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THE SCHOOL MAGAZINE.

APRIL, 1881.

HEALTH DEPARTMENT.

Editor: A. Hamilton, M. A., M. D., Port Hope, Ont.

THE SCHOLAR'S EYE.

VIII.

HYGIENE OF SHORTSIGHTEDNESS.

THE general hygienic rules to be followed by short-sighted children and those with hereditary tendency thereto are important, and so simple that parents can be made to comprehend them, and yet it is astonishing how thoroughly they are neglected. Proper illumination, natural or artificial, a moderate use of the eyes if shortsightedness be present, and avoidance of the stooping or recumbent position while engaged in study or when using the eyes for near objects requiring the convergence of the axes of the two eye-balls, together with suitable glasses, comprise the most important of such hygienic rules. Our school furniture, usually a subject of pride on account of architectural neatness and elegance, is usually sadly inefficient as regards the height of desks, the angle at which they incline, and the distance between them and the seats when required for short-sighted pupils. Dr. Cohn, of Breslau, examined the school furniture at the Paris Expo-

sition and found the American desks as deficient in these respects as those of European make, as he has shown in an article, "The School-houses at the Paris Exposition, from a Hygienic point of view." The child is compelled to stoop and bring his face close to the desk in order to see the letters, the type of school books being commonly small and defective as regards clearness, and this stooping position and the straining of the internal recti muscles in efforts of convergence causes congestion, which may cause shortsightedness if any hereditary tendency thereto exists, or increase it if it is already present in even an extremely moderate degree. Stooping and excessive convergence cause congestion of the tunics of the globe; congestion by mechanical pressure tends to increase the bulging at the posterior pole, thus increasing the shortsightedness. Aside from the use of improper glasses, these two last are the most important factors in causing progressive myopia, and consequently, to keep the head erect, to bring the book to the face, and not the face to

the book, should be what is best for all short-sighted pupils. This, however, experience teaches, is exceedingly difficult to do. The child will not hold up the book; he becomes tired and finds it easier to lean over the desk where the book finds support. It is with difficulty that the adult myope of average intelligence can be induced to systematize the position of book or paper although he may be the subject of posterior polar atrophy, and its consequent fatal results to vision fully made known to him. Some portable book-holder should be made use of. To make such is, for the present, to be left to the ingenuity and taste of the reader. The average American usually thinks himself sufficiently inventive to answer the indications by a suitable apparatus. The indications are that it shall be portable, light, readily adapted to prevailing fashions of school desks and be moved noiselessly. For the benefit of those who do not claim inventive genius so high as to meet the indications for themselves, we expect, in a future number, to undertake the practical solution of the problem.

HOW DIPHTHERIA MAY BE SPREAD IN SCHOOLS.

It is not alone by the breathing of infected air that diphtheria may be communicated from child to child in school. Indeed, those who deny that the air is often or ever a medium of communication of the disease, and who are at all familiar with the thoughtless ways of little children in school, must yet recognize that the possible means of communication by almost direct contact are many. Who has not seen a school-boy with his mouth full of marbles, just taken from a mate? Children often borrow and lend pencils, which, by instinct, they wet in the mouth or hold in the mouth; they borrow sponges of one another to wipe

their slates, which they moisten with saliva. In so democratic a community as a primary school-room, it is a common thing for all the children of the room to drink from the same cup; their clothes commonly hang in close contact in closets and ante-rooms. They manifest their likes and dislikes by biting or refusing to bite from the same apple; and the little girls often pledge eternal friendship by that classic symbol "sharing gum." Though these things may occur outside the school, they are the more frequent the more children are brought together, as they are in schools.—*Canada Health Journal*.

SCHOOL CHILDREN AND DANGEROUS COMMUNICABLE DISEASES.

Dr. Arthur H. Nichols, in a recent number of the *Boston Medical Journal* contributes a very sensible article upon the above subject, from which we extract the following recommendations:—

"Considering, however, that it is the imperative duty of the school authorities to adopt the most stringent measures designed to interpose a check to the unlimited spread of these diseases, I would venture to suggest some such rules as the following, as best calculated to meet the end proposed:—

1. No pupil shall be allowed to attend school from any house in which small-pox, varioloid, (measles), or Scarlet fever is prevalent.

2. A pupil who has been affected with small-pox, varioloid, measles, or scarlet fever, shall not be permitted to return to school until, desquamation having ceased and convalescence being complete, the surface of the body shall have been finally disinfected by warm baths (with abundant soap,) applied upon four successive days, or until no trace of roughness of the skin remains. The pupil, furthermore shall not be allowed to re-enter school until the teacher shall have received satisfactory evidence that all clothing worn by

the patient has been thoroughly disinfected, and that the sick room and its contents have been properly cleansed. If the teacher is not satisfied that all practicable disinfection has been effected in the case of any pupil, said pupil shall not be re-admitted until three weeks shall have elapsed from the beginning of convalescence.

3. No pupil shall be allowed to attend school who is affected with diphtheria or whooping-cough.

Both parents and instructors should be informed as to the measures requisite for the disinfection of the clothing,

sick chamber, etc.* They should also be made to appreciate that a neglect of these precautions, when children are allowed to return to school after slight cases, forms a principal source of epidemic infection.

It is hardly necessary to add that, under the supervision of a qualified medical inspector, to whom all obscure or doubtful points might be referred, a much more intelligent and judicious enforcement of these rules might be expected."

*See Manual of Public Health, edited by Ernest Hart, page 266.

COMMERCIAL LAW.

BY W. M. SUTHERLAND, M. A.

(Read before the Wentworth Teachers' Association.)

A CONTRACT is an agreement by which two parties mutually promise and engage, or one of them only promises and engages to the other, to give some particular thing, or to do or abstain from doing some particular act. There must be a concurrence of intention between two parties, one of whom promises something to the other, who, on his part, accepts such promise, but it does not necessarily include a mutuality or reciprocity of contract and liability. There must be at least two parties to every contract, the person making the promise and the person to whom the promise is made. The contract may be made so as to be mutually binding when it is called bilateral, or so made that only one of the parties is bound, when it is called unilateral.

All contracts are divided into :

1st.—Contracts by matter of record.

2nd.—Contracts under seal.

3rd.—Contracts not under seal, or simple contracts.

Contracts by matter of record are

now so seldom used I shall pass them by, remarking briefly that they are now found only in the shape of recognizances and that oftener in matters in which the crown is interested or concerned than between subject and subject. Thus, where a person is urgently required to give evidence in a criminal case he enters into a recognizance or bond wherein he agrees to forfeit a certain sum of money to the crown in case of non-appearance.

The two great classes of contracts, then, which we shall cursorily glance at are :

1st, Contracts under seal, or, in other words, contracts by deed, and

2nd, Contracts not by deed or simple contracts.

What are we to understand by a contract by deed? It is a written contract, *sealed and delivered*, and in many cases signed also. By the common law sealing and delivery were sufficient, but by statutory enactments signing is required in many cases. The making of a deed is one of the

most solemn and authentic acts in law a man can perform. No cause, motive or consideration beyond the will of the party making the contract is necessary to give it validity, and no one can be permitted, except on the ground of illegality or fraud, to aver or prove anything in contradiction to what he has solemnly and deliberately avowed by deed. Words pass lightly and are easily uttered, but where an agreement is by deed there is more time for deliberation and the question of thoughtlessness is abandoned in view of the solemnity of the steps taken, hence while contracts not under seal require a consideration to support them, those by deed require no consideration.

A contract not under seal is of much less efficacy and force than a contract under seal. An admission or acknowledgment of any matter of fact given by one person to another and authenticated by his signature only may be shown by the person making such parole admission to be incorrect and untrue, and may be controverted by extrinsic evidence, while if the written admission be sealed and delivered as a deed, the party making such admission is prevented or estopped from denying it. For example, an acknowledgment of debt, or receipt of money or goods, or the statement of the consideration for a simple contract, affirmed only by the signature of the party, is evidence of the debt or act of payment, or of the existence of an alleged consideration, and may be contradicted by opposite evidence, and there is no legal objection to the party's showing that this acknowledgment is false; but, had he made such acknowledgment under seal and delivered it as a deed, he is at once (in the absence of fraud or deceit) precluded from denying the debt or from contradicting the payment or statement. Another example of the superiority of a deed over a mere writing may be shown in the case of a person writing to another that he

gratuitously forgives a debt. Where such release is without consideration it is of no effect; but if given under deed cannot be gainsaid. A person might to-day by a writing merely, forgive a debt owing him and next week issue a writ for its collection, but he could not do so if he forgave the debt under seal. A creditor who has given a receipt not under seal is permitted to show that he has not been paid, not so however, if the receipt be under seal.

We said a deed required no consideration to support it, while the simple contract or one not under seal always required a consideration. There are cases in which the consideration of a deed cannot be enforced against the contracting party, such as where the consideration is illegal, immoral or in restraint of trade absolutely, or obtained by duress or by fraud, or when it is against the policy of the law, wherefore, if the deed be tainted by such circumstances it cannot be enforced.

Another point worthy of remembrance with reference to contracts under seal is that if a person wishes to become freed from any or all his obligations he must be freed by a document under seal. For example, in a lease of lands or tenements under seal; suppose the tenant bound to pay \$100 quarterly in advance, the landlord writes and tells the tenant he will accept \$80 quarterly, notwithstanding such written or verbal agreement, he can enforce payment for the balance of \$20 quarterly and the tenant cannot use as evidence such verbal agreement.

In general a contract under seal should be witnessed by a disinterested party for the easier proof of the signature of the party in case of denial.

Simple contracts may be verbal as well as in writing not under seal. What then is the difference between a simple written contract and a verbal one? There are two great practical differences which I shall briefly explain: the first concerns the mode in which

they are to be proved, and it results from the inflexible rule of the law of evidence that when a contract is reduced to writing it shall be proved by that writing alone. When a written instrument is constituted by the parties the expositor of their intentions, it must, in order to effectuate that object, be the only proof of their intentions. If contemporaneous oral evidence were admitted to vary the terms of a written contract it would substitute loose recollection and uncertainty of memory for faithful records, and would introduce looseness and uncertainty in titles to property and would make these depend on the uncertain memories of witnesses.

The second great difference between simple contracts by mere words and simple contracts in writing is that though there are several matters which, although they may become the subject of simple contract, cannot be contracted for without writing so as to give either party a right of action on such contract, and by far the most important class of contracts subject to this observation are those falling within the Statute of Frauds.

You will remember that I defined a deed to be a written instrument sealed and delivered, and that signing under the common law was not necessary. Consequent upon this state of things and also in consequence of any or all transfers of real estate being valid if made by parole, perjury and fraud became frequent. The Statute of Frauds passed in the twenty-ninth year of the reign of Charles II, a period of English History which is noted for good laws but bad administrations, passed at a time when the democratic voice spoke with unmistakeable tones against the despotic haughtiness of the hapless Stuarts, was introduced into Canada in the thirty-first year of the reign of George III., enacts in effect by its first section, that all real estate transactions be authenticated by the signature of the party to be charged, and

that all leases, estates, interests of freehold or terms for years must be in writing signed by the party making such lease, deed or assignment.

The second section allows leases for a term of three years to be made by parole. An anomaly occurs here, in that while a landlord can make a verbal lease for a term of three years, an agreement for a lease must be in writing. What would be the effect of a man's making a verbal lease of lands say for four years? It would be simply a tenancy at will and no more.

The third section requires all assignments of real estate to be in writing, signed by the party making such assignment.

The fourth section is very important, so much so that an eminent English jurist declared every line to be worth a subsidy, it enacts:—

“That no action shall be brought to charge an executor or administrator upon any special promise to answer for the debt, default or miscarriage of another person; or to charge any person upon any agreement made upon consideration of marriage; or upon any contract or sale of lands, tenements, hereditaments, or any interest in or concerning them, or upon any agreement that is not to be performed within the space of one year from the making thereof unless the agreement upon which such action shall be brought on some memorandum or note thereof shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorized.”

The contracts provided by this section are therefore:—

1st.—Promises by an executor or administrator to answer damages out of his own estate.

2nd.—Promises to answer for the debt, default or miscarriage of another person.

3rd.—Agreements in consideration of marriage.

4th.—Contracts or sales of lands, tenements or hereditaments or any interest in or concerning them.

5th.—Agreements not to be performed within the space of a year from the making thereof.

The first clause of the fourth section says that a special promise by an executor, or administrator, to answer damages out of his own estate must be in writing.

The second clause of the same section says that any special promise to answer for the debt, default or miscarriage of another person must be also in writing, this leads us to the subject of guarantees.

The sort of promise which must be in writing is a promise to answer for the debt, default or miscarriage of another person for which that other person himself continues liable. Thus if "A" go to a shop and say "let 'B' have what goods he pleases to order, and if he do not pay you I will," that is a promise to pay for the debt of another for which the other continues liable and must, if sought to be enforced against the guarantor, be in writing, let me give another example: a person went into a store and asked the merchant to supply goods to one "E. F." The merchant replied that he was not acquainted with him, whereupon the person asking for the goods replied, that if he did not know E. F., "I know him and he would see you paid." The goods were accordingly supplied and E. F., charged in the books. The latter being unable to pay, application was made to the former for payment, but payment could not be enforced against him because of its not being in writing. Again where two go to a shop, one buys, and the other to gain him credit promises the seller, "if he does not pay you I will." This is a collateral undertaking and consequently void without writing. But if he says "let him have the goods, I will see you paid," and the latter

be charged accordingly, this is an undertaking for himself and he shall be intended to be the very buyer. If goods are furnished an infant at the request of an adult, inasmuch as the infant is not responsible, the person who causes the goods to be supplied is responsible for the payment of them without writing.

After the fourth section of the Statute of Frauds had rendered verbal guarantees unavailable, actions at law were frequent for false representations, under circumstances in which before the act, the transaction would have been looked on as one of guarantee. For instance, if "A" went to a tradesman and represented to him falsely the good credit of "B," in consequence of which "B" was supplied with goods, "A" had an action on the case for the deceit, against the person making such false representation, and in order to stop frequent litigation on this point an act was passed in the ninth year of the reign of George the IV, called Lord Tenterden's act, which enacts that, "no action shall be brought whereby to charge any person upon or by reason of any representation or assurance made or given concerning or relating to the character, conduct, credit, ability, trade or dealings of any other person, to the intent or purpose that such other persons may obtain credit, money or goods upon, unless such representation or assurance be made in writing signed by the party to be charged therewith."

The third species of contracts enumerated by the fourth section of the Statute of Frauds, have reference to agreements made in consideration of marriage, but do not apply to promises to marry which may be made by word as formerly, and may be actionable. But all other agreements made in consideration of marriage must be in writing.

The fourth clause is explicit and says that any contract or sale of lands, tenements, or hereditaments, or any interest in or concerning them, must

be in writing. A verbal lease for a term of three years may be made, but a verbal agreement for a lease cannot be enforced.

The last case provided for is that of an agreement that is not to be performed within the space of one year from the making thereof. For example, if you engage a servant at a future time, you cannot enforce or have an action for the breach of contract unless it be in writing, as the agreement was not to be performed within the space of a year. Another common example of a contract not to be performed within a year, is, where works are published in numbers and delivered when published, where the publication extends beyond a year. For example, an agent takes your order without your signature to deliver Shakespeare's works in monthly editions, and at that rate of publication it would take two years to complete the volume, you get and pay for a few numbers and then refuse to continue your subscription and complete the set. An action cannot be maintained against you for non-fulfilment of the contract as there was no written contract signed by you. This clause, however, does not apply to contracts which may be performed within a year.

Another important section of the Statute of Frauds is the seventeenth, which provides that no contract for the sale of any goods, wares or merchandise, for the price of £10 or upwards, shall be good except the buyer shall accept part of the goods so sold and actually receive the same, or give something in *earnest* to bind the bargain, or in part payment; or that some note or memorandum in writing of the said bargain be made and signed by the parties to be charged by such

contract, or their agents thereunto lawfully authorized.

The first great difference which you will observe between this section and the fourth section of the same act, is that the fourth section renders a writing necessary in all cases which fall within its terms; whereas the seventeenth mentions three circumstances any one of which it directs shall be as effectual as a writing, namely: acceptance of any part of the goods, payment of part of the price, and giving something by way of *earnest* to bind the bargain, any one of which shall perfect the sale as a writing would. When none of these takes place a writing becomes necessary, and if there be none the bargain is void and there is no sale. The fourth section does not avoid contracts not signed in the manner described, it only precludes the right of action. The seventeenth is stronger and avoids contracts not made in the manner prescribed.

Another case in which the Legislature has required that a particular contract shall be in writing is that of an infant. There are many contracts which when entered into by an infant (that is a person under 21 years old) are invalid, but which are capable of being ratified by the infant when he arrives at the full age of 21 years. This ratification at Common law might have been verbal, but by 9, Geo. IV., Cap. 14, S. 5 it is enacted that "no action shall be maintained whereby to charge any person upon any promise made after full age, to pay any debt contracted during infancy, or upon any ratification after full age, of any promise or simple contract during infancy, unless such promise or ratification be in writing signed by the party to be charged therewith.

EXAMINATION PAPER IN COMPOSITION AND ENGLISH GRAMMAR.

Junior Matriculation, 1880, University of Toronto.

(ANSWERED BY MR. JNO. CONNOLLY.)

COMPOSITION.

1. Write a composition on one of the following subjects:—

(a) "The path of glory leads but to the grave."—*Gray*.

(b) "How small, of all that human hearts endure
That part which laws or Kings
can cause or cure."
—*Goldsmith's Traveller*.

(c) "Our birth is but a sleep and a forgetting:
The soul that rises with us,
our life's star,
Hath had elsewhere its setting,
And cometh from afar."
—*Wordsworth*,

(d) "Tis distance lends enchantment to the view."
—*Campbell*.

(e) "Fortes fortuna juvat."—*Pliny*.

GRAMMAR.

2. Give a full account of those grammatical forms by which the gender and number of nouns in English are distinguished, and the comparison of adjectives effected noting exceptional formations as fully as you can. See *Angus's Handbook of the English Tongue*, sections 205—208.

3. Give the past tense and perfect participle of *abide, burst, dig, flee, fly, flow, lead, lay, lie, ring, wring, set, sit, sink*. Consult *Angus's Handbook*, section 297.

4. Give rules for the use of shall and will. See *Angus's Handbook*, section 300.

5. Mention the chief sources from which the English language derives its

vocabulary, and note the character of the contributions from the different sources. See *Mason's Grammar*, Preliminary Notice.

6. Criticize the grammar of the following extracts, and where you consider it faulty suggest the proper emendations, stating your reasons for the changes you make:

(a) "An author who is translated in this fashion suffers as much as when Archbishop Alexander Neville was translated from York to St. Andrews by a Pope whom Scotland did not acknowledge."—

There is an improper ellipsis after *as*, which must be supplied, the correction would be:—

"An author who is translated in this fashion suffers as much as Archbishop Alexander Neville when he was translated from York to St. Andrews by a Pope whom Scotland did not acknowledge."—

(b) "The most recent of several attempts to realize Goethe's conception of an Iphigenia at Delphi is by C. Ernest, and may be pronounced at least as successful as that of any of his predecessors."—

Our correction would be:—

"The most recent of several attempts to realize Goethe's conception of an Iphigenia at Delphi, is that by C. Ernest, and may at least be pronounced as successful as that of any of his predecessors."

1. That is inserted to avoid ambiguity.

2. The noun predecessors should be in the possessive case, depending upon

'attempts' understood, as is evident from the sense.

(c) "I went to Oaklands for the Egham races. The party lasted more than a week; there was a great number of people, and it was very agreeable," should be "I went to Oaklands for the Egham races. The party lasted more than a week; there were a great number of people and a very enjoyable time was spent."

1. 'Was' should be plural, because there is plurality in the idea conveyed by 'great number.'

2. 'It' is used too indefinitely, and hence in the correction this structure is avoided.

(d) "The life of Marlow was as riotous, his skepticism even more daring than the life and skepticism of Greene," should be "The life of Marlow was as riotous as that of Greene and his skepticism even more daring;" because 'than' should not be used instead of 'as' after 'riotous.'

(e) "It is not wantonly that we call the attention of the public to these sort of publications," should be "It is not wantonly we call the attention of the public to this sort of publications," because 'sort' is a singular noun.

(f) "The relations of these missionaries are of thrilling interest, and deserve the attention of all who desire to become a student," should be "the relations of these missionaries are of thrilling interest, and deserve the attention of all who desire to become students of history;" because a predicate noun should agree if possible with the subject and that is evidently plural.

(g) "The class of commodities, in the production of which the facilities possessed by new communities, as compared with old attain their greatest height, are those of which timber and meat may be taken as the type, and comprises such articles as wool, game, furs, hides, horn, pitch, resin, etc.," should be "The class of commodities in the production of which the facilities

possessed by new, as compared with those possessed by old communities, attain their greatest height, is that of which timber and meat may be taken as the type, and comprises such articles as wool, game, furs, etc.

The whole sentence appears intolerably stiff and awkward and it could be further simplified, as "The commodities which are produced with greater facility by new than by old communities, are those of which timber and meat may be taken as the type and comprise etc."—

1. It is better to insert 'those possessed by' after with, to avoid all ambiguity.

2. Class being a singular noun, its verb must be singular.

(h) "Now, in nature, suppose a family of animals removed by some accident to a different climate and feeding ground than those to which they were accustomed; as for instance, a flock of sheep from Europe to South America," should be "Now, in nature, suppose a family of animals removed by some accident to a different climate and feeding ground from those to which it is accustomed; as for instance, a flock of sheep from Europe to South America."

1. Preposition 'from' is used after different.

2. The idea of unity is prominent in 'family,' hence 'it.'

(k) "Lorenzo Dow, in company with a male and female preacher, was in Camden, N. J., the last accounts," should be "Lorenzo Dow, in company with a male and a female preacher, was in Camden, N. J. the last accounts," because it is improper to omit the article before the second adjective, since the adjectives refer to two different persons.

7. *Yet, still, even* here, content can spread a charm,

Redress the crime, and all its rage disarm.

Though poor the peasant's hut,
his *feast* though small,
He sees his little lot the lot of all;
Sees no contiguous palace *rear*
its head

To shame the meanness of his
humble shed ;

No costly *lord* the sumptuous
banquet *deal*,

To make him *loathe* his vegetable
meal,

But calm and *bred* in ignorance
and toil,

Each wish contracting fits him
to the soil.

(a) Classify according to their *origin* the words of this passage which are not of the Anglo-Saxon descent.

From Latin through the medium of the Norman French: Charm, rage, redress, poor, peasant, contiguous, palace, costly, sumptuous, ignorance, soil.

Latin: content, humble, vegetable, contracting.

Greek: clime, calm.

Italian: banquet.

(b) To what country and people has this description reference?

To Switzerland and the Swiss.

(c) Parse the words in italics, explaining fully their syntactical connection with other parts of the sentence.

Yet is an adverb modifying the predicates 'can spread,' 'redress' and 'disarm.'

Still is an adverb intensive of *yet* or assisting *yet* and it modifies the same predicates.

Even is an adverb modifying 'here.'

Disarm is a transitive verb of the weak conjugation in the active voice and present indefinite tense of the Infinitive mood, forming the objective complement of the verb 'can,' understood.

Feast is common noun, of the third person, singular number, neuter gender, and in the nominative case, being the

subject of the verb 'is,' understood.

Lot is a common noun, of the third person, singular number, neuter gender and in the objective case, being the object of the verb 'sees.'

Lot, with same accidents as the preceding noun, is in the objective case, begin apposition with 'lot.'

Rear is a transitive verb of the weak conjugation, in the active voice, the present indefinite tense of the Infinitive mood, used as an adjective in the attributive relation to 'palace.'

To shame is a transitive verb of the weak conjugation in the active voice and in the present indefinite tense of the Infinitive mood, used as an adverb modifying 'rear.'

Lord is a common noun, of the third person, and singular number, of the masculine gender, and in the objective case, being the object of the verb 'sees.'

Deal is a transitive verb of the irregular weak conjugation in the active voice and in the present indefinite tense of the infinitive mood, used as an adjective in the attributive relating to 'lord.'

Loathe is a transitive verb of the weak conjugation in the active voice in the present indefinite tense of the infinitive mood, the objective complement of the verb 'make' and in the attributive relation to 'him.'

Bred is the perfect participle of the verb 'to breed,' in the attributive relation qualifying 'him.'

Each is a distributive adjective (or the more general term is demonstrative adjective) in the attributive relation limiting the noun 'wish.'

Wish is an abstract noun, of the third person and singular number, of the neuter gender and in the nominative case, being the subject of the verb 'fits.'

Contracting is the imperfect participle of the verb 'to contract,' in the attributive relation qualifying the noun 'wish.'

FRENCH INFLUENCE ON ENGLISH.

THE influence of the French language, not only on our vocabulary, but on our Grammar and our Literature, has been so great that it has changed the entire character of English, and it now stands alone among the languages of Europe as the singular example of a union between the Northern and the Southern, the Gothic and Romance tongues, essentially Gothic, but imbued with Romance culture and Romance sentiments.

The beginning of this extensive influence dates from the time of Edward the Confessor, who, owing to his residence and education in France, had acquired French tastes and French habits, and who on ascending the throne of England made his Court the home of his French friends.

But the Norman Conquest was the great event which overthrew the ancient language, with its perfect system of inflections and its extensive literature, and made it the despised language of serfs and villains, whilst the leading men of the State spoke Norman French.

The noblesse and the common people, however, could not avoid coming into contact with one another in their everyday transactions, and some compromise was necessary for mutual understanding. Hence arose that remarkable bilingualism which lasted till the middle of the fourteenth century, when the true English language made its appearance. Up to this time there were two distinct languages in the country—the language of the consumer had been one, and the language of the producer another. Saxon had been suppressed till there was danger of its entire extinction, until now Saxon and French were thoroughly coalesced.

But the bilingualism which had

existed before this condition was still present. We may detect it even at the present day in the number of *pairs* of words which seem inseparably connected in certain places, as “watch and ward,” “ways and means,” etc. If we examine the poetry of Chaucer, we shall find many of these couples, in which one word is Saxon and the other French. A striking example occurs in his description of the Knight in the Prologue to his Canterbury Tales.

“A Knight ther was, and that a worthy man,
That fro the tyme that he first bigan
‘Fo ryden out, he lovede chyvalrye
Trouthe and honour, fredom and curteisye.”

In the last line, ‘Trouthe’ and ‘honour’ express one idea, as do also ‘fredom’ and ‘curteisye.’

We see the same thing in the use of two adjectives with one noun, a Saxon adjective placed before the noun and the equivalent Norman adjective after it. We still meet with examples in poetry, as in Gray—

“Full many a gem of purest ray serene.”

but the old distinction of one adjective being Saxon and the other Norman is lost. We even see two adjectives of entirely different signification.

Another effect of French influence on our phraseology is seen in the use of phrasal adjectives, for example, ‘laws of nature’—equivalent to ‘natural laws.’ They are nearly all composed of the preposition ‘of’ with some noun, and are imitations of the French form. Other examples are found in the words with prefix ‘a,’ as afoot, ashore, adoining. They are simply the French preposition prefixed to English words, thus ‘afoot’ represents ‘à pied.’ ‘Adoining’ admits of a somewhat different explanation. Many French infinitives take ‘à’ before them, and ‘adoining’ may be the old Saxon

infinitive in 'an' with French 'à' prefixed.

A very great influence was exerted on the pronunciation and consequently on the spelling of our words. The general effect of French on English pronunciation has been to soften the consonants and drop final vowels (other than 'e'), so that instead of being harsh and guttural like modern German, it in a degree resembles the tongues of southern Europe in smoothness and melody, without partaking of their effeminacy.

The tendency of French accent is towards the *end* of words, that of English, on the contrary, is towards the *beginning*. We make use of these tendencies to distinguish words by accent, making a word accented on one syllable assume a certain meaning, and the same word accented on a different syllable assume a different meaning.

The great terminal vowel in English is *e*. In a large number of cases this subscript was added for no other reason than that it was a Frenchism; in other instances it superseded old Saxon vowel terminations; afterwards it came to denote the elongation of the preceding vowel.

Prefixing 'w' before words beginning with *h* or *r* was a favorite fashion of the sixteenth century, probably from association with groups of words already existing. It soon died out, but left two remnants worthy of notice—one in which the *w* is retained in spelling but not in pronunciation, the word 'whole'—the other in which it is retained in pronunciation but not in spelling, the word 'one.' Observe also another fashion of that date, viz: cumulation of consonants, as *sc* for *s*, *ck* for *c* hard, *ll* at the end of words, &c. Some of these have been dropped, but a great many still remain. French influence in the formation of diphthongs in English is noticeable in such words as 'yozeng,' 'about,' 'joint.' The two first are Saxon and were originally spelt

with *u*. The last is genuine French, though our pronunciation of it does not resemble that of the French. Our double vowels *oo* and *ee* were formed from French influence. We have a number of words to denote agents, terminating in *ee*, derived from the French past participle in *é*.

Let us now look at the French influence on our *Grammar*.

The characteristic difference between English and Saxon is that we have now very few inflections. Norman French produced the utmost confusion, and most of the inflections of nouns, adjectives and verbs were lost, and replaced by prepositions and auxiliary verbs.

The Saxon plural of nouns was formed by adding *es* or *en*, while the Norman French plural terminated in flat *s*, and now from occupying a subordinate place in English Grammar, it has come to be the general rule that nouns form their plural in *s*. Our pronouns shew the result of the French influence largely. We have only remaining the nominative and accusative cases singular and plural of the personal pronouns used as real pronouns. The genitive cases are now not pronouns, but pronominal adjectives. The possessive and dative relations have to be expressed by means of prepositions.

The Relative pronouns are derived in Gothic languages from the Demonstratives, as was the case in Saxon, but in Romance languages they are derived from the Interrogatives. In Saxon *who* and *which* had two functions. They were interrogative as well as indefinite pronouns. French has made them relative also, and not only that, but it has even given them a conjunctive use like the French *que* and *qui*. The fact that the language had the power of changing the *internal relations* of Saxon shews that its influence was not superficial, as some assert, but pervaded the entire language, penetrating to its deepest recesses.

MATHEMATICS.

Solutions to Algebra paper in last number.

I. The laws which obtain in the combinations of Algebraical symbols are. —

I.—The Commutative law :

(a) Addition and Subtraction may be performed in any order, thus: $a + b - c = -c + b = b + a - c = b - c + a$, &c.

(b) Multiplication and Division may be performed in any order, thus :

$$a \div b \times c = a \times c \div b = c \div b \times a, \text{ \&c.}$$

II.—The Distributive law :

(a) Addition and Subtraction of quantities may be distributed over a series of additions and subtractions of their parts,

$$\text{thus } a + (b - c + d) = a + b - c + d.$$

$$\text{“ } a - (b + c - d) = a - b - c + d.$$

(b) Multiplication of quantities by one another may be distributed over a series of additions and subtractions of the products of their parts,

$$\text{thus } (a - b)(c + d) = ac + ad - bc - bd.$$

(c) Division of quantities by one another may be distributed over a series of additions and subtraction of the quotients of their parts,

$$\text{thus } (a - b + c) \div d = a \div d - b \div d + c \div d.$$

III.—The Index law :

(a) The index of the product of any powers of a quantity is the sum of the indices of these powers,

$$\text{thus } a^m \times a^n \times a^r = a^{m+n+r}$$

(b) The index of a power of a power of a quantity is the product of these powers.

$$\text{thus } (a^m)^n = a^{mn}.$$

To multiply b by a when a and b are whole numbers is to take b as many times as there are units in a ; that is, *what is done with 1 to make a must be done with b to make a times b.* When a and b are not whole numbers the result of this operation is still called the *product* and the process is still called *multiplication*. But there is this difference that

whereas a whole number is made by adding 1 to itself a number of times, a fraction is made by dividing 1 into a number of equal parts and adding one of these parts to itself a number of times.

2. Every number must be of one of the forms, $3n$, $3n + 1$, $3n + 2$, according as it is divisible by 3 with no remainder, with remainder 1, or with remainder 2 ; n being 0 or any positive integer. Therefore, every square number is of one of the forms $9n^2$, $9n^2 + 6n + 1$, $9n^2 + 12n + 4$. The first of these is divisible by 3, and the other two become so by the addition of 2.

One of any three consecutive integers must be a multiple of 3, and if the middle number is odd, the other two are both even. We may, therefore, denote the three integers by $2a$, $3b$, $2c$ (supposing the middle one to be a multiple of 3).

$$\text{Now since } 2c - 2a = 2,$$

$$\therefore c - a = 1.$$

That is, a and c are consecutive integers, therefore either a or c is an even number ; let a be even and $= 2m$, so that the three integers become $4m$, $3b$, $2c$, and their product $= 24mbc$.

$$\begin{aligned} 3. \quad & (n \overline{n+1})^2 - (n \overline{n-1})^2 \\ & = (n \overline{n+1} + n \overline{n-1})(n \overline{n+1} - n \overline{n-1}) \\ & = 2n^2 \times 2n = 4n^3. \end{aligned}$$

$$xy + 1 = \frac{1+a}{1-a} \frac{1+b}{1-b} + 1$$

$$= 2 \frac{1+ab}{(1-a)(1-b)}$$

$$\therefore \frac{ab+1}{xy+1} = \frac{(1-a)(1-b)}{2} \quad (1)$$

$$\text{again, } x^2 + 1 = 2 \frac{1+a^2}{(1-a)^2}$$

$$\therefore \frac{x^2+1}{a^2+1} = \frac{2}{(1-a)^2} \quad (2)$$

and the prod. of (1) and (2) = $\frac{1-b}{1-a}$

also, $\frac{x+1}{y+1} = \frac{1-b}{1-a}$

hence the expression = 0.

$$4. \quad \begin{array}{r} 7+21+35+35+21+7 \\ -1 \quad \underline{\quad\quad\quad} \\ -7-14-21-14-7 \\ -1 \quad \underline{\quad\quad\quad} \\ 7+14+21+14+7 \\ -1 \quad \underline{\quad\quad\quad} \\ -7-7-7 \\ -1 \quad \underline{\quad\quad\quad} \\ -7-7-7 \\ \underline{\quad\quad\quad} \\ 7+7+7 \end{array}$$

\therefore Quotient is $7x^2 + 7xy + 7y^2$.

$$-12 \left| \begin{array}{r} 1+5-88-40+0-151 \\ -12+84+48-96+1152 \\ \underline{\quad\quad\quad} \\ 1-7-4+8-96, 1001 \end{array} \right.$$

The value is $\therefore 1001$.

$$5. \quad \begin{aligned} & 18x^4 + 9x^3 - 17x^2 - 4x + 4 \\ & = (3x+2)(3x-2)(2x-1)(x+1); \\ & \quad 8x^4 + 4x^3 - 6x^2 - x + 1 \\ & = (2x+1)(2x-1)(2x-1)(x+1). \end{aligned}$$

6. The first fraction should be $\frac{3}{4(1-x)^2}$

and the expression reduces to

$$\frac{x^2+x+1}{(x^4-1)(x-1)}$$

7. If $a=1$, the equality holds for all values of the quantities involved, and is therefore an identity.

$$8. \quad \frac{ab}{a+b}, \frac{ac}{a+c}, \frac{bc}{b+c}$$

will be in H. P. if their reciprocals are in A. P., that is, if

$$(1) \quad \frac{a+b}{ab} - \frac{a+c}{ac} = \frac{a+c}{ac} - \frac{b+c}{bc}$$

$$\text{if } \frac{1}{b} + \frac{1}{a} - \frac{1}{c} = \frac{1}{c} + \frac{1}{a} - \frac{1}{b}$$

$$\text{if } \frac{1}{b} - \frac{1}{c} = \frac{1}{c} - \frac{1}{b}$$

i. e., if a, b, c , are in H. P.

$$(2) \quad \frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}, \text{ are in A. P.}$$

$$\text{if } 2 \frac{c+a}{b} = \frac{b+c}{a} + \frac{a+b}{c}$$

$$\text{if } 2 \frac{c+a}{b} + 2 = \frac{b+c}{a} + 1 + \frac{a+b}{c} + 1$$

$$\text{if } 2 \frac{a+b+c}{b} = \frac{a+b+c}{a} + \frac{a+b+c}{c}$$

$$\text{if } \frac{2}{b} = \frac{1}{a} + \frac{1}{c},$$

i. e., if a, b, c , are in H. P.

9. Let c be the constant, connecting the area of each circle with the square of its radius; then the areas of the first two circles are each $9c$, and of the others $16c, 25c, 36c, 49c$ respectively. The sum of these is $144c$, which is the area of a circle of radius 12.

10. If 11 is the first term, and d the common difference,

$$\begin{aligned} & \text{the sum of three terms} = 33 + 3d, \\ & \text{and sum of nine terms} = 99 + 36d; \end{aligned}$$

equating these we get $d = -2$.

\therefore the series is 11, 9, 7, 5, 3, 1, -1, -3, &c.

11. Let r be the common ratio; then the fifth term is $3r^4$,

$$\therefore r^4 = \frac{16}{81} \text{ and } r = \frac{2}{3} \text{ or } -\frac{2}{3}$$

The second value of r gives the series required.

$$12. \quad \sqrt{1.77} = \sqrt{\frac{16}{9}} = \frac{4}{3} = 1.33$$

$$13. (1) \text{ The sum of } 2n \text{ terms} = \frac{(2a + 2nd) \cdot 2n}{2}$$

$$\text{sum of } n \text{ terms} = \frac{(2a + nd) \cdot n}{2}$$

and the sum of the latter half of $2n$ terms is equal to the difference between these,

$$\therefore = \frac{(2a + 3nd) \cdot n}{2}$$

The sum of $3n$ terms of this series

$$= \frac{(2a + 3nd) \cdot 3n}{2}$$

(2) First take n terms in each series;

then $a + b = 1 + 3 + 5 + 7 + \dots$ to $2n$ terms $= 4n^2$ and $a - b = -2 - 2 \dots$ to n terms $= -2n$

$$\therefore (a - b)^2 = 4n^2.$$

Next let b contain $n - 1$ terms, then $a + b = 1 + 3 + 5 + \dots$ to $2n - 1$ terms $= (2n - 1)^2$, and $a - b = 1 + (2 + 2 + \dots$ to $n - 1$ terms) $= 2n - 1$

$$\therefore (a - b)^2 = (2n - 1)^2$$

14. The roots of $ax^2 - bx = a^2x - ab$ are a and $\frac{b}{a}$

$$15. (1) x = \frac{-a - b \pm \sqrt{(a - b)^2 + 4ab}}{2}$$

$$(2) 6x - \sqrt{x} - 1 = (3\sqrt{x} + 1)(2\sqrt{x} - 1)$$

$$\therefore \sqrt{x} = \frac{1}{2} \text{ or } -\frac{1}{2}.$$

(3) Square both sides, then

$$2x - 1 + 2\sqrt{x^2 - x} = x + 1$$

$$\therefore x - 2 = -2\sqrt{x^2 - x}$$

square both sides

$$\therefore x^2 - 4x + 4 = 4x^2 - 4x$$

$$\therefore x = \pm \frac{2}{\sqrt{3}}$$

$$(4) x + y + z = \frac{a^2}{x} = \frac{b^2}{y} = \frac{c^2}{z}$$

$$= \frac{a^2 + b^2 + c^2}{x + y + z}$$

$$= \frac{\sqrt{a^2 + b^2 + c^2}}{a^2}$$

$$\therefore x = \frac{a^2}{\sqrt{a^2 + b^2 + c^2}}$$

Toronto University, Pass Algebra, First Year, 1860.

1. What extensions of the arithmetical definitions of the signs $-$, \times , are made in Algebra?

Prove $3 \times 2 = 2 \times 3$ and explain wherein this differs from the algebraic identity $ab = ba$.

2. If a number be multiplied by 4 and the same number reversed be multiplied by 5, the sum of the products is exactly divisible by 9.

Prove this and infer the general proposition of which it is a particular case.

3. Perform the following operations:

(1). Simplify

$$(a+b)(b+c) - (a+1)(c+1) - (a+c)(b-1);$$

(2). Multiply

$$\frac{x^2y^2}{9} - xy + 9 \text{ by } \frac{xy}{3} + 3;$$

(3). Divide $(ax + by)^2 + (cx + dy)^2 + (ay - bx)^2 + (cy - dx)^2$ by $x^2 + y^2$;

(4). Extract the square root of

$$a^2(x^2 + 4) - 2a(x + 2) + 4a^2x + 1;$$

(5). Find the highest common divisor of

$$a^2 + b^2 - c^2 + 2ab, \text{ and } a^2 - b^2 - c^2 + 2bc.$$

4. Describe Horner's method of synthetic division, and shew how to use it when the leading coefficient of the divisor is different from unity. Apply it in the following cases.

(1). Divide $4x^3 + 5x^2 + 1$ by $x^3 + 2x - 1$, obtaining the exact remainder, and also four terms of the remainder expressed in descending powers of x .

(2). Expand $\frac{1}{1 - x + x^2}$ in ascending powers of x .

(3). Find the remainder after the division of $8x^3 - 6x + 5$ by $2x + 3$.

5. Prove that the value of a fraction is unaltered by multiplying or dividing both numerator and denominator by the same quantity, and examine whether the value is increased or diminished by adding or subtracting the same quantity to or from both numerator and denominator.

6. Perform the following operations:

(1). Multiply

$$\frac{a}{a+b} + \frac{b}{a-b} \text{ by } \frac{a}{a-b} - \frac{b}{a+b};$$

(2). Divide

$$\frac{a}{a+c} - \frac{b}{b+c} \text{ by } \frac{c}{b+c} - \frac{c}{a+c};$$

(3). Reduce to a single fraction in its lowest terms:

$$\frac{3(x-2)}{(x-1)(x-3)} - \frac{1}{x-1} - \frac{1}{x-2} - \frac{1}{x-3};$$

$$(4). \text{ Prove } \frac{(x+1)(y+1)}{(x-1)(y-1)} =$$

$$\frac{(2y + 1 + 2x)(xy + 1 + 2y) + (x - y)^2}{2xy^2 + 1 - x^2 - y^2}$$

7. What is meant by the root of an equation? Show how to find those of a quadratic, and investigate the relations between them and the coefficients of the equation.

Find the conditions that the equations

$$ax^2 + bx + c = 0$$

$$px^2 + qx + r = 0$$

may have (1), one root common; (2), roots the same in magnitude, but of contrary signs.

8. Solve the equations:

$$(1) - \frac{x+1}{2} - \frac{2x-1}{3} = \frac{3x+4}{4} - \frac{5x-6}{3};$$

$$(2) - \frac{(x-1)(x+4)}{x+3} = \frac{(3+x)(2-x)}{1-x}$$

$$(3) - \frac{1+2x}{1-2x} = \frac{1+x+\sqrt{1+2x}}{1-x-\sqrt{1-2x}}$$

9. Find x from the equation

$$\frac{(x-1)^2(n-1)^2 + 4n}{(x+1)^2(n-1)^2 + 4n} = p$$

and show that if n be positive and x real the value of the left hand member always lies

between n and $\frac{1}{n}$.

10. Find the Arithmetic, Geometric and Harmonic means between two given quantities; for example, between $\frac{3}{4}$ and $\frac{4}{3}$.

If H be the Harmonic mean between a and b it is also the Harmonic mean between $H-a$ and $H-b$.

11. Investigate the formulas for the sum of a series of quantities in Arithmetic or Geometric progression.

(1). Find the 37th term of $6 + \frac{35}{6} + \frac{17}{3}$

+ ... and the sums of 31 and 42 terms.

(2). Find the sum of n terms of $3\frac{1}{3} + 2 + 1\frac{1}{3} + \dots$

(3). Of $1 - 0.4 + 0.16 - 0.064 + \dots$ find the sum to infinity, and find the least number of terms of which the sum will agree with this as far as 8 places of decimals.

12. There are p arithmetic series each con-

tinued to n terms; their first terms are the natural numbers 1, 2, 3 ... , and their common differences are the successive odd numbers 1, 3, 5 ... ; prove that the sum of all of them is the same as if there were n such series each continued to p terms.

SOLUTIONS TO PROBLEMS FROM CORRESPONDENTS.

1. To produce a given straight line so that the rectangle contained by the whole line thus produced and another given straight line may be equal to the square on the produced part.

Let a, b denote the lengths of the two given lines and x that of the line required.

Then since $(a+x)b = x^2$

$$\therefore (x - \frac{1}{2}b)^2 = \frac{4ab + b^2}{4}$$

$$\therefore x = \frac{1}{2}b + \frac{1}{2}\sqrt{4ab + b^2}$$

Hence we obtain the geometrical construction: To four times the rectangle contained by the two lines a and b add the square on b ; construct a square equal to this resulting rectangle; to half the side of this square add the half of b and the line required is obtained.

2. The difference of the angles at the base of a triangle is double the angle contained by the line bisecting the vertical angle, and the line drawn from the vertical angle perpendicular to the base.

Let ABC be the triangle. Draw CD perpendicular to AB and CE, bisecting the angle C. Let angle A be greater than B, then the point E lies between D and B.

$$\therefore \angle ACD + \angle CAD = 2 \text{ rt. angles} = \angle BCD + \angle CDB$$

$$\therefore \angle A - \angle B = \angle BCD - \angle ACD$$

But $\angle BCD = \frac{1}{2} \angle C + \angle DCE$

and $\angle ACD = \frac{1}{2} \angle C - \angle DCE$

$$\therefore \angle BCD - \angle ACD = 2 \angle DCE$$

$$\therefore \angle A - \angle B = 2 \angle DCE.$$

3. The price of diamonds per carat varies as their weight. If a diamond of 3 carats be worth \$342, find the value of a diamond of 4 carats.

If a diamond of 3 carats is worth \$342 it is worth \$114 per carat, \therefore a diamond of 4 carats

is worth $\frac{1}{3}$ of \$114 or \$152 per carat, and the diamond is \therefore worth \$608.

4. Solve the equations

$$20x^{n+1} - 21x^n + 1 = 0 \quad (1)$$

$$26x^{2n+1} - 27x^{2n} + 1 = 0 \quad (2)$$

Multiply (1) by $13x^n$, (2) by 10 and subtract ;

$$\text{then } 3x^{2n} - 13x^n + 10 = 0$$

$$\therefore x^n = 1 \text{ or } 3\frac{1}{3}$$

and substituting for x^n in (1) we have

$$20x \times 3\frac{1}{3} - 21 \times 3\frac{1}{3} + 1 = 0$$

$$200x = 207$$

$$\therefore x = 1.035$$

5. A railway train after travelling an hour meets with an accident, after which it proceeds at three-fourths of its former rate, and arrives 9 minutes late. If the detention had taken place 5 miles further on the train would have arrived 3 minutes sooner than it did. Find the original rate of the train and the distance travelled.

A B C D

A, starting point ; B, when detention occurred ; C, 5 miles further on ; and D, its destination.

Now, since the time required to go any distance is inversely proportioned to the rate, and since the rate from B to D is $\frac{3}{4}$ the ordinary rate, \therefore the time from B to D is $\frac{4}{3}$ the ordinary time ; that is, the time has been increased by one-third on account of the accident, and the time has been increased by 9 minutes ; \therefore the ordinary time of going from B to D is 27 minutes. Similarly, if the accident had occurred at C, we should get the ordinary time from C to D to be 18 minutes ; hence the ordinary time from B to C (5 miles) is 9 minutes ; that is, the rate is $33\frac{1}{3}$ miles per hour. Also AB being one hour's journey is $33\frac{1}{3}$ miles, and BD requiring 27 minutes must be 15 miles ; \therefore whole distance is $48\frac{1}{3}$ miles.

HINTS FOR SOLVING DEDUCTIONS.

In solving exercises upon Euclid, there are two golden rules to be remembered—(1) if the exercise be a *problem*, strictly so called, that is to say, if some line or figure be required to be drawn, *imagine it done, and find*

all the conditions that result from so doing ; (2) if the exercise be a theorem, examine all the conditions given, and those which will come into play if the theorem be true, and then endeavor to combine and connect them. Thus, suppose we had to show how to describe an equilateral triangle on a given line. This being a *problem*, suppose on the line AB an equilateral triangle ABC to be described, then by definition AB equal AC, therefore a circle with A as centre and radius AB will pass through C, similarly a circle whose centre is B and radius AB will pass through C ; hence we learn that C is the intersection of the two equal circles, and so we can start the construction as in Euclid I. 1.

Again, as an example of a *theorem*, we may prove that the exterior angle of a triangle is equal to the two interior and opposite angles. Supposing this theorem to be true, since the exterior angle is equal to the sum of the two interior, if we draw a line cutting off from it an angle equal to one of the interior angles, the remainder must equal the other interior angle. Now we know that if this line be drawn parallel to the opposite side, the alternate angles will be equal, and it is clear that the remaining angles are also equal, being interior and exterior angles on two parallel lines, therefore the theorem is true. Hence the construction as in Euclid I. 32.

Suppose we had this *theorem* set, prove that if two tangents be drawn from an exterior point to a circle they are equal. Suppose that they are equal join the external point with the centre, and the centre with the points of contact, we then have two triangles, the three sides of one being equal to the three sides of the other each to each, therefore the angles of the one are equal to the angles of the other, therefore the right angles are equal. But this we knew before ; we start from this and retracing our steps can show that since the radii are equal and the line from

the centre to the external point is common, therefore the tangents are also equal.

Of course in very complicated exercises, great care and forethought must

be used in order to estimate all that results from any given condition, but the above rules will generally suffice.—From 'Euclid,' in Stewart's *Mathematical Series*.

HOW TO TEACH MENTAL ARITHMETIC.

By J. H. Knight, P. S. Inspector, Lindsay.

CONTINUED FROM PAGE 49.

EXERCISE IV. HAY.

One ton = 2000 lbs., 4000 lbs., 3000 lbs., 1500 lbs., 2500 lbs., 3500 lbs., 4500 lbs., 1250 lbs., 1750 lbs., 2250 lbs., 2750 lbs., 3250 lbs., 3750 lbs., 4250 lbs. at \$10 a ton. \$20, \$30, \$40, \$6, \$8, \$12, \$14, \$16, \$18, \$22, \$24, \$26, \$28, \$5, \$7, \$9, \$11, \$13, \$15, \$17, \$19, \$21, \$23, \$25, \$27, \$29 a ton.

NOTE.—\$6 per ton = 3 mills per lb.
\$8 per ton = 4 mills per lb. \$10 per ton = 5 mills per lb. &c.

10 lbs. at \$10 per ton, 20 lbs., 30, 40, 50, 60, 70, 80, 90 lbs.

10 lbs. at \$6 per ton, 20 lbs., 30, 40, 50, 60, 70, 80, 90 lbs.

The same quantities at \$8, \$12, \$14, \$16, \$18, \$20, \$22, &c.

100 lbs., 200 lbs., 300, 400, 500, 600, 700, 800, 900 lbs. at \$6, \$8, \$10, \$12, \$14, \$16 per ton, &c.

1 lb., 2 lbs., 3, 4, 5, 6, 7, 8, 9 lbs. at \$6, \$8, \$10 per ton, &c.

NOTE.—If the price be an even number of dollars, multiply the number of pounds by half the number of dollars, the result will be the answer in mills.

If the price be an odd number of dollars, multiply the number of pounds by the number of dollars, and divide by 2 the result will be the answer in mills.

EXERCISE V. CORD-WOOD.

A pile of wood 4 ft. wide 4 ft. high, and 8 ft. long contains one cord; what will be the length of 2 cords? Of 3 cords? Of 4 cords? &c., up to 10 cords.

How many cords in a pile 4 ft. wide, 6 ft. high, and 8 ft. long? 16 ft. long? 24 ft. long? 32 ft. long. &c., up to 80 ft. long.

How many cords in a pile 4 ft. wide, 5 ft. high, and 8 ft. long? 16 ft. long? 24 ft. long? 32 ft. long? &c., up to 80 ft. long.

4 x 7 x 8 ft. 4 x 7 x 16 ft. &c., up to 4 x 7 x 80 ft.

4 x 4 x 12 ft., 20 ft., 28 ft., 36 ft., 44 ft., 52 ft., 60 ft., &c., up to 76 ft.

4 x 6 x 12 ft., 20 ft., 28 ft., &c., up to 76 ft.

4 x 5 x 12 ft., 20 ft., 28 ft., &c., up to 76 ft.

4 x 7 x 12 ft., 20 ft., 28 ft., &c., up to 76 ft.

4 x 4 x 16 ft. at \$2 a cord, 24 ft., 32 ft., 40 ft., &c., up to 80 ft.

4 x 6 x 16 ft. at \$2 a cord, 24 ft., 32 ft., 40 ft., &c., to 80 ft.

4 x 5 x 16 ft. at \$2 a cord, 24 ft., 32 ft., 40 ft., &c., up to 80 ft.

4 x 7 x 16 ft. at \$2 a cord, 24 ft., 32 ft., 40 ft., &c., up to 80 ft.

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The above quantities at \$1.50 a cord, \$2.50, \$3.50, \$4.50, \$1.25, \$1.75, \$2.25, \$2.75, \$3.25, \$3.75, \$4.25.

4 x 4 x 12 ft at \$2 a cord, 20 ft., 28 ft., &c., up to 76 ft.

The above quantities at the various prices.

4 x 4 x 10 ft. at \$2 a cord, 18 ft., 26 ft., &c., up to 74 ft.

The above quantities at the various prices.

4 x 4 x 14 ft. at \$2 a cord, 22 ft., 30 ft., &c., up to 78 ft.

EXERCISE VI. THE CLOCK.

(a). At what time will the hour-hand and the minute-hand be together between 1 and 2 o'clock? At what time between 2 and 3 o'clock? Between 3 and 4 o'clock? &c.

NOTE.—The two hands are together eleven times in twelve hours, viz., at 12 o'clock, and at ten other points. The first of these points is $\frac{1}{11}$ of 60 = $5\frac{5}{11}$ minutes past 1, the second $\frac{2}{11}$ of 60 = $10\frac{10}{11}$ minutes past 2, the 3rd $\frac{3}{11}$ of 60 = $15\frac{15}{11}$ = $16\frac{4}{11}$ minutes past 3, the 4th $\frac{4}{11}$ of 60 = $20\frac{20}{11}$ = $21\frac{9}{11}$ minutes past 4, &c.

(b) At what time will the hour-hand and the minute hand be opposite one another, the hour-hand being between 12 and 1 o'clock? Between 1 and 2 o'clock? &c.

NOTE.—The two hands will be opposite one another, 11 times in 12 hours. The 1st point will be $\frac{1}{2}$ of 60 + 30 = $32\frac{8}{11}$ minutes past 12; the 2nd point will be $\frac{3}{2}$ of 60 + 30 = $38\frac{2}{11}$ minutes past 1; the 3rd point will be $\frac{5}{2}$ of 60 + 30 = $43\frac{7}{11}$ minutes past 2. The results may be obtained

by constantly adding 1 hour $5\frac{5}{11}$ minutes. The hands are opposite one another at 6 o'clock.

(c) At what time will the hour-hand and the minute-hand be at right angles to one another, the minute-hand being in advance of the hour-hand, and the hour-hand between 12 and 1 o'clock? Between 1 and 2 o'clock? &c.

NOTE.—This position of the hands will occur 11 times in 12 hours. The 1st point will be $\frac{1}{4}$ of 60 + 15 = $16\frac{3}{11}$ minutes past 12; the 2nd point will be $\frac{5}{4}$ of 60 + 15 = $21\frac{9}{11}$ minutes past 1; the 3rd point will be $\frac{9}{4}$ of 60 + 15 = $27\frac{3}{11}$ minutes past 2. The results may be obtained by constantly adding 1 hour $5\frac{5}{11}$ minutes. The hands will be in this position at 9 o'clock.

(d) At what time will the hour-hand and the minute-hand be at right angles to one another, the hour-hand being in advance of the minute-hand, and the hour-hand between 12 and 1 o'clock? Between 1 and 2 o'clock? &c.

NOTE.—This position of the hands will occur 11 times in 12 hours. The 1st point will be $\frac{3}{4}$ of 60 + 45 = $49\frac{1}{11}$ minutes past 12, the 2nd point will be $\frac{7}{4}$ of 60 + 45 = $54\frac{6}{11}$ minutes past 1; the 3rd point will be $\frac{11}{4}$ of 60 + 45 = 60 minutes past 2, that is 3 o'clock; the 4th point will be $\frac{15}{4}$ of 60 + 45 = $51\frac{5}{11}$ minutes past 4. The results may be obtained by constantly adding 1 hour $5\frac{5}{11}$ minutes. The expression "next after 12 o'clock" may be used instead of "between 12 and 1 o'clock" &c., so as to avoid the difficulty that may occur where the hour-hand is exactly at 3, 6, 9 or 12 o'clock.

To be Continued.

SCIENCE DEPARTMENT.

(Continued from Page 81.)

GROUP II.—METALS OF THE ALKALINE EARTHS, CALCIUM, STRONTIUM, BARIUM, MAGNESIUM.—By Miss L.E. Briant.

PROPERTIES OF THE GROUP.—The alkali-earth metals have a brilliant metallic lustre, Ca and Sr are yellow, Ba and Mg white, are hard and ductile at the ordinary temperature, are DIVALENT and cannot be reduced by hydrogen or carbon alone, decompose water at all temperatures (Magnesium at 30° C), heated in the air they burn with a bright light to oxides (Ca O, Sr O &c.) which combine with water to form hydroxides (Ca OH)₂ &c.), the hydroxides dissolve in additional water (Mg O is nearly insoluble) forming solutions that give an *Alkaline reaction* (hence name). The metals of this group (II.) are distinguished from those of the preceding one (I K Na, &c.) by their NEUTRAL CARBONATES and PHOSPHATES being *insoluble in water, and from all other metals by being neither precipitated by HYDROGEN SULPHIDE H₂ S, nor Ammonium Sulphide NH₄ HS.* The Carbonates although insoluble in water are soluble in water containing Carbonic Acid CO₂ in solution.

I.—SYMBOL.

Ca 40 (39.9), Sr 87.2, Ba 137 (136.8), Mg 24 (23.94).

II.—OCCURRENCE.

CA.	SR.	BA.	MG.
Combined (a) forming a large portion of the plutonic rocks of which the earth is composed.	(b) Sr CO ₃ STRONTIANITE	(b) Ba CO ₃ WITHERITE.	(b) 1. Mg CO ₃ MAGNESITE.
(b) As the Carbonate Ca CO ₃ Calcite, Limestone, Chalk.	(c) Sr SO ₄ CELESTINE.	(c) Ba SO ₄ Heavy Spar.	2. Mg CO ₃ + Ca CO ₃ DOLOMITE.
(c) As the Sulphate (1) Ca SO ₄ Anhydrite (2) Ca SO ₄ + 2H ₂ O Selenite, Gypsum, or Alabaster.	(d) In minute quantities in certain spring waters.		(c) Mg SO ₄ + 7 H ₂ O. Epsom salt soluble in water, a constituent of the so-called bitter water of Mineral Springs, Epsom, England, Salschütz, Sedlitz and Püllna in Bohemia, and in sea water.

III—PREPARATION.

<p>1. By the decomposition of the Chloride Ca Cl_2 by Electricity. This was the method adopted by Bunsen who was the first to obtain the metal pure.</p>	<p>I. Same. Bunsen and Matthiessen <i>in</i> 1855—PURE METAL. Sir H. Davy in 1807 obtained it by decomposing the oxide by Electricity, but not in a pure State.</p>	<p>I. Same, Bunsen and Matthiessen.</p>
<p>2. By heating the Iodide Ca I_2 with Sodium at a high temperature in closed vessels. $\text{Ca I}_2 \times \text{Na}_2 = \text{Ca} + 2 \text{Na I}$.</p>		
<p>3. By Strongly heating a mixture of the Chloride with Zinc and Sodium—an alloy of Calcium and Zinc being formed from which Zinc can be removed by distillation.</p>		<p>2. By heating Magnesium, Chloride with Potassium or Sodium. $\text{Mg Cl}_2 + 2 \text{Na} = \text{Mg} + 2 \text{Na Cl}$.</p> <p>3. In large quantities by bringing a mixture of $6 \text{Mg Cl}_2 + \text{K Cl}, \text{Na Cl}$ fused + $\text{Ca Fl}_2 + \text{Na}$ into a glowing earthen crucible, after breaking the crucible the reduced Magnesium is quickly removed by water and dilute Sal-Ammoniac.</p>

IV—PROPERTIES.

<p>Light Yellow Metal remains for a long time unchanged in dry air—in moist becomes covered with the oxide, heated in the air burns brilliantly—CaO.</p>	<p>Beautiful gold yellow metal greatly resembling Ca in its properties. Heated in the air it becomes first red then burns to oxide SrO.</p>	<p>Not known in a Coherent State. The metallic powder becomes quickly oxidized in air or water. It forms a yellow brittle alloy with platinum.</p>
<p>A Silver, white, hard, ductile metal volatile at a white heat does not oxidize in dry air—becomes coated with the hydroxide in moist air decomposes water not at the ordinary temperature, at 30°C perceptibly, at 100°C more vigorously, burns with a dazzling white light when heated strongly in air to Magnesia MgO—the light being rich in chemically active rays is used as a Substitute for Sunlight in photographing the interior of Pyramids, &c.</p>		

V.—COMPOUNDS.

OXIDES.

<p>(a) CALCIUM OXIDE, CaO, when pure, is a white insoluble substance, uniting readily with water under evolution of heat to calcium hydroxide, Ca (OH)₂. It is formed by heating the Carbonate Ca CO₃ in kilns Carbonic Acid, CO₂, going off, and Ca O, <i>quicklime, remaining.</i></p>	<p>(a) Sr O best obtained by heating the nitrate 2 Sr (NO₃)₂ = Sr O + 4 NO₂ + O₂, resembles Ca O.</p>	<p>(a) Ba O same as Sr. Ba O₂ is formed by gently heating Ba O in oxygen.</p>	<p>(a) Mg O is obtained as a white, light, amorphous, infusible powder by heating either the Carbonate or Nitrate Magnesia, usta or calcined Magnesia of Medicine. It is nearly i..soluble in water, one part Mg O needing 50,000 parts water for solution.</p>
<p>(b) Calcium hydroxide Ca (OH)₂ slaked lime Ca O + H₂O = Ca (OH)₂ is soluble in 730 parts of cold water and 1300 parts hot. It absorbs CO₂ from the air so aiding the hardening of mortars. MORTAR is formed by the union of the hydroxide with sand, 2Ca (OH)₂ + Si O₂ = Ca₂ Si O₄ CALCIUM SILICATE. HYDRAULIC MORTARS are prepared from an impure lime (containing clay and silica) and harden under, water forming an aluminium calcium silicate. Calcium hydroxide (1) destroys the excess of animal matter in soils; (2) liberates caustic potash KOH from clay soils.</p>	<p>(b) Sr (OH)₂ + 8 H₂ O is more soluble in water than Ca (OH)₂ also absorbs CO₂ from air.</p>	<p>(b) Ba (OH)₂ + 8 H₂ O is crystalline and more soluble than Sr (OH)₂ soluble in 20 parts of cold water rapidly absorbs CO₂ from air</p>	<p>(b) Mg (OH)₂ is thrown down as white precipitate when a soluble hydroxide (KOH, Na OH, Ba (OH)₂, Ca (OH)₂) is added to the solution of a magnesium salt. The hydroxide is almost insoluble in water but readily soluble in ammonium chloride, NH₄ Cl. If ammonium salts be present, no precipitate is formed by the soluble hydroxides, the ammonium salts forming double salts with the magnesium, which are soluble in water.</p>

CARBONATES.

<p>(c.) Ca C O₃. Chalk, Limestone, Marble almost insoluble in pure water, soluble if water contains CO₂ in solution.</p>	<p>(e) Sr CO₃ Strontianite. Same.</p>	<p>(e) Ba CO₃ Witherite. Same.</p>	<p>(c) Mg CO₃ Magnesite. Same.</p>
<p>Is formed artificially when a soluble salt is precipitated by the carbonate of an alkali (K₂ CO₃.)</p>	<p>The carbonate of an alkali precipitates a varying mixture of the carbonate and the hydroxide Mg CO₃ + Mg (OH)₂ from a hot solution of Magnesium Sulphate and is the Magnesia alba of commerce.</p>		

CHLORIDES.

<p>(d.) Ca Cl₂ + 6 H₂ O. Formed from CaCO₃ + 2 HCl = CaCl₂ + CO₂ + H₂ O Soluble in water.</p>	<p>(d) Sr Cl₂ + 6 H₂ O. Same. Same.</p>	<p>(d) Ba Cl₂ + 2 H₂ O Same. Same.</p>	<p>(d) Mg Cl₂ + 6 H₂ O. The crystals when heated lose Hydrochloric Acid and water and form a mixture of Mg O and Mg Cl₂. It is impossible to obtain the chloride by evaporating the solution of the oxide in hydrochloric acid. If to the solution of magnesium chloride, sal-ammoniac be added, and the dry residue of evaporation be heated to a red heat, the latter volatilizes and fused Mg Cl₂ remains. Soluble in water.</p>
<p>Ca Cl₂ + 6 H₂ O when dried gives off 4 H₂ O and the Ca Cl₂ + 2 H₂ O is very hygroscopic and is used for drying gases. Bleaching powder is a mixture of Calcium Chloride and Calcium Hypochlorite. Ca Cl₂ + Ca (Cl O₂)</p>			

SULPHATES.

<p>(e) 1. Anhydrite Ca SO_4 : 2. Selenite } $\text{Ca SO}_4 + 2\text{H}_2\text{O}$ Gypsum. } Alabaster. }</p> <p>Insoluble in water. May be artificially prepared by precipitating a soluble salt with H_2SO_4 :</p>	<p>Sr SO_4 Celestine. Same.</p>	<p>(e) Ba SO_4 Heavy Spar. Same Blanc Fixe.</p>	<p>(e) Mg $\text{SO}_4 + 7\text{H}_2\text{O}$. <i>Epsom Salts</i> occurring in springs, etc. Is prepared from Dolomite, by separating the lime with sulphuric acid. It forms double sulphates with the alkaline sulphates, one molecule of the water being replaced by the alkaline Sulphate, Mg $\text{SO}_4, \text{K}_2\text{SO}_4 + 6\text{H}_2\text{O}$. In this case no precipitate is formed. Mg SO_4 being readily soluble in H_2O.</p>
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NITRATES.

<p>(f) $\text{Ca} (\text{NO}_3)_2 + 4\text{H}_2\text{O}$. Formed $\text{Ca CO}_3 + 2\text{HNO}_3 = \text{Ca} (\text{NO}_3)_2 + \text{CO}_2 + \text{H}_2\text{O}$. Soluble in water.</p> <p>(g) Phosphate of Lime $\text{Ca}_3 (\text{PO}_4)_2$ exists in bones of animals. Fluor Spar Ca F_2 native Calcium Sulphide, Ca S, formed in soda ash process. Calcium penta-sulphide, CS_5, a soluble compound.</p>	<p>(f) Sr $(\text{NO}_3)_2 + 5\text{H}_2\text{O}$. Same. Same.</p>	<p>(f) Ba $(\text{NO}_3)_2$ Same. Same.</p>	<p>(f) Mg $(\text{NO}_3)_2 + 6\text{H}_2\text{O}$ Same. Same.</p>
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PUBLIC SCHOOL DEPARTMENT.

USEFUL KNOWLEDGE.

(From the Royal Reader No. 3.)

CLOTHING.

Cotton.—What is Cotton? It is the soft down that grows in the seed-pod of the cotton plant.

Where does this plant grow? In the United States, and in India.

How is the Cotton made into Cloth? It is spun into yarn, and then woven into a web of cloth.

Where are the chief seats of its manufacture? Manchester, in England; it is also manufactured largely in Canada and the United States.

What is Cotton Cloth generally called? Calico, from Calicut, in India, where it was first made.

What is Nankeen? A kind of cotton, naturally of a yellow colour, first made at Nankin, in China.

What is the finest kind of cotton? Muslin; much used for ladies' dresses. The best is made in France.

Linen.—What is Linen made from? From the threads in the stem of the flax-plant.

Where does this plant grow? In Ireland, Holland, Germany and Russia.

What do we get from the seeds of the flax-plant? Linseed oil and meal; and oil-cake, with which cattle are fed.

What is Damask? Linen with figures woven in it; so called from Damascus, in Syria, where it was first made.

What is the finest kind of Linen? Cambric; so called from Cambray, in France, where it was first made.

Wool.—What is Woollen Cloth made from? From the fleece of sheep.

Where is it chiefly made? In the West of England, in Yorkshire, and in many towns of Canada.

What is Worsted? It is the name given to the coarser kinds of woollen stuffs, as flannels. It is also the name of the woollen thread or yarn used in knitting stockings.

What is Merino? It is a fine kind of woollen cloth; so called from the Spanish merino sheep.

Does all our Merino Wool come from Spain? No; the merino sheep is now reared in Australia and in America, and much of our merino wool comes from these countries.

What is Alpaca? It is a silky woollen cloth, made from the hair of the Alpaca sheep, which lives in Peru, in South America.

What is the finest kind of Woollen Cloth? Cashmere, made from the wool of the Cashmere goat.

Silk.—From what is Silk made? From the fine threads made by a caterpillar called the silk-worm, and wound round its body before it turns into a chrysalis.

Where did the Silk-worm first come from? From China; but it is now reared in all the warmer countries of Europe, especially in France.

What is Ribbon? Silk woven in narrow webs or bands.

What is Satin? A closely-woven and glossy silk fabric.

What is Sarcenet? A very fine, thin silk, first made by the Saracens.

What is Velvet? A thick silk cloth, with a shaggy pile on the surface.

What is Velveteen? Cotton Velvet; an imitation of silk velvet, made of cotton.

What is Crape? A kind of gauze, made of raw silk, and stiffened with gum-water.

Lace.—What is Lace? A fine kind of network, made of loops of linen, cotton and silk threads.

Where is the finest lace made? What is called *real lace* is best made at Brussels: it is made of linen-thread.

Of what is common Net made? Of cotton-thread.

What towns in the British Isles are famous for Lace-making? Nottingham in England, and Limerick in Ireland.

Leather.—What is Leather? The skins or hides of animals, made clean, soft and lasting by a process called tanning.

What is Morocco? A very soft kind of leather, made from goats' skins; so called because it was first brought from Morocco, in Africa.

What is Chamois? The soft leather made from the skin of the Swiss goat.

Hats and Caps.—Of what are Men's tall Hats made? They used to be made of the skins of the beaver; but they are now made of a silk cloth, with a long nap on it like the beaver's hair, and are called silk hats.

Of what are Caps made? Of woollen or worsted cloth.

What is Felt? Woollen cloth pressed and beat till it becomes close and stiff.

Of what are Ladies' Bonnets and some kinds of Hats made? Of the straw or stems of wheat plaited together.

What part of England is famous for Straw-plaiting? The countries north of London, especially Bedfordshire.

Gloves.—Of what are gloves made? Of woollen and worsted cloth, of cotton and linen thread, and of different kinds of leather.

Of what kinds of Leather are they made? Of dog-skin, doe-skin, calf-skin, and especially of *kid*, the skin of the young goat.

Where are the best Kid Gloves made? In Paris and Grenoble, in France.

COMMON THINGS.

Paper.—From what is paper made?

From cotton and linen rags, and from different kinds of straw.

How is it made? First, the rags are torn into very small shreds, and boiled till, with the water, they form a thin pulp not unlike gruel.

What is done with this Pulp? It is passed through a machine, in which it is strained, dried, and pressed, and so becomes a web of paper.

What is now much used in making Paper for printing? A kind of grass that grows in Spain.

From what does Paper take its name? From the *papyrus*—a plant which was used by the Egyptians for writing on.

What is Rice Paper? Paper made of the pith or rind of the rice-plant, used by the Chinese.

What is Blotting Paper? It is soft, porous paper, unsized.

How is paper sized? By the addition of a thin resin, which makes it to some extent water-proof.

From what is Brown Paper made? From sacking, canvas, and other coarse hempen materials.

How are Paste-board and Card-board made? By pasting and pressing together several layers of paper.

Ink.—What is Ink made of? Of gall-nuts and a preparation of iron, mixed with water and gum-arabic.

What are Gall-nuts? Little balls formed on those parts of the tender shoots of the oak where an insect has laid its eggs.

Where do the best Gall-nuts come from? From Aleppo and Smyrna in Asia.

Pens.—What are Pens made of? Of quills and of metal.

What are Quill Pens? The quills or wing-feathers of the goose, swan, or other bird; prepared, for the purpose of writing, by moisture and heating.

What are Metallic Pens chiefly made of? Of steel; but sometimes the points are of gold, silver, or platinum.

When were Steel Pens first made?
In 1803;

What were used as Pens in ancient times? Reeds cut and pointed like a quill.

Pencils.—What are Pencils made of? Of a mineral called black-lead or plumbago, enclosed in a small stick of cedar-wood.

Where is the best Black-lead found?
In Cumberland.

India-rubber.—What is India-rubber? The sap of a tree that grows in South America.

How is it got from the tree? Holes are made in the bark, through which the sap runs into clay cups or shells placed ready to receive it.

What is it like as it comes from the tree? It is white, and hardens in the air.

What is done to it afterward? It is moulded into bottles of a pear shape, and passed through the smoke of a palm-nut fire.

What is it remarkable for? It is water-proof, and very elastic.

Why is it called Rubber? Because one of its earliest uses was to *rub* out pencil-marks.

To what other uses is it now put? Coats, shoes, and caps are made of it; as well as combs, trays, and a great many ornaments.

Gutta-percha.—What is Gutta-percha? The sap of a tree that grows in the East Indies.

What is it remarkable for? It is tough, easily bent, and water-proof.

What things are made of it? Soles of shoes, water-pipes, speaking-tubes, picture-frames, cups, and many ornaments.

Why is it easily manufactured? Because a very slight heat softens it, and then it may be moulded into any shape.

Why is it used to cover telegraph-cables that pass under the sea? Because it keeps the water out, and because it keeps the electricity in.

Cork.—What is Cork? The outer bark of a kind of oak-tree.

Where does it grow? In Spain, France, Italy, and the north of Africa.

How is it gathered? The whole trunk is skinned of its bark once in every eight or ten years; for if the inner bark is uninjured, the outer bark grows again.

For what is it remarkable? It is very light, elastic, and proof against most liquids.

What is it used for? For making stoppers of bottles, net-floats, life-buoys, lining of shoes, and many other things.

Sponge.—What is Sponge? The soft skeleton of a sea-animal.

Of what does Sponge consist? Of a great number of tubes, which during the life of the animal are lined with a soft flesh like jelly.

Where is it found? Chiefly in the Mediterranean; the finest coming from the Grecian Islands in the Archipelago.

How is it obtained? By diving; the natives of these islands are trained to be divers from childhood.

Coral.—What is Coral? It is a stony substance, formed by little sea-animals.

Where do these animals live? They are most abundant in warm seas: some small kinds are found near Britain.

What is the form of Coral? It is sometimes in masses, but oftener branched.

What is a Coral-reef? It is a ridge of coral along a coast-line, produced by vast colonies of these small animals.

Are red and black coral the same as the common coral? No; they are produced in the interior of a fleshy body by similar small animals, which live at the bottom of the sea.

Pearl.—What is Pearl? A hard, shining substance, found in a shell-fish called the pearl-oyster.

Where is the Pearl-oyster found? Plentifully in the seas about the East

Indies; also in the Persian Gulf, and in several parts of Europe.

In what parts of Europe? On the coasts and in some rivers of Scotland; and in a river in Bavaria.

How is Pearl-fishing carried on? Chiefly by diving; in the same way as sponge and coral are obtained.

What is Mother-of-pearl? It is made from the shells of the pearl-oyster.

Glass.—What is Glass made of? Chiefly of sand or flint, and potash or soda, melted together in clay vessels.

Where is the best Sand for Glass-making found? In Norfolk, and in the Isle of Wight.

What are the chief kinds of Glass? Flint-glass; crown-glass, and plate-glass.

For what is Flint-glass used? For making tumblers, wine-glasses, and other articles for domestic use.

How are these articles made into the required form? By blowing through a long tube, and by moulding.

For what is Crown-glass used? Chiefly for windows.

How is it made into sheets? By twirling a mass of soft glass on the end of a rod rapidly before a furnace.

What is Plate-glass? It is the finest kind of sheet-glass, and is made by pouring the melted glass upon an iron table. The surface is then ground and polished.

What is done to all Glass after it is made, in order to make it less brittle? It is *annealed*, or slowly cooled after being brought to a great heat.

Sealing-wax.—What is Sealing-wax made of? Of a resin called shell-lac, mixed with Venice-turpentine, and some colouring matter, as ivory-black or vermilion.

What is Shell-lac? It is a crust formed on certain trees in the East Indies by an insect.

What is Venice-turpentine? A thick, sticky substance, which oozes from the larch-tree.

How is Sealing-wax made? When

the materials are mixed, they are rolled into rods on a hot marble slab.

Gum-arabic.—What is Gum-arabic? It is a sticky juice, which oozes from the acacia-tree in Arabia, Egypt, &c., and hardens in the air.

Glue.—How is Glue made? By boiling the parings of hides, and the sinews and hoofs of animals, till they turn into a firm jelly, which hardens as it cools.

How is it prepared for use? A pan containing the hard glue and a little water is placed in another pan containing water only; and as the water in the latter heats, the glue melts.

What is Gelatine? It is a fine kind of glue, made from the skins of animals, and used for making sweet jellies.

What is Isinglass? It is a still purer kind of glue, used for the same purposes as gelatine, and made from the sounds of certain fishes.

Soap.—Of what is Soap made? Of fat or oil boiled with soda, which has been mixed with lime.

What is White-soap? Soap made with pure white tallow.

What is it called when scented, and moulded into cakes? Windsor-soap.

Of what is Yellow-soap made? Of resin, and palm-oil instead of tallow.

Of what is Soft-soap made? Of whale or seal oil and tallow, mixed with pearl-ash instead of soda.

Whalebone.—From what is Whalebone obtained? From the Greenland whale.

Is it made from its bones? No; it is found in its upper jaw.

How is it arranged there? In a series of plates or blades, having fringes of coarse fibres.

What purpose do these serve? They form a kind of strainer, to separate the food of the whale from the water which carries the food into its mouth.

What does the Whale feed on? On very small fishes.

Why must it take very small fishes? Because it has a very narrow throat and no teeth.

How is Whalebone manufactured? It is first softened by boiling; then cut into strips: and when it cools it is harder than it was at first.

EDITORIAL NOTES.

The following circular letter has been sent to us for publication by a Public School Inspector who considers it his duty to warn his fellow Inspectors and teachers against the attempt now being made by W. J. GAGE & Co., publishers, Toronto, to induce them to violate the regulation of the Education Department, by acting as their paid agents.

TORONTO, Feb. 1st, 1881.

DEAR SIR,

We have mailed to you a specimen copy of an attractive new periodical, Gage's School Examiner and Monthly Review, and shall be pleased to have your opinion of its merits, as well as your influence in its favor among the Teachers in your Inspectorate. The price is one dollar per annum.

We are anxious to obtain some one in every County to push its sale, to whom we are prepared to allow a liberal commission, viz: fifty per cent. (50%). If you cannot see your way to take up the matter yourself, we shall be greatly obliged by your kindly recommending a smart, live man, among the teachers in your County, who will undertake to press the introduction of the paper.

We are,

Yours Faithfully,

W. J. GAGE & CO.

* In the *Examiner* the price is given as \$1.25.

This communication does not require to be characterized by us; it is free from all ambiguity, and makes its dishonourable advances with all the cool effrontery that comes of a man accustomed to "ways that are dark."

The motives that prompted the issuing of the circular are simply atrocious; there is here revealed a deliberate attempt to inveigle school officials into entangling alliances with a publishing firm in direct violation of the regulations issued by the Minister of Education. This firm asks Inspectors to become its paid agents, and offers any "smart live men" they may recommend the encouraging *douceur* of 100 per cent. commission on all subscriptions they can obtain for this new publication. *The Examiner*. To the pedler this journal costs only 50 cents; to the teacher and the student it is \$1.25 and the profit to the "smart live man" is just 75 cents for each subscription taken. The means employed by this firm to debauch a class that should be removed from all such corrupting influences as this circular shows are in active operation, and that can ill afford to be taxed for the support of any one, much less a publisher, who prizes them as many tools to bring gold to his mill, calls for prompt action on the part of all who have the good of our schools at heart. It is a fact that the journal is supplied free to all Head Masters of High Schools, and to all Public School Inspectors. Why does Mr. Gage draw the line at public school teachers and students and ask them to pay for his advertising ventures? The *Journal and Examiner* are supplied free to those who this "smart live" publisher thinks are influential men in

the profession, no doubt in the hope that some of these gentlemen may be induced to act as his book pedlers and trade touters in the localities where they live. We are not the first to call public attention to this disgraceful attempt that is being made by this firm to bring the profession into utter contempt.

A Contemporary thus deals with it under the heading

"A SCANDALOUS CIRCULAR."

We have more than once had to call attention to the persistent tampering with the honour of the profession on the part of a Toronto publishing house whose questionable advertising arts and unconscionable greed lead it systematically to tempt Inspectors and Teachers to violate the Regulation of the Education Department against acting as paid agents for publishers. The latest operation of the firm in question will be seen from the sub-joined circular, which has been sent us by an indignant Public School Inspector who resents being "approached" by this or any other firm in the manner indicated, and deems it "a righteous discharge of public duty" to disregard its confidential character, and expose its insidious attack upon professional rectitude and official propriety.

This new call, to hawk through the Inspectorate a trade organ, by a publishing house having intimate relations with the Education Department and the Central Committee, can surely not be sanctioned by the Minister of Education, who professes, in the stringent law he has drawn up for the guidance of the profession, to keep Teachers from being made the tools of greed and the serfs of an empty pocket. But we are not sure on this point, as this new attack on the morals of the profession is so kin to the other advertising arts of the house in question—such as making gifts to the Inspectors of books

published by the firm, and the *free* distribution, where the favour will do most good, of another *quasi*-professional organ owned by the house—gratuities which are so freely spoken of, and in many instances denounced, that we can hardly think that the corrupt practice is unknown to the Minister. Of course, it may and doubtless will be said, that this is no concern of ours, and still less would it be, if the publishers of the *School Journal* and *Examiner* issued their serials for nothing. But this would only be true in the latter case, for we should not then see honest men tampered with, and solicited to tout in the name of Education for a journal which takes one dollar from a fellow-teacher to put half of it, as a *douceur*, in his own pocket and the other half in that of the publisher. The effrontery of the firm in this matter is the more apparent when it is recalled that the announcement emanates from a publishing concern which proclaims from the housetop its regard for the teacher and its scrupulous consideration for his pocket—protestations significantly indicated by charging him a dollar for what the house itself appraises at fifty cents—the balance to be illegally used to corrupt him who would rob, in the interest which both have at heart, his fellow-teacher of the difference. No wonder that our correspondent speaks of the proposal as "an insult to his official position, and a personal affront to himself." It is to be hoped that the Minister will act in this matter. It is quite time to suppress such scandalous tampering with the profession, and to save the teacher from his "friends."

The *Canada Educational Monthly* condemns the literary thefts practised by a trade journal, published by Messrs. W. J. Gage & Co., Toronto, in the following terms:—"Those of our readers who have the edification of occasionally perusing the *Canada*

School Journal would perhaps notice with a smile how adroitly, yet dishonestly, our contemporary had garbled the extract from the *New England Journal of Education* which appeared in our last issue, in transferring it into its own pages. The *School Journal* prefaced the extract with a few words of its own, commending our *New England* contemporary "as a paper which takes considerable pains to keep itself well informed of educational matters in Canada." So as not to belie this expression of its opinion it nonchalantly omitted from the extract the erroneous enumeration of the component parts of the Central Committee, viz., "Chief Superintendent, the Council of Public Instruction and four Public School Inspectors!" The conductors of the *Canada School Journal* are on a fair way to earn a reputation for forgery. This is the next step after garbling a quotation."

In the November number of the *SCHOOL MAGAZINE* there appeared a paper on "*History in our Public Schools*;" in a subsequent issue of the *Canada School Journal* this subject was discussed in the same way, and that too without giving the author of the article in the *SCHOOL MAGAZINE* any credit for it whatever. This system of literary pilfering is not new to the management of the *Journal*; they have been guilty of other acts of a character that cannot in all cases be explained away by similarity of mental development, and yet this is the periodical that claims to be par excellence the organ of the teachers of Ontario. We deal in no vague generalities; if the *Journal* demand particulars and ask for instances, we are prepared to give them at any time. The western "road agents" who loot a coach or a caravan are noble characters in comparison with the literary Coyotes who prowl around the outskirts of honest labor ever ready to snap up whatever is unguarded. A recent writer in the

London Times thus speaks of these pseudo authors: "I can protect my horse, my rings, the saucepans my cook uses, the spade my gardener works with. But I cannot protect that work of my own brain which without me could never have taken shape or seen the light, and must be more intrinsically and utterly mine than anything on earth."

We would call attention to the advertisement of the Ontario Mutual Life Assurance Company in this issue of the *MAGAZINE*. This Company is composed of its Policy Holders, who own all its property and funds, and control its management through a Board of Directors whom they elect from among themselves. The strength of the Company is seen in the ratio of its assets to its liabilities; this it claims is larger than that of any other Canadian Company. We have compared the cost of insuring in this Company with that of other Companies and find not only that the rates are lower, but that the dividends from profits are larger than those of any other Canadian Company. This Company is noted for its economical management, hence the large dividend to its Policy Holders.

Every prominent business man that we know of is insured. The man who decries life insurance places himself on record as against the judgment of the best financial ability of the country. The head office of the Company is in Waterloo, Ont., and the manager is Wm. Hendry, Esq.

Messrs. James Campbell & Son, publishers, Toronto, have patented a very convenient kind of Map Stand; it combines lightness with strength in its construction, it is 78 by 56 inches and can be used also as a black-board. A very good idea of the stand may be obtained from the engraving of it in the advertisement on another page.

The fourth convention of the Selkirk Teachers' Association was held in Winnipeg on the 18th and 19th inst.

The programme was as follows:

President's Address.

School Routine.—Mr. Stewart.

Phonetic Reading.—Miss Shore.

The Teacher and his Student.—Mr. Ferguson.

A Class in Grammar.—Mr. McIntyre.

Flaws in our School System.—Mr. Hart.

Object Teaching.—Mr. Garratt.

How to teach Arithmetic.—Mr. Smalley.

Rev. W. C. Pinkham, B. D. is president and W. H. McIntyre secretary.

The first instalment of the graded course of instruction announced in March is unavoidably crowded out of this issue; it will appear in the May number.

The article on "Optical Tests of Milk," page 81, was from *Scribner's Monthly*.

FACETIÆ.

Yes it's perfectly proper for you to say, "Now I lay me down," but when down then you lie.—*Eli Perkins*.

Professor (to senior who persistently refuses to recognize the fact that he is "flunking"): "Now, Mr. —, what is the trap rock?" Senior: "I can't, sir, recall the exact chemical composition." Professor—"Ah, very likely. There are not six men in the country who can." (Wild applause.)—*Tablet*.

A school-boy spelled d-e-c-i-m-a-l and pronounced it dismal. "What do you mean by calling that dismal?" exclaimed the teacher. "Cause it is," answered the boy. "It's dismal fractions. All fractions are dismal. There isn't a bit of fun in any of 'em."—*Ex.*

A certain Freshman was once, oddly enough, overtaken by brain fever. His friends feared to break the news suddenly to his beloved parents. To their astonishment, however, the parents, when informed, set up, not a dirge, but a paean. The young fellow's friends were amazed, but the secret leaked out: This was the first evidence that their son had any brains!—*Harvard Lampoon*.

Professor—"What does that expression represent?" Student—"That is the

sum of the moments of the elements." Professor—"Say it again." Student repeats. Professor—"That's it. I'm going to have you say that over until I impress it on your mind, as they brand U. S. on a mule."—*Acta Columbian*.

HAVE IT RAISED.—New trustee: "Well, Mr. Syntax, you have a very fair school here." Mr. S. "Yes sir, the school is well enough, but the curriculum is defective." New trustee: "What, the curriculum defective? We must see the architect at once about it and have it raised a few feet higher."—*Ex.*

The senior Greek professor in his lecture to the juniors the other day, speaking of the marriage of Venus and Vulcan, remarked "that the handsomest women generally marry the homeliest men," adding grimly, "there's encouragement for a good many of you."—*Amherst Student*.

Professor, lecturing on psychology, "All phenomena are sensations. For instance, that leaf appears green to me. In other words, I have a sensation of greenness within me." Of course no harm was meant, but still the class would laugh. *Ex.*