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THE

EDUCATIONAL RECORD

OF THE

PROVINCE OF QUEBEC,

PUBLISHED MONTHLY, UNDER THE AUTHORITY OF THE PROTESTANT COMMITTEE OF THE BOARD OF EDUCATION, AND CONTAINING THE OFFICIAL ANNOUNCEMENTS OF THE BOARD.

EDITED BY R. W. BOODLE.

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THE

EDUCATIONAL RECORD

OF THE

PROVINCE OF QUEBEC.

No. 10. OCTOBER, 1882. VOL. II.

INSPECTOR McGREGOR'S REPORT

OF THE ELEMENTARY SCHOOLS OF THE COUNTY OF HUNTINGDON, PART OF CHATEAUGUAY AND ARGENTEUIL, AND OF THE PROTESTANT SCHOOLS OF MONTREAL.

For the Year ending June, 1882.

HUNTINGDON, 8th August, 1882.

TO THE HON. GÉDÉON OUIMET,
Superintendent of Public Instruction.

SIR,—I have the honor of forwarding you the Annual Report on the state of Education in my inspection district for the scholastic year 1881-82.

EDUCATION.

Although the state of Education is not all that could be desired, the general tone and proficiency of most of our schools is very encouraging. The Montreal schools are admirably conducted by a zealous and competent staff of teachers under the superintendence of Dr. Robins, who takes a lively interest in all that pertains to the advancement of Education. The pupils of these schools are graded according to their attainments; the evident progress made in all departments, and the order and precision with which all changes from one class-room to another are effected, are subjects for congratulation. The Montreal School Authorities, in their earnest and successful endeavour to provide suitable accommodation and thorough education for the children, are deserving of the unswerving support of the Rate-payers. The number of pupils enrolled in the City Schools is 6,152, and the daily average attendance is 5,544, or about 90 per cent. The preceding numbers include those attending the Independent as well as the Public Schools.

Of the Country schools one or two generally in each Municipality excel all the rest. Many circumstances contribute to their superiority, such as the natural and acquired qualifications of the teachers, the parents' appreciation of education leading them to give practical force to the teachers' injunctions in directing the studies of the children, regularity in attendance, and suitable school-houses, school-furniture and appliances. In order to bring the light of these superior schools to bear on those of less note, we held Competitive Examinations on the following subjects: Reading, Writing, Arithmetic, Dictation, Grammar, Geography, British and Canadian History, and Drawing, in all the schools in each Municipality in the Counties of Huntingdon and Chateauguay. The Prize-winners at these Examinations again competed at the close of the scholastic year for the honor of being esteemed the best scholar in the District, at a written Examination held in the village of Huntingdon with the following results :—

Standing.	Name.	Municipality.	District No.	First in.
1st.	Miss Jennie A. Ferguson	St. Anicet	4	British History, Arithmetic, and Dictation
2nd.	,, Elizabeth Maw	Ormstown	2	Drawing, Geography and Grammar
3rd.	,, Minnie R. Cameron	Huntingdon	1	Reading
4th.	,, Annie McGill	Ormstown	5	Writing
5th.	,, Georgina Watson	Huntingdon	1	Canadian History
6th.	,, Matilda A. Arnold	Dundee	4	Map Drawing
7th.	Mr. William Walsh	Ormstown	2	Equal with Miss Ferguson in Arithmetic.

The above successful competitors are numbered according to the marks made, and the subjects in which they stood first, indicated. Many others taking a secondary position in some of the subjects deserved "Honorable Mention". The Examinations on the whole proved satisfactory, and doubtless will be an incentive to greater exertions on the part of all having the young people's interest at heart. Sacred History and Book-keeping (Single Entry) are to be added to the programme for the Examinations during the current year. In classifying the Elementary Schools according to the programme of studies sanctioned by the Council of Public Instruction, only five can be placed under the head, 1st Class; while 155 may be creditably placed under the head, 2nd Class. Many of the latter Class are doing the work assigned to, or prescribed for, Model Schools even more efficiently than some of those so styled. Permit me here to mention a few schools that ought to be denominated—what they really are—Model Schools. They are the following :—

School District, No. 2. Ormstown. School District, No. 1. Huntingdon.
" " " 1. Dewittville. " " " 5. Hemmingford.
" " " 1. St. Andrews. " " " 2. Chatham No. I.
" " " 1. Lachute.

But in the case of Huntingdon and Lachute, they have excel-

lent Academies, and are therefore not so much in need of Model Schools.

Drawing and Book-keeping, to some extent, are taught in the majority of our schools, but the teaching of Agriculture is totally neglected.

The number of pupils in the Country schools between 7 and 14 years of age is 4,326; the number enrolled on the School Register is 4,942, and the daily average attendance is 3,049, or about 61 per cent. Thus it is seen that irregularity in attendance is one of the principal hindrances to the progress of education in the country.

There are 5 Model Schools, 2 Convents, 2 Academies, 2 High Schools, 1 Normal School and 22 Independent Schools in this Inspection District—all doing good work in their respective spheres.

TEACHERS.

The staff of teachers consists of 381, 68 males and 313 females. Of these, 50 males (of whom 7 have no Diplomas) and 236 females (of whom 10 have no Diplomas), are teachers in the Schools under control; the rest, 18 males and 77 females, are teaching in the Independent Schools. The male teachers without Diplomas are Professors of special Branches in the Montreal Schools, and have University Degrees. Of the female teachers without Diplomas, 6 are nuns in the Convents of St. Anicet and Hemmingford; of the other four, one is teaching an Independent School, subsidized, however, by Chatham No. II.; another in Harrington No. 1. has a "Third Class Certificate" from Ontario; the third is an assistant teacher in Grenville No. II.; and the fourth was teaching in the School District No. 9, Grenville No. I.

Teachers are not overpaid anywhere, and the pittance they sometimes receive in the country indicates the value which both the Commissioners and people place upon Education. But frequently the teachers themselves are to be blamed for accepting a situation with a salary insufficient to board and clothe them decently. There are many, who never spend much time or money in qualifying themselves, ready to accept whatever wages are offered, and thus keep down the teachers' salaries almost to the starvation point, while remuneration in the other professions is gradually increasing. It would be an act of justice were the Legislature to enact a law fixing the minimum salary at two hundred dollars per annum.

We would recommend all teachers, not already armed, and those intending to become teachers, to go through a regular course of training in the Normal School, though we know some with only Diplomas from the "Montreal Board of Examiners" giving as good satisfaction as the most successful of those holding Normal School Diplomas; yet, doubtless, additional training in that Institution would render the labors of the former still more

efficient. Teachers, like poets, must be teachers born; for, unless they possess those natural gifts and talents so essential to their profession, no amount of intellectual training will ever make them successful.

Commissioners and Trustees.

These, as a rule, are men of energy and intelligence and discharge their duties well, but there are a few whose ideas of Education and Educational Institutions are not up to the times, thinking and acting on the supposition that "What was good enough for the fathers is good enough for their children." They may with propriety be styled "Obstructionists," as they generally oppose every measure proposed tending to improvement or progress. In some instances they never visit their schools systematically, and consequently know nothing definitely of what is being done, or what is required within the school-room.

It seems to me that it would be productive of much good were the Commissioners and Trustees to adopt, for the use of their schools, an attainable programme of studies for each of the semi-annual visits, present the teacher of each school with a copy of it, at the beginning of the session, for her guidance, and recognize the successful examinations by increasing the salaries of the teachers concerned; and *vice versa* when unsatisfactory, unless sufficient reasons were given why the pupils were not well up to the prescribed standard.

Secretary-Treasurers.

The authorized system of keeping accounts is adopted by nearly all the Secretaries, and their books are well kept. With few exceptions, the teachers are paid up for each half-year before the Semi-Annual Reports are forwarded to the Educational Department. There is still considerable trouble in some municipalities in collecting the school-rates and monthly fees on time. The financial affairs, except in Montreal—where, doubtless, it will soon be rectified—are in a healthy condition. They are all discharging their duties faithfully, correctly, and neatly, therefore it would be invidious to specify one more than another in the matter of book-keeping.

School-Houses.

There are but few school-houses in this Inspection District worthy of the name; many of them being no better than hot-beds of disease—too small, irregularly heated, and without proper means of ventilation. But steps are being taken to improve on the old order of things. Those that have been recently built and those that are now in course of erection are of a better class and are furnished with improved desks, &c. It was a wise enactment to have all plans and specifications submitted to the Superintendent for his approval. Chatham No. I. ranks first for the quality

of their school-houses—there being eight, comparatively new, comfortable, commodious and well-furnished. Godmanchester and St. Anicet No. II., have agreed to replace the old school-houses by new ones, and have already commenced operations. Hemmingford is putting up a handsome building in the village; the municipality requires several others, and so does the Dissentient municipality. There are three new ones needed in Havelock; those in Franklin require renovation: in short, there is not a Municipality, except Huntingdon, that will not have to over-haul its schools. All are deficient in regard to school-furniture and appliances.

INSPECTOR.

The Inspector made 261 official visits, spending from 2 hours to 3 days, according to the requirements of the school, examining it; held 10 Competitive Examinations; distributed the Prize-books, generally for proficiency, regularity, and improvement in writing; was frequently in consultation with the Commissioners and Trustees relative to Educational affairs; examined the Books of the Secretary-Treasures; but had not been able to visit the Schools of Argenteuil twice, though he attended to the best of his ability to all the duties of his office.

I have the honor to be, Sir,
Your obedient servant,
JAMES McGREGOR,
School Inspector.

Through the courtesy of the Education Department, we have been enabled to present our readers with the above Report of Mr. McGregor, upon the Elementary Schools in his Inspectorial District. We believe that the official statement of the opinions and work of the school Inspectors should have the fullest circulation among teachers, Commissioners, and the public generally; and we therefore propose to publish from month to month Reports of the Inspectors from the English-speaking districts, with editorial remarks upon any points which call for special notice.

Inspector McGregor is certainly to be congratulated upon his first Annual Report. There are several features in it which encourage us to look for marked improvement in the schools under his inspection. The inauguration of a series of Competitive Written Examinations for the Elementary schools of the district is a very important step and cannot fail to have a beneficial influence upon the schools generally.

The practical difficulties which attend the carrying out of such a scheme with schools scattered over a wide area are very great,

and have been urged hitherto as an insuperable obstacle to the introduction of such Examinations in the district schools. We have, however, in this Report a simple statement that the Examination has been held and the results are given. There is no reference to serious difficulties encountered. Difficulties, no doubt, were experienced, but they have given way before the importance of these Examinations, and instead of abandoning them as impracticable, it is proposed to extend and improve them another year. We regard this as an important step, and one which other Inspectors will do well to take note of. We know that Written Examinations alone are neither a perfect test nor a fair test of work done, or of a pupil's attainments; but taken in connection with the other means at the disposal of the Inspector, they form a valuable test and means of comparison and also exercise a strong educational influence.

The absence of any definite programme or limit of studies for the guidance of the Elementary school-teachers, is very properly noted in this Report. This is a difficulty which is felt throughout the English schools of the Province, and deserves careful consideration. Even with a body of trained teachers, a well-defined programme of studies is an important element of successful work. And to the young and untrained teachers, to be found in so many of our district schools, some programme is absolutely necessary, if satisfactory results are to be attained. If a general programme of studies, which with slight modification would apply to most Elementary schools, were proposed by the Education Department in consultation with the school Inspectors, it would no doubt be adopted by the different Municipalities. It is to be hoped that an effort of this kind will be made at no distant date. There are several other points in this Report to which we would like to refer, but as they will come up in connection with the Reports of the other Inspectors, we shall defer our remarks until these Reports are printed.

THE BRAIN AND EDUCATION.

Few natural laws are more widely known or more generally abused than that expressed in the aphorism, "every part of the animal body grows exercise." The brain is part of the body—*ergo*, it grows by exercise, and, by a facile fallacy of inference, the more it is exercised the more it will grow. Whereas, although

it is of course true that the organ of the mind forms no exception to the law of "development by use," it is only in a very limited sense the fact that brain-work promotes brain-growth, and it is of the utmost importance that the precise conditions under which it so acts should be generally understood.

The brain does not grow in bulk or weight after a comparatively early age. Before the period of physical growth is completed, mental straining would be like racing a two-year-old colt, and almost inevitably issue in a break-down; and subsequently to that period there can be no question of increase in the quantity of brain-cells or molecules; the limits of development as to mass, though perhaps not as to weight, are then finally determined. The only physiological opportunity for development which remains after the age of childhood relates to the development of special qualities, capacities, or properties in the cerebral elements. Any rough application of the principle, that growth is stimulated or in any way promoted by exercise, must therefore be inadmissible in brain-culture during youth. Growth is not the end to be attained in this stage. The object to be gained is the internal arrangement of brain-molecules, under the reflex influence of special processes of activity. The means to this end is training as distinguished from mere exercise. This is an important distinction. It is not work for mere work's sake that is wanted to cultivate the brain of a youth, but a skilful eliciting of cerebral function by education tending to formulate the energy of brain-tissues by leading or constraining it to useful lines of action. Brain-tissue is, so to say, a more costly part of the organism than any other; it is less easily repaired than other tissues, and needless waste by consumption in purposeless use is to be deprecated. Brain-work is only of use so far as it trains; it cannot promote growth, for the simple reason that growth after the earlier years of life is physiologically impossible. The measure of brain-growth is practically fixed by hereditary force, and this force operates more powerfully in regard to brain-tissue than to any other element of the body, so that mischief is peculiarly likely to result from abuse of the known laws of "development" in respect to this particular organ.

It follows from these general considerations that those who have the care of youth, and persons in authority who by their official regulations determine the nature and course of the educa-

tional process to which the young are subjected, should so limit the exercises they impose or enjoin, as to minimise the expenditure of energy; while securing that, when put forth, it shall be so controlled as to lead out the faculties of the mind in healthy and useful directions. A well-developed brain implies a well-ordered mind; without order the intellectual powers can never be strong in action, and are always likely to break down, or prove self-destructive. The method of education which seems to find increasing favor with the preceptors of youth, and which is distinctly encouraged by the mischievous system of competitive examinations now ruthlessly forced on the population by enthusiastic but short-sighted legislators, is most disastrous; it disregards the main purpose of mental culture—namely, training, and treats the brain as it would treat a muscle, seeking to force its growth by exercise. The popular notion would appear to be that any fairly intelligent youth must benefit by work; whereas every exercise he performs involves an expenditure of cerebral tissue which cannot be replaced. Muscle may be replaced because it is, so to say, all of a piece. It is not permanently stamped with the impress of any act which it has performed. The cells or molecules of brain-tissue are permanently impressed by the use made of them. Every fact "committed to the memory" is impressed on some molecule, or set of molecules, and these afterwards form the physical basis of the record retained. Doubtless there is a wondrous power of adaptation in the brain, which enables it to perform the most complex acts of mental function, and the impressible particles of a healthy cerebrum are abundantly sufficient for a long life of intellectual activity; but the supply is not unlimited, and by excessive or disorderly "work" in youth, the mental capacity may be so squandered that when adolescence or full manhood is reached there will be no power to make new acquisitions of knowledge, and barely any opportunity for improvement in regard to the stock of information possessed.

Before the age of seven nothing ought to be attempted in the shape of "teaching" except what may be taught indirectly by example, or, almost unconsciously, in the ordinary communication of impressions. The sole aim of the educator should be to develope by habit the faculties of observation, and mind-storing, with the closely connected power of recalling mental impressions at will, which we call "memory." The simplest processes of induc-

tive reasoning may be developed practically, by suggesting lines of thought to the child mind, but there should be no teaching, properly so called. Subsequent to this stage—*i.e.*, the stage of brain-growth—economy of mental energy is not less important than the guidance of such force as may be liberated, or exercised, on lines calculated to develope and train the faculties for useful work. There are exercises which are needful for what seem to be purely educational purposes—that is to say, for the effects they produce on the mind or brain reflexly. For example, the dead languages, the higher mathematics, and perhaps logic, are chiefly valuable for the influence they exert in eliciting and training certain faculties or forms of thought. Such exercises are, in a practical sense, among the most important to the future integrity and efficiency of the brain which the educator can employ. The mere accumulation of what is called knowledge is not brain-training, but brain-burdening, and may easily be pushed to the extreme of brain-straining, with the result of a complete and ruinous break-down. This is especially likely to arise when, as often happens, there has been little or no wise training in early boyhood, and the mind or memory is so severely taxed for examination purposes later in youth.

A multitude of cases might be instanced in which boys who have not been trained for intellectual exercises at the outset of life have been urged or lured to make a great effort, and have been mentally ruined in consequence. No care bestowed on the manner of work can suffice to compensate for an original lack of power, or obviate the defects of a disorderly constitution of the intellectual apparatus and functions. It is no more possible to make an intellectual giant of a mental dwarf than it would be to develope a Hercules out of a mannikin. By the artice of mind-forcing and "cramming," the memory—a low-class faculty often prominently developed in the case of idiots—may be made to retain for a time the necessary material for exhibition at some examination table; but if the undeveloped mind is incited to intellectual action in the process, the result must be untoward. The untrained boys who survive the process of forcing and cramming, and retain their mental health, are for the most part those of somewhat obtuse and insensitive cerebral capacity, who take in their knowledge as beasts of burden carry a load—without either interest or worry. A sensitive boy, who has been untrained,

will feel his inefficiency so acutely while his memory is being loaded with unappropriated information, that he will fret and worry until he falls ill, either before or after the requisite quantity of "learning" has been deposited in his memory. There can be no such thing as real brain-work without power, and such power implies mental training following upon healthy growth. It is in practice a grave error to suppose any brain may be developed by mere exercise. The result of an attempt to develope it by this agency, especially in advanced youth, is more likely to ruin than to improve it.—*The Lancet.*

HOW TO KEEP THE LITTLE ONES EMPLOYED.

By Miss Reid, Girls' High School, Montreal.

Read before the Teachers' Convention, Sherbrooke, July, 1882.

Let us imagine ourselves in a school of four, five, or six distinct grades, with but one teacher for all. The term has just begun and about ten or twelve new pupils have entered. They have never been in school before, and can do nothing but gaze round the room or talk to their neighbours. The teacher has only time to give them two, or at most three, short reading lessons during the day. What are they to do while the other classes are reciting? They must not be idle, for we all know that "Satan finds some mischief still, for idle hands to do," and even if they can sit quietly without getting into trouble, it is not good as an early training. Let us suppose that the teacher has taught them, as a first lesson in reading, the four little words *is, it, in, ill.* You will at once see by this supposition, that I take it for granted, that no teacher tortures herself and her pupils, by teaching them all the letters of the alphabet before allowing them to try words.

After having spent ten minutes in teaching these four words, write the letters *i, s, t, n, l,* on the black-board, and allow the class to copy them singly first, and then combine them into the four words. This will keep them busy for some time, and in a short time they will be able to copy, from their books or from cards, the first two or three lessons; and in about a month they will be able to copy *any* lesson. Two or three minutes after the reading lesson, to put the new letters on the board, and give a few directions, and two or three minutes more when the next

class has finished reciting, in order to look at the slates and point out where improvement is needed, or where the pupil has done especially well, is all the time that the teacher need expend on this, and yet not only are they interested, but they have also learned to write.

Little children are easily tired, and it does not do to allow them to work at the same exercise for more than twenty minutes, at the most. Restlessness is nature's cry for change, and is therefore a good guide to the teacher, as to how long her lesson hours should be. To fill up the time we must have some other means of employment. Give them the numbers 1, 2, and 3, with their names. Let them copy these for a short time, and then call out the numbers and get them to form them on their slates. This is an easy test of their knowledge of what they have been doing. Later in the day give them 4, 5, and 6 to copy, and then test their knowledge of the six characters in the same way, or by pointing to them and calling on individuals to test their names. In two weeks the quick children will be able to write up to 20, either from memory or dictation; some of the others may take longer, but do not be discouraged, it is the slow persevering pupil that generally wins in the end.

These are two of the *necessary* exercises for children, but without something to relieve the monotony they will find school very dull, and wish they might stay at home and play. An unfailing source of amusement to young children is drawing, and of all systems none is so simple and so well adapted to our wants in this case as that of "freehand drawing". Give them the five dots or points in a square, let them practice the correct placing of these points for several lessons. After they can place them correctly, draw a simple figure by means of the points and ask them to copy it; they will be so much interested, that for at least ten minutes every sense necessary to its completion is strained and silence will prevail.

But I hear some teacher say, "It is very well for teachers who have been taught this method of drawing to teach it." Very true, but any teacher of ordinary intelligence, who gets one of Prof. W. Smith's manuals, and looks at the figures and reads the directions, will have no difficulty in providing this means of amusement for her younger classes. The *clever* teachers will be able to do this without the aid of a manual.

Do not give them too many new figures to begin with; and insist on that which is given each day being correctly drawn before trying the next. After giving them several, try the nine points in a square; this arrangement gives you a greater variety of designs than the last, and thus keeps up the interest. After they have had a number of these exercises, get them to *design* a figure. "*These* children design a figure?" I hear some one ask. Yes. I have tried it myself in a country school and it succeeded admirably. It is very true, as Prof. Smith of Boston recently said in Montreal, that many of them were too intensely original to be reproduced; but nevertheless some of them were very good, and the second trial was a decided improvement on the first.

You might, with success, vary the drawing by asking them to draw from memory any particular animal which they are accustomed to see; it is wonderful with what accuracy they will outline a cow, a horse, a rabbit, or any other animal. Ask them to draw a gate, any gate that they think nice, or ask them to draw the pattern of a gate, distinguishing a garden gate from a road gate, &c.

As another variation get them to draw a house with a kitchen attached; at another time let them draw a few trees near the house for ornament. This latter will be rather difficult for the very little ones and would do for the older pupils; though the little folks, having nothing to do at home, try these things on their slates and make very successful attempts. If any teacher expects perfection in any of these exercises she will be sadly disappointed, unless her pupils are much cleverer than those who have come under my care. This exercise may also be varied in the summer season by asking the little ones to get a number of leaves, enough of one kind to go round the class—leaves of simple form for the first few trials—and get them to draw these; then afterwards give them leaves of more complex form, always teaching the name of the tree or shrub from which they have been taken.

Drawing maps of the table and the objects upon it, or of the school-room or play-ground, gives to the children a good idea of relative positions. The ingenious teacher will have no difficulty in keeping up the interest by the varieties which this exercise affords.

There is another source of amusement which is practicable for any teacher who has a good supply of energy. Get a number of

frames made like this. It is merely two slips of wood, one being only about half the width of the other, tacked together so as to leave a small space between, just sufficient for a card to be slipped in and kept firmly in its place. There will be no difficulty about making these frames, for any of the older boys will be proud to be entrusted with the work, and will make them quite well enough for use in school. After securing these, get the same number of boxes, either of wood or pasteboard, and fill them with small cards having a letter on each, the capital on one side and the small letter on the other. These may be colored or not, and as children like bright things, it is better to have them colored. Give each child a frame and a box of letters, and get them to form the words of their lesson on the frame. They will only be able to form a few words at a time, as the frame is not large but they have to find the letters, and that takes some time. At another time let them form as many words as they can from memory. Or give them a certain number of letters and let them see how many words they can form with them. At another time give them the letters of one long word and let them try how many words they can make with these,—a good lesson in planning.

Many other plans or variations will suggest themselves to different teachers. If the cards are colored, they might be set to work to place in piles the cards, according to color, counting them at the same time. They might also separate them by considering the different letters. Get them to place these, or any other set of colored things, together according to their individual tastes, showing them afterwards whether the contrast is good or not.

Copying the reading lesson on the slate is a very good exercise, both in writing and spelling. The copying of examples from the black-board is very necessary. How often we are obliged to take marks off in examination for examples that are *copied* incorrectly; if children are accustomed to copy carefully they will not make these mistakes so frequently.

But I must hasten on. After they have learned to write fairly well, printing may be introduced with great advantage, and this also becomes a source of pleasant and profitable employment. But in all these exercises let the teacher be careful *never to allow the pupil to put away his slate without having looked over the work*; for if the work is not looked at by the teacher, the pupil soon becomes

careless, and thereby much of the interest will soon die out. And last, but not least, is the study of the lesson an important item in the filling up of spare time. A young child should have no study out of school, unless it be by its own wish, and a teacher who endeavors to teach her pupils *how* to study, has done for them that which none can too highly appreciate.

I might describe other methods which I have seen used, but these I think are the most practicable, and therefore the best. Many of the teachers present will doubtless have tried these means, but it is my earnest hope, that these few directions may be of some use to those who are about to enter the profession or have only done so recently. I shall be much pleased if any teachers present who use other methods will give us the benefit of their experience; for it is only by exchange of ideas that we can best succeed as teachers.

GERMAN COMMON SCHOOLS.

By D. C. Macdonald.

School-visiting in Berlin, Prussia, is not like school-visiting in this country. Here the matronly visitor puts on her spectacles, takes her knitting work in her hand, steps over to the school, knocks, walks in, and drops into the offered chair as easily and informally as if she were taking her place at the sitting-room stove at home. Over here such a visit requires a formal permit, as much as it does to visit the arsenal or any of the public departments. The writer stepped one day into the great pile of brick and blue stone which forms the City Hall of the Paris of the Spree, hunted up the office of Public Instruction and made his request for a permit to visit one of the city schools, at the same time stating his nationality and presenting his card of membership in the University of Leipsic. The necessary paper was made out at once and gave every facility for inspecting one of the city common schools in all its departments. The building was put up in the plainest style. The teachers are all considered to be government officers, and an official residence is provided in the building for the principal and his family.

The first room to be observed is naturally that of the primary scholars. Here forty or fifty children were seated behind desks on benches, wrestling and wriggling as only pickaninnies can.

We were tolerably familiar with the schools of American cities. Again and again we had seen the children of a free country sitting still, with the precision of soldiers, and here under the iron rule of an emperor were children moving naturally in their seats. We suppressed our thoughts and waited to see what would come of it. At last some of the children had shuffled so far from their places that the teacher thought it was time to notice it; so in her common tone and manner she gently said, "Platz nehmen!" (position), and in a twinkling every midget was in its proper place. The teacher went on with the lesson and the children went on with their nestling. Occasionally, whenever she thought necessary, she called them to order; always in the same pleasant way and always with the same cheerful obedience from the pupils. Their attention to her words was perfect; every eye was upon her. The teachers actually defend their custom of allowing the children to move freely in their seats. They say that a child cannot sit still; that motion is the law of its life—what in American phraseology would be called one of the natural and inalienable rights of childhood—and that no just teacher can attempt to deprive them of it.

Her instruction followed, as much as possible, the line known as object-teaching. In beginning geography, the instructor would not go outside the room for her lesson, but would say that such a wall faced the north, and the opposite the south.

Then to bring in the idea of a boundary, a desk would be taken which was bounded by other desks. Like geography, the alphabet and arithmetic are taught objectively as far as possible. Little or no use of text-books is made in any class from the youngest to the oldest. Everything is taught from the teacher's mouth. Memorizing without understanding becomes almost impossible. The children seemed to master every process they touched, and largely because they were taught from things rather than books, and were trained to reason rather than to remember. It ought to be said that it is considered the first business of a teacher to teach, and that he does not follow the American plan and consider his whole duty done when, having left his pupils to learn their lessons unaided, he simply examines them to see if they have done it, and punishes them if they have not. The German teacher really does what his name implies, and does not degenerate into an inspector and detective.

After the teacher had taught the primaries for half an hour upon geography, another subject was taken up. The children turned their attention to the new theme, and thus all their school-time was filled up. No section was ever left to look out for itself while the teacher was busy with another section, but each scholar was instructed during every moment of his school-time. With such management rapid progress is inevitable.

In speaking of progress, it ought to be remembered that a German word is always spelled exactly as it is pronounced. It has no silent letters. Each letter has one unvarying sound. The child cannot fail to spell correctly, if the teacher pronounces rightly. The Germans, therefore, save almost the whole time we give to spelling.

The rapid progress which the children make in school hours, justifies the government in shortening the school-day.

The primary schools open at seven in the morning. They are dismissed for the day half an hour after the American child begins his studies. The older the class, the more hours are required, until for the very oldest the number of hours in the school day is about equal to our own. But where the day shortens, the term lengthens. Two and a half hours of daily study will hurt no common child of seven years, which is the minimum age for admission, though he be kept at it the year round. Consequently the primaries have but a few weeks' vacation—two, if we remember rightly, in the whole year—and that is not for their own sake, but for the sake of their teachers. The older the scholars, the longer the school-days and the longer the vacation, which reaches its utmost length with university students.

The reach of the pupils' attainments testifies to the soundness of the school management. A German common school has about as high a grade as an American high school. The recitations show mastery of the subject. The scholars were all under sixteen; but, in addition to all that our common schools teach, they know the rudiments of two languages besides their mother tongue, English and French. They were proficient in algebra and geography and the elements of chemistry. The latter science turned them into enthusiasts. One boy actually got on the top of his desk to see the experiment, and what to an American was still more wonderful, was not scolded for it, but called to order with the rest of his classmates, after the interesting phase of the experiment had passed.

A system which educates its pupils so highly justifies itself by success. Its leading features seem to be these: Care not to overtax the children; short school-days; easy positions on the seats, and an atmosphere of freedom; so that the mind works easily in harness; short vacations for young scholars, to avoid that mental back-stitching by which half that is learned in a term is forgotten in a long vacation; an economical use of every moment of school hours, so that while the child is in school he is instructed and not left to himself; and teaching, wherever possible, not from books, but from the thing itself. To such an extent is this carried that, though every one else must pay his way, children in the company of a teacher enter botanical gardens, museums of natural history, and scientific collections free; the teachers making use of these to instruct their pupils by the eye.

The management of the German schools is equal to the management of the German army, and the tactics of the German teachers in their school-houses are as skilful as those of the German officers on the field. Much is said of the excellence of the German universities and their superiority to American colleges. The writer is well acquainted with both systems, and he is inclined to think that year by year the progress of the American colleges is equal to that in the German universities. Germans get their load in their common schools. One year of a common school in Germany is worth two or three in the common ols of our own country. —*The New York Observer.*

ANDREW BELL.

An Old Educational Reformer.

Readers of the Educational Record will remember the sketch given of the system of Bell and Lancaster in Dr. Robins's interesting account of the British and Canadian School. The life of the former of these worthy men has lately been written by Professor Meiklejohn of the University of St. Andrews. The following is an extract from a review of this work by the eminent educationist, Mr. J. G. Fitch. It was contributed to the pages of the *Academy*.

Andrew Bell was the son of a barber. He was born at St. Andrews in 1753, and was educated at the university of that city, which, however, he quitted before he had reached the age of

twenty. At first, he was employed as private tutor, and, in that capacity he travelled with a pupil to Virginia. Of his success in teaching the family of his patron less is known than of his speculations in tobacco, which enabled him to return to England in seven years with a small fortune of £900. Afterwards, he entered the Church, and in 1787 went out to India with the somewhat vague intention of lecturing on natural philosophy and of doing other work in the way of tuition. There he succeeded in obtaining not only various military chaplaincies, but also the post of superintendent to the Military Male Orphan Asylum at Madras. It was in this institution that, owing to the difficulty of securing suitable adult assistants, he was driven to the device of separating the scholars into small classes, and setting the elder boys to teach the younger. The success of his experiment during nearly nine years was unexpectedly encouraging. 'I think,' he said 'I have made great progress, and almost wrought a complete change in the morals and character of a generation of boys.' That he must also have succeeded in other ways is clear from the fact, unexplained in his biography, that he contrived to bring home with him in 1796 the sum of £26,000. Next year he published his pamphlet, *An Experiment in Education made at the Male Asylum at Madras, suggesting a Scheme by which a School or Family may teach itself under the Superintendence of Master or Parent.* It was dedicated to the Directors of the East India Company, and was largely circulated among the clergy, then awaking to the importance of public education. He then began an active propaganda on behalf of his 'system' of mutual instruction; and in 1808 the 'National Society' was founded, under episcopal and other powerful patronage, for the extension of his methods and for the establishment of parochial schools all over the country. During this time his own prosperity continued to increase. He became, in 1801, Rector of Swanage; soon after he was appointed to the mastership of a rich endowed hospital at Sherburn, in Durham; afterwards he was preferred to a canonry at Worcester, and subsequently became Canon of Westminster. It is not a little significant to find in a letter from one of his friends who knew him well this passage, 'Don't moderate your ambition to Sherburn Hospital, but continue your progress to the mitre. For very little money you may be paragraphed up to the episcopal throne.' Although this consummation was never actually reached, Dr. Bell

throve well. He was greatly flattered and honored; his 'system' was adopted by great people, and lauded as a new safeguard for Church and State; and before his death in 1832 he was able to place in the hands of trustees in St. Andrews the sum of £120,000, which he desired should be employed in 'promoting and immortalising his educational ideas.'

There is a pitiless candour in the brief sentences in which the present occupant of the Chair of Education founded by Dr. Bell's trustees sums up his character:—

> He was not an interesting man, he was not a great man; he had very little insight into human nature, though here and there are to be found glimpses of truth; he was singularly narrow-minded, and he was in several respects a terrible bore. There is in his own mind hardly a trace of education—hardly the smallest sign of literary culture. He had read Cicero and Quintilian, Milton and Locke; but he had read them only for the purpose of digging out of them mottoes for the chapters of his works, or passages in support of his own conclusions. There is no more trace of literature or of literary culture in all his voluminous writings than there is in the minutes of a corporation or the report of a banking company. He remained to the end of his days of the opinion which he expressed when he was acting as tutor to his two American pupils, 'I thought that a good hand was better than all the Greek or Latin in the universe.' And even after he was a richly beneficed clergyman, he looked upon grammar schools and universities chiefly as places where people 'contract prejudices.' His whole mind and soul were absorbed in the one idea of extending to the whole world the blessings and the peculiarities of the Madras system.

But, although the reaction which has since taken place against the extravagant praise once accorded to the monitorial or mutual plan of instruction is perfectly justifiable, the plan had substantial merits. Bell and Lancaster showed to a public, just becoming conscious of the need of national education, but utterly bewildered as to the best way of supplying that need, a cheap contrivance for bringing large numbers together, drilling them into order, and imparting to them the rudiments of learning. Children certainly learned to read and write, and were made cheerful, loyal, and obedient. This was a clear gain. We do not now believe, as the enthusiastic supporters of Bell and Lancaster did, that boys are better teachers than men, that it is easy to teach all one knows, and especially easy to teach that which we have only just acquired for ourselves. But it remains true that a school is a community of learners who ought to be in helpful relations to one another, and that young teachers often make up in freshness of mind and

tractability for their lack of experience, and may therefore render useful service in the lower and more mechanical departments of teaching. This principle was asserted in the monitorial system, and it betokened at least a wholesome reaction against the ancient pedagogic practice of setting tasks and 'hearing' the scholars repeat them one by one.

The question once so angrily discussed respecting the relative merits of the two systems of Bell and Lancaster, and the conflicting claims of these worthies to priority in the discovery of the 'mutual' method, have long ago been swept into the 'limbo large and broad' of barren and forgotten controversies. It would be lost labour to revive them now. Fundamentally, there was little difference between their methods of instruction. But Bell was patronised by Church dignitaries, energetically supported by Southey, and Mrs. Trimmer, and the *Quarterly Review*; and his efforts gave birth to the National Society for the Education of the Poor in the principles of the Established Church. Lancaster, on the other hand, was a Quaker, and earnestly contended that national education should be Christian, but not sectarian. He was supported by the Nonconformists and by Whig Churchmen, by Sydney Smith and the *Edinburgh Review*, by Brougham and the 'Useful Knowledge' party. The result of his early efforts was the establishment of the British and Foreign School Society. Both of these great societies continued for many years, and still continue, to do honourable service in promoting the education of the children of the poor. Indeed, up to the time when the present system of Government grants was established, and for some years later, the only public provision in England for primary education was made through their means. But each of these societies has come in time, if not to abandon the monitorial system, at least to distrust it, and to supersede it largely by other agencies; and each of them has, though for very different reasons, become somewhat ashamed of its founder. Poor Lancaster, though generous and unselfish, and animated by more of the 'enthusiasm of humanity' than Bell, was vain, thriftless, unmethodical, and fatally incapable of working well with other people in the administration of a great society or in the pursuit of a common end. Yet the personal influence of both men was considerable during several of the early years of the present century, and the part they played respectively well deserves to be studied."

"THE LADY OF THE LAKE" AS A SCHOOL STUDY.

By Miss M. Henderson, Girls' High School, Montreal.

Read before the Teachers' Convention, Sherbrooke, July, 1882.

When a poem is first put into the hands of a class, the pupils wonder what more can be required than a careful reading of it. But when day after day goes by without more than a few lines a day having been overtaken, they begin to realize that there is much more to interest and instruct them than a cursory reading would suggest. For my present purpose I have chosen "The Lady of the Lake"; partly, because it is a poem with which we are all familiar, and, partly, because of the variety it offers both as to subject and metre.

Before drawing special attention to the poem to be studied, it is well, I think, to give a short sketch of the author's life, noting particularly those characteristics to be found in the work under consideration. Let its date of publication be noted; what circumstances called it forth; whether or not its style be one wholly different from the productions of other writers of the same or preceding period. To this end, let a few lines be taken from Pope, or some other poet of that artificial school, when it will be seen how entirely Scott has set aside "all rule, and, disregarding smoothness or polish, sacrificed metre, rhyme and rhythm, all for panoramic effect"

Since the greatness of a poem depends largely upon the poet's being in sympathy with his age, and also upon what current of his age he followed, it will be well to speak of historical personages and events, and so add zest to the study of one of the most delightful and profitable branches of education. The scene is laid chiefly in the vicinity of Loch Katrine, in the Western Highlands of Perthshire. The time of action includes six days, and the transactions of each day occupy a canto. The period represented was one in which *clan* spirit was high, and the interest centres upon the feud between clan and king. It is essentially a *Scotch* poem, and love of music, a feature of the clans, is seen in the frequency with which songs are introduced.

It is well, it appears to me, at the outset, to get the pupil in sympathy with the rhythm of the poem. To do this, first let it be shown that the individual words of our language have pronunciations which require the accent to be placed sometimes on the

first syllable, sometimes on the last, at others on the middle, and so on. If a few examples be given, the pupils will, for themselves, find many others. For instance, in *reflect*, *destroy*, *attack*, and *review*, we have words of two syllables in which the accent falls on the last, while in *forfeit*, *blackboard*, *fraction*, and *ruffle*, the accent falls on the first syllable. The better to impress distinctions, let words of three syllables be also noted, and examples found where the accent falls on the first syllable only, as: *terrify*, *constable*, *register*, and *influence*; on the middle as *endeavor*, *deliver*, *destructive*, *astonish*; and on the last, as *interfere*, *volunteer*.

When such an exercise has been thoroughly enjoyed, let a number of lines in Canto I. be read by the pupil in such a way as to cause an accent to fall on every *second* syllable, thus:

The *no*ble *stag* was *pau*sing *now*,
Up*on* the *moun*tain's *south*ern *brow*,
Where, *broad* ex*tend*ed *far* be*neath*,
The *va*ried *realms* of *fair* Men*teith*.

In this way, each line will have been divided into five accented and five unaccented syllables. Again, let the same lines be taken and read with the accent upon the *first* of each foot, instead of the second, and its inappropriateness will be felt at once: and so also if the accents suitable to three syllables in a foot be tried. It will then be noticed that the accent falls upon the most important words.

Does each stanza contain the same number of lines? might be asked. No! will be at once answered. Yet, upon examination, it will be seen that the opening stanza or stanzas of each Canto do contain the same number of lines. How many? Nine. Do all contain the same number of accents? No! the ninth of each has *six*, while the others have but *five*. What can be said of the rhyming lines? That the 1st and 3rd; 2nd, 4th, 5th, and 7th; 6th, 8th, and 9th, are those ending in the same sound. Since such a combination presents the peculiar metre used by Spenser in his "Faery Queen," *Spenserian* might be at once given, whilst the Greek word *Iambic*, to denote a foot of two syllables, the first being short and the second long, may also be given.

No sooner have these opening lines been disposed of, than a map of Perthshire is found very desirable, that the many geographical references occurring throughout the poem may be fully appreciated. Before dwelling particularly upon any individual

stanza, I would note a few other points to which attention may be drawn during the study of the poem.

Scott's most striking characteristics, as evidenced in the poem, are: first, his colour sense; secondly, his vivid imagination. Examples of the first are found in Canto I., stanza xi.:—

The western waves of ebbing day,
Roll'd o'er the glen their level way;
Each *purple* peak, each flinty spire,
Was bathed in floods of living *fire*.
But not a setting beam could glow,
Within the *dark* ravines below,
Where twined the path in shadow hid,
Round many a rocky pyramid,
Shooting abruptly from the dell
Its thunder-splintered pinnacle;
* * * * * *
All twinkling with the dew-drops sheen,
The briar-rose fell in streamers *green*,
And creeping shrubs of thousand *dyes*,
Waved in the west-wind's summer sighs.

Again, in Canto III., stanza ii.:—

The summer dawn's reflected hue,
To *purple* changed Loch Katrine *blue*:
* * * * * *
The water-lily to the light
Her chalice reared of *silver* bright;
The doe awoke, and to the lawn,
Begemm'd with dew-drops, led her fawn;
The *grey* mist left the mountain side,
The torrent show'd its glistening pride;
Invisible in *flecked* sky,
The lark sent down her revelry;
The black-bird and the *speckled* thrush,
Good-morrow gave from brake and bush.

His vivid imagination shows itself in abundant use of metaphor and simile; *e.g.*, in one place he writes, "*Hurricane* had swept the glen," meaning *hunt*. As an example of a simile take the following:—

As Chief, who hears his warder call,
"To arms! the foemen storm the wall,"
The antler'd monarch of the waste,
Sprung from his heathery couch in haste.

Examples also can be given of *Transferred epithets*, or adjectives; *e.g.*, "Fast on his *flying traces* came," for "the traces of *him fly-*

ing" (I. 7). Again (III. 3), "laid his hand on his *impatient blade*," for "He impatiently laid his hand *on* his blade."

Inversion:—"Yelled on the view the opening pack"; also, "And hurrying at the signal dread" (II. 17).

Historical references to clans:—Canto II., stanzas 8 and 10:—

> Ere Douglases to ruin driven,
> Were exiled from their native heaven.

Or, in speaking directly to Ellen, the minstrel is made to say:—

> Loveliest and best! thou little know'st
> The rank, the honours, thou hast lost!
> O might I live to see thee grace,
> In Scotland's Court, thy birthright place.

Superstitions:—See Canto III., stanza 7, and Canto IV., stanza 4.

Customs:—Canto VI., stanza 31:—

> He gave him of his Highland cheer,
> The hardened flesh of mountain deer.

Antiquarianisms:—"The Fiery Cross" in Canto III., stanza 1, and the Tagharim in Canto IV., stanza 4. These and many other points may be brought out, while the interest of the pupil will be awakened, and works bearing upon them read, with profit and pleasure.

Before closing, I will ask and answer a few questions on Canto III., of such a nature as to come within the capacity of very young pupils:—

1. What is the heading of the Canto?—The Gathering.

2. Into how many Cantos is the poem divided?—Six.

3. Name them.—The Chase, The Island, The Gathering, The Prophecy, The Combat, The Guard-Room.

4. What lake is spoken of in the second stanza?—Katrine.

5. Where is it to be found?—In Perthshire, East of Ben Lomond.

6. What does "Ben" mean?—Mountain.

7. What other form of the word is found?—Pen.

8. Name any other lakes mentioned in earlier parts of the poem.—Lochard, Loch Achray, Vennacher, Lomond.

9. Name words in the stanzas suggesting *colour*.—Purple, blue, light, silver, bright, gray, flecked, black-bird, speckled.

10. What part of speech is *reflected* in "reflected hue"?—Participial adjective.

11. Why participial?—Because derived from a verb.

12. What verb?—Reflect.

13. How formed?—By adding *-ed* to the infinitive.

14. What is the subject of the sentence?—Hue.

15. What verb agrees with it?—Changed.

16. What is the meaning of the prefix *un* in "uncertainty"?—Not.

17. What is meant by *chalice?*—A cup.

18. What peculiarity of poetical construction is to be observed in the same line?—The adjective *bright* follows its substantive.

19. What is meant by *begemmed?*—Covered with gems.

20. What is the effect of placing *be* before *gemmed?*—The past participle of a transitive verb is formed.

21. What peculiarity is observable in the last two lines of the same stanza?—The subject comes between the verb and its object.

22. What character is mentioned in the following stanza?—Rhoderich Dhu or Rod-the-Black.

23. Was he a Highlander or a Lowlander?—Highlander.

24. What representative Lowlander has been mentioned?—Fitz-James.

25. What other characters do you remark?—Ellen, "The Lady of the Lake," Margaret, Roderick's Mother, The Minstrel Allan Bane, Douglas, Malcolm Graeme.

26. What means was Roderick about to employ to gather his clan?—To send round the Fiery Cross.

27. What hermit prepared the ritual?—Brian.

28. Was he a Christian priest?—No! a Druid.

29. Where had the wood for the Cross been taken from?—Inch-Gailliach.

30. Give its situation.—An island S.E. of Loch Lomond.

31. Into how many parts was Brian's anathema, or curse, divided?—Three.

32. When all was ready, who took the Cross from Brian's hand?—Roderick.

33. To whom did he give it?—His servant, Malise.

34. Name the muster place.—Lanrick Mead.

35. When Malise reached Duncraggan, with what news was he greeted?—The death of Duncan.

36. What name is given to the dirge sung over the body?—The Coronach.

37. Read the first four lines:—

He is *gone* on the *mountain*,
He is *lost* to the *forest*,
Like a *summer*-dried *fountain*,
When our *need* was the *sorest*.

38. Does the accent fall upon every second syllable?—No! on the middle of each group of three, if the first syllable be omitted.

39. How many lines are devoted to each of the three, *mountain*, *forest*, and *fountain*?—Four.

40. What peculiarity of rhyme is noticeable in the hymn sung by Ellen?—The rhyme of the 2nd and 4th lines of the 1st quatrain rhyme with those of the 1st and 3rd of the 2nd quatrain:—

Mild, prayer, wild, despair,
Care, reviled, prayer, child.

Although some knowledge of Latin or other languages is a great aid to derivations, yet a very large number of words, such as *retainer*, *horsemen*, *scornful*, *clansmen*, *broadsword*, *sunbeam*, *crosslet*, &c., give profitable exercise to the young pupil. In this connection, it might be noticed that in Saxon the *second* word of a compound contains the fundamental idea, while in French it is found in the *first*.

So many references occur during the poem, and so much scope is found for remark, that it is impossible for me to do more than merely point out a few things worthy of attention.

TWO MATHEMATICAL WORKS.

By R. G. Goggs, B.A., Cambridge.

A Practical Arithmetic, by G. A. Wentworth, A.M., Professor of Mathematics in Phillips Exeter Academy, and Rev. Thos. Hill, D.D., LL.D., Ex-President of Harvard College. (Boston; Ginn, Heath & Co.) Mailing price, $1.10.

Elements of Algebra, by G. A. Wentworth, A.M.; do. do. (Boston; Ginn, Heath & Co.) Mailing price, $1.55.

At a time like the present, when so many different text-books are being published, it is a pleasure to come across one with some amount of originality, or rather one in the compilation of which

the author has given full scope to his own ideas without blindly following former writers. Such a book is Professor Wentworth's *Practical Arithmetic*, now before us. Its most striking features which we notice at a first glance are, (1) The early introduction of decimals; (2) The introduction of the Metric System; and (3) The introduction of Logarithms and Progressions. The reasons for these innovations, if they may be so called, are given in the preface as follows:—

"Decimal fractions are introduced at the beginning of the book. Experience proves that when thus taught they present no difficulty. The difficulty of decimal fractions arises solely from comparing them with common fractions, and is avoided by teaching decimals first. The pupil learns the notation on both sides of the decimal point as easily as on one side; provided the notation on both sides is presented at the same time.

"The Metric System in a few years will be in common use, and will supersede other systems, as dollars and cents have superseded pounds, shillings and pence. Taught immediately after decimal fractions, the system is easily learned.

"The introduction of Logarithms will be welcomed by all who know the ease of learning the practical use of a four-place table, and the increased power given by it over mathematical questions."

With regard to the first of these points, we think the order proposed is decidedly better than that usually followed, the meaning of a decimal being clearly explained by reference to the decimal coinage. The author gives this explanation very simply in the following manner. He says; "Those things of which we do not naturally ask, How many? but How much? we endeavour to measure; and we answer the question How much? by answering, How many measures?" Then, after showing that \$5.375 represents 5 dollars, 3 dimes, 7 cents, 5 mills, or 5 dollars, 375 mills, he continues:—

"Parts of other measures than those of value may be written in the same way; with tenths, hundredths, etc., to the right of a point. Thus, if we omit the mark \$ from \$5.375, it may stand for 5 quarts, yards, bushels, or any other full measures and 375 thousandths of another measure."

The introduction of the Metric System into a text-book will perhaps tend to bring the subject and its consequent advantages more before the general public, but, until the system is in actual use, we do not think that it will be attended with any amount of practical good, except perhaps to the small proportion of students who may, later on in their course, read scientific works in which it is most general. The chapters on Logarithms and Arithmetical and Geometrical Progression, which clearly and simply explain these subjects, are most useful additions.

We must, however, notice one omission, and which we think rather a serious one, and that is the Rule of Practice. Were the Metric System in vogue, there would be no use for this rule, but, as it is, we cannot understand why no notice is taken of such an important Rule.

The Examples, which are numerous, as they should be, seem to have been arranged with great care, and "convey, incidentally, a great deal of accurate and valuable information; so that, by means of the index, the book becomes a book of reference for many physical and mathematical constants." For instance, we have problems, with interesting data, on the following subjects:—The comparison of the different scales of temperature; Mensuration; Distances at which objects can be seen at sea; The connection between the longitude and time of different places.

The chapters on Interest, Discount, &c., explain very fully, with examples, all the terms used in general business, and will prove most useful to the student who intends to follow commercial pursuits. There is also a vocabulary at the beginning of the book, defining not only the ordinary terms occurring in arithmetic, but also those that are likely to be met with in any practical computations. We can conscientiously say that the arithmetic will be found in every way satisfactory; that it is not only carefully and elegantly printed, but logical in its deductions, and that it should greatly increase the facilities for the study of arithmetic on this continent.

We have to turn next to Professor Wentworth's *Elements of*, or as he calls it on the cover *Complete, Algebra.* The first twenty-four chapters of this book, published under the title of Elements of Algebra, have been noticed in a former number of the RECORD (vol. i., p. 449). The remaining ten chapters contain the propositions usually found in the concluding portion of text-books, with some extremely useful additions; the chief of these being the differential method of summing series, the geometrical interpretation of imaginary numbers, and the chapter on Loci of Equations forming an introduction to Analytical Geometry.

The chapter on the Differental Method is especially good, the proofs of the theories therein contained, being clear, simple, and well arranged. We will give an instance from p. 417:—

Let $a\ b\ c\ \ldots$ be the terms of the series.

Then $b-a$, $c-b$, $d-c$, which may be denoted by a', b', c', $\ldots$ will be the first order of differences.

Again, b_1-a_1, c_1-b_1, d_1-c_1, ... which may be denoted by a_2, b_2, c_2 ..... will be the second order of differences.

This process may be continued as long as there are any differences.

The given series and the successive orders of differences arranged in lines will be:

$$\begin{array}{ccccccc} a & b & c & d & e & f & \ldots\ldots \\ a_1 & b_1 & c_1 & d_1 & e_1 & & \ldots\ldots \\ a_2 & b_2 & c_2 & d_2 & & & \ldots\ldots \\ a_3 & b_3 & c_3 & & & & \ldots\ldots \\ \ldots\ldots & & & & & & \end{array}$$

Let it be required to express the $(n+1)$ term of the series $a, b, c, d, \ldots$ in terms of $a, a_1, a_2, \ldots$

As $b-a=a_1$, $\therefore$ $b=a+a_1$;

as $b_1-a_1=a_2$, $\therefore$ $b_1=a_1+a_2$;

as $b_2-a_2=a_3$, $\therefore$ $b_2=a_2+a_3$; and so on.

In like manner $c = b+b_1 = a+2a_1+a_2$

$c_1 = b_1+b_2 = a_1+2a_2\times a_3$

$c_2 = b_2+b_3 = a_2+2a_3+a_4$ and so on.

Likewise $d = c+c_1 = a\times 3a_1+3a_2\times a_3$ and so on.

The coefficients, therefore, of $a, a_1, a_2, \ldots$ in the expressions for $b, c, d \ldots$ are the same as the coefficients obtained from the expansion of the expression $(a+b)n$; and since by the Binomial Theorem the coefficients of $(a+b)n$ are

$$1, \quad n, \quad \frac{n(n-1)}{1\times 2}, \quad \frac{n(n-1)(n-2)}{1\times 2\times 3} \ldots\ldots$$

the $(n+1)th$ term of the series $a, b, c, d \ldots$ will be

$$a+na_1+\frac{n(n-1)}{1\times 2}a_2+\frac{n(n-1)(n-2)}{1\times 2\times 3}a_3 \ldots\ldots \quad *$$

Then, by an equally simple proof, that the sum of n terms of the series $a, b, c, d \ldots$ is

$$n\left\{a+\frac{n-1}{2}a_1+\frac{(n-1)(n-2)}{2\times 3}a_2+\ldots\ldots\right\},$$

we have the following example.

Find the sum of the squares of the first n natural numbers $1^2, 2^2, 3^2 \ldots\ldots$

$$\begin{array}{lll} 1 \quad 4 \quad 9 \quad 16 \ldots\ldots \quad n^2 & = & \text{given series.} \\ 3 \quad 5 \quad 7 \quad 9 \ldots\ldots & = & \text{first order of differences.} \\ 2 \quad 2 \quad 2 \ldots\ldots & = & \text{second order of differences.} \\ 0 \quad 0 \ldots\ldots & = & \text{third order of differences.} \end{array}$$

Therefore $a=1$, $a_1=3$, $a_2=2$, $a_3=0$.

* We think that it would have been better if the general case of this theorem had been proved by induction; it would be more complete than the simple statement of the unproved fact that the coefficients of the terms follow the same law as those in the Binomial Theorem.

These values substituted in the general formula give

$$\text{Sum} = n\left\{1 + \frac{n-1}{2} \times 3 + \frac{(n-1)(n-2)}{2\times 3} \times 2\right\}$$

which reduces to $\frac{n(n+1)(2n+1)}{6}$

In a treatise containing so many additions, we are rather surprised at the non-introduction of the subject of Determinants, which is beginning to find a place in all modern Algebras. The chapters on the Exponential Theorem and the Theory of Numbers are hardly as full as we should have expected to find them in a work entitled Complete Algebra, several of the leading theorems in these subjects having been omitted. But, on the whole, the book before us is a very commendable work. It is, we need hardly say, for all Messrs. Ginn, Heath & Co.'s works are so, excellently printed and got up. We think, however, that in the next edition the author should make up his mind as to the title.

EXAMINATION PAPERS

Of the University School Examinations, 1882.

Held under the superintendence of McGill University, Montreal, and the University of Bishops's College, Lennoxville.

It has been always possible to obtain the examination papers, set for the certificate of the title of Associate in Arts, among the other Examination papers, reprinted by McGill College. As, however, these are not to be reprinted for the last year, and the A. A. Examination is one of importance to the whole Province, we have thought it advisable to reprint them in the RECORD, in which they will be generally accessible. The gentlemen by whom the examination for 1882 was conducted are Principals Dawson and Lobley, Canon Norman, Professors Scarth, Markgraf, Cornish, Darey, Murray, Harrington, McLeod and Chandler.

PRELIMINARY SUBJECTS.

English Grammar.

1. Name the parts of speech into which words are divided, and give an example of each.

2. Define Verb, and distinguish transitive and intransitive verbs, giving an example of each.

3. Name the part of speech, to which each word in the following passage

belongs :—"Oh, that I had wings like a dove! Then would I fly away and be at rest."

4. Give the feminine forms of the following words :—boy, brother, gentleman, nephew, gander, horse, ram.

5. Give the plurals both of the maculine and the feminine forms referred to in the previous question.

6. Give the possessive cases, singular and plural, of these masculine and feminine forms.

7. Give the past tense and the past participle of each of the following verbs :—fall, shine, say, hear, fly, offer, call, dine, play, fear, try, confer.

8. Correct the errors in the following sentences:—(*a*) One of the most intimate of my friends were present at the time. (*b*) Them books must be removed immediately. (*c*) Morning or evening are the best time for study. (*d*) The childrens' supper is nearly ready. (*e*) I have no idea who he is speaking of.

10. Analyse the following sentence :—

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates, and men decay:
Princes and lords may flourish, or may fade;
A breath can make them as a breath has made;
But a bold peasantry, their country's pride,
When once destroyed can never be supplied."

Arithmetic.

1. From two millions and twenty thousand subtract five hundred and three thousand and forty-eight.

2. How many days from January 1st, 1870, to July 4th, 1875, inclusive?

3. Find the value of $7858\frac{3}{4}$ articles at \$2.75 each.

4. Define the least common multiple of two or more numbers, and find that of 3, 5, 10, 15, 21, 24, 30.

5. Divide $\frac{4}{3}$ of $\frac{95}{1\frac{2}{3}}$ by $\frac{\frac{1}{2}\text{ of }\frac{3}{4}}{\frac{3}{5}\text{ of }\frac{2}{19}}$

6. Divide 73.347 by 0.3829.

7. State clearly what is meant by a recurring decimal. Multiply .36 by .0249.

8. If 4 tons 5 cwt. be carried 200 miles for \$65.28, what weight should be carried 150 miles for \$20.16?

9. Find the simple interest on \$7,865 from the 1st of January to 5th May, 1882, (both days inclusive) at 6½ per cent. per annum.

10. Find the solid content of a rectangular box measuring 4 ft. 7 in. by 3 ft. 5 in. and 2 ft. 8 in.

11. At what time after noon will the hands of a watch be twenty minutes apart for the first time?

12. What will it cost to enclose 2½ acres with a circular fence worth 2½ cents per foot; the area of a circle being πr^2, and the circumference $2\pi r$, where r is the radius and $\pi = \frac{22}{7}$?

Geography.

1. Give the divisions of North America, and name its principal lakes and rivers.

2. Name the different countries of Europe, and give their capitals.

3. Give the boundaries of Asia. What are its principal peninsulas?

4. Draw a map of Africa, naming the divisions and marking the principal mountain ranges and rivers.

5. Name the oceans; state their position. Name some of the principal islands in the Pacific Ocean.

6. Where are the following capes: Hatteras, Farewell, Horn, Finisterre, Matapan, Comorin, Camboja, Palmas, Verd?

7. Name the principal mountain ranges of the Old World.

8. Where are Quebec, Toronto, Memphis, Birmingham, Prague, Bordeaux, Calcutta, Canton, Melbourne, Yedo?

British and Canadian History.

1. Arrange these kings in their right order: James II., Stephen, George II., John, Charles I, Henry VII., Richard III., Edward IV.

2. Opposite each king of the previous question write *one* event which happened in his reign.

3. Mention *two* facts concerning each of the following:—the Norman Conquest, the Black Prince, the great fire of London, the Reformation, the Spanish Armada.

4. Who was called the Protector? When did he rule?

5. Mention two famous English generals and two famous English admirals of the present century, and one battle in which each fought.

6. What line of sovereigns now sits on the throne of England? With what previous line was the first of these kings most nearly connected? Trace the connection.

7. What was the earliest permanent settlement of the English in America? Who were the Filgrim Fathers?

8. What two Houses form the English Parliament? Which is elected by the people?

9. What European first sailed up the St. Lawrence? When?

10. Mention one historical event in which Champlain took part.

11. Who had possession of Quebec when it was attacked by the British in 1759? What army tried to take Quebec in 1775, and who led it?

12. When did the Rebellion take place in Lower Canada? Mention one person of note concerned in it.

13. What legislative bodies make laws in the interest of the whole Dominion of Canada? Where do they sit?

Gospels.

1. State what you know of the life, preaching, and death of John the Baptist.

2. Write out the Beatitudes.

3. Give the names of the twelve Apostles.

4. Give the parable of the Prodigal Son.

5. Give the account of the opening of the eyes of Bartimeus, or of the raising of Lazarus.

OPTIONAL SUBJECTS.

(1.) LANGUAGE GROUP.

Latin.

1. Translate Cicero, Pro Archia. Ch. vi. §12-13. Quaeres a nobis, Grati—ad haec studia recolenda sumpsero?

2. Translate and explain the following expressions:—(*a*) quæstio legitima, (*b*) natus est loco nobili. (*c*) nactus est primum consules eos. (*d*) audiebatur a M.

Æmilio. (*e*) litterarum memoriam flagitare. (*f*) resignare testamentum. (*g*) beneficium legis.

3. Derive tropæum, exsilium, acroama, manubiæ, giving any necessary explanation; and state the meaning and application of the word "togatus."

4. What does Cicero tell us of the relative extent and influence of Greek and Latin literature?

6. Give a brief account of the occasion and object of this particular oration.

6. Translate Virgil, Æneid, Book II. 624-640. Tum vero omne mihi.—Vos agitate fugam.

7. Translate and explain the construction of the following detached passages:—(1) Graiis servitum matribus ibo. (2) Cervici imponere nostræ. (3) Vastum maris æquor arandum. (4) Tactuque innoxia mollis lambere flamma comas. (5) Inimicus et hauserit ensis. (6) Redit exuvias i dutus Achilli. (7) Jura fidemque supplicis erubuit. (8) Fidens animi. (9) Bis quinos silet ille dies. (10). Sensit medios delapsus in hostes.

8. Derive integer, artifex, bipennis, securis, osculum, ornus, volucri, fenestra, fragor, crateres, edax, confertos.

9. (*a*) Write down the principal parts of scindo, fido, contorqueo, cædo, fallo, uro.—(*b*) What cases follow misereor, obliviscor, jubeo, hæreo, venio? (*c*) Classify the following verbs:—agito, gaudeo, claresco, soleo, verso, hortor, fio.

10. What cases follow sub, in, inter, ob, ex, ab, ad, alone or in composition?

11. Translate, Ovid, Fasti, Book I. 27-44. Tempora digereret.....preposuitque duos.

12. In ext.:—(*a*) Explain the use of the subjunctive in *digeret, et, moverit, tueatur, prodeat.* (*b*) *Temporis*,—What *Genitive?* (*c*) *Noras*,—expand. (*a*) Give the derivation and exact meaning of:—Menses, scilicet, arma, infans, tempus, trabeati, annua, umbras, kalendae, Nonae, Idus Fasti. (*b*) Write short explanatory notes on the last six vss of ext. (c) Give the name and scale of the metre, and scan the first two vss.

Greek.

1. Translate Homer, Iliad, Book VI.:—
(*a*) l. 286-296. (*b*) l. 466-475.

2. Explain carefully the following constructions:—(*a*) *ἀφνειὸς βιότοιο.* (*b*) *πυρὸς δήιοιο θέρηται.* (*c*) *χαρείη δὲ φρένα μήτηρ.* (*d*) *τὴν ὀδὸν ἦν * * * εἰνατέρειαν.* (*e*) *ἵππω γὰρ οἱ ἀτιζομένω πεδίοιο.* (*f*) *ἐνάρων ἐπιβαλλόμενος.*

3. Write down the *Nom. Sing.* and *Plu.* of the following:—*κόρυθος, δουρός, κρατός, στήθεσι, κληῖδι, ὀίεσσιν, χήτει, χθονί.*

4. (*a*) Parse the following verbs:—*μεθῆκε, χόον, κατίδω, πῆλε, χαρείη, ὀρέξατο, ἀνώγει, ἀπόερσε, ἐπιπλώς, χάνοι, πίησθα, οὔτα.* (*b*) Give the Attic equivalents of:—*φάν, δόμοιο, βείω, καταξέμεν, ξεστῇς, κάρη, εὖτε, κέν.*

5. (*a*) Write down the name and scale of the metre of the above extracts. (*b*) Scan the first three vss. of ext. (*a*).

6. Translate, Xenophon, Anabasis, Book I. (*c*) Ch. III, § 17–18. (*d*) Ch. IX, § 24–26.

7. Translate and explain:—(1) *εὐνοικῶς ἔχοιεν αὐτῷ.* (2) *ὅπως ὅ τι ἀπαρασκεύαστον λάβοι βασιλέα.* (3) *τοῦτο δ' ἂν οὕτω τρεφόμενον ἐλάνθανεν αὐτῷ τὸ στράτευμα.* (4) *Μικρὸν ἐξέφυγε τὸ μὴ καταπετρωθῆναι.* (5) *Πολὺ δὲ καὶ σήσαμόν καὶ μελίνην καὶ κέγχρον καὶ πυροὺς καὶ κριθὰς φέρει.*

8. Parse *προαισθόμενος, πείσομαι, σπείσαιτο, εἵλοντο, κατέκανε, ἀνατεταμένον, καταληφθέμενον, θεῖναι, ἀπώλετο.*

9. (*a*) Decline the singular number of *αἰτία, ἁμαξα, αἰδώς,* and *κέρας.* (*b*) Compare *εὐδαίμων, πολέμιος, δίκαιος, νέος, ἡδύς, πολίς,*—and *κακός* and *μέγας,* adverbally. (*c*) Give 1st *Sing* of the *Future, Perfect,* and either *Aorist,* of *ἐσθίω, λανθάνω, ἀφικνέομαι, καίω, βαίνω, ὑπισχνέομαι, δείδω, εὑρίσκω.*

10. Distinguish between *κατέστη* and *κατέστησε, εἶναι* and *ἴέναι, τις* and *ὅστις, εἷς* and *εἰς, οἶκοι, οἴκαδε* and *οἰκοῦσι, τοσοῦτος* and *τοιοῦτος, ταὐτόν* and *τοῦτο, ἀποπεφεύγασιν* and *ἀποδεδράκασιν.*

11. (*a*) What meanings are expressed by the Aorists, the Imperfect, and Perfect, severally, in Greek? (*b*) In how many ways can you express a purpose in Greek? Give instances.

12. Put into Greek:—(1) To send for any one. (2) To the number of four thousand. (3) About three hundred. (4) To flee at full speed. (5) On the day after.

French.

1. Translate into English:

Géronte. Tiens (*a*) voilà (*b*) la clef de mon (*c*) armoire.—*Scapin.* Bon. *G.* Tu l'ouvriras. *S.* Fort (*d*) bien. *G.* Tu trouveras une grosse (*a*) clef du côté gouche, qui est celle de mon grenier. *S.* Oui. G. Tuiras (*f*) prendre (*g*) toutes les hardes qui sont dans cette grande manne, et tu les vendras aux fripiers, pour aller racheter mon fils. *S.* (*en lui rendant la clef.*) Hé monsieur rêvez-vous? je n'aurais pas cent francs de tout ce que vous me (*h*) dites, et de plus vous savez le peu (*i*) de temps qu'on (*j*) m'a donné. *G.* Mais qu'allait-il faire dans cette galère? *S.* Oh! que de paroles perdues (*k*)! Laissez là cette galère et songez que le temps presse, et que vous courez (*l*) risque de perdre votre fils. Hélas! mon pauvre maître, peut-être que je ne te verrai (*m*) de ma vie, et qu'à l'heure'que je parle on t'emmène (*n*) esclave à Algier. Mais le ciel me sera témoin que j'ai fait pour toi tout ce que j'ai pu, et que si tu manques à être.racheté, il (*o*) n'en faut accuser que le peu d'amitié d'un père. *G.* Attends Scapin, je m'en (*p*) vais quérir cette somme. *S*: Dépêchez donc vite, monsieur; je tremble que l'heure ne sonne. *G.* n'est-ce pas quatre cents (*q*) écus que tu dis? *S.* Non cinq cents écus. MOLIÈRE *les fourberies de Scapin*

(*a*). Parse that verb. Translate it by its idiomatical correspondent in English.

(*b*). What is the literal meaning of *voila*? What difference is there between *voilà* and *il y a,* translated by the same word in English?

(*c*). Why is *mon* used? Give the rule.

(*d*). What part of speech is *fort* in? Why? To what other does it sometimes belong?

(*e*). What is the masculine of *grosse?* What is the difference between *grosse* and *grande?*

(*f g, l m*). Write the second person plural of all the simple tenses of these verbs.

(*h*). Parse *me.*

(*i*). Why is *peu* used here and not *petit?*

(*j*). Parse *on.* For what noun is it used? What do you observe about the verb of which *on* is the subject?

(*k*). Why is *perdues* thus written?

(*n*). What is the difference between *emmène*, *amène*, and *mène?*

(*o*). Parse *il.*

(*p*). What is the use of *en?*

(*q*). Why has *cents* an *s?* Give the rule and state the two exceptions.

3. Translate into French :

Your horses, sir! They are not at all in a condition to walk. I will not tell you that they are on the litter, the poor beasts have none; and it would be speaking incorrectly; moreover you cause them to keep so strick fastings, that they are nothing more than ideas or phantoms of horses.—They are very sick! they do not do anything—And because they do not do anything, must they eat nothing? It would be better for them, the poor animals, to work much and to eat the same.—*Translated from Molière.*

It would be endless to describe the different sensations of both families when I divulged the news of our misfortune, but what others felt was slight to what the lovers appeared to endure. Mr. Wilmot who seemed before sufficiently inclined to break off the match, was by this blow soon determined : one virtue he had in perfection, which was prudence—too often the only one left us at seventy-two. The Vicar of Wakefield, Book II.

(2) MATHEMATICAL GROUP.

Geometry.

1. Define parallel lines, a circle, a rectangle, a gnomon, a segment of a circle, and the angle in a segment.

2. On the same base and on the same side of it, there cannot be two triangles having their sides terminated in one extremity of the base equal, and likewise their sides terminated in the other extremity of the base equal.

3. Any two sides of a triangle are together greater than the third.

The difference between any two sides of a triangle is less than the third.

4. The opposite sides and angles of a parallelogram are equal to one another, and the diagonal bisects it.

The diagonals of a parallelogram bisect one another.

5. If the square upon one side of a triangle be equal to the squares on the other two, the angle contained by these two sides is a right angle.

6. If a straight line be divided into two equal and also into two unequal parts, the rectangle contained by the unequal parts, together with the square upon the line between the points of section, are equal to the square upon half the line.

Express the proposition algebraically.

7. In obtuse-angled triangles the square upon the side subtending the obtuse angle is greater than the squares upon the sides containing the obtuse angle by twice the rectangle contained by one of those sides and its continuation to meet the the perpendicular drawn to it from the opposite angle.

If the sides of a triangle are 7, 5, and 3, is it obtuse-angled or acute-angled?

8. If two points be taken on the circumference of a circle the straight line which joins them lies within the circle.

9. Draw a straight line to touch a given circle from a given point without it.

If it be required to describe a circle of given radius, and such that the tangent drawn to it from a given point shall be equal to a given straight line; prove that any number of such circles can be described, and that the centres of all of them lie on the circumference of a certain circle.

10. If two straight lines in a circle cut one another the rectangle contained by the segments of the one is equal to the rectange contained by the segments of the other.

If one straight line in a circle bisects another, the difference of their squares is equal to the square of the difference of the segments of the bisecting line.

Trigonometry.

1. Taking as unit angle the angle of a regular six-sided figure, find the measure of an angle of a regular twelve-sided figure.

2. As angle increases, its sine sometimes increases and sometimes diminishes; when does it increase? Can the angle's tangent ever diminish as the angle increases?

3. Given the sine of an angle, how can the cosine, tangent, secant, &c., of the angle be found?

4. How would you with ruler and compasses, construct an angle of which the cosine is a given fraction, say $\frac{3}{5}$? If the cosine were $-\frac{2}{5}$, how would you find the angle?

5. Prove that the sine and cosine of an angle are respectively the cosine and sine of the angle's complement.

6. Calculate the sines and cosines of half a right angle and of two-thirds of a right angle.

7. Prove the following:

(1) $(1 + \cos^2 A)(1 - \cos^2 A) = 1.$

(2) $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \operatorname{cosec}^2$

(3) $\tan^2 A - \sin^2 A = \tan^2 A \sin^2 A.$

8. Prove formula.

$$\cos (A + B) = \cos A \cos B - \sin A \sin B.$$

Hence find cos 2 A.

9. How long is the shadow cast by a vertical pole 15 feet high, when the sun is 30° above the horizon?

Geometrical and Freehand Drawing.

1. Construct a square of 2 in. side and an isosceles triangle having the same area as the square and a base of 2.5 in.

2. Divide a straight line of 2.5 in. into seven equal parts.

3. Construct a regular octagon of 1 in. inside.

4. Reduce an octagon equal to that in question 3 to a triangle of equal area.

5. Given a point and a straight line, draw a line through the point parallel to the given line.

6. Draw a line tangent to a given circle from a given point in the circle.

7. Make a freehand drawing of the objects before you:

(*a*) A cylinder cut to turn a right angle.

(*b*) A cube standing on a plinth.

8. Copy to half size the Eogoth exhibited.

NOTE.—No mechanical measurement will be allowed in questions 7 and 8. In the geometrical questions construction lines are to be dotted, and all results are to be obtained by direct construction and not by trial.

Algebra.

1. Multiply the sum of $\frac{1}{4}x^2 + 2xy$ and $\frac{3}{4}x^2 - xy + y^2$ by $x^2 - xy + y^2$.

2. From $3x(x+y) - y(x+4y)$ take $3y(y-x) - x^2$ and $x(3x-y) + 5y(x-y)$ and divide the result by $x+2y$.

3. Find the greatest common measure of

(1) $(x+y)^3$ and $(x-y^2)^2$

(2) x^2+2x-3 and x^2+5x+6

(3) x^3-x^2-2x and $2x^3+3x^2+x$

(4) $8x^2+6x^3-4x-3$ and $12x^3+5x^2+x+3$.

4. Reduce to their lowest terms the fractions

(1) $\dfrac{mx-nx}{mnx}$, (2) $\dfrac{3ax^2-15a^2x}{2ax-10a^2}$

(3) $\dfrac{2a^2-3a+1}{a^2+a-2}$, (4) $\dfrac{x^4-x^2-2x+2}{2x^3-x-1}$

5. Add the fractions

$$\frac{x}{x+y}, \quad \frac{y}{y-x}, \quad \frac{x^2+y^2}{x^2-y^2}, \quad \frac{2xy}{x^2-y^2}$$

6. Solve the following equations:

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

(2) $2x - \dfrac{2x}{5} - 2\frac{1}{2} = \dfrac{4x}{11} + \dfrac{8x}{7} - 1\frac{6}{11}$

(3) $\dfrac{2}{3x} + \dfrac{3}{2x} = 13$

(4) $\dfrac{x-7}{x+7} + \dfrac{1}{2(x+7)} = \dfrac{2x-15}{2x-6}$

7. Find x and y from the following simultaneous equations:—

(1) $\begin{cases} 7x-6y = 10 \\ 6x-7y = 3 \end{cases}$

(2) $\begin{cases} \frac{1}{2}(x+y) = \frac{1}{3}(2x+4) \\ \frac{1}{3}(x-y) = \frac{1}{11}(x-24) \end{cases}$

(3) $\begin{cases} \dfrac{3}{x} + \dfrac{4}{y} = 2 \\ \dfrac{4}{x} + \dfrac{3}{y} = 2\frac{1}{12} \end{cases}$

8. Find a number of three digits, each greater by unity than that which follows it, such that its excess above one-fourth of the number formed by inverting the digits shall be $36\frac{1}{4}$ times the sum of the digits.

(3) ENGLISH GROUP.

English Language.

1. (*a*) How do English nouns form their plural? (*b*) Mention three nouns with the plural forms, and distinguish the meaning of each.

2. Give the feminine of *sorcerer, actor, fox, lord, hero, margrave.*

3. To what parts of speech may *that* and *but* belong? Give examples.

4. Classify adverbs and explain their etymology.

5. What is meant by Assimilation and Dissimilation?

6. Explain the terms *monosyllabic, agglutinative,* and *inflectional,* as applied to language; and mention one language of each class.

7. (*a*) What is meant by *formative suffixes*? (*b*) What two kinds of these are there? (*c*) Give two examples of each kind.

8. Classify consonants of the English alphabet according to Peile's scheme.

9. What general remarks does Trench make on the languages of savage tribes?

10. Mention six words that show *poetry* in language.

11. State what you know about any four of the words, *dunce, cannonade, sherry, epicure, jovial, nicotine, gipsy, marshal, calico, guinea.*

12. Give English words derived from a Classical source which have the same meaning as *shepherd, feeling, handbook, murder, feathered.*

English Literature.

1. Name one Pagan and one Christian poem in English prior to the Norman conquest.

2. (*a*) At what time did Chaucer, at what time did Spencer, live? (*b*) Describe the subject of the principal poem of each.

3. Explain the Miracle Play, the Mystery, the Morality, and the Interlude, in the history of the English drama.

4. What was (*a*) the first English comedy, (*b*) the first English tragedy?

5. Name the author of each of the following works: Midsummer Night's Dream, Advancement of Learning, Lycidas, Essay on Man, Tale of a Tub, Decline and Fall of the Roman Empire, The Task, Waverley, The Excursion, Idylls of the King.

6. Mention one other work of any four of these authors.

7. (*a*) In the Lady of the Lake who is the King whose adventure is celebrated? (*b*) Where is the scene of the poem? (*c*) How many cantos does it contain? (*d*) How many days are occupied in its action?

8. Explain the nouns, pibroch, coronach, henchman, bracken, kern, rout.

9. What was the Fiery Cross?

10. Explain the words italicised in the following passages:

(*a*) Up spoke the moody Elfin King,
Who *woned* within the hill.

(*b*) The sun rides high; I must be *boune*
To see the archer game at noon.

11. Give a brief outline of the first two books of Paradise Lost.

12. Explain Milton's peculiar use of the words, admire, prone, conjure, horrid, confine, (*verb*), frequent (*adj.*)

13. Explain the words italicised in the following passage:—

Pilasters round
Were set, and Doric pillars overlaid
With golden *architrave*: nor did there want
Cornice or *frieze*, with *bossy* sculptures graven;
The roof was *fretted* gold.

14. In enumerating the fallen angels, from what source does Milton obtain names for them?

N.B.—In this paper additional marks, not exceeding 50, are allowed for quality of composition.

History.

Primers of Greece and Rome: Collier's Great Events.

1. Who was Solon? For what was he famous?

2. What do you know concerning the Peloponnesian War?

3. When did Macedonia become important in the history of Greece? Which of her Kings made famous conquests, and against whom did he fight? What city did he found?

4. What happened in B.C. 146?

5. Mention two battles fought in the second Punic war.

6. Tell what you know about Catiline.

7. Who formed the first Triumvirate? the second? What did the battle of Philippi decide?

8. How did Diocletian change the plan of the Roman Government?

9. How many Crusades were there? Give an account of the first.

10. What nations fought the battle of Sempach? what was its result?

11. Who was Richelieu? When did he live?

12. Mention a few facts regarding the great French Revolution.

13. State three leading events in the history of Spain.

14. Make a note or two in the Massacre of St. Bartholomew, and the Edict of Nantes.

Geography

1. Define any five of the following terms:—Map, Continent, Valley, Basin, Watershed, Estuary, Horizon, Zenith, Climate.

2. Distinguish the Zones, and name any plants or animals peculiar to each.

3. Name and define the political divisions of the earth.

4. Which is the most important and valuable of the minerals? In what countries is it found most abundantly?

5. Describe the course of any five rivers of the old world, naming the countries through which they flow, and the seas into which they fall.

6. Name and locate any five great commercial cities of the world.

7. Trace the course of the river St. Lawrence, and name the cities and towns on its banks, and the tributaries it receives.

8. Name the countries of S. America. State what is the government in any four of them. Describe the climate, vegetable productions and animals peculiar to this continent.

9. Describe the government of Canada, or of the United States.

10. Describe the natural features of the Province of Quebec, or of the North-West Territory, or of Scotland.

(4) NATURAL SCIENCE GROUP.

Botany.

1. Enumerate the parts of a complete Flower, state the structure and uses of one of them.

2. Name the parts of a Leaf, and describe the structures and uses of Stomata.

3. Describe the structure of an Exogenous stem.

4. What structures are indicated by the terms, Umbel, Strobile, Ovule, Cotyledon, Root-hair, Silique? Describe them.

5. Illustrate by figures the terms,—Fibrous, Fusiform, Tuberous, as applied to roots; Decumbent and Repent as applied to stems.

6. Give examples of plants having aerial roots, irregular flowers, bulbs.

7. What chemical elements occur in wood and starch, and whence does the plant obtain these elements?

8. What structures are found in a maple seed, and how do they differ from those in a grain of wheat.

9. To what series and classes do Fir trees, Indian Corn, and Ferns belong, and on what grounds can they be so referred?

10. Trace any Canadian plant through the grades of the classification from the species upward.

11. Describe the flower exhibited; stating its parts and modes of inflorescence.

Geology.

1. What are Feldspar, Hornblende, Conglomerate, Gneiss, Porphyry?

2. Explain:—Dip, Strike, Anticlinal, Formation.

3. What are Faults and Veins? Explain their nature.

4. State the general order of the geological ages.

5. State the general distribution of the Archæan in N. America.

6. What are the formation of the Upper Silurian in Canada? Give localities where they may be seen.

7. State some characteristic Marine Invertebrates and plants of the Devonian.

8 State what you know of the geological Relations, Structure and Fruits of the Coal formation.

9. Typical Rocks and Fruits of the Cretaceous in Europe and America?

10. The principal numbers of the Post-pliocene, and mode of their formation?

11. Describe any formation you have examined, with its fruits.

Elementary Chemistry.

1. Name and characterize briefly the gasses obtained by heating the following substances:—$CaCO_3$, $[H_4N]NO_3$, $KClO_3$.

2. Steam is brought into contact with red hot iron filings. What change takes place?

3. Describe any form of eudiometer, and explain its use in the analysis of gases.

4. 10 grammes of Sodium are dropped into water. What volume of Hydrogen is liberated [standard temperature and pressure]?

5. What is the difference between an anhydride and an acid?

6. Describe any experiment illustrating the use of charcoal as a reducing agent.

7. What changes are indicated by the following equation:—

$$MnO_2 + 4H\,Cl = MnCl_2 + 2H_2O + Cl_2$$

8. Fragments of Phosphorus are heated in a strong solution of Caustic Potash. What gas is produced? Give its properties.

9. How is Sulphuretted Hydrogen prepared, and what are its properties?

10. Name the substances indicated by the following formulæ: H_2SOS_4, $[H_4N]Cl$, H_3PO_4, C_7H_4, SiO_2

RECENT EVENTS.

The Management of the Schools.—The Provincial Government has appointed a Commission to inquire into the administration of the public schools, composed of the following gentlemen:—Hon. G. Ouimet, Superintendent of Education, chairman; Messrs. E J. Barbeau, L. H. Davidson, C. J. Doherty and Charles Glackmeyer, with Messrs. Provencher and R. D. McGibbon as secretaries. This

action will set at rest the complaints and doubts expressed in some quarters as to the laxity of administration by the School Boards, and the labours of the Commission will place the public in a position to understand the exact condition of the schools.

The Sherbrooke Schools.—The different schools under the Board of Protestant School Commissioners opened on Monday, September 4th, with a rather unusually large number in each. The Young Men's Academy opened with 28 pupils, the Young Ladies' Academy opened yesterday with 25, the Central School with 218, the Primary School, North Ward, with 42, the Primary School, East Ward, with 41. The new school of the Roman Catholic School Commissioners will open next week in charge of the Christian Brothers. The College opened on the 1st, and the other primary schools on the same day.

The Education Question.—Le Courrier de Canada had lately a well-considered article, dwelling largely on the overcrowding of the liberal professions, and advising all guardians of youth in the national interest, especially as regards this Province, to educate the rising generation for the many other branches of art and industry which are necessary to build up the greatness and prosperity of the country. It is willing that all youths inclined toward the religious vocation should have every facility to gratify it, as it considers that the present numbers of the clergy will soon be inadequate to supply the demand for pastors necessitated by the rapid settling up of the country, and especially of the North-West; but it holds that while there is a sufficiency of the higher educational institutions to fit out young men for the ministry, the bar, or medicine, we have not anything like enough of elementary and industrial schools to benefit our poorer classes, and generally to promote the interests of our creative industries, as well as to spread the taste among our youth for something more practical than the forum or the political hustings. In view of the fact that Quebec, as well as Ontario, will be called upon before many years to supply our immense territories in the North-West with an enormous quantity of manufactured goods of all kinds, and as good mechanics and skilled workmen will be in great demand, this article is the more welcome.

New Educational Enterprise.—The Laval University has purchased from Mr. C. S. Cherrier the piece of ground facing St. Denis street, between Dorchester and St. Catherine streets, and are, as soon as possible, to commence building upon the site. They will proceed slowly with their buildings, erecting them as their means permit.

Protestant Board of School Commissioners.—At the regular meeting of the above Board for the month of September, Mr. Stephens submitted details of an arrangement by which Jewish children

will be received into the British and Canadian School, and instructed in Hebrew a part of the day by Mr. Jacobi. This report was received and adopted. The monthly statements of accounts for June, July, and August, duly audited by the Secretary, were submitted. The annual statement of revenue and expenditure, prepared for the Superintendent of Public Instruction and for publication according to law, was laid on the table, but was not received because the auditors had not completed their report. From it, however, it appeared that the floating debt on the 30th of June last, exceeded the balance on hand by $29,179.26. The statement of attendance of teachers and of pupils for the school-year just completed, showed an average monthly enrolment of 2,826 in the Common Schools of the Board, 617 in the High and Senior Schools, and 222 in the St. George's and Hebrew Schools; a total of 3,665 pupils each month. The average daily attendance has been 88½ per cent. of the monthly enrolment in the Common Schools, and 93¾ in the High and Senior Schools. The average number of teachers employed has been 72 in the Common Schools, and, including occasional teachers, 31 in the High and Senior Schools. The Chairman was empowered to engage Mlle. Vessot, as teacher of French in the High School for Girls, and to fill vacancies in the staff of Common School teachers, as far as absolutely necessary. It was decided that the monthly fee of pupils not resident in the city, shall be $3 a month in the Senior School.

Scholarships, McGill University.—At the recent competitive examinations in McGill College, the following scholarships and exhibitions were awarded to students and candidates for entrance:—

SCHOLARSHIPS.

Tenable for two years.

Third year—Mathematical scholarships, *Mackay, A. A.
Third year—Natural science, *Blackader, E. H.

EXHIBITIONS.

Tenable for one year.

Second year—*Lochhead, W. (Listowel High School); *Climie, W. (Listowel High School); †Stewart, W. G. (Lachute College.)

First year—*Ritchie, P. E., (High School, Montreal); §S. McRae, D., (St. Catherine's).

*Value of scholarship or exhibition, $125 yearly; founder, W. C. McDonald, Esq.

† Value of exhibition, $125 yearly; donor, George Hague, Esq.

§ Value of exhibition, $100 yearly; founder, Mrs. Jane Redpath.

MISCELLANEOUS.

New English Grammar.—Messrs. Macmillan and Co. will publish in the autumn a work on English grammar, by the Rev. W. G. Wrightson, of Cambridge, which will carry the logical and grammatical analysis of the language farther than has yet been attempted in books of this kind.

Rousseau on Arithmetic.—L'arithmétique pratique s'étend plus loin qu'on ne pense quand on veut y mettre l'exacte précision. Il y a des opérations d'une longueur extrême, au milieu desquelles j'ai vu quelquefois de bons géomètres s'égarer. La réflexion jointe à l'usage donne des idées nettes; et alors on trouve des méthodes abrégées, dont l'invention flatte l'amour-propre, dont la justesse satisfait l'esprit, et qui font faire avec plaisir un travail ingrat par lui-même. Je m'y enfonçai si bien qu'il n'y avait point de question soluble par les seuls chiffres qui m'embarrassât: et maintenant que tout ce que j'ai su s'efface journellement de ma mémoire, cet acquis y demeure encore en partie, au bout de trent ans d'interruption.—*Les Confessions.*

A last word on Carlyle.—The truth has to be stated, even by a devoted disciple of Carlyle. These Irish reminiscences, like the former volumes, reveal a very weak, discontented mortal, instead of the strong, terribly earnest, scathing prophet whom we behold in his works. Yet, in spite of this revelation of weakness and ill-temper, the great torn heart of the man is plainly visible. A preacher who denounces the evils of his time is apt to let his voice grow harsh with perpetual remonstrance. Jeremiah had not a smooth tongue, and probably Isaiah frequently made himself unpleasant to his friends. When these miserable reminiscences are forgotten, Carlyle's influence will again be felt, and he will then be more gratefully remembered by an age that owes much to his teaching.—*Mrs. Heaton in "the Academy."*

Paraphrase as a branch of Composition.—No doubt paraphrasing is a good verbal exercise when it means turning a bad style into a better; but, when the very best words to express their meaning have been sought out by Skakespeare or Gray or any other great master, we cannot see that it can improve any one to turn their masterpieces into other words, which cannot fail to be worse. We wish the writers of composition books would insist more on the virtue of thoughtful and conscientious translation from foreign languages. There is no better means of getting a free use of a wide range of words, and of wooing at least, if not winning, that power of expressing in words the most delicate shades of thought and feeling which distinguishes the true literary artist.—*Saturday Review.*

Education in Spain.—The Congress assembled in Madrid towards the end of June to discuss the best method of furthering the cause

of education has broken up after holding a great number of sittings and passing several resolutions, the most important of which was that primary education should be gratuitous and compulsory, and that manual labor should be taught in all primary schools. The Froebel method of teaching was recommended for use in all infant schools; but a resolution in favor of allowing women to become candidates as teachers in the higher schools was rejected. Spain is still a long way behind most other European countries in regard to education, but it appears from some statistics referred to during the Congress that the number of primary schools has increased from 24,000 to 29,000 within the last two-and-twenty years; but there are still many villages without a school of any kind, and others in which the school buildings are unsuitable for the purpose. The teachers are badly and unpunctually paid, and the consequence is that they are, as a rule, very unfit for their posts. The Minister of Public Works intends to bring in a Bill enabling the Government to take over the primary schools and provide the funds for them.—*The Schoolmaster.*

The Papal name, Sixtus.—Prof. P. de Lagarde has published in the *Nachrichten* of the Göttingen Royal Academy of Sciences a note upon the etymology of "Sixtus," the name of so many Popes. It is not another form of *sextus*, as might be rashly conjectured. It is derived from the Latin *xystos*, Greek ξυστος = "a portico," which is itself so-called from its smooth and polished floor. In Italian, xystos naturally became *sisto*, which was again Latinised as Sixtus.—*The Academy.*

Bentley's Place among Classical Critics.—The place of Bentley in literature primarily depends on the fact that he represents England, among a few great scholars of various countries, who helped to restore classical learning in Europe. Nor is he merely one among them; he is one with whom an epoch begins. Erasmus marks the highest point reached in the sixteenth century by the genial study of antiquity on its literary side. Scaliger expresses the effort, at once erudite and artistic, to comprehend antiquity as a whole in the light of verified history. Casaubon embodies the devoted endeavour to comprehend ancient society in the light of its recorded manners, without irradiating or disturbing the effect by any play of personal thought or feeling. With Bentley, that large conception of antiquity on the 'real' side is still present, but as a condition tacitly presupposed, not as the evident guide of his immediate task. He feels the greatness of his predecessors as it could be felt only by their peer, but sees that the very foundations on which they built the classical books themselves must be rendered sound, if the edifice is to be upheld or completed. He does not disparage that 'higher' criticism in which his own powers were so signally proved; rather, his object is to establish it firmly on the only basis which can securely support it, the basis of ascertained texts.—*Prof. Jebb's Life of Bentley.*