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THE CANADA
EDUCATIONAL MONTHLY
AND SCHOOL MAGAZINE.

DECEMBER, 1886.

ANNUAL CONVOCATION OF QUEEN'S UNIVERSITY.

N. F. DUPUIS, M.A., F.R.S.C.

MR. CHANCELLOR, LADIES AND GENTLEMEN—

To the following address I must premise the statement that any opinions therein expressed are not to be taken as necessarily the sentiments of this University, as in the most of cases I do not know what the views of my colleagues are upon the questions dealt with.

LAST spring, while preparing our Calendar of the present session, we learned that Toronto University had entered into an arrangement with the Education Department to have its matriculation examinations conducted at the High Schools and Collegiate Institutes throughout the Province, in conjunction with the Departmental School Examinations. This arrangement meant that the matriculation papers of Toronto were to be distributed to upwards of a hundred local centres, if candidates presented themselves at so many. It meant, in fact, that wherever there was a candidate an examination would be held for his benefit, so that none could say that he chose some other university

because it offered greater facilities for coming to the matriculation examination. How this arrangement would affect the number of candidates appearing for matriculation at the other universities was at the time a mere conjecture, and why the Department entered into this arrangement with Toronto University alone, without at least proposing it to the others, was, and is still, a conjecture. However, the three other universities in the Province—Queen's, Trinity and Victoria—thought it proper to enquire of the Minister of Education if he was willing to extend the same privilege to them, that is to admit their matriculation papers at the High School examinations. He not only gave a ready consent, but was pleased to have the other universities take advantage of this privilege at first extended to Toronto.

Hence it came about that the matriculation papers for Queen's, as also for the other universities of the Province, were sent through the Education

Department to the various schools and institutes at which candidates signified their intention of being examined. Having decided to enter into the arrangement spoken of, we received an examination scheme; who originated it I do not know, but I suppose that it was made out to suit Toronto University. Viewed in the light of our previous practice, this scheme appeared to be particularly meagre in the time allotted to examination in pass work, and very full in that allotted to examination in honor work. Thus, two hours and a half were allowed for subjects to which we were in the habit of giving four hours. Whether this was an advantage or a disadvantage I am not prepared to say. It is quite possible that as satisfactory an examination might be made upon a given subject, which was not too extended, in two and a half hours as in four hours. And it is quite possible, also, that the mere pass man does not amount to much, although he had been in the habit of thinking that he does. However, as no change could very well be made in the furnished scheme we adopted it, and resolved to accommodate ourselves to it in the best manner possible, although in doing so we found it necessary to lower our standard in Greek, for the scheme allowed for one paper, on translation only, whereas our practice had been to give also a paper on grammar and composition.

The next question was whether the three universities—Queen's, Trinity and Victoria—should each send its own papers through the Department to the examination centres, or whether they should combine and send a common set of papers, and thus hold a common examination. The arguments against combining were (1) that each of these universities had hitherto completely controlled its own matriculations, and to combine and have a common examination would be a new

departure, the result of which might be unsatisfactory or even disastrous. (2) Each university has a certain number of scholarships to be awarded upon the results of these examinations, and it would be difficult to properly award such scholarships in a combined examination. (3) That as we did not know what new developments in the examination system might take place before another year, it would probably be wiser to wait a year for such developments, if any were to be. The arguments for combining were: (1) It would give less trouble to the Education Department to distribute a common set of papers for the three universities than to distribute a separate set for each. (2) As the examination is really a school examination, set upon work done in the schools, and under the guidance of the same teachers, irrespective of the university for which the candidate is intended; and as the schools are under the control of a single department, and brought to the highest degree of practicable uniformity, there can be no reason for any differences in these examinations, at least for candidates from the Province of Ontario. (3) The act of the three universities already mentioned in combining would be a sufficient indication of the position which they hold in regard to a completely uniform matriculation examination for the Province, should such a scheme be thought to be advisable.

The latter arguments seeming to be important, the universities decided to combine; but in order, as far as possible, to avoid the difficulties and reap the benefits of a common examination, they decided that each university should act individually in receiving applications from candidates, in finally deciding who among these shall be considered as having passed the examination, and in awarding its scholarships. For the purpose of

carrying out this arrangement a Board of Examiners was appointed, to which were entrusted all the details of the work. This Board consisted of two from Queen's, two from Trinity and three from Victoria. I had the laborious honour of being Secretary to the Board. As my duties brought me very frequently into communication with the Department, I take this opportunity of publicly thanking that model Secretary of the Education Department, Mr. Marling, for his careful and immediate attention to all matters wherein his services were required. The duties of the examiners were to prepare the papers, twenty-one in all, to read the answers of candidates, and to report to the Registrars of the several universities. My duties were to receive and classify the lists of candidates, to arrange for and superintend the printing of the papers, to transmit to the Department classified groups of the papers, to receive from the Department the candidates' answers, to assort these and transmit them to the various examiners, and to answer communications and attend to small matters innumerable. Everything being thus arranged, it was supposed that the work of the examinations was reduced to a sort of mechanical simplicity. But human beings are not mere machines, and it is impossible to get them to work like machines. The actual work of the examination soon began to exhibit difficulties and perplexities which, although not insurmountable, were not sufficiently covered by the provisions which had been made. I do not suppose that an examination of the same kind will be entered into in future; for, as Victoria ceases to be a university and becomes a part of or an attachment to Toronto, it will scarcely be worth while for Queen's and Trinity alone to combine; while it is to be hoped that some more general arrangement may be entered

into. Nevertheless, it may be worth our while to examine the difficulties referred to, and to enquire how they might have been avoided or corrected.

1. The calendars of the three combining universities were not uniform in announcing the matriculation work. The consequence was that examiners were often in doubt as to the extent of a certain subject which their papers should cover, and sometimes as to the particular parts of the subject to be taken up. Of course this could have been rectified if the scheme had been brought on soon enough, but the calendars of the universities had each gone out to the High Schools, and candidates for a particular university are usually more or less governed by the announcements in the calendar of that university, even although studying at a school in which the greatest uniformity of work exists; and it might be assumed quite naturally that there was a tendency in examiners from Queen's to incline towards the announcements in the calendar of Queen's, and a similar tendency in the examiners from the other universities. But even if such a tendency existed, I feel confident that the examiners did the best they could under the circumstances, and that although in a few cases there was some reason for complaint at the character of the papers set, yet that no real injustice was done to any candidate. Contrary to what one might suppose, we are never certain about one particular subject, as to what should be put into the calendar. Naturally, the High Schools and Collegiate Institutes are the feeders of the universities, and the subjects taught in these schools should form the subjects of the matriculation examination. The curriculum of the High Schools is adopted upon the authority of the Department, and this curriculum leads up to matriculation in Toronto University. But who makes out the curriculum?

Is it the University or the Department? Whichever it be, those who make out the curriculum for Toronto University, and hence for the High Schools, seem always to be at a loss in regard to the one subject—English. Or at least they always make a muddle of it.

Some years ago Sir Walter Scott's "Marmion" was chosen as a portion of the English subjects for matriculation in Toronto University, and as a matter of course it formed one of the works to be read in the High Schools, and thence it was adopted into the matriculation subjects of the other universities. But, after the various calendars had been published, and the work had been partially read in the schools, somebody discovered that "Marmion" was not a fit and proper work to be read by all creeds and both sexes. Hence a new instruction was sent to the schools, and "Marmion" was withdrawn, and something else put in its stead. It is no matter of ours at present as to whether "Marmion" is an objectionable work or not. Suppose it is, could not this have been discovered in time to prevent its being authorized, and thus to save a great waste of time and an immense amount of confusion? Last year Coleridge's "Christabel" was given. But after a little somebody found out that it also was objectionable, and "Christabel," like "Marmion," had to make room for something else. In the Queen's College calendar, however, "Christabel" was retained, and hence one source of confusion in the English paper of the last examination. In the present year, that is the year to which our last calendar applies, Shakespeare's "Timon of Athens" was placed in the senior matriculation on the authority of the curriculum of Toronto, but it also has been changed for something else since that calendar was published.

That mistakes should occur occasionally is to be expected, but the occurrence of such blunders year after year is the height of absurdity, and shows that whoever makes out the English part of the curriculum either does not know the character of the work he prescribes, or is culpably careless, or that outside influence and pressure is brought to bear on the Department or the Government.

2. A second source of annoyance was the difficulty of getting candidates to observe the conditions of application as communicated to them through the calendars or otherwise. Thus, after the papers had been transmitted to the Department for distribution, applications were received from a few candidates; and in some cases we were asked to send the papers direct to the teacher or inspector of the locality at which the applicant desired to appear. Now, as the Department alone was held responsible for the safe-keeping and secrecy of the papers, to send these papers to any one teacher or inspector would be quite equivalent to sending them to whoever might ask for them, and thus all assurance as to the secrecy of the papers would be destroyed. Hence the only way was to pointedly refuse to transmit any papers except through the proper channel, and accordingly at the proper time, although knowing that such refusal would in some cases create bad feelings towards the universities. Such a lesson to candidates, however, may prove beneficial. A regulation may be looked upon as a law made for a special purpose. If the regulation is not necessary it should not be made, and if necessary, it should be obeyed. Now irregularities in the conducting of examinations are particularly objectionable; hence any regulations having the good of examinations in view are worthy of consideration and should be attended to; and the best

way to teach candidates this is rigidly to enforce the regulation. Some would-be candidates, failing to obtain the papers from me, applied to the Department for permission to write at the examination. But as the examination was ours, and as the Department simply took charge of our papers, it was quite ready and willing to take any course which we might think best. But if the matriculation examinations ever come to be Departmental, such candidates will find that they *must* accommodate themselves, and very properly, to the regulations issued for that examination, or suffer the consequences.

3. A third source of confusion arose from the representations of some candidates, although of very few, that they did not receive the papers for which they applied. The applications of candidates were sent to the Registrars of the several universities, and from the Registrars I received lists of the candidates and of the papers required by each. The distribution of the papers was made according to these lists, and it is easy to understand that with the greatest care it was quite possible to have some errors. But it is a satisfaction

to me to know that a comparison of the lists with the complainants showed that the grievances were not due to errors of distribution. I am inclined to believe that the difficulty arose either from the candidate's not stating clearly what he did want, or from his having changed his mind between the time of his application and that of the examination. Whatever the cause might have been, the assumed error was discovered only during the progress of the examination and could not possibly be rectified. If the difficulty arose from a candidate's not stating his wants clearly, it could have been avoided, or could be avoided in future, by having all applications made upon a proper form supplied by the Secre-

tary of the Examining Board, and by having these transmitted directly to him without the intervention of a third party. If the trouble arose from the second cause, the only cure is for candidates to learn that other people's time is too valuable to be spent in rectifying the evils due to their vacillating intentions.

I think it will appear from what I have said that the sources of confusion were not many, that these might all have been avoided had they been foreseen, and that no real cause for grievance was given; so that on the whole the examination may be pronounced a *success*. Our past experience would be of the highest utility in conducting another examination of like kind, and I have no doubt that it might be made to work as smoothly and satisfactorily as any examination of a single university, although as a matter of course the labour increases with every increase in the number of candidates.

1. Candidates presented themselves at forty different schools throughout the Province. Of these, thirty-nine were High Schools and Collegiate Institutes, i.e., Government or Provincial Schools, and the fortieth was a Private School. Of this latter school I shall speak more fully presently. The number of candidates which presented themselves at the different schools varied from eighteen to one. About 130 candidates appeared in all, and were distributed as follows: To Queen's fifty-seven, to Victoria fifty-three, and to Trinity the remainder, about twenty. Now as far as Queen's is concerned, this is about the average number of candidates which have presented themselves for the last few years. So that Queen's did not gain in numbers by the wider distribution of examination centres. I believe this is also the case with Trinity; while Victoria experienced a very decided increase. I believe, however,

that other causes than the extension of the facilities for matriculation had much to do in producing the increase in Victoria. This seems to indicate that the constituency which supports Queen's does so for some reason or reasons other than the facility of appearing at matriculation examinations, and Queen's would have been equally well off if she had followed her former course and held her own examinations at a few selected centres.

2. Some strange peculiarities manifested themselves at these examinations. Thus, *all* the candidates for honors in history and geography were candidates for Queen's, and so also were all of those who took the science options. The science candidates were few, and generally speaking the schools which sent up the best candidates in classics, mathematics and English sent up no science candidates. This fact, coupled with my having had to read the science papers, suggested some thoughts upon science teaching in schools, the substance of which I now purpose giving. Tyndall has said that "Nature lays her beams in music," which is a poetical way of saying that all natural operations are rhythmical. This may possibly explain those singular waves of opinion which sweep over a nation at times, and threaten to revolutionize the oldest established customs and ideas. Our forefathers thought that classics and mathematics formed a fitting preparation for a university course, and a continuation of these with metaphysics and logic was quite a sufficient mental exercise for the whole work of the course. To these in later times the critical study of English was added, and later still came experimental science. In recent times speakers and writers who threaten to overturn this ancient order of things have appeared by the score. These are the so-called practical men. What good, say they, is your classics

and your mathematics, and your metaphysics? Give us something practical. If you must study languages, study those which you can have the opportunity of speaking. Throw aside your logic and give your attention to chemistry and physics and geology—learn to know your own physical system, and the means of keeping it in order—"it is better to know where your liver is than that its Latin name is *jecur*." Says one: "Give your best energies to science." Says another: "And you may reap some benefits from your study; you may possibly some day make a discovery that will bring honour to your name and money to your coffers." But why should those practical men stop here? Carpentering and blacksmithing and shoemaking are even more practical than chemistry, for fifty carpenters are needed for every chemist needed. And the same may be said with respect to physicists and geologists.

If our highest education is to consist in learning how to make money easily and respectably, or how to bring to ourselves honour or fame, or how to plead the cause of the guilty or to relieve the afflicted, our universities had better be turned into technical schools, and the ancient classics and their old time associates give place to science and law and medicine and the various technical arts. But if the highest education is to consist in the expansion and cultivation and development of the student's mind, and in giving system and accuracy to his thought, then classics and mathematics and metaphysics need not fear any modern rivals. In the days of Kane and Fowne and Libeig and Silliman, descriptive and theoretic chemistry was thought to be of some account, and was accordingly allotted an important place in their works upon the science. But the tendency in modern works is to begin with an experiment, to continue by experiment and to close

with an experiment, so that I fear the whole work becomes an experiment and sometimes a serious one. People who know little or nothing of science will cry out, Experiment, experiment; nothing is to be learned but by experiment--the only true way to acquire any real knowledge of an experimental subject is to go to the laboratory and experiment. Now this is true in a sense but not in their sense. Another says: "I am so fond of chemistry; the experiments are so beautiful and so interesting." True, so also to many people is a 1st of July celebration or a common picture gallery or an amateur concert.

Students, when they first enter the class of chemistry, and are lost in admiration of the wonderful sights there displayed, are inclined to sing with Croft: "My wandering soul is satisfied." But when the novelty begins to wear away and the real nature of the subject to reveal itself, they feel that the experiments were like the auroral display of the morning which ushers in the weary labours of the day. If any one thinks that a mastery of chemistry or physics or any other experimental science consists in a knowledge of its beautiful experiments, he has not even come to understand what constitutes a science. As well might we suppose that a critical knowledge of Shakespeare was to be obtained by studying the beautiful pictures in some voluminous illustrated edition of that author's works. If we take away the display of pyrotechny and acoustics often accompanying a chemical experiment, what does it teach? That under certain conditions a certain result is realized. But that these conditions are not always easy to fix appears from the fact that the best of experimenters will sometimes fail through a slight inadvertency. At the best then an experiment gives us an isolated fact; for any variation in the conditions

may modify or completely prevent the expected result. An experiment gives us no prophetic power, for we can never know, without actual trial, what another experiment, differing from the first only in details, may bring forth. But facts amount to very little in themselves. To be educated in a subject is not merely to know its facts, but to know the understratum upon which the facts lie. To know an experimental science we must know the laws which bind its facts together into a whole—we must be able to give a reasonable explanation of its phenomena, and to conjecture with some degree of certainty the outcome of some untried combination of circumstances. How bewildering and useless were the facts of astronomy until Newton framed them into a system and established the true theory of the universe in his law of gravitation; or those of geology until Lyell harmonized them by his theory of continuous geologic change; or those of biology until Darwin gave an insight, even though imperfect, into their cause by his now famous theory of evolution.

A science needs theory—a long experience in teaching a science taught me that experiment alone cannot impart a knowledge of science, and that experiment at random unites utility to amusement to about the same extent as a game at base-ball. The true way to teach science is to lay down the accepted theories of the science, and to employ experiment for illustrating and establishing these theories. The theoretic *must* precede the practical and the experimental if any real progress is to be made in the knowledge of a science. But, you say, the theories are drawn from experiments, and rest wholly upon them, and how then can you speak of theory preceding experiment? Yes, theories are built upon the results of experiments, and for that very reason I will venture the assertion that no boy and

very few men would be able to frame one of the simpler chemical theories even after years spent in experiments. If the theory could be established mathematically, which I believe will be done some day, the case would be different. Theories have their roots in experiment, but they are the growth of ages and of generations. Theories rise on stepping stones of their dead selves. The ground upon which a theory rests is strewn with the skeletons of those which are exploded and defunct. The process by which a scientific theory is established is experimental, and for that very reason the theory is but tentative, and may possibly at any time be proved to be more or less untrue and suffer the fate of dozens of its ancestors. How absurd then to put a lot of apparatus into the hands of boys, and to ask them to work out the explanation of phenomena. To do so requires the matured mind of men, and even ten of these fail for every one that succeeds. The theories must be given to the boy dogmatically, and then rendered probable by experiment.

In all that I have said I do not mean that experimenting will do a lad any harm; or that it will weary him in the least to carry about all the facts thus obtained; or if he wants worthy amusement, that experimentation is not incomparably superior to many leading amusements indulged in. But I do mean to assert that scientific experiment is not as great an educator of the young mind as many people suppose it to be. The character of the answers returned to the science papers showed very clearly that the knowledge of the subject possessed by the candidates was mostly of the parrot kind. Where the question could be answered by the statement of a fact, the answer was generally forthcoming. But where the question required a deeper insight into underlying principles, the answers

were given in a very uncertain voice, and were generally either nonsensical or astray. Again, in the beginning of an education, certainty and accuracy, accompanied by simplicity of statement, should be attempted if possible. To make every statement doubtful is to engender universal scepticism. But the majority of theories in science are only approximative, and have to be burdened by exceptions and minor qualifications, if accuracy of statement is aimed at. Take, for example, the chemico-physical theorem known as Boyle and Marriotte's law, "the volume of a gas is inversely proportional to its tension." This is not accurately true for any gas, and it fails signally, under certain circumstances, for every gas. Why then is it called a law? Because the real law, if completely known, would be too complex to be of much utility. Compare with this the mathematical theorem "that every prime number differs by unity from a multiple of 6." This theorem has no exceptions and no limitations, and is true for every prime number that could be written, even could you cover the vault of heaven with such numbers.

Again, the convalescent invalid who to regain his strength of limb takes a walk in the morning air, and finds it necessary to ascend a hill, does not vainly strive to clamber up to some projecting crag, but chooses a gentle acclivity and rises from a lower to a higher position by that slow and easy ascent which brings strength and vigour to his needy system. Even so should the undeveloped and plastic mind of the pupil be led on to its healthy development, by the safe and natural process of rising gradually from the simple to the complex, from the plain and the easily intelligible to the intricate and the abstruse. But science has no simple part. It requires no great powers of observation to see that a horse has four legs with one

toe on each, while an ox has four legs with four toes on each. But if we seek to explain why there is this similarity and yet this difference, our search will carry us back into the abstruse theory of animal differentiation, and land us in that most complex of all theories, evolution. Many text books on chemistry begin the subject in what is usually considered a simple manner by a description of the process by which we obtain hydrogen gas from zinc and acid. But what does an explanation of this process involve? It involves all those principles of higher and lower affinity which are generally classed under the head of chemism—it involves the theory of molecular contact in solution—it involves the nature of a change of physical state, and the laws of latent heat depending thereon—it involves the principle of valence—of atomic weight—of gaseous specific weight—of the solubility of compounds—it involves in short almost every principle that is concerned in the most complex operation that takes place in chemistry.

Contrast with this the study of geometry, for example, which begins with the primary notions of the mind, than which nothing can be simpler, and leads on step by step by almost insensible advances, removing every obstacle and making every inch of progress sure, until we rise at last to that elevation whence we can weigh the planets and know the distances of the stars. I hope it will be distinctly understood that by what I have said I do not wish to discourage the study of science. That study is a noble one, and worthy the undivided attention of the greatest human minds. And the results of scientific research have possibly done as much for the human race in ameliorating the hardships of existence upon this earth as any other outcome of mental activity.

Nor do I draw a contrast between chemistry and mathematics because these are necessarily the subjects to offer a contrast. I choose these because I know them better than any other subjects. But I *do* say that as means of pure mental development, and therefore as subjects well calculated to fit students for an after university course, science, with all its experiments, has no advantage over mathematics in its methods, while it is decidedly inferior to mathematics, as to the manner in which it gives its results, and in the gradational character of the results so given. Owing to the abstruse nature of scientific research, and the continual necessity of guarding against erroneous conclusion, science is best mastered by the matured mind which has been already somewhat developed by a sufficient prolonged study of other and less complex subjects. Now it is a fact that, although provision is made for science teaching in all of our Collegiate Institutes and many of our High Schools, science teaching is considered quite a secondary matter, while the burden of the work consists in the study of mathematics, classics and English, in most of the best schools of the country. Whether the masters have learned by experience or otherwise that this is the better course, I certainly believe that they are fully justified in the course which they have taken. I believe it can be clearly shown that the schools which on the average send up the best candidates to the universities do the least in science teaching. And I believe that the ultimate benefit to the country of the school which gives much of its time to science will be less than that of the school which confines itself mainly to classics and mathematics and English.

(To be continued)

A PLEA FOR OUR READING CIRCLES.*

BY MR. FRANK CRASSWELLER.

MIND culture may be obtained by travel and observation, by contact with minds superior to our own, or by an intimate knowledge of the best thoughts of the greatest men. Owing to the lack of money and time, especially the former, travel is practically out of the reach of a majority of teachers, but culture by means of books is within the reach of all.

Mind culture is a necessity of the present age. For self-preservation and advancement it is as essential to-day to cultivate the mind, as in the Middle Ages it was to cultivate the body. The man whose intellect has been trained to think keenly and closely, and whose mind has been broadened and sympathies deepened by extended reading and observation, is so notoriously the successful (using the word in its highest sense) man of the day that I should not have referred to the necessity of mind culture at all, had I not been told by teachers who refused to join a circle that they did not care to do so, as they did not intend to teach more than a year or two. The time when lack of mental ability was no bar to office or promotion has passed or is passing away, and the day is dawning when in order to compete successfully with rivals in the race of life it will be necessary to use every means in our power to improve our reasoning and observing powers. And if it is necessary that we, as individuals, should improve our minds, how much more necessary that we as teachers should do so. The teacher whose knowledge of the subject is

limited to the matter in the text-book before him loses more than half his power. He who would teach even the simplest subject with all the success his ability deserves, must be able to see it from all points and in all its phases—not with the spectacles of only one man (spectacles, which perhaps, give but a dim view of the matter), but with the lenses of other thinkers and observers—that it may appear to him in all its varied phases, and that he may thoroughly understand it. He must be able to draw from the stores of his memory illustrations to make the subject plainer and more interesting. He must have also boundless enthusiasm for his work, and this I hold can only come from a full knowledge of what he is to teach, and of the benefits to be derived from that which he is teaching. In order, therefore, to be a successful teacher, one must not be contented with the mere work required for his examination, but must, chiefly by reading, gather in knowledge of all kinds. He must also be able to assimilate this knowledge, and by cultivating the thinking faculty winnow the grain from the chaff, and store it up for future use to be of assistance to him in his work. Do the majority of teachers do this? My answer must be in the negative. Not that we lack conscientious teachers, who spend much of their time in self-improvement to the benefit of themselves and their schools, but because many enter the profession with the intention of remaining only a year or two; and many, too many I am sorry to say, having taken a Second or a First Class Certificate, deem their educa-

*A paper read before the West Huron Teachers' Association, at Goderich, October 14th, 1886.

tion completed, and settle down into humdrum teachers. This is the reason why the country is strewn with wrecks of pedagogues, who years ago were doing good work, but who have been forced to leave the profession to make way for younger, better qualified and more enthusiastic successors. The Minister of Education, observing these wrecks and the causes of them, instituted the reading course that every teacher might have a chart of his route and steer clear of the rocks of apathy and ignorance. Many teachers would sooner choose their own course of reading, and some doubtless think they could have made a better choice of books than has been made, but when we read the list over carefully, notice the many works almost necessary to be read by every teacher, and remember that a person's own choice will generally give too much attention and time to light reading, I think it is plain that there is advantage in taking the course prescribed. Besides, methodical reading is always to be preferred to desultory reading. The course has been divided into three parts. First, of course, comes Pedagogy as being most connected with our work. The great strides that have been made both in the theory and the practice of teaching during the last few years make it imperatively necessary for the teacher who would keep up with the times to study the newest and best thought of the day. What would be thought of the farmer who reaps his grain to-day with the sickle his great great-grandfather used, or of the mechanic whose tools are fashioned on the pattern of those used by Noah in building the Ark? What would be thought of the lawyer or doctor upon whose shelves the latest law decisions or latest discoveries in medicine were not to be found? Whatever might be thought, of one thing I am certain, the farmer would be sold out in less

than five years as a lesson to him for trying to compete with men assisted by all the reaping machinery inventive thought has devised during the last thirty years; the mechanic would be out of employment; the lawyer would lack clients, and the doctor patients. And yet this is exactly what some of us are doing: we are neglecting the newest thought and discoveries in psychology, teaching-principles and teaching-methods; our shelves are destitute of later educational works, and our tables of educational periodicals. While it is only of late years that the science of education has been studied and discussed, we are applying the same principles, the same methods, nay even the same forms that were used by our ancestors ages ago. And this is the reason why our schools are dull, our pupils apathetic, and our work disheartening. The method which to some remote, enthusiastic predecessor was replete with life has crystallized into a mere form, and you might as well try to resuscitate a corpse as to bring back into life and action this dead method. Principles, not methods, are what we should give our chief attention to, though, so long as we do not try simply to imitate the methods of others, we can by studying them, get good ideas that may help to strengthen and revive our own. We may scoff at the new education; we may deride its title of new, and assert that its main principles are as old as the hills; nay, we may even laugh to scorn the claim of its extreme supporters that Col. Parker is the apostle of all that is new and great and grand in modern education; but with all its crudities, imperfections and iconoclastic proclivities it has a life, an enthusiasm, and a force that have made it a power in the States, and that will effect a change in *our* teaching if Canada is to keep pace with her sister country.

And, after all, what are the main.

principles of the new education? As I understand them, they are the introduction into the school-room of the principles which Pestalozzi and Fröbel introduced into the Kindergarten; the making of the children acquainted with things or their exact representations more than with words; the cultivating of the powers of observation and thought more than the powers of repetition and recollection; the teaching of a child rationally rather than authoritatively. It emphasizes the opposition to Bacon's maxim that "Knowledge is power," and asserts that "Thought is power"; that power to think is more important than power to acquire, and that without thought behind it knowledge is of very little value. The Baroness von Marenholtz-Bulow visited Fröbel's Kindergarten and was so impressed by one statement of the famous educationist that she forgot, I believe, everything else he said. That which impressed her so forcibly was simply, "Man is a creative being." This fact has been recognized on the Kindergarten, where the creative instinct of childhood is given full scope, but it is necessary for us to remember that it is a factor in our school work also. Further, Solomon's advice is as pertinent to-day as ever, "With all thy getting get understanding." The school-room is the place for this creative being to get understanding. Intelligent thought is the power that moves the world. Men of thought and men of character are what are wanted every day. When nearly every adult has the right to vote and take part in the government of the country, it is necessary that all should know how to form correct judgments from given data, and this power of thinking correctly must be developed in the school-room. The development of thought, then, being the main desideratum of to-day, it at once becomes part of a teacher's duty to learn how thought is de-

veloped, and to do this he must study psychology theoretically as well as empirically. He must not only study the laws of growth of the mind, but he must also learn what systems of education are best adapted to assist growth and what to retard it; what the foundation principles of education are, and what methods have been found best adapted to economize time and secure efficiency of work. In the pedagogics of the reading course we have works which deal with all these things, written by men of world-wide fame as educationists. These give us the professional reading. But besides these we have scientific and literary works also recommended. In the United States considerable discussion has been going on as to the advisability of placing other than professional works on the reading courses, the result being that while in some States, New York and New Jersey for instance, the course is solely professional, in others, such as Iowa and Illinois, the course is more general. For my own part I think the Minister wise in adopting a general course for Ontario, as it is better adapted to rural localities. In cities and towns where public libraries are open to all, and where a teacher's environment is of assistance to him in prosecuting scientific and literary studies, the professional course would be sufficient, but in rural districts, where libraries are scarce, and the surrounding of a teacher anything but stimulating to the acquisition of general knowledge, the wider course is preferable. When we consider the wonderful discoveries that have been made in all branches of science of late years, and the claim of some of its most prominent supporters that it should have a foremost place in our educational system, we cannot but agree that a teacher should be well informed in regard to this most interesting of all studies, and that he

should be acquainted with the grandest works of the best authors in our language is so manifest a truism that it needs no argument to support it. Having examined into the adaptation of the course to our work and into the benefits that we may derive from it, it next behoves us to consider the best means to be employed in order to get the most good out of it. To my mind the most satisfactory method is by means of reading circles, Firstly, because of the companionship; Secondly, it ensures more systematic reading; and, Thirdly, the necessity of expressing our thoughts on any subject requires us to think out our ideas fully and completely. All will agree that social meetings of ten or twelve people with a common object, and the conjunction of ten or twelve brains on any subject, must elucidate that subject more than one brain by itself can. Moreover, the knowledge that we are expected to take part in a discussion of a work or part of a work makes it essential that we should read the work carefully and critically, cursory reading only making us appear either ignorant of, or but superficially acquainted with the matter to be sifted and examined. To support my thirdly, I shall simply quote a saying of O. W. Holmes—a saying I most heartily agree with :

“A man must express himself on a subject to know what he really thinks.”

There should be no formality about the meetings, for formality destroys life.

In thinking over the best methods to be employed to make a circle both instructive and interesting, I came to the conclusion that the best plan would be to have all take notes of important matter while reading, but besides this that one should be appointed to draw up a short paper on each assigned lesson—the reading of this paper to be the opening of a discussion. In order to make the meet-

ings as interesting as possible, matter outside of the course that would throw light on any points under discussion should be produced by any member, who in his general reading may have discovered it, while music and selections from good authors might well be introduced to enliven the company. If it be thought that I am too sanguine as to the success of the reading circles, I can only point in justification of my optimism to the grand progress made by the Chautauqua Literary and Scientific Circle, and also state that teachers' reading circles have been established in several of the States, and are, I believe, working satisfactorily. Indiana's reading circles had a membership of over 1,100 in one year from inauguration; New York (without the city) over 1,000 in nine months; New Jersey, over 1,000 in three months, and Illinois, 3,000 in ten months; while in Iowa, Pennsylvania, New England, and other parts of the States circles have been formed, with what membership I know not, but with gratifying success. Only a week or so ago I read that even in Dacotah circles have been recently formed in the southern part. The success to be obtained is, of course, in exact proportion to the co-operation of the members. Where all do their best, attend the meetings regularly, go carefully over the work, and take part in the discussions, success is certain. But where laziness is allowed to intervene, where indifference as to what goes on at the meetings creeps in, and apathy causes irregularity of attendance, failure is just as certain. With ourselves individually and collectively the power of making our circles successful or the reverse rests; and if we are true to ourselves and our best interests we shall cordially accept the responsibility and ensure a favourable issue.

We may not be able to write “thoughts that shall the world's

famine feed," and inspire all who read with strength and fortitude to meet the duties of life cheerfully and manfully; but we are able to gather from the master thinkers of all time grand ideas expressed in noble language that may help to build up our characters, to fill us with love for our work, and animate us with earnest thought that shall fructify to the good of ourselves and all we come in contact with.

We may not be able to study the heavens, trace the course of ancient glaciers, investigate the habits of prehistoric man, or examine the powers of that most mysterious and most useful of later discoveries; but we are able to scrutinize the conclusions of those who, having time, ability and will, have used them for the purpose of inquiring into these matters. And as our minds grasp the grandeur of the universe, the mighty changes that have taken and are taking place on our globe, and the wonderful improvement in our race since primeval man, having eaten his fish, threw the shells in heaps as mementoes to future generations, built his dwelling over the waters of the Swiss Lakes, or lived in caves, the contemporary of the mammoth and the woolly rhinoceros—we must be impressed with the power and majesty of Him who made all and holds all as in the hollow of His hand. We may not be able to undertake original investigation into the development of the mind, the foundation principles of the science of education, and the theory and prac-

tice of educational methods; but we can accept the researches of tried metaphysicians, psychologists and educationists, and apply the acquired knowledge to our own work. Our reading course and reading circles are intended to introduce us to all this and more, to give us power in our school-room, influence in our localities, and enthusiasm and strength of mind to overcome difficulties, to turn defeats into victories, and to make us successful men and teachers. Let us remember

We live in deeds, not years; in thoughts,
not breaths;
In feelings, not in figures on the dial.
We should count time by heart-throbs; he
lives most
Who thinks most, feels the noblest, acts
the best.

And if by entering heartily (for it is only by earnest co-operation that success can be obtained)—if, I say, by entering heartily into the spirit of this new departure, we can learn to think more, have nobler feelings, and act better in the future than in the past—if we can cultivate and refine our own minds, gain power to develop thought and character among our pupils, and increase the respect that is accorded us by our fellow-men, is it not our duty to do so?

Let us then, one and all, resolve that we will honestly give this experiment a fair trial, that we will take an active interest in its working and manfully do our best to make it a grand, ever-growing, ever-strengthening, triumphant success.

QUEEN MARGARET COLLEGE, GLASGOW.
—This institution, developed out of the Association for the Higher Education of Women, has been presented by Mrs. John Elder with a munificent gift. She has purchased North Park House, Hillhead, Glas-

gow, with about 8,300 square yards of ground, and has made it over to be used as a college for women. It is proposed to endow the College in time, for which purpose some £20,000 is needed. Of this the Committee have about £5,000 in hand.

THE RELATION OF HIGHER EDUCATION TO RELIGION.*

BY PRESIDENT WILLIAM DE W. HYDE, BOWDOIN COLLEGE.

(Continued from page 356).

PASSING by agnosticism on the one side and pietism on the other, as equally irrational and consequently altogether out of relation to knowledge and education, we may resolve all genuine religion into two elements, worship and service. The problem of the relation of religion to higher education resolves itself into these two inquiries: What does higher education contribute to the worship of God? What does higher education contribute to the service of God?

Let us consider first the dependence of worship on higher education. Worship must have something definite to lay hold on. "No man hath seen God at any time." No thought of man can represent him in the depth and fulness of his Infinite Being. Yet on the other hand worship can not go out into empty space. You can not direct it toward blank vacuity. Worship must have a medium. Praise and thanksgiving, adoration and homage must have something present to the mind. What shall that something be? This is the problem of problems in religion. To it there are two and only two answers. Either worship may seize on some external object, some arbitrary rite, some artificial ceremony and make that the contents with which to fill out the form of worship. This is idolatry: the substitution of some creation of God or some fiction of man for the uncreated spirit and truth of God. Or else worship must lay hold on the creative thought, and reason, and wisdom, and word of God, as he has revealed himself in nature, in history, in literature, and in the mind of man. This is true

worship, and obviously it is higher education in its various departments of science, history, literature and metaphysics, which alone can furnish to the common consciousness the true conceptions of the expression God has made of himself in creation and Providence. Truth forms the contents of which worship is the religious form. The Hebrew religion demonstrates its divine character and is assured of a lasting place in the world's devotion by the fact that her prophets and psalmists did thus identify their religion with the learned culture of their day, and worshipped God through the medium of his historic acts and his creative will, as revealed in the history and science of their day. It was the works of God that they seized on as the medium of communion and praise. "One generation shall laud *thy works* to another and shall declare thy mighty acts." "Wonderful are thy works, and that my soul knoweth right well."

In the 136th Psalm, that grand pæan of Hebrew praise, the motive is found throughout in those expressions of God which it is the province of history and science to trace. Thanks is to be rendered.

"To him that by understanding made the heavens.

"To him that spread forth the earth above the waters.

"To him that made great lights.

"To him that smote Egypt in their first-born.

"And brought out Israel from among them.

"With a strong hand and a stretched-out arm."

In the 148th Psalm likewise, sun and moon, and stars of light, dragons and all deeps, fire and hail, snow and vapour, stormy wind fulfilling his word, mountains and all hills, beautiful trees and all cedars, beasts and all cattle, creeping things and flying fowl, kings of the earth and all peoples, princes and all judges of the earth, old men and children, both young men and maidens, are recognized as the medium through which the worship of the creature ascends to the Creator. The very objects with which the higher education deals were the means by which the devout Israelite in the days of Israel's religious vigour expressed their worship. Is the natural world or the providence of God less sacred to-day than then? If they praised God as manifested in the history of their nation and the birds and beasts, the rocks and mountains, the trees and flowers of Palestine, shall not we, to whom the history and science of the who world are open, recognize in the wider knowledge and science of our day the means of a fuller, grander worship and communion than was possible to them? Not by servile repetition merely of what was the highest attainable by them; but by doing with reverence and fidelity in our day what they did so grandly in theirs; by seeing and adoring God in every truth and beauty that nature discloses to the science of our day; by recognizing and revering him in every upward and onward movement of the moral order of states and nations shall we be as devout in our Christianity as they were in their Judaism. The idea of a distinction between sacred and secular science, after countless defeats and overthrows, is pretty well exploded. We may reasonably hope that with the futile onslaught that has been made on Darwin and the doctrine of evolution, this disgraceful chapter of human misconception may be closed; and that hereafter,

while differences of opinion will continue to prevail, and controversies will continue to wax fierce, yet the banners of secular and sacred science will cease to wave over the contending hosts. May we not anticipate, too, as not far distant, the day when the barriers between secular and sacred history shall be swept away by the rising tide of a profounder religious spirit which sees that all the life of men and nations is sacred; and even special intervention in the history of one people, marks their sanctity as different in degree but not in kind from that of every just and God-fearing nation that has been or yet shall be?

Then when science shall unfold the principles which underlie the beauties and utilities of nature; when history shall spread out before us the laws by which societies and states attain greatness and well-being; when humanity shall praise the living author of these principles and laws, then and not till then shall we take up the torch of true spiritual worship where the great souls of Israel and early Christianity left it, and bear it forward for the guidance and illumination of the ages yet to come.

Only by the union of higher education with religion, furnishing from their respective spheres, contents and form, can the worship of our day have that prophetic originality, which is ever the stamp of vital union of the living God with living men.

The second essential element in religion is service. How shall we serve God? Here again two courses are presented to our choice: Either we may rest back upon some outward ceremony or elaborate ritual and call that in itself "Divine Service"; in which case again we are practising a more or less refined idolatry; or else we must serve God by practical endeavours to make the world in which we live more beautiful and bright; its

vegetable life more perfect and useful; its animal inhabitants more docile and gladsome, and above all man himself more happy, more generous, more pure, more wise, more Godlike.

Such and so practical was the service required by the law of ancient Israel. "Thou shalt not see the kid in its mother's milk." "Thou shalt not muzzle the ox when he treadeth out the corn." "Cursed be he that removeth his neighbour's landmark." "Cursed be he that wresteth the judgment of the stranger, fatherless and widow." "The wages of a hired servant shall not abide with thee all night till morning." "And when ye reap the harvest of your land, thou shalt not wholly reap the corners of the field." Scarcely less explicit are the prophets in their denunciation of those that "oppress the hireling in his wages, the widow and the fatherless, and that turn aside the stranger from his right, and that fear not the Lord." The service of God, according to the Jewish faith, involved precise and definite conceptions as to husbandry, agriculture, domestic and public economy, civil rights, judicial procedure, the relation of land, capital and labour, and the foreign policy of the nation. Now it is needless to say that the only way in which the true and the right in these relations at the present time can be determined is by the prosecution of such studies as physiology, botany, chemistry, ethics, political economy, sociology and constitutional history; the very studies with which higher education deals. Neither the old nor the new Testament defines the line between legitimate speculation in which a real future need is anticipated and provided for, and illegitimate speculation in which an artificial need is created in order that one man may profit by what he causes another to lose. But a thorough study of economic conditions will show a man where the

truth and righteousness, that is where the will of God about that matter, lies. The Hebrew law will not point out in explicit terms the way in which the godly man should vote on the tariff in 1886. But political economy will tell you what to say to the beggar at your door. But the study of social conditions will. No man will venture to assert that Christianity is intended to include less than Judaism. On the contrary, the distinctive glory of Christianity lies in this, that it is the form of an infinite content. It is adapted to include every phase of individual, family, social, industrial, commercial and political life. Yet it gives a few precise rules. It gives the form in its own comprehensive law of love to God and man. It gives the pattern in the life of Jesus Christ. It gives the motive in his sacrifice. It gives the flowing outline in its delineation of the Christian graces, faith, meekness, compassion, hope, love. But the work of filling in these outlines and reproducing in individual lives the grand pattern is left to human intelligence. And higher education on its practical side, as it deals with ethics, economics, sociology, political history and constitutional law sets forth the contents of which Christianity is the form. Unless I know something of the laws of physiology and hygiene I can not in the highest, fullest sense present my body a living sacrifice, acceptable to God. How many men and women there are today of intensest devotion to God, so far as the formal act of consecration goes, who yet from ignorance or neglect of hygienic laws, are offering him the service of bodies which in their actual concrete material condition are anything but acceptable either to God or men? Their service is complete in form, but the contents are inadequate. How many a worthy layman is sincerely offering the un-

divided service of his soul to God ; and yet the outcome of whose business, highly profitable to himself, is dooming some fellow creatures, brothers and sisters of his, to hardship and privation and want. The general diffusion of sound teaching on ethics and economics would help him to save himself from this shameful contradiction. Here again the influences of higher education are needed to furnish adequate contents to the already perfect form of religious service. It is not just to assume that every man who taxes the consumers, rich and poor throughout the country, an extra penny for their kitchen fire and evening lamp in order that he may pile up the dollars that monopoly and a limitation of the output pour into his treasury ; it is not just to say that these men are all knaves. Some of them doubtless are. But many more, as they receive their profits and give away their tithes, verily think they are doing God's service. They are ignorant ; and under the circumstances they are doubtless forgiven by God, and excusable in the sight of men. But it is the mission of higher education to enlighten them and make them without excuse. And in a community where the sound teaching of ethics and political economy should be generally diffused, the man who should by any device, whether by round-about methods in railroad construction or artificial fluctuations in stocks, or adulteration of groceries, or selling of intoxicating drink, get gains dependent upon corresponding loss and injury to others, would have to take his proper place, his " *ἴδιον τόπον* " as was said of Judas, by the side of thieves and malefactors and public nuisances. Shed abroad from your colleges and universities the searching light of strict ethics and sound political economy, and your deacons who draw ten per cent. dividends from underpaid labour, your church mem-

bers who are in any wise responsible for the evils of intemperance, your Sunday-school superintendents who water their stock or adulterate their goods, will be compelled to define themselves more precisely as to their relation to the rival masters, God and Mammon. Let sanitary laws be diffused ; let the responsibility of landlords be understood ; let the right relation of the capitalist to the labourer be clearly defined ; and the question about the prominent members of society will cease to be the superficial questions, how much is he worth ? what is his income ? and in place of them will be put the infinitely more important questions, how did he get his money ? how much was human misery or human welfare increased by his acquisition of it ? how is he fulfilling the responsibilities which the administration of such wealth involves ? and the moment these latter questions are substituted for the former, aristocracy, you perceive, will begin to rest on a sounder basis ; the man will be reckoned worth most who does the most good ; and the popular estimate and the Christian standard of manhood will begin to coincide. In other words Christian consecration will have contents adequate to its form. And without the diffusion of such higher education, such contents can not be furnished, and consequently such much to be desired coincidence and consistency can not be attained.

Without further illustration I trust it is evident that for service as for worship an intellectual content in the form of truth, principle and law, is quite as essential as the emotional or volitional form of reverence and consecration. Without such contents religion is empty, and unreal, superstitious in its devotions, and inconsistent in its practice. If this be true then higher education stands to religion in the relation of inside to out-

side, of body to figure; of contents to form. The relation between them is that relation of organic unity of opposite elements which is the principle of life and being everywhere. Though distinguishable, yet the one can not exist without the other. The cause of higher education is also the cause of true religion; the true professor is likewise a prophet of God, and they who give of their money and their service to the furtherance of sound learning are no less truly the priests and prophets of God than those who directly support and administer the institutions of religion. We are told in the inspired word of God, that wisdom, the truth, the word, was with God from the beginning, and without the word nothing was made that was made. So may religion whereby man is related to God and higher education whereby man is related to the wisdom and rational expression of God in nature and history be evermore united in holy bonds,

and bring forth their beautiful offspring of peace and justice and love and blessedness.

Our oldest university started with the simple motto *veritas*. It may have been bigotry that some years later sought to supplant the ancient motto by "*Christo et ecclesie*." It certainly was bigotry of the narrowest, shallowest type, that within the past few years has been clamouring for the removal of that second motto. Let us rejoice that neither religious narrowness nor hollow intellectualism has triumphed. The old university enters on the second quarter of her first millennium next November with a new seal:—*Veritas* upon the open books at the centre, and *Christo et ecclesie* around the circumference encircling all. May this new seal of our oldest university be the emblem of the true union of Higher Education and Religion in every institution of every State throughout this land forevermore.

LORD DERBY ON JUVENILE EDUCATION

THE Earl of Derby on Wednesday laid the foundation stone of a new Infant School at Huyton Quarry, in Liverpool. After alluding briefly to the importance of popular teaching, he said it was with a painful and uncomfortable feeling that we heard even now of children in out of the way districts who did not know that Great Britain was an island, and who had never heard of Queen Victoria. Everybody was agreed that those cases must be impossible in the future; the only dispute or controversy was as to the best means of attaining that result. He would not, however, enter into that controversy. They were all aware that the present educational arrangements were of a tentative

and experimental character, and he thought they must all feel that whether those arrangements should remain in force as they were, or should give place to others of a different kind, was a question to be decided, not so much by political action of any set of men in Parliament or out of it, as by the temper and spirit in which those arrangements were worked by the individuals who in each locality had the direction and control of them. In the large towns the matter was comparatively simple. There was not what was called the religious difficulty, because practically, every religious denomination was numerous enough to establish schools, and to employ teachers of its

own, and no inconvenience, therefore, arose beyond that of some little waste of teaching power. But in the rural districts the cause was different. There the great majority of parents were of the one way of thinking, and as a consequence there was a small minority who were not in general powerful or wealthy enough to establish schools or to employ teachers upon their own behalf, but who were compelled to make use of those schools existing in the neighbourhood. Under these circumstances, it was natural, and perhaps inevitable, that those who had to send their children to the school of a denomination which was not their own should at first feel some little jealousy or distrust of what was done. The inference which he drew, therefore, was that in such cases those representing the great majority were bound scrupulously and honourably to respect the rights of those who belonged to the minority. If this principle were adhered to, and the denominational system were worked in a spirit of moderation, fairness and justice, and if in addition they exerted themselves each in his own place to fill up those lamentable gaps in educational arrangements which still existed, he saw no reason why the present system should not continue in force for a very long time indeed. For his own part he hoped it would do so. He believed it to be the best system, because it gave a greater stimulus to individual action, greater

play to individual freedom, and showed a greater respect for individual rights and feelings than could be done by any other system more directly and immediately connected with the State. In conclusion his Lordship said—I hope those who are to manage this school will accept one or two hints, which, indeed, their own good sense would suggest. I hope they will remember that children must play as well as work, that young legs get very fidgety with sitting still, and that young brains get weary with a very little continuous effort. I hope they will remember that not kindness only, but courtesy in manner and justice in act are as keenly appreciated by even very small children as they are by grown people. I am sure they will bear in mind that not cram—not efforts or trials to overburden memory—not preccicious displays of intelligence in one or other particular case, are the objects to look to in a school like this, but that what we want to produce, or rather to develop, is the largest possible number of healthy brains and healthy bodies, and that what we most desire to inculcate is that habit of patient and persevering labour, guided by sense of duty, and directed to useful ends, that moral and industrial discipline, not affecting the intellect alone, but the whole nature, a diffusion of which among all classes is the best guarantee of material prosperity, and the best security against national disorder.—*Ex.*

It needs to be said again and again, that they are not the best teachers who do most for their pupils. They are the best who have most skill and power in stimulating, encouraging, and directing pupils in the exercise of their own powers. The highest type of teaching is that which makes pupils self-helpful.—*Ohio Educational Monthly.*

THE RELIGIOUS ELEMENT IN SCHOOL AND COLLEGE.—In the schools and colleges

of our country there should be a ruling religious element. It will be a good day for the world when every school and college will be conducted by active Christian teachers, who by precept and example will "allure to brighter worlds and lead the way;" who will show the harmony of truth as it appears in nature and revelation; who will give that direction to thought, as will lead them to look through nature up to nature's God.—*Prof. Bacon, Winona, Miss.*

CHILDREN, PAST AND PRESENT.

THERE is a story told of Professor Wilson, that one day, listening to a lecture on education by Dr. Whately, he grew manifestly impatient at the rules laid down, and finally slipped out of the room, exclaiming irately to a friend who followed him, "I always thought God Almighty made man, but *he* says it was the schoolmaster."

In like manner many of us have wondered from time to time whether children are made of such ductile material, and can be as readily moulded to our wishes, as educators would have us believe. If it be true that nature counts for nothing and training for everything, then what a gap between the boys and girls of two hundred years ago and the boys and girls we know to-day! The rigid bands that once bound the young to decorum, have dwindled to a silver thread that snaps under every restive movement. To have "perfectly natural" children seems to be the outspoken ambition of parents who have succeeded in retrograding their offspring from artificial civilization to that pure and wholesome savagery which is evidently their ideal. "It is assumed nowadays," declares an angry critic, "that children have come into the world to make a noise; and it is the part of every good parent to put up with it, and to make all household arrangements with a view to their sole pleasure and convenience."

That the children brought up under this relaxed discipline acquire certain merits and charms of their own is an easily acknowledged fact. We are not now alluding to those spoiled and over-indulged little people who are the recognized scourges of humanity, but merely to the boys and girls who have been allowed from infancy that

large degree of freedom which is deemed expedient for enlightened nurseries, and who regulate their own conduct on the vast majority of occasions. They are, as a rule, light-hearted, truthful, affectionate and occasionally amusing; but it cannot be denied that they lack that nicety of breeding which was at one time the distinguishing mark of children of the upper classes, and which was in a great measure born of the restraints that surrounded them. The faculty of sitting still without fidgeting, of walking without rushing, and of speaking without screaming can be acquired only under tuition; but it is worth some little trouble to attain. When Sydney Smith remarked that the children of rank were generally so much better bred than the children of the middle classes, he recognized the greater need for self-restraint that entered into their lives. They may have been less natural, perhaps, but they were infinitely more pleasing to his fastidious eyes; and the unconscious grace which he admired was merely the reflection of the universal courtesy which surrounded them. Nor is this all. "The necessity of self-repression," says a recent writer in *Blackwood*, "makes room for thought, which those children miss who have no formalities to observe, no customs to respect, who blurt out every irrelevance, who interpose at will with question and opinion as it enters the brain. Children don't learn to talk by chattering to one another, and saying what comes uppermost. Mere listening with intelligence involves an exercise of mental speech, and observant silence opens the pores of the mind as impatient demands for explanation never do."

This is true, inasmuch as it is not

the child who is encouraged to talk continually who in the end learns how to arrange and express his ideas. Nor does the fretful desire to be told at once what everything means imply the active mind which parents so fondly suppose; but rather a languid percipience, unable to decipher the simplest causes for itself. Yet where shall we turn to look for the "observant silence," so highly recommended? The young people who observed and were silent have passed away—little John Ruskin being assuredly the last of the species—and their places are filled by those to whom observation and silence are alike unknown. This is the children's

age, and all things are subservient to their wishes. Masses of juvenile literature are published annually for their amusement; conversation is reduced steadily to their level while they are present; meals are arranged to suit their hours, and the dishes thereof to suit their palates; studies are made simpler and toys more elaborate with each succeeding year. The hardships they once suffered are now happily ended, the decorum once exacted is fading rapidly away. We accept the situation with philosophy, and only now and then, under the pressure of some new development, are startled into asking ourselves where it is likely to end.—*Atlantic*.

PRESERVE THE VOICE OF THE CHILD.

F. W. PARKER.

THAT dreadful compound of a whine and a groan, which very many teachers can hear if they listen, is the direct product of a long, painstaking and painful drill. This dire mistake is not far to seek, yet blessed is the teacher who finds it. It is found in the wrong motive. That motive consists in making pronunciation, emphasis and pauses the purpose of teaching reading. The child has acquired the perfect power of emphasis. If the thought is in the mind, the emphasis will be perfect. Any attempt to teach emphasis by imitation hinders the power to emphasize in oral reading; that is, it makes talking and oral reading different, to the detriment of the latter. Pronunciation, enunciation, articulation, accent and pauses have been acquired. Pronunciation may be improved with most children; but to make it the aim of a reading lesson destroys the real aim, that of thinking by means of printed words.

Pronunciation and articulation are of immense importance; but the true place to teach them is in talking; that is, when pupils are expressing thought *in their own language*—thought gained from observation, hearing or reading. When the stimulus of thought is at its height, a correction in language will have its greatest effect. To vex the child's soul by numberless corrections in pronunciation when he is struggling to get thought discourages attempts in the right direction and turns them in the wrong one. I have seen, in my own classes, years ago, forty-nine children watching intently the fiftieth child who was striving to pronounce every word correctly (we called it reading), and when perchance a word was mispronounced, down came the forty-nine trip-hammers upon the poor victim's head, and down he sat to allow another to wrestle with word-pronouncing. What visions of beautiful thought must have passed

through that boy's soul when his whole mind was struggling with correct pronunciation! The already acquired power of talking is one great means of learning to read; this means is entirely lost when it is made the end. *Learning to do by doing* finds here its tremendous force. Learn to get thought by means of printed words — by getting thought by means of printed words, and use all else, that should be used, as means. Would you ever correct a pupil who mispronounces a word in reading aloud? Yes, very often I would. But whenever the correction turns his attention away from the thought, I should not make the correction. Simply pronouncing the mispronounced word by the teacher is generally sufficient for the time.

Most teaching of elocution consists in trying to correct faults acquired by bad teaching in primary schools. Listen to the merry voices of children on the playground, and then listen in the schoolroom! The greatest elocutionists have discovered the true principles by observing little children. A defect in articulation can be cured by following exactly the process by which a child learns to articulate. Listen to the voices of children, what emphasis, what melody, what harmony! Should teaching ruin those voices? Has teaching ruined voices? Who speaks first? By following nature the child has learned to talk well; by the devices of man he reads abominably. *Never allow a child to read a single sentence unnaturally.*

NOTES FOR TEACHERS.

HISTORY is the preserver of good deeds and the avenger of bad.—*Pliny.*

GEOGRAPHY and history prepare for philosophy its most valuable materials.—*Herder.*

PHILOSOPHY, superficially studied, leads away from God; profoundly studied, back again to Him.—*Bacon.*

IN anger nothing can be done judiciously, and therefore no ill-will should be mingled with reproof.—*Cicero.*

SECONDARY scholars are serviceable to a school in many ways, especially in calling a halt in the too rapid march of explanation. Bright scholars see the point of a lesson without appreciating its details, and can make a good recitation on the leading features without being in possession of the finer points upon the knowledge of which alone thoroughness depends. When,

therefore some semi-dull child acknowledges that he does not understand, explain to him kindly, knowing that therein you are of equal service to the better scholars.—*Am. Reader.*

THE vital fact in teaching, says Prof. E. E. White, is the teacher. There are five elements in teaching. Control comes first from power, which is inborn; then there is a personal magnetism. The first element in teaching is good scholarship, competency, which begets confidence on the part of the pupil; second, skill; third, heart-power, love for the pupil, and love for the work; fourth, backbone, will-power,—a good article anywhere; it always tells in a school. Manage a spirited boy as you would a spirited horse; keep a steady line and a still whip. Fifth, good eyes and good ears, soul-sight; a blind teacher is a great disadvantage in the government of children.—*Central School Journal.*

THAT the Donalda endowment, made by Sir Donald A. Smith to McGill University, Montreal, opening up a comprehensive course of study to women, supplied a keenly-felt want, is attested by the number who have eagerly embraced the opportunity for the broader and higher culture thus afforded. There are now sixty-eight female undergraduates studying under the conditions of the endowment in connection with the college. Of these, many are in their first or second year; a goodly number in their third, and of these latter the majority propose going through the entire course and becoming candidates for honors. The "sweet girl graduate," says a recent visitor, seems to have suggested long enough the notion of pretty incompetency. To see the girls at their lessons; to note the methodical manner in which the teaching is pursued, the earnest gravity of the fresh young faces as the professor learnedly descants upon experimental physics, and the perfect comprehension of the serious nature of the work in which they are engaged, is to realize that the "sweet girl graduate with golden hair" is much more than a poetical figure. The comprehensive character of the curriculum, and the earnestness with which it appears to be pursued, demand that she be taken seriously.—*Canada Presbyterian.*

IN his recent address before the British Medical Association, Dr. Withers Moore discusses the Higher Education of Women from a novel but practical point of view. In his mind there are two channels for the expenditure of a woman's vital force:—maternity, on the one hand, and competition with men in the severer exercises of the intellect, on the other. As a physician he finds these two functions mutually exclusive. Gestation and maternity require an enormous outlay of physiological force,

and if this force is used up in other work, the offspring of the world must suffer, as must the woman herself. Since only through woman can the human race be propagated, it seems to him that divine foresight ordained this as the natural function of woman. "Educate woman and you educate a race," if interpreted to mean education of the mind to the exclusion of the body, can bring only disaster. There is no need at the present time that women should do men's work. We cannot make a man able to perform woman's duties, nor can woman perform the work of men without harm to herself and her offspring. It is far better to prepare woman to do woman's work by the broadest training, physically and mentally. In the words of *Science*, "Dr. Moore's treatment of the subject shows a large experience with the every day life of the women of the present time, and will well repay most thorough and careful perusal."

THERE are many signs that the profession of the Teacher is gradually shaping itself so as to rank in importance with the Medical and Legal professions, and the latest of these signs is that it has been considered worthy of a special mark of Royal favour. Her Majesty has been graciously pleased to confer the honour of Knighthood on Mr. Philip Magnus, the able and energetic Director of the City and Guilds of London Institute. It has become the rule of late that eminent Surgeons and Physicians shall receive this recognition; and leading Lawyers are knighted as a matter of course, but this is the first time the honour of Knighthood has been conferred for services in the cause of Education, apart from political considerations. The satisfaction which this fact will afford to all friends of Education is sure to be all the greater, both because of the particular

branch of Education which is thus specially distinguished, and because the honour falls to the lot of one in every way so worthy of it as is Mr. Magnus. The conferring of this honour is another recognition of the great work that the Livery Companies are prosecuting with such munificent

liberality—a work into which Mr. Magnus, with a prophetic comprehension of its importance, heartily threw himself in conjunction with Dr. Wormell, so early as 1875, while yet the City Companies were seeking a basis upon which they could combine their efforts in one great undertaking.

THE COMING NEWSPAPER.

BY BOTH SIDES (GREY).

THE newspaper that every one wants to take will have no need to canvass for subscribers, or for advertisements either. Leaving, for the present, the local paper and the Church paper out of account, the question is what kind of general newspaper does every one want? It must, of course, be a daily paper, for in these days of steam and telegraph, news a day old is no news at all. It must be a large paper, for the volume of really interesting general news is constantly increasing, and there is a limit beyond which condensation cannot go. And the number of men who wish to tell their fellows what they have for disposal, and what they want, is continually multiplying. It must be an enterprising paper, willing to make it worth some one's while to forward items of general interest from all parts of the country, and having intelligent and wideawake correspondents in the news centres of other countries. It must be a NEWSpaper, literally and strictly, presenting daily to its readers the freshest literature, the latest market reports, the newest of new advertisements, the sayings and doings of prominent persons; impartial accounts of important meetings—social, religious, industrial, municipal, political; concise reports of the latest events of interest; correspondence on both sides of public

questions—correspondence which shall be a fair reflex of current thought; Parliamentary reports which shall do as full justice to the wrong side as the right, and a record of Government procedure as impartial as the statements of the official gazette.

It must not favour any party, in Church or State. It will do so most certainly to its own detriment, and there is no need that it should. A newspaper has no business to advocate anything. Its mission is simply to collect news and circulate it. The editors will have enough to do to select, arrange and supervise the publication of the heterogeneous mass of news that will daily accumulate on their desks. They will have to work hard, and will need to be men of sense and shrewdness, but the publishers will be able to pay them salaries that the editors of to-day will stare at. Party politicians and ward bosses, and crafty contractors, and wirepullers of all sorts will then have to run papers in their own interest, and send them gratis to all whom they want to "get at," and the general public will begin to think for itself, and reach its own conclusions by reflection on the facts reported, instead of paying for both facts and conclusions, to the mind of some particular editor who himself thinks to the order of his employers.

Of course the Dominion would not need more than three or four such papers, but every one of them would have a circulation three times as large as any now published, and they could be issued at rates that would put

them within reach of the average workingman. What an educator and elevator of the public mind even one such Daily would be, with one hundred thousand readers! Is there any prospect of such a boon?

CORRESPONDENCE.

To the Editor of THE MONTHLY :

SIR,—Your request for a free exchange of opinion on the merits of the proposed scheme for a College of Preceptors induces me to send you a few thoughts. It is, however, with some hesitation I do so, mainly because I am not certain that any amount of discussion will make the scheme practicable. The objects aimed at by its authors are worthy of our hearty support and sympathy. No one who thinks of the actual state of affairs as regards teachers in this Province, can fail to notice the existence of forces and influences which do not tend to manliness and independence of character, or to the development of the highest forms of intellectual and moral excellence. To a large extent we are bondsmen, and naturally enough, we are developing the characteristic vices of slaves and dependants. A truckling servility to the educational powers of the day—a dishonest and ignoble rivalry for place and profit—an almost inexcusable absence of professional honour and etiquette are evils so manifest and so prevalent that further remarks on this point are wholly unnecessary. The question then before the minds of many is, How can this state of things be remedied? Is there any way by which *teaching* can be made a *profession*? Can we, the teachers of Ontario, raise our status until what is now looked upon as a comparatively low occupation be considered, next to

the *ministry*, the highest and noblest of professions! Such, I doubt not, is what is before the mental vision of the supporters and advocates of a College of Preceptors. It is one thing to recognize the existence of an evil; and it is another to devise and carry into effect a genuine remedy. It would be traversing old ground to point out where this College of Preceptors' scheme fails. It is inconsistent with our system of State-supported education. It may be perfectly true that a College of Preceptors would not fail to protect the interests of the public; that it would jealously guard the entrance to the teaching profession; and that it would elevate the character and increase the efficiency of the teachers of the community. This is not, however, the question at issue. The difficulty arises from the unwillingness of the public to hand over the examining of teachers to an irresponsible body. There must be a responsible individual or body of individuals somewhere, to whom the people will look for a wise and careful expenditure of the public money. Compulsory education, and compulsory expenditure for education, is the law of the land: and so long as we have such a law, so long will the average ratepayer demand that he receive his money's worth. Had we a system of voluntary education, a College of Preceptors would be not only desirable but possible. We would then be on the same footing as lawyers, doctors and clergymen. Now, I do not see

anything in this scheme for a College of Preceptors, which furnishes a means of overcoming this difficulty of responsible government. Nor have I heard of any proposal which, while leaving the main features of the scheme intact, suggests a key to the solution of the problem.

There is not, I admit, much practical benefit in pointing out difficulties in the way of reform; and it is at best a thankless task to dwell upon evils, and yet cry out there is no remedy. I do not, however, say there is no remedy—what I say is that an effective remedy has not yet been discovered. Permit me to suggest some things which would tend to mitigate the evils which just now fall to the teacher's lot.

1. The raising of the standard of non-professional and professional examinations would have the tendency to shut out the incompetent and intellectually weak aspirants. As a class, we are not estimated by the public by the best samples of intellectual and teaching ability we furnish; we are estimated by the standard of the average. Raise the standard of the average teacher, and we will raise the profession.

2. Professional honour, and professional morality may be developed by more intimate association—by a gradual but unbroken course of education in the ethics of the profession. This education must come from within, and it can be materially aided by live and fearless educational journals. This

does not appear a very tangible means of developing educational ethics, but it is all we have at present, and all we can expect to have for some time. And here I may point out that the raising of the standard for entrance to the profession will be a powerful factor in the promotion of professional morality and honour.

3. Many of the difficulties in the administration of educational affairs, such as examining teachers, selecting text-books, etc., could be removed by the Minister of Education, for the time being, taking counsel from committees chosen by the different sections of the Provincial Teachers' Associations. This would involve a change in the character of the association. Instead of being a purely voluntary association, it would necessarily become a representative body, with members elected by the different county associations. No great difficulty would be experienced in making this change; and the fact that our representatives had a voice in the management of our educational affairs would tend to allay much of the bitterness and discontent that now prevails.

These are only brief suggestions; but in them lies a partial solution of our present difficulties. A complete solution I do not pretend to submit. Time and discussion may yet provide a remedy—therefore let the discussion go on.

W. J. ROBERTSON.

St. Catharines, Nov. 9, 1886.

EDITORIAL.

SUGGESTIONS.

NO one should be allowed to write for a certificate of any grade till he is of the legal age to obtain a professional certificate—that is, seventeen or eighteen years old. This rule would prevent a good deal of the

unpleasantness which exists in schools at the present time.

At all the examinations the questions proposed should be simple and expressed in clear and familiar language, but the reading of the answers should be done with the utmost care

and exactitude This plan would yield more satisfaction and produce better results than the contrary plan on which we in Ontario have been working for some years, namely: absurdly difficult questions and very autocratic treatment of the answers. An examination paper prepared and given to candidates to write on, should on no account be interfered with by (any one whomsoever) minister, chairman of committee or examiner.

We know of many persons in Ontario who would like to know who has the authority, or how came the authority to any one now in office in educational affairs, of handling examination papers as they were dealt with last summer. For example, as the kind process to which the second class algebra paper was subjected. Some other papers were "bleached," but we name this one for obvious reasons. Teachers await with interest an answer from some competent official.

The admission of scholars to High Schools should be left to the head master of the High School and the Public School Inspector for the district. The preparation and printing of the questions may be left for the sake of convenience to the Minister of Education as at present, but with this should end the work of the Department as far as the admission to secondary schools is concerned.

It goes without saying that the treatment which teachers have received at the hands of the Education Department for the last ten years has had a very bad effect (on their character), and our correspondent does not put it too strongly in the communication *re* College of Preceptors. Now, a teacher cannot suggest a change in the mode of doing work or carrying on the administration of the Education Office but he is at once classed under the euphonious heading of a "sorehead," or called an opponent of the Govern-

ment, or a personal enemy of the Minister of Education. It was not so under the *régime* of the Chief Superintendent of Education.

The very fact of our penning these few words, and especially the words "Chief Superintendent of Education," will be sufficient with quite a number to put this magazine down as an out-and-out opponent of the present Government, notwithstanding the fact that we have advocated consistently during the last eight years the necessity of returning with all possible speed to the position we formerly occupied with such profit to the educational interests of the country. Let us have a non-political head of the Education Office. "We speak as to wise men, judge ye."

OUR PUBLIC AND HIGH SCHOOL SYSTEM.

WE are somewhat inclined to boast of our system of public education, and to refer with pride and pleasure to its results as seen in the training of our youth, ignorance being eradicated and knowledge disseminated throughout the land.

However, occasionally we hear it said that our young people are over-educated, that the young men of the rural districts will not stay on the farms their fathers have tilled, and that our daughters prefer other employments before house-keeping.

It may be that the system of education or the manner in which that system is being carried out, is not alone responsible for the state of matters above referred to. This overcrowding of professions or business pursuits may, perhaps, be partly accounted for in another way. In past time when the erection of the log house and the clearing of the forest preceded or accompanied all farming pursuits, when the appliances for domestic work of the simplest kind were

difficult to provide, and the inconveniences neither few nor small, steady, hard work and long hours were a necessity, and the brave pioneers of Ontario were equal to the occasion. but now, with all our natural and acquired advantages, with the wonderful aid of machinery, the life of the farmer, the farmer's wife, and of his sons and daughters, with its beautiful surroundings, ought to be the most attractive of all.

It is therefore most earnestly to be desired that all kinds of country occupations should be put upon a better footing, that the working hours out of doors and indoors should be of a reasonable length, and abundant leisure given for recreation and self-improvement, so that the young people may have time and opportunity for finding out how very enjoyable country life may become in this age of the speedy transmission of news and easy means of communication.

The disinclination for farm life cannot arise from over-education in the proper sense of the term. It may, however, be fostered by imperfect instruction on some points; it is here that our duty as teachers comes in. Let us constantly keep before our pupils the principle that all work is

honourable, that men and women are worthy of respect and attention in proportion as they do their work faithfully, and not at all on account of following one kind of employment more than another. "My Father *worketh* hitherto and I *work*."

It is always well that we, as teachers, pay special attention to the "morals of manners," such as dress, personal appearance and personal habits; but it is also important that we diligently cultivate the "industrial virtues" and hold up before our pupils, on all suitable occasions, the value of industry, thrift, diligence, punctuality and order, the dignity of useful labour and the attractions that life in the country presents to a cultivated mind, one capable of being touched by a love of nature, or open to receive its impressions or teachings. Is there any position of responsibility or trust in the Government or community to which an educated farmer may not aspire? But he must be educated in the best sense of the word; his aspirations must be high rather than *gain* or *place*; he must be animated by a spirit of patriotism and of devotion to duty; and as he rises to a proper conception of his work, the educating process will still go on.

SCHOOL WORK.

MATHEMATICS.

ARCHIBALD MACMURCHY, M.A., TORONTO,
EDITOR.

EDUCATION DEPARTMENT,
ONTARIO.

JULY EXAMINATIONS, 1886.

First Class Candidates—Grade C.

ALGEBRA.

Examiner—J. A. McLellan, LL. D.

NOTE.—This paper valued at 133½ per cent.

1. Show by an example in multiplication how to derive the rule for synthetic division.

Divide $x^{15} + 3x^{10} + 3x^5 + 1$ by $x^3 + 3x^2 + 3x + 1$.

1. This may be done by using detached coefficients, or thus

$$\left(\frac{x^5 + 1}{x + 1}\right)^3 = (x^4 - x^3 + x^2 - x + 1)^3 = \text{etc.}$$

2. Write down the remainder arising from the division of $x^3 - (2 + p)x^2 + (2p + 1)x - p + 1$ by $x - p$; and show that $2a^2b^2 + 2b^2c^2 + 2c^2a^2 - a^4 - b^4 - c^4$ is divisible by $b + c - a$; and that $a^3 + b^3 + c^3 - a^2(b + c) - b^2(c + a) - c^2(a + b) + 2abc$ is divisible by $a - b - c$.

2. Remainder is found to be 1 by putting $x = p$ in given expression. Put each divisor

= 0, or substitute $a=b+c$, in each expression, and result is 0; \therefore these expressions are completely divisible.

3. When is an expression completely symmetrical with respect to two or more letters? Apply the principle of symmetry to simplify the following:

$$(1) \frac{(a-b)^2 - (b-c)^2}{a^2 + ab - bc - c^2} + \dots + \dots$$

$$= \left(\frac{(a-c)(a-b+c)}{(a-c)(a+b+c)} \right) + \dots + \dots = 0.$$

$$(2) \frac{(a-b)^2 - c^2}{a^2 - (b+c)^2} + \dots + \dots$$

$$= \frac{(a-b-c)(a-b+c)}{(a-b-c)(a+b+c)} + \dots + \dots = 1.$$

4. Resolve the following expressions into factors, stating any general principles on which the method in each depends:

- (1) $(a^2 - b^2)^2 + (b^2 - c^2)^2 + (c^2 - a^2)^2$.
 (2) $(m+1)x^2 + (m+n)(x-y)xy - (n-1)y^2$.
 (3) $ax^3 - (2a+b)xy - (3a-c)xz + 2by^2 + (3b - 2c)yz - 3cz^2$.

4. We have where $a+b+c=0$,

$$(1) \frac{a^3 + b^3 + c^3}{5} = \frac{a^3 + b^3 + c^3}{3} \cdot \frac{a^3 + b^3 + c^3}{2}$$

applying this

$$(a^2 - b^2)^2 + \dots + \dots = 5(a^2b^2 - a^2b^2 + \dots)$$

$$(a^4 + b^4 + c^4 - 2a^2b^2 - 2b^2c^2 - 2c^2a^2).$$

$$(2) (m+1)x^2 - (m+n)(x-y)xy - (n-1)y^2$$

$$= m(x^2 - x^2y + y^2x) - n(y^2 + x^2y - xy^2)$$

$$+ x^2 + y^2$$

$$= mx(x^2 - xy + y^2) - ny(y^2 - xy + x^2)$$

$$+ (x+y)(x^2 + y^2 - xy)$$

$$= \{ (m+1)x - (n-1)y \} \{ x^2 - xy + y^2 \}.$$

(3) Given expression

$$= (ax - by + cz)(x - 2y - 3z).$$

5. Mention any artifices that may be used in solving equations involving fractions. Solve

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

$$(2) \frac{3x-1}{x-1} - \frac{3x+9}{x+2} = \frac{28x-80}{7(x-3)} + \frac{28x+12}{7(x+4)}$$

5. (i) $x = \frac{mn}{m+n}$.

6. Solve $ax+by=c$, $a'x+b'y=c'$, and interpret the results where

$$(i.) \frac{a}{a'} = \frac{b}{b'}. \quad (ii) \frac{a}{a'} = \frac{b}{b'} = \frac{c}{c'}$$

6. See Todhunter's Larger Algebra, pp 118 and 119.

7. A student had four numbers in proportion, and thinking the numbers too large for convenience in working, he diminished each term of the proportion by the same number, and so obtained the result $41:93::7:51$. What was the true proportion?

7. We have $a:b::c:d$ suppose, and $a-x=41$, $b-x=93$, $c-x=7$, $d-x=51$. Whence $x=180$, and true proportion is

$$221:273::187:231.$$

8. Find the relations between the roots and coefficients of the quadratic

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

If the roots of the equation $a^2x^2 + bx + bc + b^2 = 0$ are equal, show that $\frac{1}{4a^2} - \frac{c}{b} = 1$.

8. $ax^2 + bx + c = 0$ has equal roots if $b^2 = 4ac$; \therefore in example there are equal roots if $4a^2(bc + b^2) = b^2$, or dividing both sides by $4a^2b^2$ and transposing if $\frac{1}{4a^2} - \frac{c}{b} = 1$.

9. Solve

$$i. \frac{1}{x+a} + \frac{1}{x+b} + \frac{1}{x+c}$$

$$+ \frac{1}{x+a+b+c} = 0.$$

ii. $x^4 + x^3 - 4x^2 + x + 1 = 0$.

iii. $\frac{x^4 + 1}{(1+x)^4} = 3\frac{1}{2}$. $x+y+z=6$

iv. $x^2 + y^2 + z^2 = 14$. $xy + yz = 8$.

9 (i.) We get this equation to reduce to a cubic, finally to a quadratic, but have not space to give the solution; if any of our mathematical men will send us a short and easy solution we will be pleased to print it.

(ii.) Equation may be written

$$(x^4 - 2x^2 + 1) + x(x^2 - 2x + 1) = 0,$$

$$\text{or } (x-1)^2 \{ (x+1)^2 + x \} = 0,$$

$$\therefore x=1, \text{ or } \frac{3 \pm \sqrt{5}}{2}.$$

(iii.) $\frac{1+x^4}{(1+x)^4} = 3\frac{1}{2}$

$$\begin{aligned} &\text{or } 5x^2 + 28x + 42x_2 + 28x + 5 = 0, \\ &\text{or } 5(x^2 + 1)^2 + 28x(x^2 + 1) + 32x^2 = 0, \\ &\text{or } \{5(x^2 + 1) + 8x\} \{x^2 + 1 + 4x\} = 0, \\ &\text{or } x^2 + 4x + 1 = 0, \text{ and } 5x^2 + 8x + 5 = 0, \end{aligned}$$

$$\therefore x = -2 \pm \sqrt{3} \text{ or } -\frac{4 \pm 3\sqrt{-1}}{5}.$$

(iv.) From third equation $x + z = \frac{8}{y}$ sub-

stitute in first equation and $y + \frac{8}{y} = 6$;

$$\therefore y = 4 \text{ or } 2, \text{ whence } x \text{ and } z.$$

10. There are three members such that the sum of the first and second added to their product is 194, the sum of the first and third added to their product is 207, and the sum of the second and third added to their product is 239. Find the numbers.

10. We have $x + y + xy = 194$.

$$x + z + xz = 207.$$

$$y + z + yz = 239.$$

Substitute in second equation the values of x and z in terms of y ; when simplifying we have $y^2 + 2y = 224$, whence $y = 14$ or -16 , and the numbers are 12, 14 and 15.

11. Find the sum of n terms of an Arithmetic Progression.

The sum of n terms of an A. P. is $an + bn^2$, find the m^{th} term.

11. We have $s_n = a n + b n^2$,

$$s_{n-1} = a(n-1) + b(n-1)^2,$$

$$\therefore \text{nth term} = a + b(2n-1) = s_n - s_{n-1}.$$

$$\text{and } m^{\text{th}} \text{ term} = a + b(2m-1).$$

12. Prove the Binominal Theorem for a positive integral exponent.

Show that in the expansion of $(1+x)^n$ the coefficients equally distant from the beginning and end are equal, where the exponent is a positive integer.

Expand $(\frac{1}{2}x - \frac{1}{5}y)^8$, and $(a^2 - x^2)^{-\frac{1}{2}}$ to five terms.

At the request of a subscriber we give the following:—

1. Prove that $(s-a)^3 + (s-b)^3 + (s-c)^3 + 3abc = s^3$ where $2s = a + b + c$.

Expand and add, and we have: $3s^3 - 6s^2 + 3s(a^2 + b^2 + c^2) - a^3 - b^3 - c^3$; by substituting the value of s and simplifying, the result is s^3 .

Now $(s-a)^3 = \frac{1}{8}(b+c-a)^3$;

$$\begin{aligned} \therefore (s-a)^3 + (s-b)^3 + (s-c)^3 + 3abc &= \frac{1}{8}(b^3 + 3b^2c - 3b^2a - 6abc + 3a^3b + c^3 - 3ac^2 + 3a^2c - a^3) + (\text{anal.} - \dots) \\ &\quad + (\text{anal.} - \dots) + \frac{1}{8}(4abc) \\ &= \frac{1}{8}\{a^3 + 3a^2b + 3a^2c + 3ab^2 + 6abc \\ &\quad + 3ac^2 + b^3 + 3b^2c + 3bc^2 + c^3\} \\ &= \frac{1}{8}(a+b+c)^3 = s^3. \end{aligned}$$

2. Factor $2(a+b+c)^3 - (a+b)^3 - (b+c)^3 - (c+a)^3$

$$\begin{aligned} \text{putting } (a+b) = \alpha \quad (b+c) = \beta \quad (c+a) = \gamma \\ \text{exp.} &= (\alpha + \beta + \gamma)^3 - (\alpha^3 + \beta^3 + \gamma^3) \\ &= 3(\alpha + \beta)(\beta + \gamma)(\gamma + \alpha) \\ &= 3(a + 2b + c)(b + 2c + a) \\ &\quad (c + 2a + b). \end{aligned}$$

3. Shew that

$$\begin{aligned} a^2 \left(\frac{1}{c^2} - \frac{1}{b^2} \right) + b^2 \left(\frac{1}{a^2} - \frac{1}{c^2} \right) + c^2 \left(\frac{1}{b^2} - \frac{1}{a^2} \right) \\ = \frac{\frac{1}{bc} \left(\frac{1}{c} - \frac{1}{b} \right) + \frac{1}{ca} \left(\frac{1}{a} - \frac{1}{c} \right) + \frac{1}{ab} \left(\frac{1}{b} - \frac{1}{a} \right)}{(a+b)(b+c)(c+a)} \\ = \frac{a^2b^2(a^2 - b^2) - c^2(a^4 - b^4) + c^4(a^2 - b^2)}{-c(a^2 - b^2) + ab(a-b) + c^2(a-b)} \\ = \frac{a^2b^2 - c^2(a^2 + b^2) + c^4}{ab + c^2 - c(a+b)} \cdot (a+b) \\ = \frac{(a^2 - c^2)(b^2 - c^2)}{(a-c)(b-c)} (a+b) \\ = (a+b)(b+c)(c+a). \end{aligned}$$

PROBLEMS IN ARITHMETIC.

By A. M. B., BLYTH.

1. If it cost \$84 to carpet a room 36 ft. long and 21 ft. wide, what will it cost to carpet a room 33 ft. long and 27 ft. wide?

Ans. \$99.00.

2. A clerk receiving a salary of \$950 per annum, pays \$275 a year for board, and \$180 for clothing, and \$150 for other expenses; what per cent. of his salary is left?

Ans. 36 $\frac{2}{3}$ per cent.

3. What will it cost to dig a cellar 40 ft. long, 21 ft. 6 in. wide, and 4 ft. deep, at \$1.75 a cubic yard?

Ans. \$22.96.

4. 2 pk. 3 qt. 1 $\frac{1}{2}$ pt. is what decimal part of 20 bu.?

Ans. .030625.

5. What are the proceeds of the following note, discounted at bank, and when will it

become due? (Interest being reckoned at 6 per cent.) :—

\$100. NEW YORK, Oct. 11, 1875.

Ninety days from date, for value received, I promise to pay to the order of John Smith, One Hundred Dollars, at the Albany Bank.

JOHN JAY.

6. A can mow 2 acres in 3 days, and B 5 acres in 6 days; in how many days can they together mow 9 acres. *Ans.* 6 days.

7. How many bricks will be required to build a wall 2 rods long, 6 ft. high, and 18 in. thick, each brick being 8 in. long, 4 in. wide, and 2½ in. thick? *Ans.* 6,416 bricks.

8. If the wages for 24 men for 4 days are \$192, what will be the wages of 36 men for 3 days? *Ans.* \$216.

9. At what rate per cent. will \$311.50 amount to \$337.40 in 1 yr. 4 mos.?

Ans. 6½⅞.

10. A woman bought 6 silver spoons, each weighing 3 oz. 3 dwt. 8 gr., at \$2.25 an oz., and a gold chain weighing 14 dwt., at \$1.25 a dwt.; what was the total cost?

Ans. \$60.25.

CLASSICS.

G. H. ROBINSON, M.A., TORONTO, EDITOR.

BRADLEY'S ARNOLD.

B I M. A.

Exercise 33 B.

1. Illud bona tua venia quærere velim, utrum casu hoc an consilio feceris. 2. Cum lacrymis, cum ploratu, summa cum solitudine, domo profecti sumus; curarum onere, levati, metu vacui, et cum summa omnium lætitia, ad finem itineris pervenimus. 3. Homo est moribus integerrimis, et tantum ab ejusmodi scelere abhorret ut mirer equidem quemadmodum in tam nefariæ impietatis suspicionem venire potuerit. 4. Cum dignitate mori, quam servi vivere malumus, sed hoc modo perire, hujusmodi hominis causa, nolumus. 5. Potui morti ipsi nullo negotio obviam ire, sed hanc tam gravem calamitatem æquo animo perferre nequeo. 6. Qui adeo exarsit ira, ut non fratri solum suo, sed omnibus qui adstabant mortem denuntiaverit.

Exercise 46.

1. Multa nobis incommoda, multæ molestiæ nostra ipsorum culpa accidunt, nec illud raro hominibus contingit, ut pueritiæ peccata jam adulti luant. 2. His dictis tribunos centurionesque ad suum quemque cohortem remisit, et quum equites jussisset adventum suum tumulis tectos expectare, concitato equo profectus pedites, qui ad ipsa castra se receperant, voce ac gestu cohortabatur ut reversosse sequerentur. 3. Eum te esse credo cui cives tui, propter ipsam virtutis tuæ opinionem magistratum mandaturi sint. 4. Regis est non sui solum, sed eorum qui tibi successuri sint rationem habere. 5. Ipse eum immaturam filii deplorantem audivi; quam tu calamitatem minimi cum fecisse dicitas. 6. Nostris ipsorum inquit ærumnis vix magis quam amicorum moveri debemus. 7. Quum ad suos rediisset obstabatur ne inimicissimis suis et ipsorum, qui patrem suum occidissent et ipsos prodidissent se dederent, sed potius ultima experti in acie perirent. 8. Suo se, non Germanorum, tempore suos ad pugnandum educturum esse ait. 9. Sui et ætatis suæ pænitere cujusvis est; summæ vero est sapientiæ illud intelligere, quemadmodum præteriti temporis sanare incommoda, et reipublicæ vulneribus mederi possimus. 10. Interrogantibus quid emolumenti ex amicistam multis percepisset, propter se expetendas esse amicitias respondit. 11. Quum consedisset, accessit sociorum legatos interrogavit cur in tali tempore et se deserere et ipsorum libertatem prodere vellent.

MODERN LANGUAGES.

Editors: { H. I. STRANG, B.A., Goderich.
W. H. FRASER, B.A., Toronto.

EXERCISES IN ENGLISH.

1. Select the phrases in the following, and tell the grammatical value of each:

“Next morn we wakened with the shout
Of merry voices high and clear;
And saw the teamsters drawing near
To break the drifted highways out.
Down the long hillside, treading slow,
We saw the half-buried oxen go,
Shaking the snow from heads uptost,
Their steaming nostrils white with frost.”

2. Substitute phrases for the italicized words :

- (a) It will cause a *temporary* delay.
 (b) I suppose that he did it *unconsciously*.
 (c) Such conduct is *undoubtedly reprehensible*.
 (d) Such a result seemed quite *improbable*.
 (e) I think he acted *judiciously* in *postponing* the meeting.

3. Contract the following sentences to simple ones :

- (a) Have you heard how the trial resulted ?
 (b) I know no other way in which it can be done.
 (c) You asked me a question and I answered it.
 (d) It is probable that he took it with him.
 (e) He was ill and consequently unable to attend to it.
 (f) As there wasn't a quorum we had to adjourn.
 (g) He said that he was willing to return the money.
 (h) I have carried out the instructions which he gave me.
 (i) It was not without some hesitation that I agreed to it.
 (j) He will be sorry when he hears that you have failed.

4. Change the compound sentences to complex, and *vice versa* :

- (a) You must do it, or I'll punish you.
 (b) He would have gone if his friends would have let him.
 (c) I wrote him a letter but he has not answered it.
 (d) As he was present at the time he must have seen it.
 (e) He was very ill but still he tried to finish it.
 (f) He has reason to fear the result but I have more reason.
 (g) I can prove that he took the money.
 (h) He would not go, and I know the reason.

5. Arrange in as many ways as possible without destroying the sense :

- (a) Not always shall the slave uplift
His heavy hands to heaven in vain.
 (b) The good man sat beside his door
One sultry afternoon.
 (c) The robin, softly, o'er the lea
A farewell song is trilling.

5. Express the following in at least two other ways, changing the language and construction as much as possible :

- (a) No one cares to employ a careless workman.
 (b) Of all ordinary causes of disease none is so productive of sickness and death as impure air.
 (c) Exercise is necessary to the healthy development and maintenance of either brain or muscle.

7. Change from direct to indirect narrative :

(a) A husbandman set a net in his field to catch the cranes that came to pluck up his newly-planted corn. When he went to examine the net to see what cranes he had caught he found a stork among the number. "Spare me," cried the stork, "and let me go. I am no crane; I have not eaten any of your corn; I am a poor, innocent stork, as you may see."

Change from indirect to direct :

(b) But the husbandman would hear no more, and replied that all that might be true enough, he would admit. This he plainly knew, that he had caught him with those that were destroying his crops, and he must therefore suffer with the company in which he was taken.

8. Substitute other words or phrases of equivalent meaning for those italicized :

- (a) Pitt wanted to *prosecute hostilities*.
 (b) The period *was prolific* of great writers.
 (c) In India English *prowess* decided the *question of supremacy*.
 (d) The *obnoxious* measure was withdrawn at Pitt's *urgent solicitation*.
 (e) The most of them *preferred voluntary expatriation*.
 (f) The terms of peace though *lauded* by the king were bitterly *inveighed against*, as they *inadequately compensated* England for her *outlay*.

9. Paraphrase the following :

A man who kept a horse, along the way
 Unladen used to lead him, and to lay
 His burden on an aged ass, who groaned,
 And coming to the horse his fate bemoaned.
 "Wouldst thou but share my load, I might
 survive,"

Said he, "but else I sha'n't be long alive."
 "Move on," the other cried, "don't worry
 me!"

The ass crept on, reproved; and presently
 Sank under toil, and died as he had said;
 His master therefore set the horse instead
 Beside him, shifted all the weight, and laid
 This and the ass's skin, when it was flayed,
 With all its trappings, on the horse's back;
 He cried, "Ah, ill advised! Alack! Alack!
 I would not bear a part, however small,
 And now constraint hath laid upon me all!"

10. What do the following contractions
 stand for?—Jr., M. D., Prof., viz., Bp., ult.,
 Jno., e.g., Col., J. P., %, mdsc., Cr., Ill,
 nos., inst., N. Y., Xmas., C.O.D., schr.,
 M.P.P.

11. Break up the following complex sen-
 tence into eight simple ones, each containing
 one assertion :

"The chief engineer, who had just been
 relieved from duty, endeavoured to extin-
 guish the flames, and when he failed in this,
 perceiving that the captain intended to beach
 the vessel, he felt his way at the risk o' his
 life to the lever of the engine and pulled
 open the throttle valve so as to give her as
 great a head of steam as possible."

12. Combine the following into not more
 than six sentences :

"A gentleman was walking in the fields
 one day. He heard the cries of a bird. It
 seemed to be in distress. He looked up.
 He saw a hawk. It was trying to catch a
 lark. The lark darted this way. It darted
 that way. It managed to keep out of the
 reach of its enemy. It was becoming tired
 out. This was quite evident. The man felt
 very sorry for the lark. He wished to save
 it. Suddenly it darted down. It flew
 straight into his hand. It remained there.
 It was panting. It was trembling. The
 hawk saw all this. It flew away. It
 seemed disgusted."

13. Divide into clauses, and tell the na-
 ture and grammatical value of each :

(a) *A few cases, however, have been
 known in which Hindoos have succeeded in
 taming tigers so completely that there was
 no necessity for confining them in cages as
 they would follow their masters about like
 affectionate dogs.*

(b) *As night drew on, and, from the crest
 Of wooded knolls that ridged the west,
 The sun, a snow-blown traveller, sank
 From sight beneath the smothering
 bank,*

*We piled with care our nightly stack
 Of wood against the chimney-back.*

(c) *And, following where the teamsters led,
 The wise old Doctor went his round,
 Just pausing at our door to say,
 In the brief, autocratic way
 Of one who, prompt at Duty's call,
 Was free to urge her claim on all,
 That some poor neighbour sick in bed
 At night our mother's aid would need.*

14. Parse the italicized words in 13.

15. Analyze fully:

(a) *At Stralsund, by the Baltic Sea,
 Within the sandy bar,
 At sunset of a summer's day,
 Ready for sea, at anchor lay
 The good ship Waldemar.*

(b) *Failing to secure the coin, the ele-
 phant, after several attempts, stood motion-
 less for a few seconds, apparently consider-
 ing how to act.*

16. Give two examples each of (a) an
 adverb modifying a clause; (b) a noun
 clause in apposition, (c) an adverbial clause
 of purpose; (d) an adjectival clause begin-
 ning with a conjunctive adverb.

17. "Certain words partake of the nature
 of two parts of speech." Show that this is
 true of the italicized words in the following :

(a) I found the children *playing* marbles.
 (b) I kept him in for not *knowing* his lesson.
 (c) I sent for his father, *who* came and took
 him home. (d) Soon we arrived at the
 wharf, *where* we parted, never to meet again.
 (e) He wanted *to learn* their names.

18. Correct any errors, giving your rea-
 sons, in the following :

(a) *In nearly every creek or arm of the sea
 lies buried inexhaustible supplies of this
 manure.*

(b) *I hope that in a short time I will be
 able to pay it all back.*

(e) It isn't quite a year since it has been discovered.

(d) Some say that the heat and dust affects the colour and texture of the material.

(c) Has more than one case of it occurred in the school?

(f) It was laying on the floor when I seen it last.

(g) If it wasn't her I don't know who he could have meant.

(h) If I was to spare the rod in this case I would certainly not be doing my duty.

(i) There is the man whom we all thought would have got the nomination.

(j) Such a result, however, will only be achieved when all are united.

(k) Neither history or tradition gives us any account of its origin.

(l) The Reform party has not obtained power, and will not have an opportunity of showing what they can do.

(m) The letter was no doubt written with a malicious intention of damaging Mr. A.'s character.

(n) He was denouncing them as schismatic, turbulent, self-seeking, and other choice epithets.

THE CLASS-ROOM.

EDUCATION DEPARTMENT,
ONTARIO.

JULY EXAMINATIONS, 1886.

First Class Teachers.—Grade C.

BOTANY.

Examiner—J. C. GLASHAN.

NOTE.—The examiner attaches most value to the answer to No. 7.

1. Describe briefly (naming examples in every case) the usual arrangement of leaves on the stem. What is the relation of whorls to spirals? What is the direct cause of the death and fall of the leaf in the case of deciduous trees?

2. What different parts of plants are occasionally converted into tendrils? Give examples of each case. How does the Poison Ivy (*Rhus toxicodendron*) climb?

3. What are the chief alterations undergone in some cases by the ovary in becoming the pericarp? Describe the chief methods adopted by plants to secure the dispersion of their seeds. What is the difference between the down of milk vetch and that of dandelion?

4. Mention the principal useful and ornamental plants of the ranunculaceæ and of the liliaceæ proper.

5. Classify the principal cereals.

6. Define the following terms and name plants that afford illustrative examples of each:—tuber, corm, bulb, stock, stipule, ligula, raceme, spike, corymb, umbel, cyme, panicle, legume, samara.

7. Fill the accompanying *Floral Schedule*, from observation of the specimen before you.

PHYSICS.

Examiner.—J. C. GLASHAN.

NOTE.—Each candidate may select eight, but not more than eight of the following questions as numbered.

1. Distinguish between the mass of a body and its weight. Mention some phenomena which depend on one or the other respectively.

By what experiments can it be shown that the weight of a body is proportional to its mass? What common practical application is made of this fact?

2. Define and distinguish clearly by illustrative examples, "acceleration," "force," "momentum," "energy" and "work." What are the units commonly employed in measuring each of these?

3. State Newton's Second Law of Motion.

What will be the meaning of "impressed force" if "change of motion" be taken to mean (a) "total change of momentum during a given time", (b) "time-rate of change of momentum"?

4. Define density and specific gravity, and clearly distinguish between them by illustrative examples.

How can the specific gravity of sand be practically determined? Illustrate by a numerical example.

5. Describe how the weight of a cubic foot of air may be experimentally determined. How does the density of air vary when the pressure to which it is exposed is varied? How may this relation be experimentally determined? What errors must be guarded against in making this experiment?

6. A boat is rowed at the rate of 176 yds. per min. at right angles to a stream which carries it downwards at the rate of 57 yds. per min. Find the actual speed of the boat.

7. *A*, *B* and *C* move with uniformly accelerated velocities in straight lines. At a distance in each case of 33 ft. from the initial point *A*'s velocity has changed from 21 to 12; *B*'s has changed from 12 to 21; and *C*'s has changed from 21 to -12. Find the acceleration and the time in each case.

8. A railway train weighing 150 tons, moving along a level track at the rate of 30 miles an hour, is stopped by friction in a length of 176 rd. What must the average resistance to its motion have been, *taking the weight of a pound mass as the unit of force*?

9. It is wished to upset a tall column by means of a rope of given length pulled by men on the ground; at what height above the base of the column must the rope be attached that the work may be done with the least possible stress on the rope?

10. A vessel containing water with a wooden sphere floating on it is placed under the receiver of an air pump. How will the sphere be affected on exhausting the air from the receiver?

State precisely what will happen if the density of water be 775 times that of air at ordinary pressure, supposing the sphere originally to have been immersed to its centre.

CHEMISTRY.

Examiner—JOHN SEATH, B.A.

NOTE.—The Candidate is requested to arrange, as far as practicable, the different parts of his answers to 2.5 under the following heads: (1) Experiment, (2) Observation, and (3) Inference.

1. 4144 gramme of an organic compound containing the elements C, H, I, and N,

yields on analysis .5 gramme of CO_2 and .1055 gramme of H_2O . .497 gramme of the same compound yields .5335 gramme of AgI . Its vapour density is 109.5. Find its molecular formula.

2. You are given a solution known to contain NaNO_3 , KHSO_4 , CaO , H_2 , CaCl_2 , H_2BO_3 or K_3PO_4 . By what series of experiments could you determine most simply which of these the solution contains?

3. How would you demonstrate

(a) The differences and the resemblances between the properties of Iodine and Bromine; and

(b) The nature of Flame and of the Blow-pipe flame?

4. You are given Cu , NaCl , H_2SO_4 , KNO_3 , and a liquid containing NH_4OH .

(a) How would you produce therefrom Nitrous Oxide and Nitric Oxide?

(b) How would you demonstrate that you had done so?

5. A sample of green cloth is supposed to contain Arsenic. Describe minutely each step in Marsh's process for determining the question.

6. (a) Calculate the vapour-volume of 10 grammes of H_2SO_4 at 400°C .

(b) What volume of Hydrochloric Acid would be produced by replacing by an equivalent weight of Hydrogen, the Boron in one litre of Boric Chloride (calculated at 0°C)?

EUCLID.

Examiner—J. DEARNESS.

NOTE.—Contractions, and symbols except of operation, may be employed. Use capital letters on the diagrams. It is recommended that every step in the demonstration should begin on a new line, and references and authorities be placed opposite in the margin.

1. If a straight line cut two parallel straight lines it shall make the alternate angles equal to one another, also any exterior angle equal to the interior opposite angle upon the same side, and the two interior angles upon the same side together equal to two right angles.

Given the hypothenuse and the sum of the sides to construct a right angled triangle.

2. Bisect a given (irregular) quadrilateral by a line drawn from one of its angular points.

3. If a straight line be bisected and produced to any point, the square on the whole line thus produced and the square on the part it produced are together double of the square on half the line bisected and of the square of the line made up of the half and the part produced.

Produce a given straight line so that the square on the line made up of the whole and the part produced shall be double of the square on the part produced.

4. If two straight lines cut one another within a circle, the rectangle contained by the segments of one of them is equal to the rectangle contained by the segments of the other.

State and prove the converse of this proposition.

5. Describe an isosceles triangle having each of the angles at the base double of the third angle.

In Euclid's figure show that the base of the required isosceles triangle is (a) the side of a regular decagon inscribed in the larger circle, and (b) equal to $\frac{1}{2}r(\sqrt{5}-1)$ where r is the radius of the circle.

6. Define the conditions under which the first of four magnitudes has to the second the same ratio that the third has to the fourth. State the converse of this definition.

7. In a right angled triangle, the rectilinear figure described upon the hypotenuse is equal to the sum of the similar and similarly described figures upon the sides containing the right angle. (VI. 31). Hence prove I. 47. Show whether I. 47 has been used in any proposition upon which the proof of Prop. 31, Bk. VI depends.

WE are requested by the Education Department to state that it is the intention to prepare papers for the next Entrance Examination to High Schools, containing a greater number of questions than the candidates will be required to answer, thus giving them a choice of eight or ten on the paper. Also to make a correction in the circular sent out some time ago, in which it was stated that candidates would be required to submit drawing books Nos. 4 and 5 to the examiners; it should have read, 4 or 5.

NOTES ON FOURTH BOOK LESSONS FOR ENTRANCE EXAMINATION, DECEMBER, 1886.

THE VISION OF MIRZA.

First Reading.

Oriental.—Belonging to the East. Notice the beauty of derivation; it originally meant belonging to the rising sun.

Mirza.—A Persian title, meaning "son of a prince."

Moon.—Month. Both words come from the same root. The proper meaning of month is the length of a moon.

The custom of my forefathers.—Mohammedan customs, for this, it must be borne in mind, is supposed to be the translation of an Eastern manuscript.

Bagdad.—A city on the river Tigris.

Vanity.—Uselessness.

Habit.—Dress.

Vale of misery.—This world.

Measured out by the sun.—The sun may be said to measure out time into days and years. Eternity itself is not counted by days and years, for it is immeasurable.

Entire.—Whole.

An hundred.—Now written "a hundred." Why "an" here?

Threescore and ten.—"The days of our years are threescore years and ten."

At first of a thousand arches.—Before the Flood the age of man was nearly a thousand years as the Scripture account is generally understood.

Innumerable trap-doors.—Different kinds of death as accidents or diseases.

Set ve y thick at the entrance.—Alluding to the greater mortality among the young and the aged than among those in middle life.

A kind of hobbling march, etc.—Those who live to 'e over the allotted age of "threescore years and ten."

Second Reading.

This wonderful structure.—The bridge of human life.

Some with scimitars.—Violent death any kind, in war or otherwise

Flights of birds.—These seem to be arranged according to the respective passions for which they stand, thus Envy is represented by the vultures, Avarice by harpies, Superstition by ravens, etc.

Winged boys.—Cupids.

Spreading forth into an immense ocean.—Time leading to eternity.

Innumerable islands, etc. Notice that it is a Mohammedan idea of a paradise, entirely different from the Christian ideal.

Seats.—Situations or places.

Relishes.—Tastes.

WE are requested by the Education Department to announce that the following selections from the literature prescribed for

Third Class Teachers' non-professional examinations will be repeated for 1887-8:—

PROSE.

No. XV., Addison, "The Golden Scales," pp. 88-92; No. XXII., Goldsmith, "From the Vicar of Wakefield," pp. 127-133; No. LXIII., Thackeray, "The Reconciliation," pp. 308-315; No. LXX., George Eliot, "From the Mill on the Floss," pp. 356-359;

POETRY.

No. LXVII., Longfellow, "The Hanging of the Crane," pp. 336-342; No. LXXIX., Tennyson, "The Lords of Burleigh," pp. 370-372; No. LXXXI., Tennyson, "The Revenge," pp. 373-377; No. CV., E. W. Goss, "The Return of the Swallows," pp. 437-438.

CONTEMPORARY LITERATURE.

THE November number of the pretty children's magazine, *Our Little Ones*, is early to hand and is more than an average number.

THE November number of *Education* contains articles of great value, on various important subjects. Among these are "Manual Training," "Romans in England," etc.

INTERESTING travel-papers form an attractive feature of recent numbers of the *English Illustrated*, a magazine which, as the "Thunderer" lately remarked, "has no rival in England."

THE *Overland Monthly*, in common with other magazines, devotes considerable space to the discussion of new astronomical methods. The article is entitled "Photography, the Servant of Astronomy."

THE *Atlantic Monthly* for December contains the address delivered by Mr. Lowell, at the 250th anniversary of Harvard University; Dr. Holmes' poem, written for the same occasion, but even without these it is a good number.

TWO noteworthy articles in the November *Eclectic* are "Prospects of Home Rule," by E. A. Freeman, and "The Future Supremacy of Women," by E. Lynn Linton, the former being taken from the *Fortnightly* and the latter from the *National Review*.

THE *Youth's Companion* celebrates this year its sixtieth anniversary. Among its contributors are W. D. Howells, J. T. Trowbridge, Prof. Huxley, The Duke of Argyle, The Marquis of Lorne and Princess Louise, and Archdeacon Farrar. The *Companion* has nearly 400,000 subscribers.

THE November Brooklyn magazine is an entertaining number, containing several short poems of merit and instalments of serials, besides the sermons of Rev. H. W. Beecher and Dr. Talmage, here published as revised by the writers, and occupying a considerable portion of this valuable magazine.

WE congratulate the readers of *Harper's Monthly* on the beautiful Christmas number which will shortly be in their hands. For nearly forty Christmastides the holiday *Harper's* has been issued, and a glance at

the contents of the fortieth in the series is enough to ensure its welcome.

OUR readers will find, in the current number of the *Popular Science Monthly*, nearly one hundred and fifty pages of valuable reading. Among the articles may be mentioned "Geology of the Atlantic Ocean," by Sir Wm. Dawson; "Sunday Legislation," by the Rev. A. H. Lewis; and "The Mental Faculties of Monkeys," by Mme. Roger.

USEFUL BOOKS FOR TEACHERS.

D. C. HEATH & CO., Boston: Monographs on Education. 2. The Study of Latin. 4. How to Teach Reading.

GINN & Co., Boston: 1. Classics for Children. *Ivanhoe*. *Gulliver's Travels*. 2. The Beginner's Latin Book. 3. Combined Number and Language Lessons.

ELDRIDGE & BRO., Philadelphia: Punctuation and the Use of Capital Letters.

HOW TO STRENGTHEN THE MEMORY; OR, NATURAL AND SCIENTIFIC METHODS OF NEVER FORGETTING. By M. L. Holbrook, M.D. Price \$1.00. New York: M. L. Holbrook & Co.

A PRACTICAL RHETORIC. For instruction in English Composition and revision in Colleges and intermediate Schools. By J. Scott Clark, A.M., Syracuse University. New York: Henry Holt & Co. pp. 381 \$1 50.

Our examination of this book, which differs widely from the great majority of American text-books on the subject of Rhetoric, leads us to believe that it fully deserves its title. It contains a large number of sentences selected for criticism and correction from actual essays, and arranged somewhat after the manner of these in Abbott's "How to Parse." We heartily commend it to the notice of English masters in our High Schools and Institutes.

CÆSAR'S GALLIC WAR. By F. W. Kelsey, of Lake Forest University. Boston: John Allyn. pp. 490. Introductory. Price \$1.25.

It would take long to enumerate the special features and merits of this "Newest Cæsar,"

introduction, notes, text, coloured illustrations, full-page maps, plans, etc., all that a student needs to make the study of Cæsar attractive, interesting and profitable.

WARD'S GRADED LESSONS IN LETTER WRITING AND BUSINESS FORMS. A. S. Barnes & Co., New York and Chicago.

This series consists of four books which are devoted largely to the teaching of letter writing, so far as that can be taught, and business forms. We have very little faith in the teaching of letter writing at all beyond the actual form, but if it had to be introduced it would have been more in accordance with the plan of the series to have confined it to business correspondence. The business forms are decidedly the most valuable feature of the series, and an admirable plan is adopted to familiarize the pupil with them. He is first required to copy a carefully engraved form, and he is next given material at the top of the page to write out a similar form for himself, as an exercise upon what he has previously copied.

The engraved forms of notes, etc., are made to resemble those used in actual business.

BARNES' NATIONAL SYSTEM OF PENMANSHIP. A. S. Barnes & Co., New York and Chicago.

There are several commendable features in this series. It consists of only six books, in which is comprised all that needs to be taught in the way of practical penmanship. The engraved head lines are accurately drawn and beautifully executed. The introduction of both capitals and small letters is made upon an intelligent and well-defined plan. A unique and commendable feature is the business forms, which are engraved to represent the cheques, notes, etc., used in business. It would have added to the merit of the series had the superfluous initial strokes been left out, as they always are in actual business correspondence.

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Our readers will observe that special attention is given to examination papers in this Magazine; in many cases hints and answers are given, and for several papers solutions have been furnished to all the questions. We hope subscribers and others will show in a practical way their intelligent appreciation of the valuable work done by the editors of the different departments of **THE MONTHLY**.

WE are grateful to the kind friends of **THE**

MONTHLY who have, from many different places, sent us letters of approval and appreciation. If golden words were current coin, our esteemed treasurer would be able to declare a handsome dividend, and while we are much encouraged by the frequent assurances that **THE MONTHLY** is fulfilling a noble mission, we would respectfully ask our good friends to forward their subscriptions, as, though one dollar is a small amount, yet when a large number are delinquent in this small sum at one time, the effect is somewhat hurtful to the position of an educational journal, depending chiefly, as **THE MONTHLY** does, upon the support of the profession.

The best educational journal is the teacher's best friend, and we ask you, gentle reader, to aid in securing new subscribers for this educational journal, and to help the editors in getting original contributions for its columns, thus making it more and more the best.

Bound copies of this Magazine in cloth may be had from Williamson & Co., or from James Bain & Son, King Street, Toronto, for \$1.50 per copy.

WOODSTOCK High School has been raised to the status of a Collegiate Institute. The following is the teaching staff:—D. H. Hunter, B.A. (Toronto), Principal; Geo.

Strancon, B.A., (Edinburgh); A. D. Griffin, 1st Pro. Certif. A; Thos. H. Lennox, B.A. (Tor.); Geo. W. Watson, B.A. (Vic.), Ph.D. (Sy.)

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