind. In some exceptional cases they dwelt in caverns, or in shallow excavations. The cottages were usually circular; piles of stones and earth, arranged in a circle, constituted their foundation. This form is found amongst all nations; that of the square, requiring more complicated combinations, was not adopted at first.

The simplicity of the first erections for religious purposes may be seen in the construction of the altars of early times. The first sacrifices, which the Bible and ancient tradition trace up to the creation, were made upon consecrated heaps of stones, which were collected upon high places. These first altars, called He-riu (the House of God), were erected in Chaldea, in Judea, and in Egypt. They were built, according to the Scriptures, of stones without cement, if the places where they were raised afforded proper materials. In other places they were constructed of turf and earth, where the plain country presented no solid materials. Such erections or mounds are found in Asia Minor and in India; at Heliopolis, celebrated for the worship of the sun, and the great sidereal divinity of the Syrians. Lucian describes a throne or altar to the sun composed of four great stones arranged in the form of a table. At Ortosia, in Syria, there is an edifice of this kind raised in an open enclosure, and built of stones in a square form. Strabo relates that, travelling in Egypt, he saw his road covered with temples devoted to the god Mercury, which were composed of two unhewn stones, which supported a third, resembling the cromlechs which are to be seen in some parts of England. Artemidorns, quoted by Strabo, mentions that in Africa, near Carthage, the god Melkart (Moloch), or the Phoenician Hercules, was worshipped in a similar manner three or four stones being placed one upon another in the form of a rude altar or table.

This simple manner of building applied to primitive altars, and to the sacred enclosures which surrounded them, after having been developed, as we have seen, in Asia and Africa, extended into Europe from the borders of the Black Sea and the Caucasus,
Lessons in French—XXIV.

Section XL—The past participle [§ 131].

1. The past participle, which in French forms a part of every compound tense [§ 45 (8)], is susceptible of changes in its termination.

2. The student will find, in the table of the terminations of the regular verbs [§ 69], the different changes which the past participle of these verbs undergoes. The feminine termination of the past participle of the irregular verbs will be found in the alphabetical table, § 62.

3. The last letter of the feminine termination is always an a or e.

4. The plural of a past participle not ending with an s is formed by the addition of that letter to the singular, masculine or feminine.

5. The past participle, accompanied by the auxiliary verb avoir, never agrees with the nominative or subject [§ 134 (3)].

6. The past participle, having être as its auxiliary verb, assumes in its termination the gender and number of the subject [§ 134 (2)].

7. The participle, accompanied by the auxiliary verb avoir agrees in gender and number with its direct object or régime direct [§ 2 (3), § 42 (4)], when that object precedes it [§ 134 (4)].

8. When the régime direct or objective (accusative) follows the participle, no agreement takes place [§ 134 (4)].

9. A past participle never agrees with its régime indirect, or régime indirect object (dativo or ablativo) [§ 2 (3), § 42 (5)].

10. The past participle used adjectivally, that is, without an auxiliary verb, follows the rule of the adjective [§ 66 (3), § 134 (1)].

Des livres bien imprimés, 
Well-printed books.

11. The participle, preceded by the relative pronoun en, remains invariable, although the en should relate to a feminine or plural noun [§ 135 (7)].

Avez-vous apporté des livres? 
Have you brought books?

12. The presence of en does not, however, prevent the agreement of the participle, when it is preceded by a régime direct [§ 135 (7)].

Les femmes que j'en ai rencontrées, 
The women which I have brought from it.

Résumé of Examples.

Vos sceurs qui sont-elles? 
Your sisters are what?

Les lettres que vous avez écrites. 
The letters which you have written.

Avez-vous écrit ces lettres? 
Have you written these letters?

Je les ai lues, je les ai lue. 
I have read them, I have read them.

Avez-vous apporté ces lettres? 
Have you brought these letters?

Les demeules qui vous avez dites, 
The ladies whom we have seen.

Les lettres que nous avons lues. 
The letters which we have read.

Avez-vous vu les dames? 
Have you seen the ladies?

Avons-nous vu les lettres? 
Have we seen the letters?

Avez-vous apporté des livres? 
Have you brought books?

J'en ai apporté. 
I have brought some.

13. The presence of en does not, however, prevent the agreement of the participle, when it is preceded by a régime direct [§ 135 (7)].

Les plumes que j'en ai apportées, 
The pens which I have brought from it.

Vocabulary.

Achet-er (a), to buy [§ 49 (5)].

Appel-er (a), to call [§ 40 (4)].

Apparaître (a), to bring. 

Beau, beautiful. 

Boucles, f., curls. 

Broche-er (a), to stitch. 

Casse-er (a), to break. 

Commission, f., errand. 

Dit, from dire, i.e., to say, 

Dom-er (a), to gape. 

Entendre-er, to hear. 

Exam-er-er, to examine. 

Expres, on purpose. 

Fleur, f., flower. 

Garde-er, to keep. 

Graffe, f., engraving.

Laisser, i.e., to leave. 

Nouvelles, f., news. 

Oublier, to forget. 

Recevoir, r., to receive. 

Rêver, m., p., the dream. 

Tasse, f., cup. 

Voir, from voir, 3, ir., to see.
EXERCISE 77.

EXERCISE 78.
1. Have you seen my cups? 2. I have not yet seen them. 3. Have you brought me my books? 4. I have not forgotten them. 5. I have left them at my brother's. 6. Has your mother called your sisters? 7. She has not yet called them. 8. Has the servant told you this news? 9. She has told me this news. 9. Has she told it to me. 10. Have you forgotten my errand? 11. We have not forgotten it, but we have forgotten your money. 12. Where have you left your purse? 13. We left it at the merchant. 14. Have you bought any useful engraving which I saw at your bookseller's? 15. I have not seen them. 16. Has your mother bought them? 17. She has bought books, but she has bought no engravings. 18. Has that little girl broken my cups? 19. She has broken them on purpose. 20. Does that lady receive her income every month? 21. She receives it every six months. 22. Is the house which you have bought large? 23. I have bought no house. 24. Did you receive a letter from your father yesterday? 25. I received a letter from him four days ago. 26. Have you spoken to those ladies? 27. I have spoken to them. 28. Have you given them flowers? 29. I have given them some (m). 30. Are the books which you have bought bound? 31. No, Sir, they are in paper covers. 32. Have you examined that house? 33. I have not examined it. 34. Your brother (en) has examined several (plusieurs).

SECTION XLII.—USE OF THE AUXILIARIES [§ 46].
1. The active verb [§ 42 (3)], that is, the verb which has or may have a direct regimen or object, always takes avoir as its auxiliary [§ 46 (1)].
Nous avons écrit à notre banquier.  We have written to our banker.
2. Almost all other verbs, i.e., verbs which cannot have a direct object, take the auxiliary avoir, when they express action.
Nous avons couru, marché, paré.  We have run, walked, spoken.
3. The compound tenses of a few other verbs, expressing action, are, however, conjugated with être,—aller, to go; arriver, to arrive; choisir, tomber, to fall; décéder, mourir, to die; naître, to be born; venir, to come; parvenir, to succeed; devenir, to become; revenir, to return.
À quelle heure êtes-vous venu? At what hour did you come?  Je suis né en France. I was born in France.
Look carefully at the last example, and mark that, when the person spoken of is living, the French use the present and not the past of the auxiliary with the past participle of naître, to be born.—Cette dame est mère d'Angélique, that lady (tô) was born in England. Mon frère est né en France, my brother (is) was born in France.
4. A few other verbs [§ 46 (3)] take avoir, when they express action, and être, when they express situation.
Votre frère est-il sorti aujourd'hui? Has your brother gone out this morning?
Votre frère est-il sorti? Is your brother gone out?
5. The past indefinite of the verb être [4, ir.] (J'ai été, etc.) is used instead of the present of avoir when speaking of a place where one has been.
Le médecin est allé à Paris, The physician has been at Paris, J'ai été à l'église ce matin, I went to church this morning.
6. When, however, we are still in a given place, or on the road towards it, the expression je suis allé, etc., is used.
Le médecin est allé à Londres, The physician is gone to London.
Votre sœur est allée à l'église, Your sister is gone to church.
RÉSUMÉ DE EXEMPLES.
Avez-vous été au bal hier soir? Did you go to the ball last evening?
Nous n'y avons pas été. We did not go.
Où cette demoiselle s'est-elle trouvée? Where was that gentleman born?
Elle a été chez son frère et chez son oncle. She went to her brother's and to her uncle.
Où est votre sœur allée ce matin? Where is your sister gone this morning?
Elle est allée trouver sa cousine. She is gone to her cousin's.
Avez-vous pas sorti aujourd'hui? Did you not go out today?
Je n'ai pas encore sorti. I have not yet been out.
Où est Monsieur le général? Where is the general?
Je ne sais pas, Monsieur; il est sorti. I do not know, Sir; he is gone out.
Où est-ce que cette sœur est née? Where was that gentleman born?
Il est né à Paris ou à Lyon. He was born in Paris or Lyon.
Votre nièce s'est-elle trouvée chez vous? Did your niece go to visit her brother?
Elle a été le voir hier. She went to see him yesterday (and is back).
Votre sœur est-elle allée chez vous? Has your sister been here?
Elle est allée le voir hier. She went to see him yesterday (and is not back).

VOCABULARY.
Bijouterie, l., jewellery. Magasin, m., ware-
Chapellerie, m., hatter. house.
Edé, à être, 4, ir. born.
Horloger, m., watch-
Marchandise, f., merchandise. maker.
Monstre, f., watch.
Maison, m., house. Veau, from veal, 2,

EXERCISE 79.
25. Sa sœur a été à l'église ce matin, et elle est allée à l'école il y a une demi-heure.

EXERCISE 80.
1. Is the physician at home? 2. No, Sir, he is not at home; he is out. 3. Have you been out this morning? 4. No, Sir, I have not been out; I am sick. 5. Is your sister's little girl out? 6. Yes, Sir, she is out; she is at my brother's. 7. At what hour did the hatter arrive? 8. He arrived last evening at nine. 9. Did the jeweller go to Paris or Lyon this year? 10. He went to Paris six months ago, but he is back (de retour).
11. 'Did you go to my brother or to my sister? 12. I have not had time to go to them. 13. Where was that gentleman born? 14. He was born in England—in Exeter or in Portsmouth. 15. Was not your sister born in Paris? 16. No, Sir, she was born in Madrid, in Spain. 17. Did you tell me that your brother has bought a good house? 18. He has bought a very good house in London. 19. Do you know at what time the watchmaker arrived? 20. He arrived this morning at a quarter before five. 21. Has he brought much jewellery? 22. He has not brought much jewellery, but he has brought many watches.
23. Has he been in France or in Germany? 24. He has been in France, in Germany, and in Switzerland. 25. Has your sister taken part in (la maison), Sir? 26. No, Sir, she is out; she is gone to church. 27. Did she go to school yesterday? 28. She went to school and to church. 29. Is she there now? 30. No, Sir, she is back. 31. Is the hatter arrived? 32. Yes, Sir, he is
arrived. 33. When did he arrive? 34. He arrived yesterday, at nine o'clock in the morning.

SECTION XIII.—IDIOMATIC EXPRESSIONS.

1. Combin en temps corresponds with the English expression how long.

2. Combin de temps avez-vous don-
meur en Italie?

3. Combin de fois answers to the English how often, how many times.

4. Jusqu'où avez-vous été? How many times have you been there?

5. Jusqu'où avez-vous été? How far have you been?

6. Jusqu'à quelle heure, till what hour, means also how late.

7. Jusqu'à quelle heure avez-vous How late did you wait?

8. Où means whence; par où, which way, in what direction.

9. D'où venez-vous, mon ami? Which is your friend gone?

10. Menuez [§ 49], portez, to take, to carry; amener, apporter, to bring, to take with one; emmener, emmener, to take, to carry away.


12. Jusqu'où avez-vous été?


14. Jusqu'à quelle heure avez-vous écrit? How far is your brother gone?

15. J'ai écrit jusqu'à minuit.

16. Doivent vous ces Allemands?

17. Elles viennent d'Aix-la-Chapelle.

18. Par où sont-elles venues?

19. Elles sont venues de Bruxelles.

20. Menez-vous cette petite fille à l'école?

21. Je ne l'y mène pas, je l'y porte; elle est trop petite pour marcher.

22. Amenez-vous vos enfants?

23. Portez-vous une lettre à la poste?


25. J'ai l'intention d'emmené. 21. Qu'avez-vous apporté de France?

26. Nous avons apporté de magnifiques soieries, des draps fins et des chapeaux de Lyon. 23. Avez-vous amené votre fille à pied ou à cheval?

27. Je l'ai amené en voiture.

28. Vos frères nous ont apporté des livres.

EXERCISE 82.


3. How is the physician gone? 4. The physician is gone as far as Cologne. 5. He has taken his son with him? 6. He has not taken him. 7. How have you brought your two little girls? 8. I brought one in a carriage, and my wife carried the other. 9. Is the little girl well? 10. It is not too small to walk, but she is ill. 11. Have you brought your horse?

12. We have brought two horses. 13. Have you brought the books which you promised me? 14. I have forgotten to bring them. 15. Has that lady brought her eldest son? 16. She has brought all her children. 17. How did they come? 18. They came in a carriage. 19. Which way did your brother come from Germany? 20. He came by Aix-la-Chapelle and Brussels.

21. Do you school this afternoon?

22. I do not intend to take him there, it is too cold.

23. Is that child too ill to walk? 24. He is too ill to walk, and I intend to carry him.


27. Have you brought the physician? 28. I have not brought him, no one is ill at our house. 29. Will you take this book to church?

30. I have another. I do not wish to do that; but others would be glad of my death. Lord, however thou disposest of me, continue on and go on to do good for them. Teach "if you look too much upon thy instruments, to depend more upon myself, and pardon such as desire to trample upon the dust of a poor worm, for they are thy people too.”

HISTORIC SKETCHES.—XII.

THE PROTECTOR OF THE COMMONWEALTH.

At the Royal Palace of Whitchall, on the 3rd of September, 1558, a man lay dying. Eight days before he felt so confident of life that he told his wife not to think he should die, as he felt sure of the contrary. Now he was speechless, sinking; and the last thing about which he had seriously troubled himself was a curious metaphysical one: "Tell me," he said to Sillery, a minister, "Is it possible to fall from grace?"

"It is not possible," said the minister. "Then," exclaimed the dying man, "I am safe; for I know that I was once in grace." And then he prayed, "Lord, though a miserable and wretched creature, I am in covenant with thee through thy grace, and may and will come to thee for thy people. Thou hast made me a mean instrument to do them some good, and thee service, although of them seem so small, yet others would be glad of my death. Lord, however thou disposest of me, continue on and go on to do good for them. Teach those who look too much upon thy instruments, to depend more upon myself, and pardon such as desire to trample upon the dust of a poor worm, for they are thy people too."
itself in the person of his own king, by bringing him to a public trial and a public execution; the man who had overthrown all rivals, punished all rebels against his own authority, and set his foot firmly on the throne of kings (having been originally but a country gentleman), though he had refused, and refused resolutely, the name and emblems of royalty.

It was the 3rd of September, the day Cromwell was wont to call his fortunate day. On a 3rd of September he overcame the Scots' army at Dunbar, when, looking at the position of his army in a military point of view, he was committed to certain destruction at their hands; on a 3rd of September he had fought the battle of the Boyne; on a 3rd of September he rescued his young tenant from the jaws of death, as he called it, when the royalist cause was lost in England, so long as Cromwell could move a regiment or man a ship. His wife and his friends hoped much from this circumstance, that the worst of the fever seemed to come upon him on this his fortunate day. Fortune indeed if he could realise in his own case the assertion of the wise king, that the day of one's death is better than the day of his birth; fortune too, still, if he could feel that death was but the entrance into life, the outlet from a world of which, and of the people and things in which, he was heartily tired and weary; the means by which, and by which only, he could enter into rest.

In this last sense surely the 3rd of September was still Cromwell's fortunate day, for if ever a man was weary of life and anxious to be quit of the cares of it, Cromwell must have been that man. Whether he was to be blamed or not for the part he had taken in the recent troubles—whether he was the murderer of the king, or whether in putting him to death he had done but a solemn act of justice—the result to him was the same; the weight of the government pressed heavily upon his shoulders, and he found at the end of ten years that all he had for the labour which he had taken under the sun was vanity and vexation of spirit. Fugitive of body and mind, continuous and severe, occasioned by causes acting from without, were supplemented latterly by a spring of bitterness welling up within, sapping the strong man's energy, gnawing away at the very vitals of his strength, overwhelming him with a dreadful sense of responsibility and fear lest he had strived in vain and in the wrong direction. Once he had felt no hesitation about what he should confirm, and believed that his decision was an inspiration of the Spirit of the Almighty; now he doubted whether all things were lawful or expedient unto him. Once he had felt no difficulty in telling his troopers, by way of assurance against their fears as to the propriety of offering personal violence to the king, "If I should meet the king in battle, I would shoot the king;" now he was uneasy in his mind when even his favourite daughter, Mrs. Clapole, suggested to him doubts as to the integrity of his conduct. Even the members of his family, whose safety he had stood by him through good report and evil until his genius eclipsed them and turned them into rivals and opponents, those too had forsoaked him, and left him alone in the state like a lode in a garden of cucumbers. Then he found how, without being bitten, a man's household may be among his foes. His mother, a homely woman, quite incapable of realising the magnitude and the difficulties of her son's position, disquieted him in return for his filial devotion to her with the expression of her convictions that they and the like of them had no business in the royal palaces. His children were incapable, excepting perhaps Henry, of appreciating his statesmanship and his motives, and were therefore divided from him by a great gulf of want of sympathy; while some of them, if the accounts of those times are to be trusted, actually reproached him for what he had done for the country. On one side a numerous and implacable enemy, burning with desire to avenge the unpardonable death of "the royal martyr," and the losses they had incurred in his behalf—on another side, a formidable array of enemies who had once been friends and associates; the hatred of foreign nations, only kept from finding expression by the fear inspired by his sword; chronic rebellion at home; within the camp inwrought allies, ready to fall away like water as soon as they should perceive the least rub in his administration; without, the habitual uneasiness in his own mind about grace and acceptance; doubtful, too, as has been said, whether or not he had striven in vain for the ultimate good of his country—what comfort could he have in living? He was alone, and he felt it keenly; the still strong man felt the need of some sympathy, some divider of cares with whom he could relieve himself of the great burden of public and private care which came upon him daily in the singularly exceptional position in which he found himself placed. As age increased, he suffered more and more from the chilling wind of isolation, and seemed to years after that rest which the weary love. Yet the spirit of duty within him, the duty which he believed he was called to discharge in England, strove to prevent his wish to depart; he saw his work all unfinished, and he knew that he had no fit successor; he believed—some say affected to believe—that his work was God's work, and he wished to do it to the utmost of his power. For duty's sake and religion's, and because he felt it "one's portion," he guarded his life "from sooth and wrong," and his hold on life was not a little strengthened by the natural dread a man has of loosening it through sudden violence and deadly malice. Such a dread had Cromwell for a companion, in addition to his load of caring cares and weighty troubles. Plots to assassinate him were continually being made, and were only baffled by the most watchful energy and the most exemplary punishments. The knowledge of their existence, and the consciousness that at any moment he might fall a victim, contributed to make a man whose mind was already overladen, a man who had a religious or superstitious dread of being sent to his account suddenly, "disappointed, unauned," without any reckoning made, excitable and nervous to an almost unbearable degree.

In August, 1658, he was at Hampton Court Palace, watching the proceedings of discussion, the body of his best beloved child, Elizabeth Claypole. He was, and had been for some time, far from well, but the absorbing attractions of his daughter's state made him oblivious or indifferent to his own ills. On the 6th of August the strongest link of affection that bound him to the world was snapped; Elizabeth Claypole died, and then the Protector found out, what other men had known long since, that he was very ill. For a time he distracted himself by the and cares of the last offices for his daughter, whom he caused to be buried with imperial pomp among kings and queens in Westminster Abbey; but this done he had leisure to find out that he was mortal. At the moment of his daughter's death he was confined to his bed with gout, and upon that fever supervened. His pulse became intermittent; but his physicians did not seem to be anxious, and he, on his wife expressing her fears, said, "why should I be so disturbed?" For the issue of his illness, both he and his wife believed that there was much to be done for him, and that he would not die, since he knew he should not "from better authority than any which you can have from Galen or Hippocrates. It is the answer of God himself to our prayers; not to mine alone, but to those of others who have a more intimate interest in him than I have."

For sake of the change he had moved from Hampton Court to Whitehall, where he took to his bed, and within a month of the 5th of September he expired, 5th day of September. Thurloe, his faithful secretary and most devoted friend, announced the event to the Deputy of Ireland in a letter wherein he said of Cromwell, "He is gone to heaven, embalmed with the tears of his people, and upon the wings of the prayers of the saints."

With a magnificent ceremonial, copied from that which was used at the funeral of the Spanish King Philip II., in 1598, the Republican Government laid the body of Oliver Cromwell in Westminster Abbey, where it remained with those of princes and senators till the restoration of the monarchy, when the spirit of revenge wreaked itself on the corpse of the spoiler of kings by causing it to be exposed on the gallows at Tyburn, and then buried in a hole like the carcass of a dog. To Cromwell himself it could scarcely have mattered much where they laid his body or what they did with it after he had done with it; the splendid funeral to which he was a little in accordance with his habits and ways is the ignominious barbarity at Tyburn. He was beyond the reach of honour and dishonour, insensible to flattery as to blame; but to those who remained these two ceremonials signified something. What had Cromwell done that gave significance to them?

In order to answer this question it is necessary to take a survey of the life of the man, as the history of it is presented to us in the records of his time, and by the light of dispassionate, truth-seeking inquiry instituted since then.

Oliver Cromwell was born on April 25, 1599, at Huntingdon, and was the son of a country gentleman of moderate estate, who was of the same family as that Thomas Cromwell,
Cardinal Wolsey's favourite secretary, who was made Earl of Essex by Henry VIII, and was afterwards beheaded by him. Oliver was sent to the University, where he made but small proficiency in his studies, and fell, it is said, into some wild courses. Reforming his mode of life, however, on a sudden but sincere conviction that it was a wrong one, Cromwell married, and at the same time warmly embraced the puritanical faith, which was then beginning to acquire great influence throughout the country. For reasons of economy he gave up housekeeping as a country gentleman, and farmed some land which he took near St. Ives; but his operations in this direction were not successful, the duties of the farmer being probably neglected for those of the religious politician. In conjunction with his kinsman, John Hampden, he formed a project of emigrating to America, believing that there alone he could live in the enjoyment of complete independence of political opinions, which was denied to him and his brethren here. How that project was frustrated by royal order, on the very eve of completion, has been already shown at length in No. VII. of the present series of Historic Sketches (page 222).

Soon after the veto was put on his emigration, Cromwell was sent to Parliament as member for the town of Cambridge, and though he seldom spoke, and when he did, not in a way to captivate or lead the House, his vote was invariably found to be on the lists of those who had maintained the popular right against the kingly power. He did not take a prominent part in the political and domestic matters which brought about the rupture between the King and the Parliament, but he made good use of his time, and of his great powers of observation and reflection, to make up his mind thoroughly both as to the righteousness of the cause and as to the character and the mode of life of the men engaged on both sides of it. Having formed very strong opinions upon the most important questions of the day, he cleaved to them as a strongly persuaded man does with uncompromising intensity; and the shape of the quarrel in the state, and the peculiar habit of his mind, caused him to see plainly a great gulf fixed between what he believed to be on one side the cause of God himself, and on the other the cause of God's enemies.

In all important points before the breaking out of civil war we find him voting on the popular side, lending whatever weight his influence had to the cause of liberty; and when by the flight of the king from London, and by the rearing of the royal standard at Nottingham, August 25, 1642, war became inevitable, Cromwell, then in his forty-third year, was among the first to offer a challenge. Parliament for some time commissioned to raise a troop of horsemen to serve in the Parliamentary army. This troop, which he soon increased to a regiment, he raised from among the yeoman and well-to-do farmers in Cambridgeshire and the neighboring counties, ensuring thereby a certain amount of education among his men, and a large admixture of that free spirit which cannot grow but in an independent atmosphere. But he found the men of the famous "Tories," dreadfully in battle; he prayed with them, preached to them, fought with them, and by cool courage and fervent zeal succeeded in inspiring them with a belief that a prophet had risen up among them. First at Gainsborough, and then at Horncastle, in Yorkshire, Cromwell displayed his military ability as a general, by defeating with severe loss some divisions of the Royalist army under Stanley, and then of Newcastle, and at Newcastle he was appointed second in command of the Parliamentary army operating in the Eastern counties under the Earl of Manchester. In conjunction with Fairfax and Lambert, the Earl of Manchester, having been victorious in the east, marched to York and besieged it, the issue being the battle of Marston Moor, where the cavalry and infantry under the command of Oliver Cromwell beat the royalist ranks of Prince Rupert, and carried the day "for God and the Houses."

At Dennington Castle, near Newbury, where King Charles had left his baggage and artillery after the rout of his army at the latter place, a difference arose between Cromwell and the Earl of Manchester which first showed the firmness and domi-

not now to follow him through all his military achievements prior to the death of the king, suffered it to be said that he was incessantly employed, retaining by strange inconsistency his seat as a member of Parliament the while, and that he figured in all the great battles of the war, including Naseby, June 14, 1645, and always was attended by success.

Thoroughly persuaded of the dishonesty of the king; convinced that, unless he were completely overthrown, the last will of Charles, that England would be worse than the first; persuaded also that there was not any man, or any set of men on the Parliamentary side, who could prevent this except himself, he determined, about the time King Charles was given up by the Scots, with whom he had taken refuge, to gather up the reins into his own hands, and to drive the chariot of the state along the road which in his opinion was a safe one. Firmly, harfly, perseveringly, prayerfully, he addressed himself to his task, which was to overthrow the king—though this king—whose authority by a sort of raid on the captives' guard at Holdemby, in Yorkshire, where he was on his way to be given up to the Parliament, and snatching the king from the hands of the Scots' and Parliamentarian commissioners, brought him to the head-quarters of the army. The army at that time was in open quarrel with the Parliament on the subject of the limitations which that body had imposed on the king's power, and desired to overawe the Senate by a showing of force; and Cromwell, whose influence with the army was at this time paramount, resolved to crush the rival but divided power, and knowing the immense importance of the possession of the king's person, gladly acquiesced in, if he did not order, the violent taking of Charles from the custody of the Parliamentary commissioners.

Immediately he heard of the king's re-arrest he left London, hastened to the army, and putting himself at its head, marched to St. Albans, where he opened negotiations with the Parliament in London. The nation looked on approvingly, being disgusted with the way in which the Houses had used their power, with that of the army, and with the whole conduct of the state by the earl of protector, and by the governor, Colonel Hammond. Meantime the army, represented by Cromwell, had completely overawed the Parliament, which was allowed, however, still to exist till the dictator had used them for his purposes. The negotiations between it and the king having proved futile, Cromwell summoned a council of the principal officers of the army to devise some means of settling the nation. At this council it was agreed that, after much prayer for the deliverance of the king, and for bringing the king to face his enemies, all committed treason against the people by levy war upon him. Plots and counterplots now took place, some having in view the overthrow of the officers, some of the Parliament, some the restoration of the king, the result being that a second civil war broke out, aided by the Scots, and England was abased again from end to end. Promptly, skillfully, successfully, Cromwell at last carried the rebellion and the invasion; and when being done, they resolved to bring the king to punishment for the part he had had in them. The Parliament resisting, the army came to London; and the Houses having still declared their willingness to treat with the king, and their entire disapproval of the course taken by the army, Cromwell resolved to coerce them still more, and on the 6th of December, 1645, "purged" the House of Commons with some of the members, made his application to the king, to ask for more, and to him to him instead of his friends, as a part of his own to his interests, and allowing no more than some sixty of the most partisan-like to remain. It was by a High Court of Justice appointed by this "Rump" Parliament that King Charles was
brought to trial in Westminster Hall, and by a sentence of that court, signed, amongst others, by Oliver Cromwell, he was publicly executed 'in the open space before Whitehall,' on the 30th of January, 1648. There was no other way in the state to which things had come; it was war to the knife, and so wide had become the difference in political and religious feeling between the opposed parties, that the intolerant absolutism of one of them was inevitable.

For years after this event the government of England was nominally republican, and really a sort of parliamentary executive under the control of the army. The prime mover, though he kept himself in the background, was Oliver Cromwell, whose will made itself law, and whose policy guided the state. Ireland, the state of which was more wretched and desolate, perhaps, than at any other time in her history, was to be 'quarantinielled,' and Cromwell marched through it in inoffensive fashion, putting whole garrisons to the sword, burning, killing, and destroying, in pursuance of what his stem, strong nature conceived to be the only efficacious way of dealing with her. Ireland was tranquil in the sleep of death, and never again was able to trouble the sister island with her aspirations after life. It was an awful omen the Puritan leader gave her, and deadly and bitter was the hatred with which she wore them. The effects of it, with no worse menace than an Irishman curse to-day than with 'the curse of Cromwell.'

The Dutch were punished for the aid they gave to the king's cause by a naval war, which was singularly brilliant, and in which the names of De Ruyter, De Witt, Van Tromp, Blake, Ayasene, Venables, and Monk, shine out in bold relief. Scotland, which had espoused the cause of Charles II., and had proclaimed him king, was overran by the same irresistible man who had crushed the Commonwealth and Puritans in Ireland. At Dunbar, at Stirling, and then at Worcester, whither the Scots' army had penetrated in order to be overthrown, the strong hand and wise head of Oliver Cromwell prevailed, and the royal cause was irretrievably lost.

In 1653 it became obvious to the army, or to the man who commanded it, that parliamentary government must cease in form as well as in reality. The exceptional state of England rendered it impossible to have a divided government, and in dissensions and petty squabbles the Parliament, mutilated as it was, was only strong. Every day the civil and military powers were coming into collision. In the face of smouldering war at home, avowed hostility abroad, and the still unsettled state of the realm, this sort of thing would not do. Cromwell resolved to take the helm himself, and alone to steer the ship of the state. On the 30th of April, 1653, he dismissed the shambles Parliament, and Cromwell was forthwith made Protector of the Commonwealth of England.

From that moment England rose to be a first-rate power in Europe. The Dutch were ruinously beaten in a two days' naval battle, in which Van Tromp, their great admiral, was killed. Spain, the greatest power in Europe, was victoriously withstood, and lost, among other possessions, the island of Jamaica; France, under Cardinal Mazarin, was glad to be well with the Protector of England; and Portugal received compensation for her losses. She made her remonstrance for some assistance she gave to the exiled king. At home a firm and disinterested rule served to heal many of the wounds from which poor England bled; and with a commerce protected afloat, and industry encouraged on shore, the English people grew prosperous, wealthy, and in some sort contented. Now and again the royalists, and those enemies of theirs who were enemies with Cromwell, gave the government trouble; and it was seriously proposed, in order to put an end to their hopes, that Cromwell should make himself king, and found a new dynasty. In 1657 the crown was actually offered to him, but he firmly refused it, and accepted instead 'the humble petition and advice,' wherein were laid down rules for his guidance in the government, and in which his authority was defined.

For twelve months he continued to carry on his work, hoping against hope that it might be an abiding one; welding the disintegrated masses of English society into a strong, unified community; striving to do justice to all, though many would not suffer him; making the country he had been called upon to govern prosperous at home and respected abroad. Space fails to tell all he did; or to seek out a knowledge of the intentions he was not allowed to fulfil. Regarded with respectful hatred by the royalists, with envy by those whom he had outstripped in the race, with admiration by those who loved their country more than themselves, and prized the objects for which England had struggled and fought; loved by very few, unhappy in himself, Cromwell sank to rest; and enough has been said here to make it intelligible why to many of his countrymen a funeral and a tomb less than the most splendid seemed all unworthy of him. Yet when Charles II. was restored to his father's throne, there were found men to suggest and approve the senseless barbarity which led to the exposure of his dead body on Tyburn gallows. Perhaps even these men, after "the merry monarch" had reigned a few years, might have looked back and said—when they saw the Dutch in the Medway, the French all-powerful through money, the Spaniards insulting the English flag in all places in the world, and the revenues of the kingdom in the hands of mistresses and foreign potentates, with the sovereigns of the state died of hunger—that somehow, harsh, ungenial as Cromwell might have been, he never allowed an Englishman to have cause to blush for his nationality, never made the state interests subservient to his own, never gave the people such provocation as did the restored line of princes, that in less than thirty years after the day of their unfortunate restoration they hurled them off the throne, and forbade firmly and for ever their re-accession to it.

SYNOPSIS OF EVENTS IN THE LIFE OF OLIVER CROMWELL, LORD PROTECTOR OF THE ENGLISH COMMONWEALTH.

Oliver Cromwell, who virtually held supreme sway over England from the abdication of Charles I. by the Scotch in 1647, was the son of a gentleman of Huntingdonshire, and grandson of Sir Henry Cromwell, of Hinchingbrooke. By his wife, Elizabeth Bourchier, daughter of Sir John Bourchier, he had two sons and six daughters.


Blake defeats the Dutch Fleet off Portsmouth, Feb. 13-14, 1653

Sovereigns contemporary with Oliver and Richard Cromwell.


Russia, Czars of: Alexis 1645.

Poland, Kings of: John II. (some-times styled Casimir V.) 1649. Philip IV. 1651.


Turkey, Sultans of: Mahomet IV. 1649.

LESSONS IN BOTANY.—XII.

The reader will now begin to understand the general principles on which a natural classification of vegetables is effected. In the first place, we divide them into cryptogamic and phanogamous; then we divide the latter into endogenous and exogenous. Next we proceed to establish orders, from a consideration of such characteristics as the position and structure of the fruit, character of seed; and, as we have already seen, we usually give to each order a name derived from some leading genus or sub-division. Thus, our principal genus in the Ranunculaceae order is the Ranunculus or Crowfoot; hence the generic name Ranunculaceae is given; and we subdivide this genus into species by the addition of terms which considerate without its notice before, we will explain before we proceed.  

The first new word that requires explanation is *caducus*, used to describe the peculiarity of the sepals. The reader will remember they are the component parts of the calyx, and form the green envelope of the poppy-bud which bursts asunder when the flower is ready to open. Soon after the flower has opened the sepals fall off, and for this reason they are called *caducus*, from the Latin *caduceus*, which is derived from *cado*, to fall. *Estivation* is the manner in which the sepals and petals are thrown open, and is not a characteristic of the order or tribe, but of some species. The poppy is the *angiosperm* order, which is termed *unilocular* because it is “one-celled,” or has only one cell, from the Latin *unus*, one, and *locus*, a cell, the diminutive of *locus*, a place. In the fruit are found the parts to which the seeds are attached, which are called *placentas*. These placentas are flattened, and derive their name from the Greek *plastos*, genitive *plastos*, meaning thrown together, such as a plate or flat cake. They grow out or project from the inside of the ovary, or as it were from the wall of the ovary, therefore they are called *parietal*, from the Latin *paries*, a wall.

The reader may provide himself with a red corn-poppy as a specimen of the flower, and a white poppy-capsule, procurable at the druggist’s, as a sample of the fruit. Like buttercups, poppies will be seen on examination to have a great number of stamens; these stamens, moreover, are below the carpels, or are hypogynous. Thus far, the resemblance of the Poppy tribe to the Ranunculaceae tribe is complete. But when we come to examine the fruit, what a difference is there! In the Ranunculaceae tribe the parts remain distinct, and the fruit is, owing to that circumstance, denominated *apocarpous*; in the Papaveraceae the carpels unite together and constitute one capsule, the poppy-head of the shop. This, then, is the grand distinction between the two natural orders. The carpels have all grown into one common ovary, but what has become of the *stigma* or upper expansion of the styles? These may be seen at the extremity of the poppy capsule, as represented in the accompanying diagram (Fig. 120) where they may be observed forming a sort of crown. If the capsule be now opened it will be found to consist of one cell, into which numerous little flattened plates project; the latter are termed *placentas* or *placenta*, a term of which a full explanation has already been given above; they are the parts of the fruit which give attachment to the seeds.

Such are the mechanical conditions, if we may so term them, in which the Papaveraceae differ from the Ranunculaceae; but there is a well-marked physiological difference also. Plants belonging to the Ranunculaceae tribe are supplied with a watery, acrid, poisonous juice; whereas in plants of the Poppy tribe the juice is milky, and usually contains opium. The substance known as opium in the shops is derived from the white poppy,
by making cuts on the ripe capsules, and allowing the juice to exude. After exposure for a while to the sun, the juice, at first milky, soon thickens into a dark waxy-looking mass. This is opium, the active principles of which are numerous, but that termed morphia is the chief.

Just as the characteristics of the Ranunculus tribe become veiled in the larkspur, anemone, celandine, and poppy, so are the Poppy characteristics obscured in certain plants belonging to this natural order. For example, on some parts of the sea-coast, there grows a plant termed the "horned poppy," on account of the peculiar appearance of its fruit, which, instead of being round like the fruit of a common red or white poppy, is shaped something like a horn. The form may be partially explained by the fact that the seeds are wind-pollinated. In the fruit of the ordinary poppy numerous carpels are united together, and thus a globular body results, just as the orange presents a globular aspect on account of the assemblage of so many easily divisible sections; but supposing many of these sections removed, the orange would no longer be globular, but elongated. It is thus with the horned poppy. Its fruit, like the ordinary poppy, is syncarpous; that is to say, compounded of carpels united together; but their number being fewer—only two—the resulting fruit is necessarily more elongated.

The Celandine (Chelidonium majus) is another plant of the Poppy tribe, in which the fruits are elongated. All these species of Papaveraceae are characterised by having a milky juice, by the presence of which, taken in connection with hypogynous stamens and fruits, the various members of this tribe may always be discriminated. The milky juice of the celandine will remove the excrescences called warts.

SECT. XXIII. — ROSACEÆ, OR THE ROSE TRIBE.

This is a very extensive natural order of plants, comprehending not only the roses proper, but almonds, strawberries, apples, pears, and many other plants.

Characteristics: Calyx monocempalous, usually in five divisions; sometimes adherent to the ovary; imbricated in sections; petals five, alternate with the sepals free, inserted on the calyx, imbricated in sections, sometimes absent; stamens usually of indefinite number, inserted like the petals; pistil, various; ovule, reflected; seeds, dicotyledonous; leaves alternate, usually compound, with stipules. All these botanical terms have already been explained.

Perhaps the best specimen for affording the general characteristics of the Rose tribe is a strawberry flower. Supposing the reader to have provided himself with one of these, he will at first be struck with a general resemblance to a buttercup flower. In both the carpels and the stamens are numerous, but the following leading distinction between them may at once be seen. In the buttercup the stamens do not grow from the calyx, so that the latter may be altogether removed without in any respect disturbing the former. If, however, we attempt to dissect a rose or a strawberry flower in this manner, we shall soon find it impossible to remove the sepals of which the calyx is composed without at the same time removing all the stamens. This distinctive characteristic was known to Linnaeus, and embodied by him in the distinction between his Rosa and Polyandra, as the reader will observe if he turns to page 305.

This peculiarity in the insertion of the stamens in flowers of the Rose tribe is shorty indicated in botanical language by the term perigynous. We have already seen that the term hypogynous means below the carpel; therefore the reader will now be prepared to understand that perigynous means around the carpel; and this is expressive of the mode of growth of stamens in the Rose tribe. Had we not previously explained the nature of the strawberry fruit, that point would have to be explained now; but the reader is already aware that the real botanical fruits of the strawberry are those little seed-like things scattered over the surface of the part which we call strawberry.

Very nearly allied to the strawberry in their botanical aspect are the Cinquefoil or Potentilla plants. Their flowers are almost exactly like those of the strawberry, but strawberries, nevertheless, fail to result. The torus, which becomes juicy and delicious in the strawberry, remains hard in the potentilla.

Raspberries and brambles are also members of the Rose tribe, with which they agree in the easily-recognised essential characteristic of perigynous stamens. There is a sort of general resemblance, too, between the fruits of the raspberry, blackberry, and the edible portion of the strawberry; yet the botanical distinction between raspberries and blackberries on the one hand, and strawberries on the other, is very clear. The very part we eat in the strawberry is the portion of the flower we throw away in the raspberry and blackberry. The fleshy and delicious torus or receptacle of the strawberry becomes in the latter white, insipid, spindle-shaped core, whilst the edible part is a real fruit, or rather an assemblage of real fruits, matured ovaries. How are we to know this? The learner will ask. Simply, by never observing that each of those little bell-like elevations is surmounted or terminated by a sort of hair? Now these hairs are nothing more than the styles of carpels, the lower portions or ovaries of which have expanded in order to become fruit.

In the illustration on this page the reader will find a good representation of the wild rose or dog-rose, the Rosa canina of Linnaeus, which is to be found in almost every hedge-row in the country, and which furnishes excellent stemwood which to engrave the different varieties of garden roses by budding. The smaller cuts, immediately below the engraving of the rose itself, with its flower-buds and glossy dark-green leaves, will help him in distinguishing the component parts of the flower when dissecting it, as No. 2 exhibits an accurate sketch of a vertical section of the flower, and Nos. 3, 4, and 5, the carpel, the seed within the carpel, and the outer envelope in which the carpels are contained.
READING AND ELOCUTION.—XII.

ANALYSIS OF THE VOICE (continued).

VIII.—CORRECT INFLections.

"INFLACTION" in elocution signifies an upward or downward "slide" of voice, from the average, or level, of a sentence. There are two simple "inflammions" or "slides,"—the upward, or "rising," and the downward or "falling." The former is usually marked by the acute accent ['], the latter, by the grave accent ['].

The union of these two inflactions, on the same syllable, is called the "circumflex," or wave. When the circumflex commences with the falling inflection, and ends with the rising, it is called the "rising circumflex," marked thus ['']; when it begins with the rising, and ends with the falling, it is called the "falling circumflex," marked thus ['].

When the tone of the voice has no upward or downward slide, but keeps comparatively level, it is called the "monotone," marked thus [—].

Examples.—Rising Inflection.

"Intensive," or high, upward slide, as in the tone of surprise:

Hâ! Is it possible!

In the usual tone of a question, that may be answered by Yes or No:

Is it really so?

"Moderate" rising inflection, as at the end of a clause which leaves the sense dependent on what follows it:

If we are sincerely desirous of advancing in knowledge, we shall not be sparing of exertion.

The "slightest" rising inflection—marked thus [''], is used when the voice is suddenly and unexpectedly interrupted:

When the visitor entered the room—

The last-mentioned inflection may, for distinction's sake, be marked as above, to indicate the absence of any positive upward or downward slide, and, at the same time, to distinguish it from the intentional and prolonged level of the "monotone."

Falling Inflection.

"Intensive," or bold and low downward slide, as in the tone of anger and scorn:

Down, ruthless insultor!

The "full" falling inflection, as in the cadence at a period:

All his efforts were in vain.

The "moderate" falling inflection, as at the end of a clause which forms complete sense:

Do not presume on wealth; it may be swept from you in a moment.

The "slight" or slight falling inflection, marked thus [''], as in the members of a "series," or sequence of words and clauses, in the same syntactical connection:

The force, the size, the weight of the ship, bore the schooner down below the waves.

The irresistible force, the vast size, the prodigious weight of the "ship," rendered the destruction of the schooner inevitable.

The "slightest" downward slide is marked as above, to distinguish it from the deeper inflection at the end of a clause, or of a sentence.

TABLE OF CONTRASTED INFLECTIONS.

The Rising followed by the Falling.

Will you go, or stay?

Do you ride, or walk?

Did he travel for health, or for pleasure?

Does he pronounce correctly, or incorrectly?

Is it the rising, or the falling inflection?

The Falling followed by the Rising.

I would rather go than stay.

I would rather walk than ride.

He traveled for health, not pleasure.

He pronounces correctly, not incorrectly.

It is the falling, not the rising inflection.

Examples of Circumflex.

Punish.—And through heavy to weigh, as a score of fat sheep.

He was not, by any means, heavy to sleep.

Example of Monotone.—Aw and Horror.

I could a tale unfold whose lightest word.

Would narrow thy soul, freeze thy young blood,

Make thy two eyes, like stars, start from their spheres,

Thy knitted and combined locks to part,

And each particular hair to stand on end,

Like quills upon the fateful pincers.

Rules on the Rising Inflection.

Rule 1.—The "intensive" or high rising inflection expresses surprise and wonder, as:

Hâ! laugh'st thou, Lochiel, my vision to scorn?

Rule 2.—The "moderate" rising inflection takes place where the sense is incomplete, and depends on something which follows:

As we cannot discern the shadow moving along the dial-plate, we cannot always trace our progress in knowledge.

Note.—Words and phrases of address, as they are merely introductory expressions, take the "moderate rising inflection," as:

Friends, I come not here to talk.

Sir, I deny that the assertion is correct.

Soldiers, you fight for home and liberty!

Exception.—In emphatic and in lengthened phrases of address the falling inflection takes place, as:

On ye brave, who rush to glory or the grave!

Soldiers! if my standard falls, look for the plume upon your king's helmet!

My friends, my followers, and my children! the field we have entered, is one from which there is no retreat.

Gentlemen and knights—companions and soldiers, Edward the Fourth upon his throne will not profit by a victory more than you.

Rule 3.—The "suspensive," or slight rising inflection, occurs when expression is suddenly broken off, as in the following passage in dialogue:

Poet. The poisonous dâme—

Friend. You mean—

P. I don't.

P. You do.

Note.—This inflection, prolonged, is used in the appropriate tone of reading verse, or of poetic prose, when not emphatic, instead of a distinct rising or falling inflection, which would have the ordinary effect of prosaic utterance, or would divest the expression of all its beauty.

Examples.

Here waters, woods, and winds in concert join.

And flocks, woods, streams around, repose and peace impart.

The wild brook babbling down the mountain's side;

The lowing herd; the sheepfold's simple bell;

The pipe of early shepherd, dim descried

In the lone valley; echoing far and wide,

The clamorous horn, along the cliffs above;

The hollow murmur of the ocean tide;

The hum of bees, the linnet's lay of love;

And the full choir that wakes the universal grove.

White horses peep through the trees; cattle stand cooling in the pool; the casement of the farm-house is covered with jessamine and honeysuckle;† the stately greenhouse exhales the perfume of summer climates.

Rule 4.—A question which may be answered by Yes or No, usually ends with the rising inflection, as:

Do you see your cloud?

Exception.—Emphasis, as in the tone of impatience, of extreme earnestness, or of remonstrance, may, in such cases as the above, take the falling inflection, as:

† The penultimate inflection of a sentence, or a stanza, usually rises, so as to prepare for an easy cadence.
Can you be so infatuated as to pursue a course which you know will end in your ruin?

Would you blind rash on destruction?

Would you so, if the case were your own?

Rule 5.—The penultimate, or last inflection but one, is, in most sentences, a rising slide, by which the voice prepares for an easy and natural descent at the cadence, as:

The rocks crumble, the trees fall, the leaves fade, and the grass withers.

Exception.—Emphasis may sometimes make the penultimate inflection fall, instead of rising; as the abruptness of that slide gives a more forcible effect:

They have rushed through like a hurricane, like an army of locusts, they have devoured the earth; the war has fallen like a waterspout, and deluged the land with blood.

Rules on the Falling Inflection.

Rule 1.—The "intensive, downward slide," or "low," falling inflection, occurs in the emphasis of vehement emotion, as:

"Oh! "Oh!" to the just and the glorious style!"

Rule 2.—The "full" falling inflection usually takes place at the cadence, or close, of a sentence, as:

No life is pleasing to God, but that which is useful to mankind.

Exception.—When the meaning expressed at the close of one sentence is modified by the sense of the next, the voice may rise, instead of falling, as:

We are not here to discuss this question. We are come to act upon it. Gentleman may cry "peace, peace!" But there is no peace.

Rule 3.—The "moderate" falling inflection occurs at the end of a clause which forms complete sense, independently of what follows it, as:

Law and order are forgotten: violence and rapine are abroad; the golden cords of society are loosened.

Exception.—Plaintive expression, and poetic style, whether in the form of verse or of prose, take the "slight" rising inflection, in its prolonged form:

Cold o'er his limbs the listless languor grew;

Paleness came o'er his eye of placid blue;

Pale mourned the lady where the rose had died;

And timid, trembling, came he to my side.

The peaks of the mountains fall: the mountains themselves decay with years; the ocean shrinks and grows again; the moon herself is lost in heaven;* but thou art for ever the same, rejoicing in the brightness of thy course.

Rule 4.—The "suspective," or slight falling inflection, takes place in every member but one of the "series," or successive words and clauses, connected by the same conjunction, expressed or understood.

Note 1.—A succession of words is termed a "simple series:" a succession of clauses a "compound series." A succession of words which leave sense incomplete is termed a "commencing series;" that which leaves complete sense, a "concluding series." A "commencing series" is read with the "suspective," or slight falling inflection, on every member but the last; a "concluding series," with the "suspective" slide on every member, except the penultimate, or last but one.

"Simple commencing series:"—

The air, the earth, the water, team with delighted existence.

"Simple concluding series:"—

Delighted existence teems in the air, the earth, and the water.

"Compound commencing series:"—

The fluid expanse of the air, the surface of the solid earth, the liquid element of water, teem with delighted existence.

"Compound concluding series:"—

Delighted existence teems in the fluid expanse of the air, the surface of the solid earth, and the liquid element of water.

* "Rising slide," for contrast to the following clause.
† "Penultimate" rising inflection, preparatory to the cadence, or closing fall of voice, at the end of a sentence.
‡ "Full" falling inflection, for the cadence of a sentence.

Exception 1.—Emphatic, abrupt, and disconnected series, may have the "moderate" or the "bold" downward slide on every member, according to the intensity of expression, as:

His successes, his fame, his life, were all at stake.

The roaring of the wind, the rushing of the water, the darkness of the night, all conspired to overwhelm his guilty spirit with dread.

Eloquence is action, noble, sublime, godlike action.

The shore, which, but a few moments before, lay so lovely in its calm serenity, gilded with the beams of the level sun, now resounded with the roar of cannon, the shouts of battle, the clash of arms, the curses of hatred, the shrieks of agony.

Exception 2.—Light and humorous description gives the "moderate" upward slide to all the members of a series, as:

Her books, her music, her papers, her clothes, were all lying about the room, in "most admired disorder."

Exception 3.—The language of pathos (pity), tenderness, and beauty—whether in verse or prose—takes the "suspective," or slight rising inflection, except in the last member of the "commencing" and the last but one of the "concluding" series, which have the usual "moderate" rising inflection, as:

No mourful flowers, by weeping fondness laid.

No pink, no rose, drooped on his breast displayed.

There wrapt in gratitude, and joy, and love.

The man of God will pass in Sabbath noon.

There in the grave, vile insects consume the hand of the artist, the brain of the philosopher, the eye which sparkled with celestial fire, and the lip from which flowed irresistible eloquence.

Note 2.—All series, except the plaintive—as by their form of numbers and repetition, they partake of the nature of "diminut," or increase of signification—should be read with a growing intensity of voice, and a more prominent inflection on every member, as:

The splendor of the firmament, the verdure of the earth, the varied colours of the flowers which fill the air with their fragrance, and the music of those artless voices which mingle on every tree; all conspire to captivate our hearts, and to swell them with the most rapturous delight.

This remark applies, sometimes, even to the rising inflection, but, with peculiar force, to cases in which the language is obviously meant to swell progressively in effect, from word to word, or from clause to clause, and which end with a downward slide, on every member, as in the following instance:

I tell you, though you, all the while, though an angel from HEAVEN, should declare the truth of it, I could not believe it.

Rule 5.—All questions which cannot be answered by Yes or No end with the falling inflection, as:

When will you cease to trifle?

Where can his equal be found?

Who has the hardihood to maintain such an assertion?

Why come not on these victors proud?

What was the object of his ambition?

How can such a purpose be accomplished?

Exception.—The tone of real or affected surprise throws such questions, when repeated, into the form of the rising inflection, as:

How can such a purpose be accomplished?

To the diligent all things are possible.

LESSONS IN ARITHMETIC.—XXII.

MEASURES OF SURFACE OR SUPERFicies.

6. Definition.—A square is a four-sided figure, of which the sides are equal, and the angles right angles.

Surfaces are measured by means of square inches, square feet, square yards, etc., i.e., by squares the sides of which are respectively 1 inch, 1 foot, 1 yard in length, etc.

7. To find the magnitude of a Square, the length of its side being given.

Raise to the number expressing the number of linear units (inches or feet, etc.) in the side to the second power. This will give the number of square units of the same kind in the square.

For instance, a square, of which the side is 4 inches, contains
16 square inches; a square, of which the side is 5 feet, contains 25 square feet. The truth of this will appear from the following diagram:

1
2
3
4

Fig. 1.

10. To find the magnitude of a Cube, the length of an edge being given.

Raise the number expressing the number of linear units in the edge to the third power. This will give the number of cubic units of the same kind in the given cube.

For instance, a cube of which the edge is 4 inches long contains 54 cubic inches; a cube of which the edge is 5 feet long contains 125 cubic feet.

The truth of this will appear from the following diagram:

Take a cube, as in the diagram, of which the edge is supposed to be 4 inches long, and divide each edge into lengths of one inch. Then, by drawing parallel planes, as indicated in the figure, we can divide the cube into a number of cubes, each of which is a cubic inch. Now, any one slice such as that which is shaded clearly contains 4 × 4, or 16 cubic inches, and there are 4 such slices. Hence the cube contains 4 × 4 × 4, or 64 cubic inches.

11. Definitions.—A rectangular parallelepiped is a solid figure contained by six rectangular figures, of which every opposite two are parallel.

This differs from a cube in the fact that the length, breadth, and thickness are not equal.

The volume of (i.e., the number of cubic units in) a parallelepiped is obtained by multiplying the numbers together which express the number of linear units in the length, breadth, and thickness respectively.

This will perhaps be sufficiently apparent from the accompanying diagram of a rectangular parallelepiped, of which the length, breadth, and height are supposed to be 6, 5, 4 inches respectively.

There will evidently be six such slices as that we have shaded, each containing 5 × 4, or 20 cubic inches.

The volume of the solid will therefore be 6 × 5 × 4, or 120 cubic inches.

CUBIC MEASURE.

1728 cubic inches = 1 cubic foot, written 1 c. ft.
27 cubic feet = 1 cubic yard , , 1 c. yd.

This measure is used in estimating the magnitude of timber, stone, boxes of goods, the capacity of rooms, ships, the solid mass of earth in railway cuttings, etc.

For example, 42 cubic feet are defined to be one ton of shipping.

For liquids and dry commodities other systems are adopted, which we will give after we have explained the measures of weight.

LESSONS IN PENMANSHIP.—XXIV.

Although it is not possible to give a detailed scheme of elementary forms of which the capital letters of the writing alphabet are composed, as was done with regard to the small letters, it may be as well, for the benefit and instruction of the self-teacher, to make a few remarks on the method of forming each of the capital letters.

In the capital letters of the writing alphabet the letter I is the key, and forms the principal part of most of the letters; it consists of a nicely tapering black stroke, commencing with a hair-stroke, and ending in a hair-stroke with a full point or a scroll. The head or top of this letter is variously made; a common form is seen in the capital letters in page 387; sometimes the head is formed like that of the capital J, which is the same letter in writing, with the black-stroke and the bottom hair-stroke carried below the level and terminated in a loop to the left.
LESSONS IN PENMANSHIP.

The letter A is very like the printed A, with a loop or hair-stroke drawn across the middle; the hair-stroke generally begins with a full point, and the black-stroke tapering from the top terminates with a hair-stroke like a bottom-turn, or with a scroll; but it often terminates in a straight stroke, as it does in some printed forms (A).

The letter B consists of the letter I without its head, and a curved black-stroke to the right with a loop in the middle to the left; this curved black-stroke commences with a curved hair-stroke on the left of the middle stroke, and terminates with the same on the right of it, close to the bottom of the middle stroke.

The letter C is composed of a tapering black-stroke, beginning with a loop in hair-stroke, and ending with a scroll.

The letter D is composed of the letter I without its head, with the hair-stroke ending in a loop to the left at bottom, but carried round the top and made to terminate in a scroll.

The letter E commences with a scroll, which merges into a thick down-stroke after being carried to the left. The stroke which has been gradually narrowed to a hair-line is now carried to the left and brought over the lower part of the down-stroke in a curved line towards the right.

The letter M is like two A's joined together; but the middle down-stroke is generally made to taper gently to a sharp point at the bottom.

The letter N is anomalous; the middle is a black-stroke, tapering at both ends; it is joined at top by a hair-stroke like the hair-stroke of the letter A, and at bottom by a hair-stroke running up into a curve.

The letter O is like the small o, only it is left open at the top, and generally turned round in a loop at the end of the hair-stroke.

The letter P is like the letter B, wanting the letter part of the curved black-stroke from the loop downwards.

The letter Q is a curved tapering black-stroke, commencing at the top with a scroll, and ending in a loop to the left, of which the hair-stroke is carried across the black-stroke at the bottom in a waving curve.

The letter R is like the letter B, with this difference, the

towards the right and looped, after which it is carried to the left again, deepened into a thick-stroke, and finally turned, as the letter was commenced, in a scroll.

The letter F is composed of the letter I with its head formed in a scroll and loop to the right at the top; it is also marked with a hair-stroke across the middle of the black-stroke, and terminating also in a small loop.

The letter G consists of a tapering black-stroke curved to the left, beginning in a loop at top, and ending in a hair-stroke, to which is attached a black-stroke like the letter J among the small letters.

The letter H is composed of the letters I and C joined together by a hair-stroke in the middle.

The letters I and J have been described. The letter K is like the letter H, with this difference, that the black-stroke of the C part has a small loop in the middle to the left; the first or I part is sometimes a mere black-stroke, tapering from top to bottom.

The letter L is commences with a loop in hair-stroke. The fine line with which the letter is commenced is turned to the right, and brought downwards in a thick down-stroke. This down-stroke is again narrowed to a hair-stroke, which is looped

latter part of the curved and looped black-stroke is turned to the right with a scroll.

The letter S is the body of the letter I, with a hair-stroke loop to the right, at the top.

The letter T is like the letter I with a larger head, made exactly like the head of the letter F.

The letter U is a tapering black-stroke, commencing with a scroll, and ending in a hair-stroke, to which is attached the body of the letter C, with or without the head.

The letter V is like the first part of the letter U, but the hair-stroke terminates in a small loop at the top.

The letter W is like the letter M inverted; or rather, it consists of two tapering black-strokes joined by a hair-stroke, and commencing and ending with precisely curved hair-strokes. Originally the letter W was just like two V's put together, and frequently this letter is still made like the latter half of the letter W.

The letter X is formed very like the small x, only that it begins and ends with a scroll.

The letter Y is like the letter U, with the second black-stroke drawn below the line and terminated in a hair-stroke loop.

The letter Z is like the same letter in the small alphabet, but
it begins and ends with a scroll; sometimes the lower scroll is formed into a loop below the line.

The above description of the method of making the capital letters will prove of considerable assistance to the self-teacher in tracing out their varied forms, although we might reasonably suppose that he could not err in beginning each letter and ending it in the right place, after the experience that he has gathered in following carefully and studiously the instructions given in our lessons on the formation of the small letters of the writing alphabet. The mode of shaping out each letter is the chief thing that each learner should aim at learning, and this he can do only by repeated practice. Our Copy-slips are arranged alphabetically, so as to give the student a sample of each letter in the alphabet.

LESSONS IN GERMAN.—XXII.

SECTION XLI.—PECULIAR IDIOMS. (continued).

Sometimes, as in English, a clause or sentence is made to supply the place of an adjective, as:—Die nie zu vergessene Expedition bei Leipzig, the never-to-be-forgotten battle by (at) Leipzig. Der inmitten der fremden Welt geblieben, der ever-to-be-admired courage of Luther (§ 150).

1. Anstatt, like the corresponding English word "instead," is compounded of a preposition and a noun, which components may be separated as:—Anstatt, Statt, instead, of his father; or, an einen Vater statt, in his father's stead.

2. The infinitive preceded by anstatt is, in German, used where we used to precede participles preceded by instead of, as:—er sitzt, anstatt zu arbeiten, he plays, instead of "working." When preceded by the preposition eben, it is to be rendered by a participle governed by the corresponding preposition "without," as:—er sitzt eben, ohne zu arbeiten, he is sick, without knowing it. Er sitzt, seine eigenen, seine uns zu helfen, he has been here without visiting us. The infinitive is also often used where we employed the present participle preceded by from, as:—er wertet mich, und ich dachte, he regrets me from sleeplessness. 3. The infinitive is also used substantively [without zu: § 146. (1) c], as:—Sichentzweifeln, geräumt, to command is easy; to obey, difficult. It is often preceded by the article, as:—eine Sache zu wissen, to think, writing, but not drawing.

4. After geben, stellen [§ 146. (1) c], etc., the infinitive often answers to our present participles, as:—er giebt sitzen, he remained sitting (literally, he continued to sit). Er bleibt stehen, he remains standing. Er sitzt, seine ganze, he has gone a fishing. In a sentence which is employed as the subject of a verb, the infinitive frequently rejects the preposition zu [§ 146.], as:—Er bleibt ihm sie nicht geben zu, er hat ihm zu geben, to defend an (the) enemy is noble. Zu is generally omitted before such verbs as sehen, to teach; tragen [§ 146. (1) c], to learn, etc., as:—eine Sache zu geben, I teach him to write. Er füllt gelegen, he learns to speak.

5. The past participle in German is sometimes used where we use the present, as:—Dort kommt ein Mann in seine Sache [§ 149. (3)], yonder comes a man running at full speed (in full haste).

VOCABULARY.

Ehre, kind, good.
Genug, to hate.
Gut, to holy.
Gute, all, courteous.
Einem, f. cannon.
Sich, f. chest.
Gehen, to paint.
Man, f. crow.
Reich, f. crew.
Genug, f. nourishment.
Machen, f. paint.
Bieten, f. root.
Gaben, f. draw.
Vollkommen, together.

RESUMÉ OF EXAMPLES.

Das Schreiben und Lesen zieht mich. I prefer writing and reading to all other employments.

Anstatt des Weines trinkt er Wasser. Instead of wine, he drinks water.

Anstatt zu schreiben, liest er. Instead of writing, he reads.

Zwischen Sagen und Lied ist ein grosser Unterschied. Between saying and doing there is a great difference.

Zwischen dem Hingen und Weitsencken verlebt eine Stunde. Between departing and returning an hour elapsed.

Während seiner Krankheit habe ich die Stelle eines Bäders vertreten. During his sickness I took the place of a watchman.

Ohne Brüche mit Kantinen geschafft mir. His mode of dealing does not please me.

Schreiben ist vernünftiger, als mit. To be silent is more reasonable than unreasonable writing (to speak unreasonably).

EXERCISE 78.

1. Anstatt mit einem Stoffe versucht er sich mit einem Regenbogen.


EXERCISE 79.

1. The never-to-be-penetrated almightiness of God. 2. I am here instead of my brother. 3. The opposition of the Poles was full of despair; terrific was the singing of their war-song: "Not yet is Poland lost."

4. The reading of instructive books enlarges the understanding. 5. To assist the poor is a Christian duty. 6. The changing of times and seasons and the removing and setting up of kings belong to Providence alone. 7. He defends this man without knowing him. 8. The danger heightened the courage of the soldiers, instead of depressing it. 9. The student learns drawing and painting from his brother. 10. This mode of life does not agree with me.

SECTION XLI.—SUBJUNCTIVE MOOD.

The subjunctive mood is employed both in indirect assertions and in indirect questions after verbs of speaking, thinking, wishing, hoping, etc., i.e., after all verbs of mental action, when the actual words of him who spoke, thought, etc., are not quoted, as:—er sprach, er sprach zu ihm, der sprach zu ihm, who said his friend was ill (he actually said, my friend is ill). Er fragte mich, wer sich, he asked me who I was (he asked, who are you?). Man sagt, er ist ein größer Marschard, it is said that he has a great fortune. For further information on the subjunctive, see § 143; and for conjugation of haben and sein in the subjunctive, see § 72. 1. 2.

The subjunctive in German is often translated by the English indicative, as in the following examples:—

Man sagt, er ist rich. They say he is very rich.

Er meint, es ist besser, hier zu bleiben. He thinks it is better to stay here.

Sie sagten mir, er wäre mein. They told me he was my friend.

Es meinte, er wäre eine Frei. He thought it was a jest.

Man glaubte, er wäre auf ihren. It was thought he was on the ert's.

Er sagt, er Kaifer habe ihn be. He says the emperor has pardoned him.
LESSONS IN GEOMETRY.

It is thought he has fallen.

Man glaubt, er sei gefallen.

They thought I had been sick.

Man glaubte, ich wäre nie ge-
wesen.

It was thought I had never been there.

Man glaubt, er werde nie wieder glät-

He believes he shall never be

Man sagt, er werde bald die Ober.

It is said she will soon have the

Ascendancy.

VOCABULARY.

Allgemein, universal.

Bonität, health.

Begriff, to assert.

gerichtet, to direct.

Grenze, limit.

er, to tell, narrate.

Kern, center.

Rätsel, to call.

Reihe, row.

Stern, star.

Land, Hungary.

Sternenfieber, to act.

Verdacht, suspicion.

Erster, upper.

Rem, note.

Vocabulary.

Illegit, fall to.

Gebräuchliche, common.

Gegen, against.

Verhältnis, to produce.

Gang, slow, slowly.

Wenden, to announce.

Nervenfieber, nervous fever.

Komplex, complex.

Rasen, grass.

Erst, first.

Verdiinfung, dilution.

Vermitteln, related.

Jan, indeed, it is true.

RESUME OF EXAMPLES.

Er behauptet, daß er war fei.

Ich will, daß Du sparst mehr fei.

Es scheint mir, daß er traurig ist.

Man glaubt, daß wir reich sein.

Die Stimmung der Zeit, die sich

recht wähmen.

Es scheint mir, daß sie Amerikaner

sind.

Es hält an, als ob er nicht gefühlt

wäre.

Ich glaube, daß er traurig gewesen ist.

Man sagt, daß er schon hier gewesen ist.

Ich hoffe, daß er glücklich gewesen

sein wird.

Er sagte mir, daß du bald das Lehrer- 

buch bekäst.

Ich bezweifle, daß der Narr die Münze

hat.

Man vermutet, daß er hier Gebirge

ist.

Man weiß, daß sie freute an dieser

Stelle haken.

Ich hörte, daß er ein großes Vor-

sehen hatte.

Der Dichter erzählt, daß er eine an-

gewogene Reise geführt hatte und

hatten einenpleasant journey.

Exercise 80.


hörte, Sie seien aus dem Wagen gefallen.

3. Die Gebräuchlichkeit, daß

Turf, welcher Magdeburg im treißigjährigen Kriege erbeutet, sehr barbäristen

verfunden.

4. Mein Bruder sagte, Sie seien sehr gekocht worden.

5. Die Franzosen befanden, sie seien im Gebräuch in der Welt.

6. Ihre Schwestern glaubten, Sie waren in der Stadt gewesen.

7. Die Gardisten sind der Meinung, sie seien die Herren des Mersees.

8. Die Reiter erzählen, er sei inzwischen in Rem gereist.

9. Er hoffte, er werde in echt gelegen.

10. Sie fürchten, Sie seien zu langsam im Hanteln gewesen.

11. Wir glaubten, Sie wären auf dem Kante.

12. Ich glaube, wir waren gesessen zu sehr gekommen, wenn das Wetter schön gewesen wäre.


14. Sie sagte, sei, er sei traurig, das liebe, es sei Erzählung

von ihnen gewesen.

15. Sie vermuteten, sagen, sein Glück habe sein

langjährig erlebt.

16. Ich hörte mit Bedenken, Sie hatten das

Rennfieber gehabt.


18. Man erzählt, der Narr habe sich in den Tod sein Ratter-

land tru verschrieben.

19. Ich hörte, dieser junge Junge werde ein grosses

Vermögen erben.

20. Ich glaube, daß viele Menschen hier auf Grund des

Gutes gefühlt haben werden.

Exercise 81.

1. People say these gentlemen have been tipppy, but they are

mistaken.

2. They say that residence in Paris is more agreeable

than in London. 3. We could not believe that this was

true.

4. It is universally believed that the enemy has crossed

the frontier.

5. He asserted that it was better to stay at home

than to go out.

6. I wish that he may be treated with more

kindness.

7. He tells every one that you are a very rich man;

but if you were, you would not be so penurious.

8. Have you heard, too, that your friend has fallen from his horse?

9. No, but I have heard that he has fallen out of the coach.

10. I hope that you will be with your parents in a fortnight.

11. I doubt that he can be so ungrateful.

12. This stranger says that he

has been twice to India, and was very sick on his last voyage.

LESSONS IN GEOMETRY.—XII.

As the next lesson will put the learner in possession of the last of the

problems that we intended to give on the construction of

figures contained by three and four straight lines—namely, the

triangle, the square, the rectangle, and the parallelogram—we

would recommend him to go carefully over the whole of the pre-

sent series of problems from the commencement, constructing as

many figures as he possibly can, to meet the requirements of the

data in each case. And in doing this we advise him to try to

construct figures different in form to those which we have given

in these pages, as, if he can do this, he may be sure that he has

gained a thorough knowledge of the various methods of con-

struction set forth in the different problems.

The problem in practical geometry that was brought before the

notice of the student in the last lesson, showing him how to

construct a square that should be equal in superficial area to the

sum of two squares described on two given straight lines, has

been solved by the introduction of the triangles and parallelograms, equal in superficial area to the sum or

difference of any two or more squares, rectangles, or parallelo-

grams, as the case may be; and it has also shown him that the

main principle on which their construction depends, is the

relation between the triangle, the figure contained by the least possible

number of straight lines (since two straight lines cannot enclose

a space, although one curved line can, as in the case of the circle),

and the square, the rectangle, or the parallelogram. It may be as

well to repeat that this principle is, that when a square, rectangle,

or parallelogram is upon the same base and between the same

parallels, the area of the square, rectangle, or parallelogram

(as the case may be), is double the area of the triangle.

Now supposing we have a square, rectangle, or parallelogram

before us, and we wish to construct a triangle equal in area to

either of those figures, what have we to do? Manifestly nothing

more than to draw one of the diagonals of the figure in question,

produce the base indefinitely in the necessary direction, and, after

setting off on it a straight line equal in length to the side of

the square, rectangle, or parallelogram, that serves as its

base, to join the extremity of the line thus set off with the

upper end of the diagonal. This will be evident on an inspection

of Fig. 43, where, in the square or parallelogram A B C D, the
diagonal A C is drawn; the base C D, on which the

square (rectangle or parallelogram) A B C D stands, is produced

indefinitely in the direction of F; a straight line, D E, set off

along it from the point D, equal to D C; and the straight line

A B drawn, joining the points A and D, and completing the
triangle A B C, which is equal in superficial area to the square

(rectangle or parallelogram) A B C D.

But conversely, when we wish to draw a rectangle or parallelo-

gram equal to a given triangle, all we have to do is to bisect the

base of the triangle, and on either half of the base construct the

required rectangle or parallelogram, after drawing through the

apex of the triangle a straight line parallel to the base.

In the case of the parallelogram, if it be required to make two of

its opposite sides equal to a given straight line, as the straight

line X Y in Fig. 43, or two of its opposite angles equal to a given

angle, as the angle X, we must from the extremity of one-half
of the base of the triangle—say, for example, the extremity D of the half C D of the base—with a radius equal to x, describes an arc cutting F Q in H; join D H, and through D H, and meeting F Q in K, thus completing the parallelogram H D C K; or, at the point C in the straight line D C we must make the angle D C K equal to the given angle y, and through D draw D H parallel to C K in order to complete the parallelogram as before.

This process will only be found practicable for the construction of a square equal in area to a triangle when the triangle is a right-angled isosceles triangle; but for any other description of triangle it will be found necessary first to construct a rectangle equal in superficial area to the given triangle, and then to draw a square equal to the rectangle thus obtained. How to do this will be shown presently in Problem XXXI.

By Problem XXX. we are enabled to construct a square equal in area to any number of given squares. Thus, suppose we wish to construct a square equal in superficial extent to the five squares of which the length of the sides of each is represented by the straight lines A, B, C, D, E respectively (Fig. 44). Draw any straight line, F O, equal to A, and at its extremity, O, draw O G H at right angles to it equal to N. Join F H: the square described on F H is by Problem XXX. equal to the square described on F G and O H. Next draw H K equal in length to the given line, C, at right angles to F H. Join K F. The square described on F K is equal to the square described on K H, H F, or to the squares described on K H, H G, O F, since the square described on H F is equal to the square described on H O, O F. By continuing this process we at last obtain the straight line M F. The square described on this line is equal to the sum of the squares described on the given straight lines, A, B, C, D, E. Now let us see how far this is of practical value to the artisan. Let us suppose that a cabinet-maker has a number of small squares of veneering of several kinds of choice wood, each square being of a different size, and he wishes to use up this wood in veneering a table or the panel of a cabinet without wasting a single scrap of it. By following the process just described it is manifest that he possesses the means of readily ascertaining the exact area of the square that these pieces will cover, and after finding this, he can, if it be desirable, by Problem XXXI. draw a rectangle equal in area to the square if he prefers using up his squares for veneering, and then arrange his pattern in such a manner that his squares may be worked up without waste. It is also a process that is useful to the maker of floors in parquetry, or to a stonemason who wishes to veneer a rectangle to know how large a square he can pave with a number of smaller squares of stone or slate of different sizes. Of course in such cases the operator would work to a given scale, and the process might be used as a test of the correctness of the result of the operation by which the whole content of the squares may be found arithmetically, or as one which is far more certain and involves far less trouble than the arithmetical operation, which would be a long and tedious one.

Problem XXXI.—To draw a square that shall be equal in superficial area to a given rectangle.

Let A B C D (Fig. 45) be the given rectangle; it is required to draw a square equal in superficial area to the rectangle A B C D. Produce C D indefinitely in the direction of E, and on the straight line D E set off D F equal to the side D A, or B C of the rectangle A B C D, Bisect C F in O, and from the centre with the radius O C or O F describe the semicircle C H F. Produce D A until it meets the semicircle C H F in K. Then along the straight line D C set off D L equal to D K, and through the points K, L, draw the straight lines K M, L M parallel to C F, D K respectively, and meeting in the point M. The figure D L M K is a square, and it is equal in area to the given rectangle A B C D. If F N O L had been the given rectangle, the same process would have been followed. F L would have been produced in the direction of F C, and set off on it equal to the side L O of the rectangle L O F N; C F bisected in O; the semicircle C H F described as before, and L O produced to meet the circumference C H F in P. The square drawn at P is equal in area to the rectangle F L O N.

If it be required to draw a square equal in area to a given rectangle, we have only to construct a rectangle equal to the given parallelogram, and proceed as above. This will be seen from Fig. 45, in which the rectangle A B C D is equal to the parallelogram D C O R.

Problem XXXII.—To draw a rectangle that shall be equal to a given square, and have one of its sides equal to a given straight line.

Let A B C D (Fig. 46) be the given square, and x the given side of the required rectangle, and in this case let x represent the shorter of the two pairs of sides by which the rectangle is enclosed. First produce C D indefinitely both ways towards x and F, and set off x on C F to x, and also along C set off C F equal to x. Join B O, bisect it in K, and through K draw K L perpendicular to B O, meeting E F in L. Then from the point L as centre, with the radius L O, describe the semicircle O B M. Through the point M draw M N parallel to A D or C B, and through H draw H N parallel to A B or C F, and let the lines H N, M N meet in N. The rectangle O H N M is equal in area to the square A B C D.

When the longer of the two pairs of sides that enclose the rectangle is given, as y in Fig. 46, produce C D indefinitely both ways as before, and set off C M along C F equal to y. Join B M, bisect B M in o, and through the point o draw o L at right angles to B M, meeting E F in L. Then from L as centre, with the distance L M, describe the semicircle M B G. Set off along C B the straight line C H equal to C G, and complete the rectangle. Bisect the line thus obtained, describe a semicircle on it, and find the mean proportional to the two lines of which it is composed, by drawing a perpendicular from their point of junction to meet the semicircle, as in Problem XIII. (page 192); while, to find the lengths of the sides of a rectangle that shall be equal to a given square, we must draw a straight line at right angles to a line equal in length to the side of the square, and from a point in this line on either side of the line thus represents the side of the given square, draw a semicircle with a radius equal to the straight line joining the point that is used as the centre of the semicircle and the more remote extremity of the line that represents the length of the side of the given square. The lines intercepted between the other extremity of this line and the extremities of the arc of the semicircle will be equal in length to the sides of a rectangle, having a superficial area equal to that of the given square.
ANIMAL PHYSIOLOGY—XII.

THE ORGAN OF TOUCH (concluded).

It has been shown in the previous lesson that the sense of touch, in its wider sense, is of a highly intellectual character. As an informant of the mind it is second only to the sense of sight, and in the suggestion of abstract ideas it is, perhaps, superior even to vision itself. There is no fundamental conception in relation to matter which it cannot impart. Though devoid of every other sense, a man possessed of this can pursue the study of every science, if he will but surmount the difficulties which oppose themselves to his acquisition of the results of the experience of other men. Thus, blind men have taken to the study of mathematics, and by the aid of the figures of Euclid, conic sections, etc., given in relief, have acquired a knowledge which has placed them in an honourable position in the examinations at Cambridge. The very theory of light and all its laws are quite comprehended by such blind students. The sense of touch is absolutely bounded by the surface of the body, but it makes amends for being less far-reaching than other senses by being the most real of all the senses. We make our ultimate appeal to it when the eye gives false or confusing indications. In the King's Palace at Amsterdam there is a wasps'nest painted to express figures as if they projected from, and were carved, upon its surface. The shading is so well managed that the eye is completely imposed upon, and it is almost impossible to believe that the surface is flat. A rapid sweep of the hand, however, at once dispels the illusion; and so effectually that when you move back to gaze again, it is difficult to regain the impression of an embossed surface. The unbelieving Thomas, however reprehensible his scepticism might be, expressed it both with force and delicacy; for he at once recognised that his own sense of sight might be deceived, and expressed a doubt, not of the truthfulness of the other disciples, but of their correctness of vision.

That this sense, when combined with the muscular sense, is
it has control; what is part of itself, and therefore has to be nourished, cherished, and defended—what is foreign, and therefore may be used or avoided, as it is wholesome or noxious.

Indeed, the sense seems indispensable to all animals that are not plunged and fixed, through every stage of their life, in the midst of touch. In which both air and food to themselves, to all animals, it might be said, if it were not tautological, whose life is not purely vegetable.

In the higher animals, and in all those whose means of defence lie more in their active powers than in defensive armour, the sense of touch is distributed over the surface of the skin, as in man. Every such animal may be compared to an island. The border of the island is the touch of that part which are placed, at various intervals, places of outlook, just as our own light little island has been surrounded with Martello towers. These stations are few and far between where the coast is rocky, abrupt, and inaccessible, but nearer together at those parts where a descent could be easily made, and crowded together at the outlets of ports, creeks, and rivermouths, through which an active commerce is carried on. On one hand, the comparison of the extremities of the tactile nerves to Martello towers is the more appropriate, because these have ceased to be of any use in defence, and have become stations of outlook for the coast-guard. So the tactile nerves are, in themselves, no protection; but, rather, being delicate organs, they need protection; for they act as alarmists, awakening and calling up the active powers to fight in defence of the body or prey country.

Furthermore, that of passive defence and active alarm— are complementary to one another: where one is very efficient, the other is less needed. In the scaled and matted fishes, and in such forms as the tortoise among reptiles, and the armadillo among animals, the function of sensation is sacrificed to that of defence; but in the naked skinned animals the sense of touch had need be very acute. In comparing man with the lower animals of that class to which we belong, we find that his sense of touch is, perhaps, better developed than that of any other animal. The lower animals have to sacrifice a certain amount of their surface sensibility to the paramount necessity of being shielded from the cold; or, to put it more truthfully, to the retention of their animal heat.

Man has neither the continuous thick coating of hair of the ox, the thick skin of the rhinoceros, nor the dense accumulation of fur of the camel, nor the skin of the pig and in the whale. He is only cosmopolitan because his superior intellect enables him to clothe and house himself. His nearest relatives among beasts, though much better supplied with hair than himself, are confined to the tropics. Man makes himself at home everywhere, but only by becoming a clothes philosopher. His triple investment of ordinary cloth, outer, and overcoat enables him to suffer all climates. Hairs are instruments by art the line of defence at those points where nature has left him exposed. The main use of the coating of hair is, no doubt, to defend the brute from the winter's cold, but that which will keep in heat will keep it out, so that it may also be considered as a defence against the excessive heat of the sun also. Doubtless the universal presence of hair on the heads of both sexes of the human species indicates that in his native home man had more to fear from sun-stroke than from the cold of winter. Besides this, the hair is sometimes a real defence against the rough usage of the outer world. Thus the manes of the lion and the buffalo are real shields both against the trenchant blows and the warning of the teeth of hostile animals. Even the matted hair of the negro is said to be able to resist a tolerably forcible sabre cut. The principal use, however, is, clearly, to furnish a defense from cold; and it is remarkable how this main object is arrived at without much prejudice to the function of touch.

Few solid substances are lighter than hair, even when pressed close; and few substances are worse conductors of heat—so that brutes retain their heat by the aid of a substance which costs them but little in the way of carriage. Beyond this, the springy, spongy structure of hair enables it to resist the shocks of cold and air; and, when motionless, is a bad conductor of heat, and adds, absolutely, to weight. Hence on the coldest day, when the thermometer stands below zero, the beast is still surrounded with a layer of warm air, almost equal in temperature to its body. So much to prove its efficiency for its main purpose. Now we have to show how it leaves the sense of touch, if not impaired, at least not obliterated. The reader must refer back to the

illustration in Lesson XI. (page 353) to understand the structure and relation of each hair to the skin in which it is developed and fixed. The hair is essentially a tubular projection of the cuticle, firmer and denser in its composition, being made up of closely-pressed, elongated, spindle-shaped cells, instead of scale-like, fragmented, and radiating cells. Among them from the level of the surface of the body, but from a bag or follicle, which is always narrow, and more or less deep as the hair is long or short. This horny tube dilates at the bottom of its bag to enclose a vascular papilla, similar in every respect to those papilla which lie immediately under the surface of the superficial cuticles. The hair itself, like the rest of the cuticle, is given over to the use of the senses. It is a part of the function of the animal; but the papilla has not only blood-vessels but nerves, and is very sensitive, so that the hair cannot be pulled or moved in any direction without affecting the sensitive part. Though a furred animal cannot precisely tell the exact point at which it is touched, on account of the length and flexibility of its individual hairs, yet the sensation of touch is as truly conveyed to the true animal, as it is when the pressed ridges of the forehead of man cause feeling to be excited in the papilla beneath them. In one respect hairs are even advantageous to the sense of touch, inasmuch as they reach considerably beyond the surface, and thus the range of the sense is extended. This advantage is so far recognised by nature that certain hairs are specially developed which have no other use than that of touch. These may fairly be said to be the sense hairs.

These hairs are usually, and almost exclusively, situated in the upper part of the head, and are the most prominent part of the muzzle. In quadrupeds the snout is of course the most salient part of the body, and is most used in investigation. These whiskers, as they are called (though they would be better named moustaches), are remarkable for their length and stiffness, the depth to which their large bulbs run into the skin, and even protrude in the internal surface, and also for the large nerves that enter the papilla of the bulbs. Those coming from the whiskers of a seal as they run together look like the strands of small cords as they become woven into a rope of tolerable thickness. The animals in which these whiskers are most developed are the carnivora and the rodentia.

This is not improbable associated with the fact that these are for the most part nocturnal animals. Moreover, many of the large carnivora have a habit of lying in the surrounding trees, and many of the smaller carnivora are always poking about in holes and crannies for prey. It certainly would be an advantage to a fox on a dark night to be able to gauge with his whiskers the size of the aperture in a hen-roost before he tried to force his way through it; and it thus has been thought that there is a relation between the width of the body and the extreme extent of the fields of vision of whiskers in the two classes of animals.

In birds the place of hairs is supplied by feathers. The structure of these is very wonderful and beautiful, but a description of it would be out of place here, because they are certainly less efficient tactile organs than hairs. Birds' feathers are coarser than hairs; they are less flexible; they are inserted only on certain parts of the body; and since there must be provision made for moult, they are more definitely cut off from the sensitive skin below. For all these reasons they are not good organs for transmitting the sense of touch, although they are formed in the same manner as hairs. Probably on account of this inaptitude to transmit impressions, they are sometimes replaced by hairs in certain parts of the body; but as a rule the whole of the bird's body is encircled with feathers, which, its overlapping one another, and turned in one direction towards the tail of the bird, have the function of a vest or fur. Though hairs with the lower jaws, instead of being covered with soft, flexible and sensitive lips, are covered with a hard, horny bill, and its legs, though often devoid of feathers, have to be defended by scales or scutes, to prevent the long tendons of their leg muscles being severed. Under these circumstances, a bird enjoys little advantage from its sense of touch. Indeed, it is only in the padded under-surface of its foot, in the axilla of its wings, in the inner and outer tongue—when the former is leathery, and the latter not cuffed with horn—where there can be any provision for the exposure of a sensitive surface. It has sometimes been stated that the heron, as he stands in shallow, muddy water, is guided by feeling the eels twisting in and out, or even sucking his toes. This statement seems rather suited for a fable of the biter bitten than to be regarded as a scientific fact. That the sense is pro-
sent in some birds is shown by the fondness of parrots for tickling; but it may be stated that the great activity of birds makes them rely on their far-reaching senses rather than on the circumscribed indications of the sense of touch.

The cold-blooded animals (reptiles and fish) differ from the warm-blooded (mammals and birds), in having for the covering of their bodies thin non-conducting or heat-retaining substances. Hairs and feathers are admirable retainers of heat; but scales and scutes, though good to resist blows and pressure, allow heat to pass out or in without much resistance. This, of course, is associated with the fact that reptiles and fish have but little heat to lose. It does not follow, however, that because the body of a fish or lizard is entirely defended by scales, whose free edges overlap the insertions of those next behind them in a manner somewhat like "jambers" in a building, that therefore they are entirely without the sense of touch. The scales of a fish are as much as the human nails are, and we know that these are themselves insensible; yet they are so intimately connected with the sensitive parts by which they are formed, that the nails are the conductors of acute, and even morbid sensation. The quick of the nail is proverbially sensitive to pain; witness the common phrase of being wounded, or cut to the quick. Reptiles, however, although at certain seasons, and the old skin, disintegrated from the cutis, adheres to them for some time, like the locomotory system of a caterpillar; the new and complete armour is formed below. During such periods, and inferentially at all times, the sense of touch cannot be acute. Scaled reptiles may be alive to blows or pressure, but hardly to those sensations of soft touch which convey the most distinct impressions of all to us. These remarks apply with yet more force to the hard, stony, surface of the backs of crocodiles. The tongue is made use of by serpents and lizards to touch objects with; and this is probably its main, if not its only use. In conformity with the assertion that nocturnal animals often have specially modified organs of touch, we find that certain nocturnal tree-snakes have their snouts prolonged into tactile organs.

The large majority of fish are completely closed in by plates and casings. With few exceptions even the lips are hard and dry, so that the hungry angler, who has sometimes special organs of touch, objects with; and this is probably its main, if not its only use. In conformity with the assertion that nocturnal animals often have specially modified organs of touch, we find that certain nocturnal tree-snakes have their snouts prolonged into tactile organs.

The articulara (though some of them are soft-skinned) are for the most part covered with a hard, horny covering, which is as resisting as plate-armour. It is therefore necessary that these animals should have special organs of touch. We have already referred to those of the lober and its tribe in a former number. Insects have, developed from their heads and mouth-organs, jointed rods, which have nerves of touch running to them and in them. These jointed rods are covered with hard, horny matter, like the rest of the body; but sometimes the last joint exposes a naked membrane, and where this is not the case, the jointed and therefore flexible nature of the organs makes them capable of receiving impressions of touch, and of measuring the dimensions and resistance offered by external objects. The normal number and position of these organs will be seen in the illustration. There are two long, many-jointed ones jutting from the head, which are called the mandibles, and one short spring from the lower lateral jaws; they are called the maxillary palpi. Another pair (or pairs) spring from the sides of the lower lip; these are called the labi palpi. The soft-skinned epidermis have no antenna or labi palpi, but their maxillary palpi are so long and large as to look like legs.

The echinoderms, or sea-urchins, are so enclosed in their moro or oval shell, that even the casual observer would suppose them to be unfeeling wreathes, capable of inflicting wounds with their long spines, but insensible to softer emotions. This is not the case, however, for they can protrude through the small holes which perforate the shell and occupy five double meridional bands of their globular boxes, a multitude of soft, tubular, sucking feet, to each of which there runs a nerve. The sea-anemone, with its streaming feelers, lives by feeling; and the whole sub-kingdom to which it belongs is
characterised by animals with largely developed and multifidular feelers.

Finally, those animals which we call protozoa, on account of the simple condition of their bodies, can manufacture, from their jelly-like substance, any number of long feelers. These they often render so branched and long as to give to the animals the name of "rhizopods," or "root-footed," because the feelers, which also perform the function of feet, look like the branching roots of a tree.

We have now set before our readers the principal facts connected with what are called in popular phraseology the "five senses," and we have given, as far as the discoveries of physiological science extend in the present day, a description of the organs with which an all-wise and beneficent Creator has furnished his creatures, from the protozoa, the first link in the great chain of the animal kingdom, up to man, who stands but "a little lower than the angels," to enable them to see, hear, smell, taste, and touch—five great powers wonderfully contrived to administer to our pleasure and gratification, as well as to enable us to discharge the several functions that form the work which He has allotted to each on earth.

To enable the unscientific reader, and those even who can do little more than read, to follow us step by step, and appreciate and understand all that has been advanced, the description of each organ, its difference of formation in man and the lower animals, and the various purposes for which it serves, has been given in language which we have carefully sought to render as plain and clear, and as free from technical terms as possible. When, however, it has been found absolutely necessary to use technical names, which are applied by scientific men for the sake of brevity of expression, and a ready means of distinguishing one animal or organ from another, by reference to some peculiarity that it possesses, the explanation of these terms has been supplied directly or indirectly in the papers in which they occur. The illustrations, too, that accompany the description of each organ of sense, will be found as useful by our readers in enabling them to understand the formation of each organ as has been said of their formation, etc., as the map of a country, or the chart of a sea, is to him who would become acquainted with the physical condition of the former, or the heights and abysses that lie hid from view beneath the waters of the latter. It may be as well to remind our readers that, in order to arrive at a thorough comprehension of everything that is advanced in our lessons on Animal Physiology, they should be studied and mastered consecutively; first to the organs that accompany the eyes; then the lessons are given the technical names of the different parts of each organ under consideration.

In future lessons we shall enter on other branches of this great subject as interesting and important in every respect as that which has been treated in the present series.

LESSONS IN LATIN.—XIII.

DEGREES OF COMPARISON.

When two objects are compared together, the ideas involved in the words more and most come into prominence. Thus we say, "the father is more learned than the son." Cicero was the most learned of the Romans. The question which we have to answer is, how is such an expression to be formed as a Latin? Observe that at the bottom of more learned and most learned is the quality learned; for no one can be more learned or most learned without being learned. This ground quality is something positive, a real definite quality. Hence in grammar it is called the positive degree. It is the first step. A higher step is indicated by our word more; and the highest by most. You have seen that besides the positive there are two other degrees, of which the one is the higher, and the other the highest of the three. The higher is called the comparative degree, and the highest is called the superlative degree. Accordingly, there are three degrees of comparison, the positive, the comparative, and the superlative. It has been denied that the positive is a degree of comparison. The term may not be rigidly correct, but it is in use, and no better substitute has been offered. Our business is not so much to criticise as to explain; and consequently only must we enter into criticism when it smooths the way to explanation.

Now these three forms of speech which I have just given stand in Latin thus:

<table>
<thead>
<tr>
<th>Positive</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pater est doctus</td>
<td>Pater est doctior</td>
<td>Pater est doctissimus</td>
</tr>
<tr>
<td>Father is learned</td>
<td>Father is more learned</td>
<td>Father is most learned</td>
</tr>
</tbody>
</table>

Look at the terminations of the adjective. In the first case it is us; that is the positive, or ordinary form of the adjective. In the second case, it is isor; that is the comparative. In the third case, it is issimus; that is the superlative. You thus see what in the English is expressed by more is in Latin expressed by isor; and what in the English is expressed by most is in Latin expressed by issimus. Remember, then, isor is the formation of comparison, issimus is the superlative form. You might thus obtain for yourself the rule, and say that to the stem of the positive add isor, and you have the comparative; and to the stem of the positive add issimus, and you have the superlative. Such in reality is the rule. These two endings, isor and issimus, are to be added to the stem of adjectives and participles, in order to convert the positive degree into the comparative and the superlative. I subjoin some instances:

- Positive.
  - Latin, youthful
  - Pudic-us, modest
  - Imbecill-us, weak
  - Lev-is, light
  - Fertil-us, fruitful
  - Div-is, rich
  - Prudens
  - Amant-us
  - Felix

- Comparative.
  - Lat-is, joyful
  - Pudic-is, more modest
  - Imbecillic-is, weaker
  - Lev-is, lighter
  - Fertil-is, more fruitful
  - Divitis, richer
  - Prudent-is, more prudent
  - Amans, more loving
  - Felix, happier

- Superlative.
  - Latissimus, most joyful
  - Pudicissimus, most modest
  - Imbecillissimus, weakest
  - Levissimus, lightest
  - Fertillissimus, most fruitful
  - Divitissimus, richest
  - Prudentissimus, most prudent
  - Amantis, most loving
  - Felicissimus, happiest

If, however, the adjective ends in c, rimus is used instead of issimus, for the sake of sound, as:

- Miser, unhappy, miserable; miser-ior, more unhappy; miser-rimus, most unhappy.

In like manner, vetus (gen. veteris), old; veter-rimus, oldest (the comparative veter-ior is rarely used); also nuper-ius, late (no comparative); nuper-rimus, latest.

The six adjectives which follow tenebus in the superlative, namely:

- Facil-is, easy
- Prudent-us, prudent
- Amant-us, loving
- Felix, happy

In full, thus:

- Facil-is, easy; facilior, easier; facilissimus, easiest, etc.

There are some compound adjectives which form their comparatives and superlatives by endings different from these. Such adjectives are those which in the positive end in dicus, ficos, and cubus; for instance, maledicus, magnificus, benevolus. I have called these compound adjectives, because they are composed of two words. In these cases, the suffix is formed from male, badly (in an evil manner), and dico, I speak; and consequently denotes an evil-speaker; magnificus is formed from magnus, great, and facio, I do; and consequently denotes a great doer; benevolus is formed from bene, well, and volo, I wish, and consequently denotes a well-wisher. To form the comparative of these, add to the stem entior; and to form the superlative, add entitiousus; thus:

- Positive.
  - Malodio-us, abusive
  - Magnific-us, magnifier, more magnificissimus, most abusive

- Comparative.
  - Malodio-enter, more malodio-enterus, most abusive
  - Magnificenter, more magnificenter, most magnifier

- Superlative.
  - Benedictus, benevolent
  - Benedictus-enter, more benedictus-enterus, most benevolent

* These comparatives and superlatives are evidently formed in the regular way, from such nouns as maledicus, magnificus, and the two of which, at least, are in use in the language, and have the same meaning as the other positives above given.
In Latin as well as in English, some adjectives depart from the usual modes of comparison. As we say, positive, good; comparative, better; superlative, best; so the Romans said, bonus, good; melior, better; optimus, best. Carefully learn by heart the following

IRREGULAR FORMS OF COMPARISON.

<table>
<thead>
<tr>
<th>Positive</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonus, good</td>
<td>melior, better</td>
<td>optimus, best</td>
</tr>
<tr>
<td>Malus, od</td>
<td>pejor, worse</td>
<td></td>
</tr>
<tr>
<td>Magnus, great</td>
<td>major, greater</td>
<td>maximus, greatest</td>
</tr>
<tr>
<td>Parvus, little</td>
<td>minor, less</td>
<td>minimus, least</td>
</tr>
<tr>
<td>Multus, much</td>
<td>(plus n.) more</td>
<td>(plus plur. n.) most</td>
</tr>
<tr>
<td>(plus m. f.) more</td>
<td>(plur. and plur. n.) most</td>
<td>(plur. and plur. n.) very many</td>
</tr>
</tbody>
</table>

Many Latin adjectives do not take any of these forms of comparison. Such are adjectives which have c before the termination us; as idoneus, fit. These are formed by prefixing magis, more; and maximus, most; as, magis inus, more fit; maximus, most fit; so, plus, pias; magis plus, more pious; maxime plus, most pious. In the same way, form nearly all adjectives and participles ending in -ius, minus, inus, ivus, orus, undus, andus, and bundus.

In the English meanings added to facials above, I have given the forms easy, easier, easiest. Here you see changes made at the end of the positive, similar to those you have just been instructed to make in the Latin. First, the positive easy is changed into fast, and then to this, as the stem, we add er for the comparative, like the Latin tor, and est for the superlative, like the Latin tissimus. This similarity of forms indicates in the two languages a sameness of origin. As too, in English, we use more and most, so do the Latins use magis and maximus, to denote the comparative and superlative. Magis and maximus must be used for this purpose, in the case of adjectives which do not admit the termination forms.

Besides expressing the formal degree of comparison, the Latin superlative signifies a very high degree of the quality involved in the positive, as doctissimus, very learned; pater tuus est doctissimus, thy father is very learned. So in English, Milton uses wisest-:

"The wisest heart
Of Solomon he led by fraud, to build
His temple right against the temple of God."

Latin comparatives are declined like adjectives of two terminations, and according to the third declension. Thus, positive altus, high, makes comparative altior, higher; altior is masculine and feminine, the neuter is altius.

**EXAMPLE OF A COMPARATIVE.—THIRD DECLENSION.**

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case</td>
<td>Case</td>
</tr>
<tr>
<td>N. altius</td>
<td>N. altiora</td>
</tr>
<tr>
<td>G. altior</td>
<td>G. altiora</td>
</tr>
<tr>
<td>D. altiori</td>
<td>D. altioribus</td>
</tr>
<tr>
<td>Ac. altiorum</td>
<td>Ac. altiorum</td>
</tr>
<tr>
<td>V. altior</td>
<td>V. altiora</td>
</tr>
<tr>
<td>Ab. altiora</td>
<td>Ab. altiora</td>
</tr>
</tbody>
</table>

**VOCABULARY.**

Accommodatus, -a, -um, suited (E. E. accommodate, commodious).
Adiantus, -a, -um, flattery (E. E. adulation).
Affinitas, -atis, f., relationship (E. E. affinity).
Amabilis, -a, -um, worthy to be loved (E. E. amiable).
Amor, -oris, m., love (E. E. amor). Beantum, -a, -um, happy.
Benedicere, -as, -a, -orum, to bless (E. E. benedict).
Benevolus, -a, -um, -o, -are, beneficent, beneficent (E. E. benevolent).
Beneficium, -i, n., gift in giving (E. E. benefaction).
Breviarum, -i, f., a short (E. E. brevity).
Celebem, -bris, -brae, -is, famous, noted, celebrated (E. E. celebrated).
Contemno, 3. 1st, I despise, contempt.
Corrus, -i, m., a raven.
Crus, curris, n., the leg (from the leg to the ankle).
Curtalis, -ae, -um, talkative (E. E. garrulity).
Hirundo, hirundinis, f., a swallow.
Homerus, -i, m., Homer.
Humilla, -ae, humilia, low.
Labor, -oris, m., labour (E. E. labor).
Lucis, -ae, licht, light.
Morbellus, -i, n., custom; in the plural, character (E. E. mora).
Mutilus, -i, m., maimed, limbless (E. E. mutilated).
Naturam, -is, f., nature.
Niger, nigri, nigrum, black (E. E. niger).
Quam, coae, than.
Ratio, -onis, f., reason (E. E. ratio).
Res secundum, favourable things, that is, good fortune.
Sapientia, -ae, -orum (E. E. sapientia).
Secundus, -a, -um, second (E. E. second).
Sint, -is, f., salvation (E. E. salut).
Solutus, -a, m., a sound.
Soror, sororum, -e, sister, sisters (E. E. soror).
Succedam, -us, f., wisdom (E. E. successus).
Temporalis, -i, m., temporal (E. E. temporal).
Truncus, -i, m., a trunk.
Valens, -e, strong, I am worth.

**EXERCISE 45.—LATIN-ENGLISH.**

1. Nilii is nature hominis accommodatius quam benevolentia. 2. Tulli est amabilis quam virtate. 3. Quam, optimus quam sapientiam. 4. Nilii est nullus quam sapientia. 5. Multi homines magis garrulisi sunt quam hirundines. 6. Paupere sape sunt manufactores quam divites.

**EXERCISE 46.—ENGLISH-LATIN.**

1. Nothing is worse than the pretense of love. 2. The sun is very great. 3. The sun is greater than the moon. 4. The life of men is very short. 5. The richest are often the unhappiest.

**LESSONS IN GEOGRAPHY.**

**EXPLORATIONS AND DISCOVERIES IN AFRICA, 1834-1860.**

To give a detailed account of the additions that have been made yearly by our stock of information, the explorations of Africa by travellers, and explorations in all parts of the continent since the discovery of the principal embouchure of the Niger by the brothers Richard and John Lander, would require more space than that which we have at our command, as it is necessary now to bring our sketch of the progress of geographical discovery to a close, and proceed with these portions of the subject which treat of the earth's position in space as one of the members of our solar system, the great physical and political divisions into states, empires, kingdoms and republics, and their various subdivisions. All we can do is to touch briefly on the principal expeditions that have been set on foot to effect explorations in Africa since 1830, and to mention the discoveries that have been made, first in Soudan or Nigerita, by Drs. Barth, Overweg, and Vogel; secondly, in the interior of Southern Africa, by Dr. Livingstone; and thirdly, in the interior of the belt of land that extends from the north to the south of the equator, by Burton, Speke, Grant, Baker, and Petherick.

In 1841, the British Government having resolved to effect a further exploration of the great river of Western Africa, the Niger, and the densely populated countries through which it flows, sent out an expedition consisting of three steamers, the Albert, Soudan, and Winder. The vessels reached the principal mouth of the Niger in August, and the ascent of the river was commended forthwith. The malaria, however, arising from
the marsh lands and tangled jungle by the river-side, combined with the intense heat of the climate, proved fatal to the success of the expedition. Fever broke out among the crews of the vessels, and they were compelled to return and abandon the enterprise after going northwards up the stream as far as Egga, a large and populous town on the right bank of the Niger, about 320 miles from the sea, measuring in a direct line from the mouth of the river Nun, the principal channel by which the waters of the Niger enter the Gulf of Guinea.

Since that period the most notable journeys of exploration that have been undertaken on the western side of Africa have been the travels of M. Paul B. du Chaillu in 1856-59 in the equatorial tract watered by the Niger, Benue, and Cross Rivers, and the southern border of the Sahara, and the powerful gorilla; and in 1863-4 in Ashango Land and the country of the Acharas, where he met with a race of dwarf negroes measuring from four feet to four feet and a-half in height, and having skin of a light-brown colour.

In 1845-46 the great desert Sahara, which forms the barren centre of Northern Africa, bordered on the north and south by a broad fringe of fertile country, teeming with luxuriant vegetation, was explored by James Richardson, who visited the Touareg and other wandering tribes of the people of Sahara, and has given a full account of the cities of Ghat, Ghadames, and Mourzouk, and the fruitful, well-watered oases in which they stand. In 1849 he again set out to explore Central Africa, as the leader of an expedition fitted out by the Foreign Office. To the south of the Gambia and Overweg were attached. Having reached Tripoli towards the close of the same year, they spent some time in making the necessary preparations for the journey, starting on their passage across the Sahara on March 23, 1850. In the fall of the year they reached Damergu, and at this point they separated, each traveller to pursue his explorations alone, and to meet his companions once more at Kuka, the capital of Bornou, in the following year. Richardson died on his way from the great trade routes of Auguruta and Barth to the Niger, and thus continued their explorations alone. This they did with considerable success, but often at great personal risk, exploring Lake Chad and the rivers Shary and Youat that enter it on the south and west, and traversing Bornou, Baghirani, Kanom, and other districts that lie grouped around the lake. On September 27, 1852, Dr. Overweg died, and Dr. Barth proceeded by way of Sockato to Timbuctoo, which he reached on September 7, 1853. Here he remained until May in the following year, making inquiries into the resources, commerce, and statistics of the surrounding country, when he quitted the city, in which he had spent eight months, and travelling along the left bank of the Niger as far as Say, he made his way once more by Sockato to Kukawa, and thence across the desert to Tripoli, arriving in England in 1855, after an absence of six years. A young Geologist, E. Vivian, accompanied him on the latter part of the journey, and Dr. Barth, was not so fortunate. He did not fall in with Dr. Barth, and while pursuing his explorations in Waday, a district lying to the east of Lake Chad, he is supposed to have been assassinated by order of the Sultan of that country.

Few travels in Africa, in the present century, have been attended with such important results, by way of extension of our geographical knowledge of that continent, as the journeys of Dr. Livingstone to South Africa. It is probable, although it may be many years before our trade and commerce may derive any perceptible benefit by the establishment of commercial relations with the natives of those countries through which he has passed. Some years previous to commencing his explorations Dr. Livingstone had been residing at Kolobeng, on one of the head-streams of the river Limpopo, as a missionary among the Bantu, who were the first to visit Lake Nyami, in 1849, seems to have created in him the desire to probe to the source of the river, which had led him to traverse so large a portion of South Africa on foot, undeterred by the perils that beset the explorer on all sides, or the long years that he must frequently pass without meeting a single human being who speaks the same language, or is even of the same colour as himself. Two years afterwards he pushed his way northwards as far as Linyanti, the chief city of the district inhabited by the Makololo, situated on the Chobe, one of the southern affluents of the river Zambesi. On his return from this journey he determined to send his wife and children to England, and having accompanied them as far as Cape Town he once more turned his steps towards the interior. Starting from Linyanti in June, 1853, accompanied by Sokeloton, the chief of the Makololo, and a number of his people, Dr. Livingstone proceeded to explore the upper course of the Zambesi, which is called the Leambye above the Victoria Falls, a cataract not far from its junction with the Chobe. In his first journey from Linyanti he went northwards as far as the junction of the Leambye, and the Leambye, passing on its way near Narielo, the chief town of the Barotse. In his second expedition from Linyanti, in November, 1853, he ascended the Leoba, reaching its source, a small lake called Dilolo, in February, 1854. This lake is also one of the sources of the river Congo, or Zaire, whose principal head-stream is the Kasai. From this point Livingstone struck out to the north along a series of lakes and rivers, and with a few African companions, he ascended the course of the west coast of Africa, which he reached at the end of May.

Leaving St. Paul do Loanda at the commencement of autumn, and following the course of the Cuanza for a considerable distance, Livingstone and his party of Makololo arrived once more in the neighbourhood of Lake Dilolo in June, 1855, and reached Linyanti in the following September. From this point he resolved to make his way down the course of the Zambezi to the coast, and he started on his new journey on November 9, 1855, and arrived at Quillimano, on the north mouth of the river, in May, 1856, after travelling for nearly four years through the heart of Southern Africa from coast to coast.

Dr. Livingstone then repaired to England, but after a brief rest he returned to Africa once more, to take command of an expedition that had been set on foot for the purpose of exploring the river Linyanti, and the countries bordering on it and its tributaries. In this expedition he was accompanied by his brother, Charles Livingstone, Dr. Kirk, Mr. Thornton, Mr. T. Baines, and other Europeans. The chief result of their explorations was the discovery of the lakes Shirwa and Nyassa, from the latter of which issues the river Shire, one of the northern tributaries of the Zambesi. After traversing the country watered by the Shire, and procuring the upper stream of the Zambarati, they ascended the river Linyanti, at the mouth of which, they explored the Roventa, a river a little to the north of Cape Delgado, which failed. A second attempt to ascend the river in September, 1861, was made successful, some rocky rapids being reached, about 160 miles from the mouth of the river, which prevented further progress. After spending some time in retracing his steps over districts that he had already traversed, Dr. Livingstone returned to England in 1863.

While Livingstone had been busily engaged in South Africa, other travellers, as we will show presently, had discovered the large fresh-water lakes Albert Nyanza and Victoria Nyanza on the equator, and Lake Tanganyika, the northern extremity of which is about 100 miles to the south of the first named of these lakes. As it is doubtful whether Lake Tanganyika may not be the most southern of the great reservoirs which discharge fresh waters through the Nile into the Mediterranean, the channel of the Nile, Dr. Livingstone set out on another expedition in order to discover whether this were really the case or not, and to explore the country between Lakes Nyassa and Tanganyika, leaving the coast on his way inland in March, 1866. In the following year some desperados from his party spread a report that he had been murdered on the west side of Lake Nyassa, near its northern extremity. The researches of the expedition to South Africa into its mysteries into his fate, have disproved the assertions of the men who abandoned him; and it is possible that the traveller has been engaged in exploring the coasts of Lake Tanganyika and following the course of the Nile northwards from its southernmost head-stream through the chain of huge lakes that form such conspicuous features of the country in Eastern Equatorial Africa.

1854, about the time Dr. Livingstone was at St. Paul de Loanda, a travel of a series of journeys was taken, that resulted in the discovery of the great lakes about which we have just been speaking. This was an expedition to Harar, a town in the country of the Somalii, about 200 miles south-west, as the crow flies, from Berbera, on the south coast of the Gulf of Aden. The party was composed of Lieutenant (now Major) Burton, of the Indian army, Captain Speke, the discoverer of the Lake Victoria Nyanza, and Lieutenant-stirr, and Herbert. A few days after their return to Berbera, in 1855, they were attacked by a party of Somalii, and in the conflict Stirran was killed and Captain Speke severely wounded.

This, however, did not prevent Burton and Speke from prose-
FALLS OF THE ZAMBESI.—Geography.
cutting their explorations; and in June, 1857, they set out on an expedition inland from the coast of Zanzibar, having received instructions from the Royal Geographical Society to proceed westward along the 6th parallel of south latitude, in search of some of the great lakes in the interior that were said to be in or near that latitude. Eight months later, in February, 1858, they stood on the shore of Lake Tanganyika, about 600 miles from the coast; and from the report of a native, who said there was a large river running northwards out of the northern extremity of the lake, they believed they had reached the source of the Nile. This fact, however, they were not in a condition to prove, and finding themselves exhausted by illness, fatigue, and privations, and harassed by the natives, they were compelled to leave the question in doubt, and retrace their steps to the coast. On their way back to Zanzibar, Speke left Burton at Kazeh, and travelled northwards alone. His solitary journey resulted in the discovery of the Victoria Nyanza, and to Speke belongs the honour of being the first Englishman whose eyes had rested on the broad expanse of the lake which is perhaps the largest, though not the only lake that helps to swell the waters of the Nile.

In 1860-63 Captain Speke, accompanied by a brother officer, Captain Grant, travelled along the northern coast of the lake Victoria Nyanza and countries in its vicinity, and found a large stream, now known as the river Somerset, issuing from the lake at a point situated nearly in the middle of the northern coast, and falling at a short distance from its point of exit from the lake over a broad ledge of rocks, forming a cataract which has been named Ripon Falls. Had the travellers been able to trace the Somerset northwards through the whole length of its course, they would have found that it was only a head-stream of the Nile, and not the Nile itself; and they would have discovered the true source of the Nile, which, as the Nyanza is an arm of Lake Victoria, must have been beyond Ripon Falls. But when they had gone as far as possible from fatigue, he reached the edge of a precipitous line of cliffs towering above the lake, one bright and beautiful morning, and beheld its waters spreading before him in every direction, with a background of blue mountains in the western distance. "It was impossible," he writes, "to describe the triumph of that moment. Here was the reward for all our labour; for the years of tenacity with which we had toiled through Africa. England had won the somas." With a brief mention of Mr. Petherick (who has resided for some years as consul at Gondokoro, and has explored a considerable part of the country west of the Nile between Gondokoro and the Albert Nyanza) and Dr. Charles Beke (who has travelled through Abyssinia, and who must be considered, for the present at all events, the chief authority on that country), as an intimation to the reader of sources from which he may derive much useful and accurate information on the Nile countries, we close our historical sketch of the progress of geographical discovery from the earliest years to the present date.

LESSONS IN DRAWING.—XIII.

Our next subject in these lessons will be the theory and practice of drawing foliage; by this we do not mean merely the leafage of trees, but we include all herbs and plants that enrich the ground, and add so materially to the effect of a picture by their variety of form, their colour, and wild luxuriant growth; all combining to make the meanest subject interesting. It is not in the forest alone that we must look for beauty; a common without a single tree has its charms; its uncultivated and undulating surface varied with patches of bright heath, yellow fusz, and ferns, its many irregular gravel-pits, over the sides of which grow untrained and uncared-for the bramble, the wild rose, the honeysuckle, the foxglove, with the broad-leaved dock-plant, will compose a picture in which all lovers of nature must delight. Each season of the year makes its own demands upon our attention, each brings with it the changes of condition to which the vegetable world is subject, so that the mind of the observer must be fully prepared at all times to note down the peculiarities which influence the growth of trees and vegetation of all kinds and under all circumstances. The trees are stripped of their leaves we have the advantage of studying the course of their growth. Trees in winter are not so much interesting objects as they are when clothed with their summer foliage, but to the student they offer, perhaps, an interesting object of study, as they present many features which an uninterested eye would pass over as less worthy of remark than the more prominent and striking features of the tree. The eye must be fully acquainted with its anatomy, that is, the character and disposition of its branches. Trees individually differ as much in this respect as they do in the foliage, and therefore we are equally capable of distinguishing any particular tree in winter as we are in summer. Compare the branches of the oak with those of the poplar, the willow, or the cedar. The disposition of the oak, in general, is to send out its branches at right angles with the parent stem from which they spring (Fig. 92); the poplar collects its branches closer together, and lifts them upwards parallel with the main trunk; the willow droops; and the cedar spreads out its branches horizontally. In short, each tree has its own marked characteristics in its ramifications, and is worthy of our attention to its separate branches, both with and without its fresh summer leaves. To draw a tree successfully we must divide our attention between two important considerations: First, the trunk and its branches; second, the foliage. We repeat, that the first lesson to be received from nature is at the time when the branches are totally bare of leaves, as then we can study to very great advantage the dispositions of the branches. When the branches are covered with leaves, the distribution may be seen, but it is much more difficult to be correctly observed and to determine the general size of the tree and the space it has to occupy upon the paper; then return to the points which are arranged for the commencement of the branches from the trunk, and mark in their courses and extent; that is to say, after marking points by the method which has been discussed in the lesson on the angles, proceed with regard to the minor branches. All this is a preparation for the completion of the drawing, and for which it will be necessary to follow out the method still further for the more receding branches; in short, we must allow nothing to pass unnoticed in the arrangement that has the stamp of individuality upon it; after this the drawing will prove to be comparatively easy. When the places for the trunk, the most prominent boughs, and other branches are settled, the attention will only have to be directed to the form that each successive part presents. We will remind our pupils that there is a good moral maxim which we must follow in arranging the characteristic parts of a tree, as well as in anything else, as it contains a principle applicable to drawing that should not be disregarded: let each line individually be so placed that it may afford every facility to its native disposition to take its proper space, which does not belong to it, or cause an adjoining line to be pushed out of its proper place, or appear to claim for itself greater consideration than it justly deserves. The next important step towards drawing a tree is the foliage: in this we must be guided principally by the light and shade; when we look at a tree, the eye does not rest upon leaves singly, but upon foliage collectively. The pupil may have removed—indeed, he cannot at once without this—his natural eye from the object to the paper, and this will induce him to consider it—so that when we look at any object, but at trees especially, the eye first rests upon the parts in light. They are the first to attract the eye, and therefore, with regard to trees, it is the branches in light upon which the eye rests, and it requires an effort to look into the shadows; it consequently follows that in drawing a tree we must especially be careful to distinguish the lights, and of course this is done by adding the shadows, but the shadows
must be made subservient to the lights, that is, they must be worked about the lights in such a way as to relieve them, and throw out their forms clearly. The first practical example we will give is Fig. 98, and relates to the drawing of the trunk and branches. As we have already given the principles which are to guide the pupil in first arranging the trunk and branches, and afterwards drawing them, we will proceed to the foliage; and here we shall practice many times the examples which we have given in Fig. 88 to Fig. 97. The first four are merely masses of foliage, and it will require a considerable amount of repetition to secure a free and flowing manner of accomplishing this first difficulty in drawing foliage. Each example must be done, not by continued lines, but by broken touches, the only way to arrive at that light appearance peculiarly characteristic of foliage. The pencil may be allowed to press a little heavier on the under parts on the opposite side to the light, and it must be held almost perpendicularly, because in that position the pencil can be guided upwards, downwards, or to the right and left with equal ease and freedom; a tolerably soft pencil, say a 4, will be the most suitable. To relieve the lights straight lines may be drawn at first, as in Figs. 92, 94, and afterwards the manner of Fig. 96 may be employed for the parts of the tree in shadow; but before attempting Fig. 96 let Fig. 97 be mastered, as the former is but a combination of the latter. Fig. 98 is the same tree as Fig. 99; one represents the branches as in winter, the other when covered with foliage, as in summer; and we advise the pupil to make his drawing of the branches first from Fig. 98, and then arrange the foliage from the other example. We again repeat, all this will require a great deal of patient perseverance, for no one can expect to overcome the difficulties without making many failures; but we particularly recommend the pupil to execute slowly and carefully the first trials, and not on any account to attempt a sleight-of-hand kind of treatment, from a supposition that a rapid movement of the pencil is necessary to accomplish the task.

LESSONS IN FRENCH.—XXV.

SECTION XLIV.—USES OF REFLECTIVE AND UNIPERSONAL VERBS [Sect. XXXV.]

1. The reflective or pronominal verb always takes est as its auxiliary [§ 46].

Votre cousin est promené,
Nos amis se sont flattés,
Elles se sont donnée la main,
It will be easily perceived that vos in the first sentence is a direct régime, and that the word se in the second represents an indirect object.

3. Verbs essentially unipersonal, i.e. verbs which cannot be conjugated with a direct régime when that régime precedes it, and is invariable when the régime follows it. The student should be careful to see if the reflective pronoun be a direct or an indirect régime [§ 135].

Elles se sont donnée la main,
Vous êtes flattées,
Vous avez pris un pavot,
We again repeat, all this will require a great deal of patient perseverance, for no one can expect to overcome the difficulties without making many failures; but we particularly recommend the pupil to execute slowly and carefully the first trials, and not on any account to attempt a sleight-of-hand kind of treatment, from a supposition that a rapid movement of the pencil is necessary to accomplish the task.

VOCABULARY.

Acier, m., steel.
S'adresser, s'., to address.
S'éprouver, s', to try.
S'asseoir, s', to sit.
Beaucoup, adv., much.
Canif, m., penknife.
Plume, f., pen.
Porter, s', to carry.
Trouver, v., to find.

EXERCISE 83.


EXERCISE 84.

1. Has it rained to-day? 2. It has not rained, but it has hailed and snowed. 3. Has anything happened to your little boy? 4. Nothing has happened to him, but he is sick to-day. 5. Did your sister sit down at your house? 6. She did not sit down, she was sick. 7. Did that cloth sell well? 8. It sold very well, we have sold it all. 9. Did you perceive your error? 10. We perceived it. 11. Were not your sisters mistaken in this affair? 12. They were not mistaken. 13. Were not your cousins weary of being in the country? 14. They were weary of being at my brother's. 15. What have you used to write your exercises? 16. I used a gold pen, and my brother used a silver pen. 17. Have you used my penknife? 18. I have used it. 19. What has happened to you? 20. Nothing has happened to me. 21. Has your mother been well? 22. She has not been well. 23. Did you go to your school at all? 24. They applied to their studies, and have finished their lessons. 25. What weather was it this morning? 26. It was very fine weather. 27. Has your sister taken much trouble in this affair? 28. She has taken much trouble for nothing. 29. Did the Dutch ladies walk? 30. They walked this morning. 31. How far did they walk? 32. They walked as far as your brother's. 33. Have you given each other the hand? 34. We shook hands. 35. Those ladies flattened themselves very much.

LESSONS IN ARITHMETIC.—XXIII.

THE MEASURES OF WEIGHT.

12. The smallest weight in use is called a grain, and by Act of Parliament is defined in the following manner:—A vessel, of which the capacity is a cubic inch, when filled with distilled water at a temperature of 62° (Fahrenheit's thermometre), has
LESSONS IN ARITHMETIC.

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its weight increased by 252-459 grains. Of the grains thus determined, 7,000 are a pound Avoirdupois, and 5,780 a pound Troy.

TROY WEIGHT.

13. The derivation of the word Troy is doubtful. One theory is that it comes from the town Troyes, in France, because the pound Troy is said to have been first used there. Another derivation is "Troyvant," the prehistoric name of London; a third derives it from trois (three), because it is the money weight, and that money and money weight have each three denominations—penny, shilling, pound; pennyweight, ounce, pound. Troy weight is used in weighing gold, silver, precious stones, etc., and also in scientific investigations. The fineness of gold—that is, the ratio of the weight of pure gold in any given mass to the weight of the whole—is generally estimated by the number of carats (about 3 1/3 grains) of pure gold contained in 24 carats of the given substance. Standard gold—that is, the gold of our coinage—is 22 carats fine. This means that out of 24 carats of sovereign gold 22 are pure gold. Sometimes this is also expressed by saying that standard gold is 11 fine, this being the ratio of the pure to the alloyed metal. Diamonds and other precious stones are weighed by carats.

The following are the different denominations in Troy weight:

24 grains (24 grs.) make 1 pennyweight written 1 dwt.
20 pennyweights 1 ounce 1 oz.
12 ounces 1 pound 1 lb., or lb.

14. The weights used by apothecaries are aliquot parts of the pound Troy, and are as follows:

20 grains (grs.) make 1 scruple, written 1 s.
3 scruples 1 dram 1 dr.
8 drams 1 ounce 1 oz.
12 ounces 1 pound 1 lb.

APOTHECARY'S WEIGHT.

15. The pound avoirdupois contains 7,000 grains, and a cubic foot of distilled water, 62°F Fahrenheit, weighs 62-321 pounds avoirdupois very nearly.

The following are the subdivisions:

10 drams make 1 ounce written oz.
16 oz. 1 pound 1 lb.
20 lbs. 1 quarter 1 qr.
4 qrs. (112 pounds) 1 hundredweight 1 cwt.
20 cwt. 1 ton 1 ton.

A stone is the name given to the weight of 14 pounds.
A sack of coals is 2 cwt.
A ton of shipping is 40 cubic feet.
A load of rough timber is 40 cubic feet.
A load of squared timber is 50 cubic feet.

IMPERIAL LIQUID AND DRY MEASURE.

16. The gallon contains 277-274 cubic inches, and contains 10 pounds avoirdupois of distilled water at a temperature of 62°F Fahrenheit.

4 gills make 1 pint written 1 pt.
2 pints 1 quart 1 qt.
4 quarts 1 gallon 1 gal.

For measuring dry goods, such as grain, fruit, etc., we have, further, the following denominations:

2 gallons make 1 peck written 1 pk.
4 pecks (8 gallons) 1 bushel 1 bu.
8 bushels 1 quarter 1 qr.

In measuring liquids, the gallon is the largest measure recognized by legal enactment. There are, however, besides the above, many denominations still used in trade, which are derived from the names of the coins themselves.

For instance, in measuring wine:

| 3 1/2 gallons | make 1 hogshead |
| 43 gallons | make 1 tierce |
| 2 hogsheads | make 1 pipe, or butt |
| 3 pipes | make 1 tun |

Also for spirits:

| 10 gallons | make 1 sauker |
| 18 gallons | make 1 runlet |
| 2 tierces (84 gallons) | make 1 tunnicorn |

And in measuring ale or beer:

| 9 gallons | make 1 firkin |
| 3 firkins | make 1 kilderkin |
| 2 kilderkins | make 1 barrel |

And in dry measure we have also:

| 2 quarts | make 1 pottle |
| 2 bushels | make 1 strike |
| 2 strikes | make 1 coomb |
| 2 coombs | make 1 quarter |
| 5 quarters | make 1 load |
| 2 loads | make 1 last |

MONEY.—COINAGE.

MONEY OF ACCOUNTS.

17. 4 farthings make 1 penny written 1d.
12 pence 1 shilling 1s.
20 shillings 1 pound £1.

A farthing is indicated either as a fractional part of a penny—thus, 4d.—or by the letter "q."—thus, 1q.

The symbols £, s, d, q, are the initials of the Latin words Libra, solidus, denarius, quadrans.

There are the subdivisions of money in which accounts are always kept. Besides these, however, we have several coins representing other subdivisions, which are used to facilitate traffic. From this they are called current coins. The following is a list of our CURRENT COINS.

Copper

| A Farthing.  |
| A Halfpenny. |
| A Penny.    |
| Threepenny piece. |
| Fourpenny piece. |
| Sixpence.   |

Silver

| Shilling. |
| 3-shilling piece. |
| 21-shilling piece, or Florin. |
| 5-shilling piece, or Half-crown. |
| 5-shilling piece, or Crown. |
| Half-Sovereign. |
| Sovereign (the pound piece, equivalent to 20 shillings). |

It has already been explained, under the head of Troy weight (Art. 13), that standard gold (that is, the gold of the coinage) is 22 or 23 carats fine. Out of a pound Troy 466 sovereigns, so that, by dividing this by 12, we find the price of standard gold per ounce to be 331 1753, 1814, no charge being made at the Mint for coining gold.

Standard silver is 3 fine, and out of a pound Troy 66 shillings are coined; so that the Mint price of standard silver is 5a. 6d. an ounce. The market price of silver bullion is less than this—generally about 5s. 1d. an ounce. The advantage which the Mint thus gains is called seignorage.

In the new bronze coinage 43 pence are coined out of a pound avoirdupois. The bronze consists of 65 parts copper, 4 tin, and 1 zinc.

The standard of our coinage is gold. By this is meant that any amount of gold coin can be legally paid in liquidation of a debt, the creditor being obliged to take it. This is expressed by saying that gold to an unlimited amount is the only legal tender. No one is obliged to take more than 40s. worth of silver, or more than 12d. worth of copper.

Other coins besides the above were formerly in use. The guinea (21s.), the half-guinea, the 7-shilling piece, the noble (5s. 5d.), mark (15s. 4d.), the pistole (16s. 10d.), moidore (27s.).

ANGULAR MEASURE.

18. The circumference of a circle being divided into 360 equal parts, straight lines drawn to the centre divide the four
right angles at the centre into 360 equal angles. Each of these subdivisions, therefore, is equal to the 90th part of a right angle. It is called a degree, and written thus—1°. A degree is divided into 60 minutes, one of which is written thus—1′; each minute into 60 seconds, one of which is written 1″ (vide Art. 3, "Division of Time," page 366). The arcs of the circle, which subtend at the centre an angle of 1°, 1′, 1″ respectively, are also called a degree, a minute, and a second respectively. To know their actual magnitude, we must know the size of the circle (see Note on page 367).

**MISCELLANEOUS TABLE.**

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<tr>
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A sheet folded in two leaves forms a folio.

| " " | four | " " | quarto (4to) |
| " " | eight | " " | octavo (8vo) |
| " " | twelve | " " | duodecimo (12mo) |
| " " | eighteen | " " | eighteen-mo (18mo) |
| " " | thirty-six | " " | thirty-six-mo (36mo) |

**LESSONS IN ENGLISH.—XIII.**

**DERIVATIONS: PREFIXES (continued).**

**Proct, of Latin origin (procer, agenat), is found in pro-natural, contrary to nature.**

**Pro, of Latin origin, fore, onward, as in produce (Latin, duco, I lead), to bring forward. Pro appears in proceed (Latin, cedo, I go), in procreate (Latin, creo, I beget), in proffer (Latin, foro, I bear), in prolepsis, an anticipation, etc.**

"We have evinced (proved) that the generality of mankind have constantly had a certain prolepsis or anticipation in their minds concerning the actual existence of a God."—Chaleworth, "Intelligent System."

**Pro becomes in French pour, which again becomes par, as in purport (Latin, porta, I carry), signification. Purchase is given by Richardson as from a fancied French word, namely, pour-chasser; and purchase, he says, means to chase, and so to obtain. Such derivations are enough to bring etymology into disgrace. Purchase is from a Low Latin word, percauchare (per-calaure), which meant to tread over, and to mark out, the limits of a piece of land, the necessary preliminary to the purchase of it. See Ducange on the word, who gives the noun percauchia (purchase), as something acquired. Purchacia is common in old legal documents, and is the origin of the obsolete French word pourcauchier (percauchare), which has nothing whatever to do with chasser, to chase or hunt. Pourcauchier, in old French, signifies labour, and suggests the derivation which involves labour as the price paid in the acquisition of land, etc. This idea of purchase, as founded on labour, is in unison with the meaning of purchase. Whence it signifies a point for a lever to act upon, or the power which hence ensues, as in these words:—**

"A politician, to do great things, looks for a power, which our workmen call a purchase; and if he finds that power in politics as in mechanics, he cannot be at a loss to apply it."—Burke.

**Proto, of Greek origin (πρότος, πρώτος, first), occurs in proto-martyr (martyr, a witness), the first witness or martyr: applied to Stephen, in Church history.**

"With Hampden, firm assessor of her laws, And pro-martyr in the glorious cause."—Dryden.

Also in prototype. We have already had antitype and archetype: here we have prototype, which means the first or original form or model.

**Pseudo, of Greek origin (ψευδός, su-dos, a falsehood), signifies what is not genuine, false; as, pseudo-prophet, a false prophet.**

"Out of a more tenacious cling to worldly respects, he stands up for all the rest to justify a long usurpation and convicted pseudopiscopacy (Greek, ερμηνωτης, a bishop of prerates)."—Millen.

**Pussil, of Latin origin, comes from pusillus (little) or pusillus (E.R. pupil), the diminutive form of pusus or pusus, a boy (pupa, a girl), which is the source of our word puppet, in the French poupee, a baby, a doll. Pussil is found in union with animus, mind, forming pusillanimous, small in mind, applied particularly to a want of spirit or courage.**

**Putri, of Latin origin (putris, rotten, E.R. putrid), enters into the composition of a class of words, namely, putrify (Latin, facio, I make), putrefaction, putrescent, putrescence, etc.**

"It is such light as putrefaction broods In fly-blown flesh, whereas the maggots feeds, Shines in the dark, but heliered into day, The stench remains, the lustre dies away."—Cowper.

**Quadra, quadra, of Latin origin (quattuor, four), is found in quadrangle, four-sided; quadruped (Latin, pes, a foot), four-footed; quadruple (Latin, plicis, a fold), fourfold; also quarter, as in quaternion (quaternio, the number four), etc.**

"Aire and ye elements, the eldest birth Of Nature's womb, that in quaternion run, Perpetual circle, multiform, and mixt; And nourish all things."—Milton, "Paradise Lost."

The four elements of the ancients were fire, air, earth, and water. "I have chosen to write my poem (annus mirabilis) in quatrains or stanzas of four in alternated rhyme, because I have ever judged them more noble and of greater dignity both for the sound and number than any other verse in use amongst us."—Dryden.

**Quinquaginta (Quintus, Latin, five, occurs in quinquennial (Latin, annus, a year), happening every five years; in quintessence (Latin, essentia, essence); and in quintuple, fivefold.**

"Aristotle of Stagira hath put down for principles these three, to wit, a certain form called entelechies, matter, [and] privation: for elements form, and for privation, the heavenly body which is immutable."—Holland, "Paracelsus."

**Re (red), of Latin origin, primarily signifies back, backward (and has nothing to do with ere, nor does it mean before, as Richardson states), as return, to turn back; hence opposition, as resist, to stand against; also repetition, as revive, to live again; reform, to make again.**

Re, denoting back:—

"To desire there were no God, were plainly to unavow their own being, which must needs be annihilated in the subtraction of that essence which substantially supported them, and restrains them from regression into nothing."—Pico della Mirandola, "Vulgar Errors."

Re, denoting opposition:—

"To this sweet voice a dainty musique fitten Its well-tuned strings, and to her notes consortid; And while with skilful voice the song she dittid, The babbling echo had her words restored."—Spenser.

Re, denoting repetition, as in rehearse, recapitulate, remove, etc.:—

"The land of silence and of death. Attend my next remove."—Watts.

Re sometimes merely strengthens the word, as in receive, reception (Latin, capio, I take), and recommend (Latin, mando, from manus, a hand; and do, I give).

**Rect, of Latin origin (recus, straight), appears in rectify (Latin, facio, I make), to make straight; in rectangular (Latin, angulus, a corner), right-angled; rectilinear (Latin, lines, a line), straight-lined; and rectitude, uprightness.**

**Refro, Latin, backward, as in retrogradation (Latin, gradior, I walk), going backward. It is found, also, in retroactive (Latin, ago, I do, act), acting in a backward direction.**

**Res, of Latin origin, the base of sine, without, denotes separation, apart from, without; as, seclude (Latin, clado, I shut), to shut out; secede (Latin, I go, yield), to withdraw from; secede (Latin, duco, I lead), to lead from duty.**

"From the fine gold I separate the alloy, And show how nasty writers sometimes stray."—Dryden, "Art of Poetry."

**Sept, of Latin origin (septem, seven), appears in septennial (annual), occurring seven years; and in septuagesima, the seven stars, the Great Bear, Charles's Wain, the north.**

"Thus art as opposite to every good As the antipodes are unto us, Or as the South to the Septentrion."—Shakespeare, "Ham. VI." (3rd pt.)
LESSONS IN PENMANSHIP. — XXV.

The capital letters in the present series of copy-slips, which have been inserted to enable the self-teacher to acquire a knowledge of the shape and mode of formation of each, will serve as models for every variety of handwriting — for large-hand as well as small-hand, and of the intermediate sizes.

It is necessary, however, for us to remind our readers that in using the letters that are affixed to our Copy-slips in angular writing, as in Copy-slip No. 95, as capitals for copies in hands in which the strokes are rounded at the top and bottom, as in Copy-slips Nos. 94, 96, 97, and 98, care must be taken to substitute a well-rounded curve for the angles or points that form so conspicuous a feature in angular hand; and, vice versa, in using the round-hand capitals for angular hand, the writer must substitute points for the rounded curves.

As we have said before, angularity is for the most part the distinguishing feature of a lady's hand; while roundness is, generally speaking, the chief characteristic of men's handwriting; and having proceeded thus far in acquiring a sound knowledge of the formation of the large and small letters of the writing alphabet from our copy-slips and instructions, we would recommend all self-teachers, in practising writing, to direct their attention more particularly to those copies which present the characteristic features of the writing of the sex to which they belong; that is to say, that men and boys should copy our copy-slips in round and commercial hand in preference to those in angular hand, while girls and women should pay more attention to copies in the latter hand than to those in the former.

In drawing towards the conclusion of our present series of copies and instructions in the formation of letters, we cannot urge too strongly on our learners the necessity of unremitting practice if they wish to write a clear and legible hand with a
fair degree of rapidity. It is, however, a wearisome matter to be always copying the same copy-sheets over and over again. There is nothing, indeed, that can be calculated to destroy the learner's interest in what he is doing than to be, as it were, always "harping upon one string;" and to prevent this, as well as to save him the trouble of ruling lines for his copies, we have prepared a series of cheap ruled copy-books, based on the method which has been taught in our lessons on Penmanship, and furnished with suitable hand-lines, which will answer the double purpose of providing the reader with a variety of subjects for copying, and save him the trouble of ruling his paper.

In "Cassell's New Copy-books for the Million," the learner will find everything that can be required for practice. The series, the contents of which we append, comprises thirteen books, price 2d. each, or the thirteen for 2s., and may be procured direct from the publishers of the Popular Educator, and from all booksellers.

5. Text Hand. 11. Introduction to Ladies' Hand.

ESSAYS ON LIFE AND DUTY.—IV. TEMPERANCE.

The success of life and the happiness of life, as well as the usefulness of life, depend to a very large extent upon the cultivation of the spirit of temperance. Men of temperate speech and judgment, of temperate likes and dislikes, are apt to risk alike reputation and influence. The counsel to be temperate does not, indeed, suit those whose passions predominate over their judgment, but all wise and thoughtful persons will see at once that there is no virtue which has so much to do with the force and excellence of character as temperance; a word difficult strictly to define, but it is evidently a holding of the mean between extremes in lawful things. Temperance implies the right in the thing itself, as there are some things which it would be wrong, under all circumstances, to be in any way connected with. To be temperate in swearing, stealing, or lying, would be manifestly a caricature of the word; there can be no temperance in that which is essentially evil. Can it then, the reader may say, be possible to be temperate in right? is it not compelling us to stop short in that course of duty which must get more right as we go on? Strange as it may seem at first sight to the student, there is a temperateness needed even in the virtues themselves, without which their very existence as virtues must be endangered. Amiability is one of the most beautiful excellences of character; and yet, if amiability is primary, there must be a secondary requisite—there must be a condition of temperance, or a word of the law of another virtue, or a word which would not destroy, or at wrong, no earnest hatred of oppression, and no practical effort to remove it. Contentment is another praiseworthy grace of character; but content may run into indifference and sloth, and the God-given powers of the mind may be suffered to lie fallow, and even to rot.

These instances are only added as illustrations of a law which applies to all the virtues; punish any one of them, thus ever honourable, and it becomes a vice. It will thus be seen what a careful nurseryman each man ought to be of the vineyard of his own nature; and also what the Scriptures mean when they say, "Drunk, but not with wine." It is easy to be intoxicated with pride and ambition; either of these two powers has, indeed, its proper sphere, and their elimination from human life cannot take place from the serious discipline of their character. In all ages of the world men have been found to love and advocate extremes; some have been Epicureans, denying themselves no pleasure, and some Stoics, denying themselves all; and, doubtless, the disciples of extremes attract more notice, and are often credited with greater earnestness; whereas it should be remembered that, as it is more difficult to preserve the just balance, so is it more honourable and worthy of praise.

I imitate American thinkers says: "Men undertake to be spiritual, and they become ascetic; or, endeavouring to hold a liberal view of the comforts and pleasures of society, they are soon buried in the world and become slaves to its fashion; or, holding a scrupulous watch to keep out every particular sin, they become legal, and fall out of liberty; or,charming with the noble and heavenly libraries, they are drawn to negligence and irresponsible living. So the earnest become violent, the fervent fanatical and censorious, the gentle wave, the firm turn bigots, the liberal grow lax, the benevolent ostentatious. Poor human infirmity can hold nothing steady."

The more true we feel this to be, the more necessary will be seen to be the exercise of a spirit of temperance, and how difficult its application is. Temperance in the human life and character no respect is mankind more in danger of becoming intemperate than in speech; for to lay an embargo upon the tongue is among the most trying efforts of the spirit of temperance. It is difficult to deny ourselves what often gratifies our own pride, and, at the same time, damages the prestige of another. From this propensity have sprung family feuds, protracted law-suits, and party divisions immeasurable. It would be our own provinces of meaning and principle to specify the evils which have resulted to society from intemperance in other provinces of character, but it must surely be admitted that no moral code can be perfect which does not inculcate temperance as well as justice. True, indeed, it is, that there is nothing high-sounding in it, and it is not likely to enlist in its advocacy those who are nothing, if not extreme. But it had of old amidst its advocates the charm of a noble beauty, and as it was an answer to the emptiness of the evils which have made more authoritative on us by its enforcement on the page of Inspiration. The pleasures of temperance are steady in their development, but they are very lasting and real. When nature is kept in proper equipoise of action, there is freedom from nervous depressions which are incident to excitements of any and every kind. Instead of keen sensational pleasures, succeeded by times of leaden indifferency and dulness, are quiet, and, in the enquiry of the mind, which brings with them a cheerful sense of healthful recreation. As experienced travellers prefer, after all, the temperate zone—neither the frigid cold of the far North, nor the glaring heat and heat of the tropics—so the most experienced student of life will prefer the temperate zone of character as the one most conducive to the health and longevity of the virtues.

Temperance keeps the body cool, and the mind clear, and is that related to the other virtues in a vast variety of ways, presenting to us that which is of inestimable value—a same mind in a sound body. There is an insanity which results not only from the excessive use of ardent spirits, but from the intemperate exercises of pride and passion, and multitudes would have been preserved in health and reason if they had received and acted on the maxims of this essay. All the pride of this virtue is related to varieties and differences of temperament. Some are in little danger of excess of anger; others need fear no excess of pride. Solomon's celebrated maxim, "Know thyself," should be well pondered; for then, when the danger is clearly apprehended, the remedy can be best applied, according to the specific difficulties of each separate constitution. As the subject becomes clearer, it will be seen that temperance being the mere negation of things, it is rather the right enjoyment of them. The dangers incidental to human character do not come in one direction only; and in the multitudinous aspects of life and duty it is as wise as it is right to be temperate in all things.

OUR HOLIDAY.

CRICKET.—II.

The following are the Laws of the game of Cricket, including the latest revisions by the Marylebone Club, which is the recognised authority on the subject. Besides forming the standard of appeal in disputed cases, they will be found by the learner to throw light on points which were but briefly touched upon in our previous paper:

THE LAWS OF DOUBLE-WICKET.

1. The Ball must not weigh less than five ounces and a half, nor more than five ounces and three-quarters. It must measure not less than nine inches, nor more than nine inches and one quarter in circumference. At the beginning of each innings either party may call for a new ball.

2. The Bat must not exceed four inches and one quarter in the widest part. It must not be more than thirty-eight inches in length.

3. The Stumps must be three in number, twenty-seven inches out of the ground; the balls eight inches in length; the stamps of equal and of sufficient thickness to prevent the ball from passing through.
4. The Bowling Crease must be in a line with the stumps, six feet eight inches in length; the stumps in the centre; with a return crease at each end, towards the bowler, at right angles to the line in which they would be if extended. Any four feet from the wicket, and parallel to it; unlimited in length, but not shorter than the bowling crease.

6. The Wickets must be pitched opposite to each other by the umpire, one being on the stumps, and the other about 3 feet 11 inches away. The bowler's stump must be as near the bowler as may be conveniently fixed.

7. It shall not be lawful for either party during a match, without the consent of the other, to alter the ground by rolling, water ing, covering, mowing, or beating, except at the commencement of each innings, when the ground shall be swept and rolled. This rule shall not apply if the bowler from beating the ground with his bat near the spot where he stands during the innings, or to prevent the bowler from filling up holes with sawdust, etc., when the ground is wet.

8. If after rain the wickets may be changed, with the consent of both parties.

9. The Bowler shall deliver the ball with one foot on the ground behind the bowling crease, and within the return crease, and shall bowl four balls unless he change wickets, which he shall be permitted to do only once in the same innings.

10. The ball must be bowled. If thrown or jerked, the umpire shall call "No ball."

11. He may require the striker at the wicket from which he is bowling to stand on that side of it which he may direct.

12. If the bowler shall toss the ball over the striker's head, or bowl it so wide that, in the opinion of the umpire, it shall not be fairly within the reach of the batsman, he shall adjudge one to the party receiving the innings, either with or without an appeal, which shall be put down "Wide ball," and every such ball shall not be reckoned as one of the four balls; but if the batsman shall by any means bring himself within reach of the ball, the run shall not be adjudged.

13. If the bowler delivers a "no ball," or a "wide ball," the striker shall be allowed as many runs as he can get, and he shall not be put out except by running out. In the event of no run being obtained by any other means, then one run shall be added to the score of "no balls" or "wide balls," as the case may be. All runs obtained for "wide balls" to be scored to "wide balls." The names of the bowlers who bowl "wide balls" shall be inserted in the score book to show the parties by whom either score is made. If the ball shall first touch any part of the striker's dress or person (except his hands), the umpire shall call "Leg bye."

14. At the beginning of each innings the umpire shall call "Play." From this time to the end of each innings no trial ball shall be allowed to any bowler.

15. The Striker is Out if either of the balls be bowled off, or if a stump be bowled out of the ground; or if the ball, from the stroke of the bat, or hand, but not the wrist, be held before it touch the ground, although it be hugged to the body of the catcher; or if, in striking, or at any other time while the ball shall be in play, the striker put down, except his bat be grounded within it; or if, in striking at the ball, he hit down his wicket; or if, under pretence of running, or otherwise, either of the strikers prevent a ball from being caught, the striker of the ball is out; or if the ball shall be struck, and be wilfully strike it again.

16. Or if, in running, the wicket be struck down by a throw, or by the hand or arm (with ball in hand), before his bat (in hand) or some part of his person be grounded over the popping crease. But if both the balls be off, a stump must be struck out of the ground.

17. Or if any part of the striker's dress knock down the wicket; or if the striker touch or take up the ball, while in play, unless at the request of the opposite party; or if with any part of his person he stop the ball, which, in the opinion of the umpire, the bowler's stump has been pitched in a straight line from it to the striker's wicket, and would have hit it. If the players have crossed each other, he that runs for the wicket which is put down is out.

20. A ball being caught, no runs shall be reckoned.

21. If a "Lost ball" be called, the striker shall be allowed six runs; but if more than six shall have been run before "Lost Ball" shall have been called, the striker shall have those runs.

22. After the ball shall have been finally settled in the wicketkeeper's or bowler's hand, it shall be considered dead; but when the bowler is about to deliver the ball, if the striker at his wicket go outside the popping crease before such actual delivery, the said bowler may, at his discretion, make the bowler's stump be pitched in a straight line from it to the wicket, and would have hit it.

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28. A ball being caught, no runs shall be reckoned.

29. If a "Lost ball" be called, the striker shall be allowed six runs; but if more than six shall have been run before "Lost Ball" shall have been called, the striker shall have those runs.

30. After the ball shall have been finally settled in the wicketkeeper's or bowler's hand, it shall be considered dead; but when the bowler is about to deliver the ball, if the striker at his wicket go outside the popping crease before such actual delivery, the said bowler may, at his discretion, make the bowler's stump be pitched in a straight line from it to the wicket, and would have hit it.

31. If the players have crossed each other, he that runs for the wicket which is put down is out.

32. A ball being caught, no runs shall be reckoned.

33. If a "Lost ball" be called, the striker shall be allowed six runs; but if more than six shall have been run before "Lost Ball" shall have been called, the striker shall have those runs.

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43. If the players have crossed each other, he that runs for the wicket which is put down is out.

The Laws of Single Wicket:

1. When there shall be less than five players on a side, bounds shall be placed, twenty-two yards each, in a line from the off and leg stump.

2. The ball must be hit before the bounds to entitle the striker to a run, which run cannot be obtained unless he touch the bowling stump or crease in a line with his bat, or some part of his person, or go beyond them, returning to the popping crease as at double wicket, according to the rules for stumps.

3. When the striker shall hit the ball, one of his feet must be on the ground and behind the popping crease, otherwise the umpire shall call "No hit."

4. When there shall be less than five players on a side, neither bays nor throws shall be allowed, nor shall the striker be caught out behind the wicket, nor stumped out.

5. The fieldman must return the ball so that it shall cross the play between the wicket and the bowling stump, or between the bowling stump and the bounds. The striker may run till the ball be so taken.

6. After the striker shall have made one run, if his start again he must touch the bowling stump and turn before the ball cross the play, to entitle him to another.

7. The striker shall be entitled to three runs for lost ball, and the same number for ball stopped with hat, with reference to the 28th and 33rd laws of double wicket.

8. When there shall be more than four players on a side, there shall be no bounds. All hits, bays, and overthrow shall be allowed.

9. The bowler is subject to special care of umpires as at double wicket.

10. Not more than one minute shall be allowed between each ball.
We come now to the practical part of the game, concerning which a few hints will be useful to the beginner. A good cricketer can only be made by practice, but it will assist the learner to have right principles before him at the outset.

The Batsman, at starting, should stand in the position shown in Fig. 1—his right foot firmly planted on the ground, and his left in readiness to move freely either to the one side or the other, as may be required in striking the ball in the style appropriate to his particular situation of his bat at a spot within the popping crease, and about the length of the bat from the wicket; and, in order that he may guard his wicket well, he is entitled to ask the umpire stationed near the opposite wicket to give him the correct line for the middle stump; that is, to inform him when his bat is so placed as to cover this stump, looking from the bowler's end. He marks this spot by an indentation with the bat, and is then in readiness for the ball. One principle must be laid down for playing either fast or slow balls. If they appear to be coming straight into the wicket, they must be blocked, or stopped, and the player should not attempt to strike them.

In blocking, the bat is lifted only a short distance from the ground, and the ball is struck downward, so as to bring it to a dead stop if possible. For this purpose the handle of the bat should be sloped well forward, by which means the front of the bat is made to cover the ball, and prevent its rising from the ground. Otherwise, in blocking, the ball may receive just such a tip as would cause it to pass from the edge of the bat into the hands of "point" or "cover-point," who will be on the look-out for it.

The position known as "the draw," which is engraved in our second figure, is something between a rock and a hard place. It is the mode of meeting a ball when, after being pitched, it rises from the ground and is apparently coming straight in towards the top of the wicket or the ball. The bat is held straight before the wicket (Fig. 2), but the surface of the bat, instead of meeting the ball full, is turned slightly to one side, so that the ball, when it meets the bat, is turned off as driven, and a run is frequently the result.

If the ball, when delivered, appears to be coming somewhat wide of the wicket, the batsman may play it freely, either by a "hit," a "cut," or a "drive." But it is frequently difficult to tell what line the ball is really taking for, if you are playing against an expert bowler, you will probably find the ball comes towards the wicket with a twist from the spot at which they were pitched, and, in order of pursuing a straight course, turning in to the stumps. This being the case, he is to be able to give this twist to the ball, as well as to direct it straight at the wicket. Nothing but practice, and quickness both of eye and hand, will teach the young batsman to guard effectively against this danger.

In striking, hit the ball, if possible, between the line of the fielders, or wherever you see the field most open and unprotected. Strike low, so that you may not afford the opportunity of a catch to one of your watchful opponents. Do not be too eager to make runs; let your object rather be to protect your wicket as long as possible, waiting your opportunity for a good hit now and then at a ball delivered with less care than usual. Do not attempt a run after the ball is in the hands of one of the fielders, otherwise the ball may reach your stumps before you can return to the wicket, and you will be "run out."

If practice is necessary to the batsman, it is still more essential to make an expert Bowler. The learner should practice bowling at a mark, either in a field or in an outhouse. He should acquire both the fast and the slow styles, for it is of the greatest service in actual play to be able to vary the character of the bowling—to deliver a slow ball after a fast one, and vice versa. Nothing is more embarrassing to the batsman than the uncertainty this causes as to the kind of ball he is about to receive. The bowler should acquire the knack of twisting the ball in its delivery, to which we have previously alluded. The ball should be held in the fingers only, and not grasped in the palm of the hand. It matters not whether the style of delivery be "round-arm," or "under-hand"—that is, whether with a swing of the arm from the shoulder, or bowled in the ordinary meaning of the word. The learner should adopt that mode which gives him the greatest command of the ball and its direction. The round-arm style is more generally suited to fast, and the under-hand to slow bowling; but this rule has its individual exceptions. A few years ago, very little bowling other than in the round-arm style was seen in the cricket field. The under-hand fashion was regarded with some degree of contempt. Now, however, it has come again into vogue, and may be seen practised almost, if not quite, as frequently as the more modern round-arm delivery. Fig. 3 represents the attitude of the bowler when about to deliver the ball in round-arm style.

Next in importance to batsman and bowler, in the duties he has to perform, comes the wicket-keeper. His duty is to stop the ball, if he can, immediately it passes the wicket, and, if the batsman be not sufficiently guarded, or within his bounds, to knock the balls off before the striker can recover his proper position. He should also receive the ball after the fielders have secured it, and it is his place to throw it to the stumps before the batsman can complete his intended run. Therefore, the fielder who may stop the ball, instead of throwing it at once to the wicket-keeper, should deliver it as quickly as possible into the hands of the wicket-keeper; otherwise, if he miss his aim and the ball pass by the wicket, the batsman may run again, and make as many more towards the score as if the ball had been again hit. The hands of the wicket-keeper should be protected by padded gloves, especially if the bowling be of the fast order. The watchful and ready attitude of the wicket-keeper are depicted in Fig. 4.

Balls which pass the wicket-keeper should be secured by Long-stop, who is stationed at some distance behind him for that purpose, as indicated in the diagram of the relative positions of the players, given in our previous paper. The other duties of long-stop and the rest of the fielders may be described in general terms. They must be on the vigilant look-out when the ball is delivered, that they may catch it or stop it as soon as possible, if it should chance to be struck that way. Quickness of eye, a firm hand for a catch, and good legs, the power to throw a ball straight to the wicket-keeper, and judgment not to over-throw it, are the essentials to a good fielder. Such a player is often able to render his side quite as good service as either the expert bowler or the batsman.
Here, then, the calyx, not being adherent, the fruits or carpels, although surrounding them, can readily be separated. But after the examples of botanical transformation which we have already seen, the reader will not be surprised at the information that, in certain members of the rose order, the calyx not only surrounds the carpels, but actually attaches itself to them; thus becoming, what we should term in ordinary language, a portion of the fruit. This is the case with apples and pears, which are composed each of five carpels, recognisable by the five seed-vessels closely enveloped in a fleshy calyx. What we term the

body, which contains little hairy prominences termed seeds in ordinary language. In reality, these are fruits, each containing a seed, and the external envelope in which they are contained is nothing more than the calyx. This peculiar conformation will be readily demonstrated by considering the various parts of a rose flower, and the changes which these parts undergo. If we open a rose flower, we see numerous stamens but no pistils. On looking still more attentively, the tops of pistils become evident, that is to say, their stigmas, but their styles are hidden. If a vertical section of the flower be now made, the stigmas will be seen to proceed from ovaries affixed, as already described, to the inside of the calyx, and hidden by the envelopment of the latter, which surrounds them on all sides, only a narrow throat-like opening being left at the top.

eye of an apple is nothing but the remains of the free part of the calyx enclosing withered stamens.

A precisely similar structure is observable in the pear (Fig. 130), the quince, and the mountain ash; the fruit of the last-named, indeed, resembles common apples in every respect except size and colour. The hawthorn is also a rosaceous plant, belonging to the sub-order Rosae; hence the structure of the fruit, haws, should resemble the structure of an apple. On a casual examination this does not seem to be the case, for whereas the apple contains internally some parchment-like cavities, the fruit of the hawthorn contains seeds covered by a hard strong investment, this is no other than a thickened condition of the parchment-like compartments of the apple.
The apple tribe (sub-order Pomeae) is thus seen to be nearly allied to the roses proper; the almond tribe (sub-order Amygdalo-
tace), containing almonds, peaches, apricots, nectarines, plums, etc., is still more nearly allied, however little one might anticipate such resemblance from a casual examination of the fruit. The reader will remember that in the sub-order Pomeae, the ovary, or lower portion of the united carpels, is inferior; to say, the calyx grows around it, adheres to it, and appears above the rose proper. In such adherence takes place; hence the ovary may be said to be superior; in Amygdalaceae, or the sub-order of Rosaceae, containing almonds, plums, nectarines, etc., the ovary is also superior; hence the truth of our remark, that this sub-order was more nearly allied to roses proper than is the sub-order Pomeae. If the flowers of peaches, plums, nectarines, etc., be examined, they will be found to be made up of one to five sepals, a calyx of five sepals, and numerous stamens arising from the sides of the calyx; these are all characteristics of the rose tribe. Instead, however, of many carpels, like the roses proper, the members of the almond tribe have each only one, which ripens into the sort of fruit termed by botanical writers a drupe, a term which has been fully explained. For another specimen of the rose tribe we refer the reader to Fig. 151.

Let us now examine the chemical and physiological characteristics of the Rosaceae. The sub-order Rosaceae, containing the roses proper, does not include one noxious plant. On the contrary, the strawberry yields us a delightful article of food, and the fruit of some species of rose is made into conserves. The leaves of this sub-order are usually aromatic, and so in like manner are the petals; those of the garden roses are frequently used by medical men for the preparation of astringent draughts. Need we call attention to the fragrance of roses? That fragrance depends on the presence of a volatile oil, which admits of being extracted from the flower petals. It constitutes the otto or attar of roses.

The sub-order Pomeae is also harmless, if we except the seeds and flowers of certain species which contain a minute amount of prussic acid, which might be injurious. The fleshy part of pomaceous fruits is frequently an agreeable article of food, containing much sugar in the sweet varieties, and various acids, of which the malic is the principal. In the sub-order Amygdalaceae (Figs. 132 and 133), the amount of prussic acid, which becomes accumulated for the most part in the leaves, petals, and seeds, is often very great; nevertheless, the poisonous principle rarely extends to the fleshy pericarp or edible portion of the fruit. The malic is often combined, and bitter almonds, and bitter cherry laurel, furnish examples of a great accumulation of prussic acid in certain members of this beautiful sub-order, which is also further distinguished from Rosaceae and Pomeae by yielding gum, which the two latter never do.

Other plants belonging to the order Rosaceae are represented by Figs. 134 and 135.

LESSONS IN GERMAN.—XXIII.

SECTION XLIII.—IDIOMATIC PHRASES.

1. Wegen, to deliver. Wegen, zu bedienen, to carry out. Wegen, to command. Wegen, to govern, rule. Wegen, to go. Wegen, to bring. Wegen, to supply. Wegen, to explain. Wegen, to follow. Sagen, to conduct. Sagen, m. sub-

2. Wegen, to deliver. Wegen, zu bedienen, to carry out. Wegen, to command. Wegen, to govern, rule. Wegen, to go. Wegen, to bring. Wegen, to supply. Wegen, to explain. Wegen, to follow. Sagen, to conduct. Sagen, m. sub-

VOCABULARY.

* Wegden zu bedienen, to carry out. Gesagt, m. subj., said, told, explained.

3. Wegen, to deliver. Wegen, zu bedienen, to carry out. Wegen, to command. Wegen, to govern, rule. Wegen, to go. Wegen, to bring. Wegen, to supply. Wegen, to explain. Wegen, to follow. Sagen, to conduct. Sagen, m. sub-

EDUCATOR.

4. Several words, as beden, ja, sogen, vie erheit, und, and, etc., are often used with a signification different from their primary one, or where no corresponding one is employed in their English, as:—Wir ist vie erheit traut? are you (perhaps) sick? Wir etc. Wie west mein gegen abrufen? is it true, shall you depart to-morrow? Wir und sein fruenn, he will already (doubtless) find us. Wenn er traut, sie fahrt er nieter kennen, if he is sick, (then) he cannot come. Als er nicht, und er sein doch bat, he does not read, (and indeed) because he has no book. Wenn die ja ist, do not go by any means. Ein fruenn (see note) wie sein fruenn, it might indeed so happen (come). Wenn die sogen sind? are you going already? Jamals, yes (certainly); or, yes, indeed. Sie glaubt, er konnte uns seinhe beregen, I thought he could (already) visit us to-day. Wir glaubt, er konnte uns fahnt er sech aus den is, if I were to be himself upon him.

5. The causative adverbs, treiben, treiben (therefore), tret (thereby), etc., are frequently introduced into a leading sentence, where the corresponding English word is omitted, as:—Wir ist treiben uns unrichtig, weil sein bruen nicht hier ist, he is (therefore) dis- contented because his friend is not here.

6. Si suchy with sein signifies "to be indebted, to owe," the word denoting the amount being put in the accusative (§132, 9). as:—Wir ist mir nur ein guten wissen, he owes me but one florin. Verstehen also signifies "to owe," but only in the sense of "to be obliged for, to ascribe to," as:—34 versteht meine (Sic) for reiten ket ter Duetz; I owe my recovery to the pure air of Switzer-

RESUME OF EXAMPLES.

Ge femt, nicht, nur year, weil er He does not come (and indeed) was. Weiter, nicht, noch mein Reise My voyage is found of saving, and my nephew of hunting.

34. Dass meine wissen, wie viel iler er ist, I would like to know what o’clock it is.

35. Rent, Gedachtniss, und Freiheit, werten alle Menschen gern haben. Liberty, righteousness, and truth all men should love.

Wissen, ob ich dann vielleicht? How much do I owe you? He owe his life to the fleetness of his horse.

36. Da kein der Welt, ein Kind How has the world to predetermine the duration of his life.

37. Wenn der Welt, ich aus dem Herren geben, sehr wie wir der bekannten. The arrow may indeed be drawn out of the heart, yet the injured one will never recover.

38. Die beste Wurme, thut er dem Teller nach. (Schiller.)

39. Ich war ein guter Jahr, der Bunter It has been a good year; the paysant can even (now) give again. (Schiller.)

EXCERPT 82.

LESSONS IN MUSIC.

1. Had your friend not become ill, he would certainly have embellished the feast by his presence. 2. If you were more prudent you would not have met with this inconvenience. 3. I do not think you have mentioned it to me. 4. His brother would have been better resolute. 5. He would have better friends if he were more agreeable. 6. You would have had more difficulties if you had not followed the advice of your friends. 7. I should not have the least doubt that you would have succeeded if you had acted more prudently. 8. We should not sail for Holland if we had a fair wind. 9. His power should have been acted in another manner, because I should not have had so much patience. 10. What would be the folly of man if he always sought his happiness in himself? 11. You would be richer if you were more enterprising. 12. If I had not lost my purse I should still have it. 13. He would not have so much money if he had been idle. 14. The greater the difficulty, the greater pleasure there is in overcoming it. I will not cross the bridge, the toll-gatherer will not have demanded payment.

LESSONS IN MUSIC.—VII.

Every art is best taught individually. It is true that there are some advantages to the singer in collective teaching. The "sympathy of numbers" both aids and encourages him. But his progress will depend entirely on individual attention and endeavour. In most classes the few make progress and lead, while the many—some from timidity, and others from ill-nature and inattention—hang upon the leaders, and will be like doing their movements. As, however, singing for schools and congregations must be generally taught in classes, the object of the teacher must be to combine the spirit and sympathy of numbers with as careful an attention to individual progress as possible. He should also occasionally separate the laggards from the more forward, and (without blaming or discouraging them) cause them to retrace their steps, and, when others are progressing rapidly and fairly in a new class, for those purposes, the pupil should be led to expect a rigid personal examination at the close of each stage of progress, and a division of the class as the result. Several lesson hours should be devoted to this examination. It might be conducted in a separate room, while the rest of the class are practising. In adult classes, most of the questions might be announced to the class, and the answers written down. It requires separate examination in connection with the exercises. The examiner would then decide by the result of the two examinations. A register of each examination should be kept by the teacher, and a memorial of it given to the pupil. To aid both the self-teacher and the class-teacher, the following questions and tests of progress are given:—Let no one consider himself worthy to pursue the course further until he be thoroughly fulfilled these requirements. Things to be done are marked by an asterisk. These especially must not be omitted.
LESSON 1 (page 27).
1. What were the reasons that encouraged "our friend" to think that he had a voice? What kind of road to music do we offer? What are the conditions of admission to it?
2. What is the difference between high and low in music?
3. Must be chosen and fixed before the notes which may be introduced into a tune are distinctly ascertained? What is this arrangement of notes called, and by what primary laws is it regulated? What grounds do we call it the scale of nations and of all times?
4. What is a musical interval? Is it a distance in time? in space? in what?
5. Draw from memory a diagram of the scale, with the sol-fa syllable to represent the notes, marking carefully the two shorter distances.
6. What is the general character of the 1st, 3rd, and 5th of the scale? How is the voice tuned?
7. Sol-fa and point on the diagram, from memory, Exercises 1, 2, 3, 4.

LESSON 2 (page 90).
1. Give an account of the first experiments on the sounds of a single string. What note does half a string give?—two-thirds?—three-fourths?—four-fifths?—etc.
2. Describe the "siren." What is the relation of a note's length to its vibrations?
3. What is the smallest perfect measurement of the scale in plain figures, and according to that how many degrees belong to the great tone?—small tone?—tone?
4. What is an "octave" note or "replicate?"
5. Sol-fa and point on the diagram of the scale, from memory, Exercises 5, 6, 7, 8.

LESSON 3 (page 145).
1. Explain the two sets of tetrachords. Arrange them by memory, taking coins to represent your notes.
2. By what intervals are the tetrachords of the scale always separated from one another? Show this by drawing a circular diagram.
3. Draw a modulator from memory. (Notice that the right-hand column takes its DOH from the level of solm, the left from FAH.)
4. Explain fully the three great advantages of the modulator, its picture of interval; its mnemonic (or memory-helping) power; and its aid to the pattern.
5. What is the effect of a "mental modulator" on the horizontal line of notes?
6. Give three reasons for learning an "interpreting notation" of music in connection with the other.
7. What is accent? How many sorts of accent are there? What is a measure?—an aliquot?
8. What is the structure of the Dinary Measure, and what is its character? Trinary? Quadrinary? Senary?
9. Give Dr. Bryce's views of the origin of our sense of Rhythm, and its connection with the heart and lungs?

LESSON 4 (page 211).
1. Sol-fa and point on the modulator, from memory, Exercises 9, 10, 11, 12, 13, 14.

LESSON 5 (page 273).
1. What are the three different senses in which the word time is used in ordinary musical language? Give examples of each.
2. What is the peculiarity in the swings of the pendulum? What regulates the speed of a pendulum?
3. Describe the "metronome." With what is it proposed that each swing of the metronome should correspond in the binary, ternary, and quaternary measures?—in quick senary measure?
4. How would you use the string pendulum?
5. In learning to "keep time," what is the double object to be gained? Will beating time help you?
6. Describe the views of Rousseau, Dr. Burney, and Dr. Bryce on "beating" time.
7. What is the standard by which the length of notes is measured in the sol-fa notation? What proportion of time belongs to a note placed alone immediately after an accent mark? What is the meaning of the horizontal stroke?—the dot after a note?—the comma?—the dot and comma?—the inverted comma? What means an empty aliquot?
8. How do you indicate a slur?
9. Explain the meaning of the following signs: — D.C., D.S., E., F., F., J., F., etc.
10. How would you indicate "expression" in writing or printing words?—loud?—soft?—abrupt?
11. Take a book of hymns or songs, and mark ten pieces for expression. [This is a really important and useful exercise of judgment and taste.]
12. What are the vibrations of the tenor c—the standard note of pitch's? Draw a diagram of the standard scale. What is meant by G-sharp? B-flat?
13. Pitch the key-note A—G—F—E—D, and take the chord in each case.

LESSON 6 (page 339).
1. Point on the modulator by memory, and afterwards sing to words the tune GRIFFIN.
2. What is the difference between the sound of the voice in speaking and in singing? What is a sound of the singing voice called?—of the speaking voice?
3. What is the best posture for the singer in reference to his head?—shoulders?—chest?—mouth?—tongue?—lips?
4. What is the first daily practice for opening and strengthening the lungs? How should the chord and scale be sung, and with what two peculiar observances, in this daily practice?
5. What three faults should be especially avoided by the singer?
6. What habit, in reference to loudness and softness of voice, should be carefully formed?
7. In what respects would you alter your phrasology and mode of illustration if you had to set the facts and principles of this first "stage" of our course before the minds of the young, or persons dull of comprehension? [It will be a good exercise of mind for you to answer this question. It will be better still for you to do so practically. Teach what you know. There is no better way of perfecting your knowledge.]
8. What are the advantages and disadvantages of class teaching? Show the importance of personal effort and examination.
9. Sing a high note with the low larynx,—a low note with the high larynx.
10. Sing (taking a very low note for DOH) DOH ME SOH DOH ME, and if you can without straining the voice, SOH, I.—holding each note with a long and steady breath. [You should be more anxious about the chord than the scale in the present stage of your course; for you may not yet have got all the notes of the scale quite perfectly in tune.]
11. Repeat slowly and very distinctly (with good use of tongue, lips, and teeth), and in one breath, "How doth the little busy bee improve each shining hour." Take two more lines in another breath, and so on.
12. Point and sing the tune LEYBURN from memory on the modulator.

LESSONS IN FRENCH.—XXVI.
SECTION XIV.—THE PASSIVE VERB (§ 54).
1. The passive verb is conjugated by adding to the verb être in all its tenses, the past participle of an active verb. See § 134 (2), Sect. XLI. 54.
2. This participle must agree in gender and number with the subject (§ 134 (2), Sect. XLI. 6).
Ces vieillards sont respectés, These old men are respected.
Ces enfants sont aimés de tout le monde, These children are loved by everybody.
3. The genius of the French language seems to prefer the active to the passive voice. Many expressions which are in the passive in English, are accordingly rendered into French by the active or reflexive (§ 128 (6), § 113 (1)).
Cette maison est à louer ou à vendre, This house is to be let or sold.
Ma sœur est à plaintext, My sister is to be pitied.
Cet homme est à craindre, That man is to be feared.
Cet homme s'appelle II. [Sect. That man is called II.

XXXV. 2]
Cet homme se trompe [Sect. That man is mistaken. XXXVII, 2].
On dit que cela est ainsi [Sect. It is said that it is so, XXXIV, 2].
On nous dit cela [Sect. XXXIV, 2]. We have been told that.
4. In an answer to a question [see Sect. XXIII, 12], the pronoun le corresponds in signification with the English word so or if, expressed or understood. Le refers then to a noun not determined (not preceded by an article or a possessive adjective), to an adjective, to a verb, or even to a whole sentence.
Ces enfants sont-ils aimés?
Il en est ainsi.
Ces demoiselles sont-elles sœurs?
Elles ne le sont pas.
5. When le refers to a determined noun, it often corresponds in signification to the pronoun he, she, or they, which may or may not be expressed in the English sentence. Le must then assume the gender and number of the noun to which it refers.
Etes-vous la sœur de mon ami?
Je le suis.

Résumé of Examples.
Leur conduite est-elle appréciée?
Elle n'est appréciée de personne.
Cette dame est-elle estimée et respectée?
Elle n'est ni estimée ni respectée.
Ces marchands sont-ils à vendre.
Ces enfants sont bien à plainir.
A-t-on dit quelque chose à mon frère?
On ne lui a rien dit.
Savez-vous comment cela s'appelle?
Madame, êtes-vous maîtresse ici?
Je ne le suis pas, Mousier.
Etes-vous la maîtresse de la maison?
Je la suis.

Vocabulary.
S'appeler, 1, p. c., to be called [§ 40 (4)].
Auteur, m., author.
Blinder, 1, to blind.
Car, for.
Conduire, f., conduct.
Crotre-4, ir., to believe.
Diligent, -e, diligent.
Ecolier, m., scholar.
Gros, -o, large, about.
Jardin, m., garden.
Louer, 1, to let, to.
piable.
Mère, f., mother.

Exercice 85.
1. Votre mère est-elle aimée de sa sœur? 2. Elle est aimée
   de son frère et de sa sœur. 3. Les Italiens sont-ils aimés des
   Français? 4. Vos écoliers ne sont-ils pas blâmés? 5. Ils sont
   rarement punis. 8. Par qui êtes-vous puni quand vous êtes
   pareuseux? 9. Je ne suis jamais puni. 10. Sa conduite a-t-elle
   été appréciée? 11. Elle a été appréciée de tout le monde. 12.
   Elle a été appréciée par ses amis. 13. Cet auteur est-il
   estimé? 14. Il est estimé de tout le monde. 15. Le jardin du
   relieur est-il à vendre ou à louer? 16. On dit qu'il est à louer.
   17. Le menuisier a-t-il fait un habit? Il en a fait deux.
   18. Les habits que vous avez achetés sont-ils usés?
   20. Ils sont usés, j'en ai fait trois mois que vous êtes
   pareuseux.

Exercice 86.
1. Are you blamed or praised? 2. I am neither blamed nor
   praised. 3. Is not your cousin esteemed by everybody? 4. She
   is esteemed by nobody. 5. What has been said of my brother?
   6. Nothing has been said of him before, do you know if your
   brother's house is to be let? 8. I have been told (on ma dit)
   that it is to be sold. 9. Is not an idle person to be pitied? 10.
   The idle man is to be pitied. 11. Is your son sometimes punished
   at school? 12. He is always punished when he is idle. 13.
   Are your scholars praised when they are diligent? 14. They
   are praised when they are diligent, and they are blamed when
   they are idle. 15. Is that lady esteemed and respected? 16.

* The prepositions de and par are used indifferently after many
  passive verbs.

She is loved, esteemed, and respected by everybody. 17. What
   has been told you? 18. We have been told that your brother
   is respected by everybody. 19. Madam, are you M. R.'s
   sister? 20. No, Sir, I am not. 21. Madam, are you pleased
   with your son's conduct? 22. No, Sir, I am not, for he is
   blamed by everybody. 23. What is that stout man called?
   24. They say he is called H. 25. What is your brother's
   name? 26. He is called James. 27. Have you been told
   that my brother has arrived? 28. We have been told so. 29.
   Are the goods which your brother has bought for sale? They
   are not for sale. 31. Has the bookbinder had a coat made?
   32. He has had a coat made. 33. Is his other coat worn out?
   34. The coat which he bought last year is worn out.

Section XLVI. Idiomatic Expressions.
1. In the compound tenses of the verb s'en aller, to go away
   [Sect. XXXIX, 1, 2], the pronoun en will of course keep its
   general place, after the other pronouns and before the auxiliary.
   It must never come between the auxiliary and the particle.
   Je m'en suis allé.
   Nous nous en avons allé,
   Tu t'en as allé, Thou wentest away, etc,
   Il s'en est allé, He went away, etc.
   Les dames s'en sont allées,
   Les messieurs s'en sont allés,
   Les dames sont allées,
   Les messieurs sont allés,
   The ladies are gone away,
   The gentlemen are gone away.
2. The verb aller, when referring to articles of dress, answers
   to the English to fit, to set.
   Mon habit va bien,
   My coat fits or sets well.
3. Seoir [4, ir.; see table, § 62] answers to the English to
   suit, to become.
   Ce chapeau ne vous sied point.
   That hat does not become you.
4. Essayez [§ 49] corresponds in signification to the English
to try on.
   J'ai essayé mon gilet, il me va.
   I have tried on my waistcoat, it fits well.
5. Être is often used in French for to appear, to belong
   [§ 106 (3)].
   À qui est cette maison?
   Whose house is that?
   Elle est à mon cousin,
   It is my cousin's.

Résumé of examples.
À quelle heure vous en êtes-vous
   Allé?
Je m'en suis allé à neuf heures.
Vous en êtes-vous allés trop tôt,
Mes gents?
Nous nous en sommes allés trop tard.
Cette robe vous va-t-elle bien?
Elle me va pas bien.
Cet habit vous sied-il fort bien?
Je l'ai essayé, mais il ne va pas bien.
Il lui va bien (indirect regimen.
Je me le suis acheté.
Cette robe ne lui va pas bien.
Ces livres sont-ils à vous ou à moi?
Ils ne sont ni à moi ni à vous.
À qui sont-ils donc?
Les livres de qui avez-vous apportés?
J'ai apporté ceux de mon frère.
I have brought my brother's.

Vocabulary.
Beau-frére, brother-in-
   law.
Fonce, -e, dark.
Géner, 1, to hurt.
Nest,-e, new.
Boîte, f., box.
Volonté, -e, will.
Court, -e, short.
Grand, -e, large.
Étroit, -e, narrow, tight.
Large, wide.

Exercice 87.
1. Vos bottes ne vont pas bien, elles se montrent trop.
   2. Elles sont trop étroitement.
   4. Elles sont trop étroites et trop courtes, elles me gênent.
   5. Le cordonnier s'en est-il allé?
   6. Il ne s'en est pas encore allé.
   7. À quelle heure les compagnes de votre sœur s'en sont-elles
EXERCISE 88.

1. Are your friends gone away? 2. They are not yet gone away, they are still here.
3. At what hour did your mother go away? 4. She went away early this morning.
5. Did your little sister go away late? 6. She went away too soon.
7. Does her sister's new dress become her? 8. It does not become her.
11. Do light colours become your brother's wife? 12. They become her very well.
13. Are your new boots too narrow or too wide? 14. They are neither too narrow nor too wide, they fit very well.
15. Does your brother's waistcoat fit him? 16. It fits him, but it does not become him.
17. Light colours never become him.
18. Does your coat press you? 19. It does not press me, it is far too wide.
20. Whose house is that? 21. It is my father's and brother's.
22. Whose books have you brought this morning? 23. I have brought my brother's and my sister's.
24. Whose dresses are those? 25. They are my mother's, my sister's, and my cousin's.
26. Are not those German books yours? 27. They are not mine, they are my friend's.
28. Are those pens yours or mine? 29. They are neither yours nor mine, they are my brother's.
30. Does this hat fit you? 31. Yes, Sir, it fits me, but it does not become me.
32. Is your hat too small? 33. It is too large.
34. Are your gloves too large? 35. They are too small, I cannot put them on.

SECTION XLVII.—UNIPERSONAL VERBS AND THEIR USES.

1. The verb falloir [3, ir.], to be necessary, is always conjugated unpersonally. See table, § 62.

Il faut, il a fallu,
It is necessary, it was or has been necessary.
Il faut étudier tous les jours,
It is necessary to study every day.

2. As falloir has always a unipersonal pronoun for its nominative or subject, a pronoun in the indirect regimen (dative—me, to, lui, nous, vous, leur), placed before the verb, will be equivalent to the pronoun used as nominative to the English verbs must, to be obliged, etc.

Il me faut écrire un thème,
I must write an exercise.
Où nous faut-il aller?
Where must we go?

3. Falloir is used in the signification of to want, to need, to be under the necessity of having.

Il me faut un livre,
I need a book.
Il lui faut d'argent,
He is in want of money.

4. When must is used in the last acceptance, and has a noun as its nominative, the noun in the corresponding French sentence should be in the indirect regimen preceded by d.

Il faut un livre à ma sœur,
My sister must have a book (needs a book).

RéSUMÉ OF EXAMPLES.

Pour apprendre une langue il faut étudier.
To learn a language it is necessary to study.
Il faut aller à l'église et à l'école.
It is necessary to go to church and to school.
Il faut rester à la maison.
It is necessary to remain at home.
Il faut lire un bon livre.*
I must read a good book.
Il lui faut aller voir sa mère.
She must go and see her mother.
Que nous faut-il faire?
What must we do?
Que lui faut-il?
What do they need?
Que leur faut-il?
What do they want or need?
Il leur faut d'argent ou du crédit.
They need or must have money or credit.

* Another construction of these sentences will be found in Sect. XXI. 1, 2.

VOCABULARY.

Allemagne. your brother's

Aller trouver, to go to a person.

Combien, how much.

Vrai, very, very much.

EXERCISE 89.


Exercices, the Rising and the Falling, in connection.

Rule 1.—When negation is opposed to affirmation, the former has the rising, the latter the falling inflection, in whatever order they occur, and whether in the same or in different sentences, as:

He did not call me, but you.
He was esteemed not for wealth, but for wisdom.

Study not for amusement, but for improvement.
LESSONS IN PENMANSHIP.

Rule on the Monotone.

The tones of grand and sublime description, profound reverence or awe, of amazement and horror, are marked by the monotone, or perfect level of voice.

Note.—A monotone is always on a lower pitch than the preceding part of a sentence; and to give the greater effect to its deep solemn note—which resembles the tolling of a heavy bell—it sometimes destroys all comma pauses, and keeps up one continuous stream of overflowing sound, as:

His form had not yet lost
All her original brightness, nor appeared
Less than an angel, and the excess
Of glory obscured. As when the sun, now risen,
Looks through the horizontal misty air,
Shorn of his beams, or from behind the moon.
In dim eclipse, disastrous twilight shades
Half his face, and with fear of change
Perplexed monarchs.

And I saw a great white throne and that sat on it, from whose face the heavens and the earth fled away; and there was found no place for them.

Upon my secure hour thy uncle stole,
With fishes of cursed hæmón in a vein,
And in the parches of former seas did pour
The rotten distilment; whose effect
Holds such an eminence with blood of man,
That swift as quicksilver it courses through
The natural gases and iles of the body,
And, with a sudden vigour, it doth possess
And curl, like eager droppings into milk,
The thin and wholesome blood; so did it mine;
And a most instant terror barked about,
Most lazer-like, with wile and listhmost crust,
All my smooth body.

Rule on “Harmonic” Injections.

“Harmonie” injections—or those which, in emphatic phrases, are intended to prevent the frequent occurrence of emphasis in the same phrase from becoming monotonous to the ear—are applied in clauses of which every word is emphatic, and are marked by a distinct and separate injection, as:

He has been guilty of one of the most abominable acts I ever discerned; or the nature or the name of man.

Note.—In such cases the injections usually alternate, in order to give the more vivid and pungent force to vehement emphasis.

Rule on Repeated Words, Phrases, and Sentences.

Words, phrases, and sentences which are repeated for effect, rise higher, or fall lower in injection, besides increasing in force, at every repetition.

From these walls a spirit shall go forth, that shall survive when this edifice shall be, “like an unsubstantial pageant, faded.” It shall go forth, exulting in, but not abusing, its strength. It shall go forth, remembering, in the days of its prosperity, the pledges it gave in the time of its depression. It shall go forth, uniting a disposition to correct abuses, to redress grievances. It SHALL GO FORTH, uniting the disposition to improve, with the resolution to maintain and defend, by that spirit of unbothered affection, which is the chief defence of nations.

What was it, fellow-citizens, which gave to Lafayette his spotless fame?—The love of Liberty. What has consecrated his memory in the hearts of good men?—The love of Liberty. What served his youthful arm with strength and inspired him in the morning of his days with prudence and counsel?—The living love of Liberty.

To what did he sacrifice power, and rank, and country, and freedom itself?—To the love of liberty protected by law.

LESSONS IN PENMANSHIP.—XXVI.

With this lesson, which is accompanied by抄y-epis headed by the remaining capital letters of the writing alphabet, from S to Z, we complete our elementary series of Lessons in Penmanship, having capable of the self-teacher, by an easy and carefully graduated succession of steps, to advance from the formation of the first elementary stroke that enters into the composition of the small letters, to writing sentences in which to be found capital letters and figures, as well as small letters. We have now done as much for him as it is possible to do by verbal instruction, and it remains for the learner to acquire an easy, flowing style of writing, and facility and rapidity in the use of
Smeaton built the Eddystone Lighthouse.

COPY-SLIP NO. 99.—SMEATON BUILT THE EDDYSTONE LIGHTHOUSE.

The art of printing invented by Koster, 1438.

COPY-SLIP NO. 100.—THE ART OF PRINTING INVENTED BY KOSTER, 1438.

Ulm in Germany.

COPY-SLIP NO. 101.—ULM IN GERMANY.

Victoria Regina, 1837.

COPY-SLIP NO. 102.—VICTORIA REGINA, 1837.

Wellington, born 1769, died 1852.

COPY-SLIP NO. 103.—WELLINGTON, BORN 1769, DIED 1852.

Xeres, chief seat of the wine trade in Spain.

COPY-SLIP NO. 104.—XERES, CHIEF SEAT OF THE WINE TRADE IN SPAIN.

Yarmouth, in Norfolk, famous for its herring.

COPY-SLIP NO. 105.—YARMOUTH, IN NORFOLK, FAMOUS FOR ITS HERRINGS.

Zollverein, the German Customs Union, 1818.

his pen by building, by zealous practice, on the foundation that we have assisted him to lay, by means of the copy-slip and the instructions that have been brought under his notice in the present series of lessons. In some future Lessons in Writing we will give specimens of the various styles of writing which are required for commercial purposes and for candidates for the Civil Service Examinations, etc.

HISTORIC SKETCHES—XIII.

HOW A LONDON JURY A TRUE VERDICT GAVE, ACCORDING TO THE EVIDENCE.

Just as there are many great men in the world who never get an opportunity of asserting themselves in it, so there are many memorable events in history which are seldom if ever mentioned. Some of these are important enough, not merely in a political but also in a social sense, and it is well not to suffer them to languish in the cold shade of oblivion. Such an event is the subject of the present sketch. It has been selected not only because of its intrinsic importance, but also as showing how great privileges may be won and valuable rights established by very humble means.

In the report books of proceedings in the law courts in 1670 is an account of a scene in which the principal actors were the Recorder of London, King Charles’s Attorney-General, and John Bushell, a member of a jury. The case is called “Bushell’s Case,” and it is one of the most important possible, for upon it was established once and for ever the grand right of a juryman “a true verdict to give according to the evidence,” without reference to whether that verdict was or was not acceptable to the court to whom it was returned. Now-a-days, when juries are chosen with the utmost regard to the ends of justice, and with a single eye to perfect impartiality, and, when chosen, are treated with the fullest respect, neither being worried into verdicts nor molested after they have given them, we who have never seen a different state of things, are apt to suppose that there never was one, and to take it for granted that the thing which is, is the same that hath been. Let us look for a few minutes at “Bushell’s case.”

The circumstances under which Bushell, the jurymen, came upon the scene were these:—Two Quakers, Penn and Mead, had thought fit to preach to the people from the steps of a house in Gracechurch Street. In the course of their address they had used language which was interpreted as conveying, and perhaps was meant to convey, animadversions upon the government. For this they were arrested, and, having been committed by a city magistrate on the charge of stirring up a riot, were put upon their trial. Like many of the charges preferred at that time by the over-zealous agents of the government, the accusation was an extravagant one, and considerable sympathy was shown by the Londoners in favour of the prisoners. If what the two men had said amounted to sedition, then, it was felt, no man could safely talk politics even in the mildest way; and it was further felt that the prosecution was a tyrannical act on the part of the government, and people were getting rather tired of the thing. Notwithstanding such was the case—popular sympathy at that time was but a whet to the prosecuting spirit of the king himself. They gladly raked their hats off, wherever upon the Recorder, not without a citron to rubbling the man’s roughness, but to having a preliminary fing at the prisoners, ordered him to replace them. Being put in the dock, the prisoners were thus addressed by their judge:—

Recorder: Do you know where you are?
Penn: Yes.
Recorder: Do you not know it is the king’s court?
Penn: I know it to be a court, and I suppose it to be the king’s court.
Recorder: Do you not know there is respect due to the court?
Penn: Yes.

Recorder: Why do you not pay it then?
Penn: I do.
Recorder: Why do you not pull off your hat then?
Penn: Because I do not believe that to be any respect.

Recorder: Well, the court sets forty marks apiece upon your heads, as a fine for the contempt of the court.
Penn: I desire it might be observed that we came into the court with our hats off (that is, taken off), and if they have been put on since it was by order from the bench; and therefore not we, but the bench, should be fined.

After this the prisoners, unaccustomed with much politeness and some show of disrespect to the court, refused to plead to the indictment, which charged them with having caused a tumultuous assembly, until the questions they raised as to the legality of it in point of form should have been answered. The Recorder and the Lord Mayor tried in vain to silenced them, resorting to threats, and abuses of a very coarse description, and not succeeding, the Recorder did in effect enter a plea of “not guilty” for them, and had them put upon their trial.

Among the jury was one man, Bushell, whose character for conduct disapproving to the court was already well known, and to whom several unworthy remarks had been made at the time he was sworn. Under his guidance the jury retired, and in a short time returned into court with a verdict acquitting Mead, and saying that Penn was “guilty of speaking in Gracechurch Street.” This verdict angered the court exceedingly. “I say, is that so? there is nothing in Scotland law that I have in commission,” was the reply. “You had as good say nothing.” Being further pressed, and also told, “the law of England will not allow you to part till you have given your verdict,” the jury replied, “We have given in our verdict, and we can give in no other.”

The Recorder refused to take such a verdict, and sent the jury back again to reconsider it. In half an hour’s time they came back into court, and handed in a written verdict to the same effect as before, and signed by all of them. Upon this being received, the Lord Mayor rated the jury in these words:—

Mayor: What, will you be led by such a silly fellow as Bushell? An impudent, canting fellow. I warrant you, you shall come no more upon juries in haste. You are a foreman, indeed (addressing Bushell). I thought you had understood your place better.

Recorder: Gentlemen, you shall not be dismissed till we have a verdict that the court will accept; and you shall be locked up, without meat, drink, fire, and tobacco. You shall not think thus to abuse the court. We will have a verdict by the help of God; or you shall starve for it.

The jury declined to alter their verdict, and Penn, one of the prisoners, claimed to have it recorded. The agreement of twelve men is the verdict in law; and such a decision by the jury I recognize to be the force of the law. If the Recorder refuses to record it, as he will answer at his peril. And if the jury bring in another verdict contradictory to this, I affirm they are perjured men in law; and looking upon the jury, he said:—You are Englishmen! Mind your privilege! Give not away your right!”

The court was adjourned till next morning at seven o’clock, the prisoners were sent back to Newgate, and the jury were ordered to proceed. The next day those who were to keep them without fire, food, drink, or any other accommodation till the adjourned sitting of the court.

While the jury are thus away in their retiring room, making up their minds what verdict they shall give—chasing, some of them, at the manner in which they have been treated by the court, and, under the guidance of their foreman, resolving that they will not submit to dictation, but act upon the exordium made to them that evening, they undertook the box;—let us consider for a moment what right it was for which they were contending, and the way in which that right was acquired.

Trial by jury was an old-established institution in England, as old, some think, as the Anglo-Saxon laws. Something like it is certainly to be found in the history which has come down to us of those times, but the jury system, as we now understand it, was the creation of a period subsequent to the Norman Conquest, 1066. Before that date the jury which tried causes consisted of a certain number of “compurgators” as they were called, that is to say, persons who did not give their opinion upon evidence adduced before them on oath, but who merely swore that they
believed what the defendant said under sanction of his oath. The form of procedure was simply this. A man accused of default, on civil or criminal process, was put on his oath if he chose to be so, and then swore he was innocent of the offence charged, or that his version of the case between him and the plaintiff was a true one. The complications, of which the number varied from twelve to thirty-six, being also sworn, deposed to their belief in what the defendant had said, and, as they were commonly chosen from among the neighbours and acquaintance of the man, they were supposed to know something of the facts connected with his case, as well as to be able to form an estimate of the truth or falsehood of his statements. It can easily be imagined that one of these oaths would be sufficient to impeach the latter for his misconduct. He was suffered to speak for himself at the bar of the House, and to go free on promise of amendment.

In the face of this, and in spite of the expressed opinions of most of the legal luminaries of the day, including Lord Chief Justice Hale, the Recorder of London, in 1670, ventured, under these circumstances stated above, to fine the jury which acquitted Penn and Meech, and to commit Mr. Bushell to prison when he refused to pay. Here was what followed when the jury remained obstinate in their simple verdict of "not guilty," after having been browbeaten, threatened, and ridicule. In both, by chief magistrate and Recorder, and after having been sent back three times to consider their verdict, which indeed they did alter to a simple verdict of "not guilty," as to both prisoners.

**CLERK:** Are you agreed upon your verdict?

**JURY:** Yes.

**CLERK:** Who shall speak for you?

**JURY:** Our foreman.

**CLERK:** What say you? Look upon the prisoners at the bar. Is William Penn guilty of the matter whereof he stands indicted in this form and form of acquittal, or not guilty?

**FOREMAN:** We find Penn guilty of speaking in Gracechurch Street.

**MAYOR:** To an unlawful assembly?

**BUSHELL** (the foreman): No, my lord, we give no other verdict than what we gave last night. We have no other verdict to give.

**MAYOR:** You are a factious fellow. I'll take a course with you.

**SIR T. BLOODWORTH** (alderman): I know Mr. Bushell would not yield.

**BUSHELL:** Sir Thomas, I have done according to my conscience.

**MAYOR:** That conscience of yours would cut my throat.

**BUSHELL:** No, my lord, it never shall.

**MAYOR:** But I will cut yours so soon as I can.

**BUSHELL:** If not guilty be not a verdict, then you make of the jury and Magna Charta but a mere nose of wax.

**MEAD:** How! Is not guilty no verdict?

**RECODER:** No, it is no verdict.

After this judicial dictum there were other passages between the jury and the court, and the jury being once more asked as to William Penn's guilt, said, as before, that he was guilty. (And speaking in Gracechurch Street.)

**RECODER:** What is this to the purpose? I say I will have a verdict. (And speaking to Edward Bushell), said: You are a factious fellow. I will set a mark upon you, and whilst I have anything to do in the city I will have an eye upon you.

**MAYOR:** Have you no more wit than to be led by such a pitiful fellow? I will cut his nose.

**PENN:** It is intolerable that any jury should be thus menaced. This according to the fundamental laws? Are not they my proper judges by the Great Charter of England? What hope is there of ever having justice done when jurors are threatened, and their verdicts rejected? I am concerned to speak, and grieved to see such arbitrary proceedings. Did not the Lieutenant of the Tower render one of them worse than a felon? And do you not plainly seem to condemn such for factious fellows who answer to your ends? Unhappy are those jurors who are threatened to be fined, and starved, and ruined if they give not in verdicts contrary to their consciences.

**RECODER:** My lord, you must take a course with that nasty fellow.
LESSONS IN GEOMETRY.—XIII.

In the last lesson (page 383) was given the method of drawing a triangle equal in superficial area to any regular four-sided figures, such as a square, rectangle, or parallelogram; and, before entering on the geometry of the circle, it only remains to show the learner how he may draw a triangle equal in superficial area to any given irregular four-sided figure, whether it be a trapezium or trapezoid (Defs. 31, 32, page 58), or to any multilateral figure or polygon, whether regular or irregular; that is, to have its sides and angles equal on the one hand, or having its sides and angles unequal on the other (Def. 29, page 53). It will be seen that each process is effected by the aid of the knowledge of certain geometrical facts in connection with the triangle which have been already explained.

Problem XXXIII.—To draw a triangle that shall be equal in superficial area to any given irregular quadrilateral figure.

Let $A B C D$ (Fig. 46) be the given irregular quadrilateral figure; it is required to draw a triangle equal to it in superficial area. Draw $E D$, one of the diagonals of the irregular quadrilateral figure or trapezium $A B C D$, and produce the side $C D$, on which the figure stands, indefinitely towards $E$. Then through a draw $A F$ parallel to the diagonal $B D$, and meeting $C E$ in the point $F$. Join $B F$; the triangle $B F C$ is equal to the trapezium $A B C D$. That this is true may be soon seen. After taking away the
common piece \( B C D E K \) from the trapezium \( ABCD \) and the triangle \( BFC \), we have the triangle \( AKB \), the remainder of the trapezium \( ABCD \), and the triangle \( KFD \), the remainder of the triangle \( BFC \).

But these triangles are also parts of the triangles \( ADB \), \( BFD \), which are equal in area, since they are on the same base, \( BD \), and between the same parallels \( AP, BD \), and as the triangle \( KDB \) is common to both, the triangle \( AKB \) is equal to the triangle \( KFD \). In the same manner, by drawing the diagonal \( AC \) of the trapezium \( ABCD \), producing \( DC \) in the direction of \( G \); drawing \( BH \) parallel to \( AC \) and meeting \( DO \) in \( H \); and lastly, joining \( AH \), it may be shown that the triangle \( AHF \) is also equal in superficial area to the irregular quadrilateral figure \( ABCD \).

It will be useful for the student to repeat this construction as an exercise, taking the sides \( CB, BA, \) and \( AD \) in succession as the base of the trapezium \( ABCD \), or the side on which it stands.

**Problem XXXIV.**—To draw a triangle that shall be equal in superficial area to any given multilateral figure or polygon.

First let us take a five-sided figure, as being next in order to a four-sided figure, as far as the number of its sides are concerned, and let \( ABCDE \) (Fig. 47) represent the five-sided figure or pentagon, to which it is required to draw a triangle equal in superficial area.

From \( C \), the apex of the pentagon, draw the straight lines \( CA, CE \), to the points \( A, E \), the extremities of the base on which it stands.

By doing this we divide the pentagon \( ABCDE \) into three triangles \( ABC, CAE \), and \( CED \). Produce the base \( AE \) indefinitely both ways in the direction of \( F \) and \( G \), and through \( B \) and \( D \) draw the straight lines \( BH, DK \), parallel to \( CA, CE \) respectively, and meeting the base \( AE \) produced, in the points \( H \) and \( K \). Join \( CHK \); the triangle \( CHK \) is equal in superficial area to the pentagon \( ABCDE \). That this is true may be seen as follows:—Of the three triangles \( ABC, CAE \), and \( CED \), into which the pentagon was divided, the triangle \( CAE \) is common to both the pentagon and the triangle \( CHK \). Of the remaining portions of the pentagon and triangle, the triangle \( ABC \) of the former is equal to the triangle \( CAH \) of the latter, because they are on the same base, \( AC \), and between the same parallels; and for the same reason the triangle \( CED \) of the pentagon is equal to the triangle \( CKH \) of the triangle.

The learner will find it useful to repeat this construction as an exercise, taking the sides \( AB, BC, CD \) and \( DE \) in succession, as the base on which the pentagon is supposed to stand.

That the learner may thoroughly understand the process of drawing a triangle equal in superficial area to a polygon having a great number of sides, and see that it is as easy as it is to draw a triangle equal in area to a pentagon, which has only five sides, we will take the irregular seven-sided figure, or heptagon

\[
ABCDEF (\text{Fig. 48}),
\]

and proceed to construct a triangle equal to it in area. As the figure is complicated, the lines which contain the heptagon and the triangle equivalent to it in area have been drawn thicker than the lines which are necessary in working out the process (as in Fig. 47), that the reader may the more readily distinguish the relative areas of the figures in question.

The first step is to draw straight lines from \( A \), the apex of \( \triangle \) \( ABC \), and the angles \( D, E, F \), or to each salient point of the polygon except the two immediately on the right and left of the apex. The straight lines \( A, C, D, A, E, F \) divide the polygon \( ABCDEFG \) into five unequal triangles, \( ABC, ACD, ADE, AEF, \) and \( AFG \).

The reader will note that however many may be the sides of the polygon, it is divided by this process into a number of triangles always less by two than the number of its sides. Thus in the figure below the number of triangles into which it is divided by drawing straight lines from its apex to its salient points is five, the number of its sides being seven; a dodecagon, or twelve-sided figure, would be divided into ten triangles, and so on.

Now—beginning with the triangle \( ABC \), the highest triangle on the left side of the apex—by producing \( DC \) in the direction of \( E \), indefinitely; drawing \( BH \) parallel to \( AC \) to meet \( CD \) produced in \( H \), and joining \( AH \); we get a triangle, \( AHC \), equal to the triangle \( ABC \), and by adding the polygon \( ACD, DEF \) to each of these triangles, we find that we have a hexagon or six-sided figure, \( AHDEFG \), equal in area to the original seven-sided polygon \( ABCDEFG \). By making the triangle \( AKD \) equal to the triangle \( AHD \) by the same construction, which we need not repeat, we get a pentagon, or five-sided figure, \( AKF \), equal in area to the hexagon \( AHDEFG \), and consequently to the original heptagon \( ABCDEFG \).

Continuing the process with making the triangle \( APL \) equal to the triangle \( AFG \), the highest triangle on the right side of the apex, we get an irregular quadrilateral figure, \( AKFL \), equal to the pentagon \( AKEFG \), the hexagon \( AHDEFG \), and the heptagon \( ABCDEFG \). Once more, by making a similar construction the triangle \( AEH \) equal to the triangle \( ALE \), we get at last a triangle, \( AKL \), equal in area to the quadrilateral figure \( AKLE \), and the above-named pentagon and hexagon and the original heptagon \( ABCDEFG \).

The learner will find the value of this geometrical process in determining the areas of irregular polygons in mensuration. To calculate the area of the heptagon \( ABCDEFG \), it would be divided as in the above figure into five triangles, and by an arithmetical process to be explained hereafter the superficial content of each triangle would be found, and the five results added together to obtain the area of the polygon. By reducing the area of the polygon to a triangle, its area can be found by one calculation instead of five, and a sum in compound addition; or, to ensure accuracy, both processes may be gone through, each proving a test whereby the correctness of the other may be ascertained.

As in the preceding propositions, let the learner repeat the above construction as an exercise, taking the sides \( EF, FG, GA, AB, BC, \) and \( CD \) in succession, as the base on which the polygon is supposed to stand, and the salient point which happens to be immediately opposite the base in each case as the apex.