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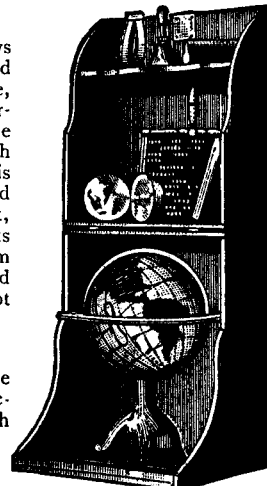
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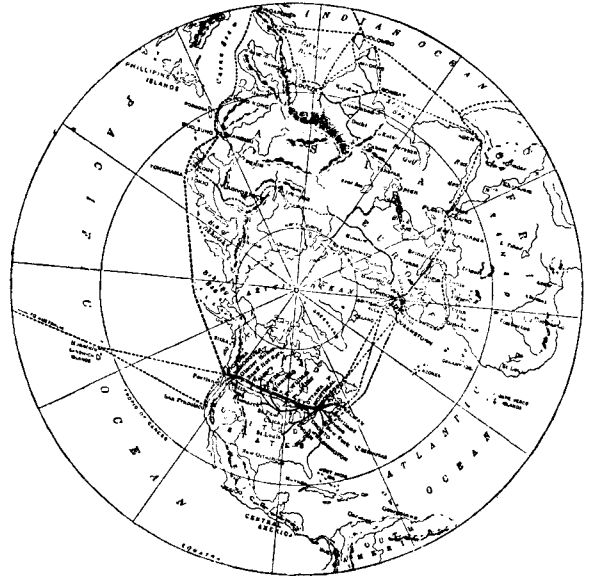
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TORONTO, FEBRUARY 15, 1896.

Vol. IX  
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## Editorial Notes.

FOR Question Drawer see next number. It was crowded out of this.

WE understand, from the Education Department, that a series of vertical writing copybooks, now in course of preparation, will be authorized about April next.

OWING to the shortness of the time since the new regulations were adopted, we understand that there will be no examination this year for the commercial diploma (Form II.). The examination in Form I. takes the place of the former commercial examination.

ACCORDING to press reports, considerably more than two thousand members of the University of Cambridge have signed a memorial praying for the admission of women to degrees in the University. Among the signatories are Arthur J. Balfour, First Lord of the Treasury; Gerald Balfour, Chief Secretary for Ireland; Sir Walter Besant, the well-known author, and other notable men.

SOME candidates for the next Junior Leaving Examination who hold Primary certificates, and who purpose taking advantage of the special provisions allowed to the holders of certificates granted under the former Regulations, have erroneously

assumed that they are not required to pass any examination of Form II. It should be understood that all such Junior Leaving candidates must, in 1896, take the following subjects of Form II.: English Grammar and Rhetoric, Arithmetic and Mensuration, and History of Great Britain and Canada. This fact was fully shown in our issue of September 2nd, 1895.

AT the recent meeting of the North Hastings Teachers' Association the following resolution was passed: "That, in the opinion of the North Hastings Teachers' Association, the Board of Examiners for admission to High Schools and Collegiate Institutes should be composed as follows: (a) The headmaster of the High School or Collegiate Institute; (b) the Public School Inspector; (c) a representative of the Public School Board of Trustees, who shall be a Public School teacher actively engaged in teaching in a Public School; (d) a representative of the Separate School Board, who shall be a legally qualified Separate or Public School teacher actively engaged in teaching in a Public or Separate School."

WE are at a loss in determining what amount of space, if any, should be given in our columns to the work of the Fifth Class; that is, to the requirements of the Public School Leaving Examination. Some teachers of high standing, who are in a good position to know, have advised us that since, under the existing Regulations, the completion of this course does not entitle the pupil to advanced standing in the High School or Collegiate Institute, or, at least, does not admit him to Second Form, so few pupils will take the fifth year that it is not worth while to give much of THE JOURNAL'S limited space to the special work prescribed for this year. On the other hand, several teachers have written us, urgently requesting that this special work be fully covered by THE JOURNAL. Now, what are we to do in the matter? Will not all those subscribers who have pupils in

preparation for the Public School Leaving, and desire the help of THE JOURNAL in preparing them, kindly let us know immediately by postal card? This will help us very materially in reaching the right decision.

AMONG the various methods which are being tried in different places to counteract the disadvantages under which the children in sparsely settled rural districts are placed with regard to educational advantages, the "Concord Experiment," which has been tried for about four years in Massachusetts, U.S., deserves special consideration. This plan is simply that of doing away with the smaller local schools, and concentrating them in chosen localities. This is made possible by the simple expedient of providing for the comfortable conveyance of all the children within a radius of three and a half to four and half miles to the central school. This is done by means of large wagons, capable of seating comfortably eighteen to twenty-two pupils each. These wagons are so constructed that they may be covered and closed in when desirable, and comfortably warmed. The service is performed by contract, at about a dollar a day for each conveyance. The contractors are bound to make the service satisfactory, according to conditions carefully specified. The success of the experiment has been such that, under a permissive law passed about four years ago, one hundred and forty towns in the State are already availing themselves of the privilege. The result is that there is now, it is said, scarcely a small school in the state. The cost of education for the outside pupils has been reduced about forty-five per cent.; the average of attendance has been largely increased; fewer teachers are required to do the work; hence better salaries are paid, and better teachers employed. The pupils of outlying districts get the same advantages as those of the towns and villages. It is likely that something like this will be the method of the future, especially in new and sparsely settled districts.

## Special Papers.

### THE PENCIL IN THE PUBLIC SCHOOL.

T. F. M'LEAN, BRIDGEPORT.

For our present purpose, the term "pencil" may be regarded as synonymous with any means employed in teaching the art of drawing in our Public Schools, as we endeavor briefly to treat of the bearings of the subject on the work of both pupil and teacher.

It is a question whether any subject in the course is less taught, or less effectively taught, than drawing. Teachers do not manifest that energy, enthusiasm, and indefatigability which, as a general rule, characterize their work in many of the other branches. And why is it thus?

Drawing, as an art, presents to us as pure, high, and noble ideals as either of the kindred studies, music or literature. The world honors the artist, as it does the musician, the hero, the philosopher, the statesman, or the poet. In national life, the proficiency in art denotes the height of national prosperity and civilization; in the home it points to domestic felicity.

Drawing is to the observation, memory, and imagination, what vocal expression is; the latter assumes the form of a word-picture, the former a color-picture, both clearly and easily presentable to the mind, the only difference being in the means of conveyance. The pen or pencil writes thoughts; the pen, pencil, or brush, as the case may be, embodies them in pictorial form. Of the two ways of giving expression to a thought or image, the latter is more easily comprehended; for the sense of sight is more easily, because more directly, appealed to.

As to the uses of drawing, they are without number. But, generally speaking, the ability to draw enables one to give to the world around him what he has seen or thought, of which otherwise he only would be the selfish possessor. A word-picture or even a vivid description from the pen of the most accurate observer would prove inadequate to satisfy our thirst for sight. The illustration must supplement the description, else no definite conception is attained. It is by this means only that we acquire some of the most useful information we possess. We know what the mammoth or the ancient Egyptian looked like; we can scan the features of Robert Bruce, of William Pitt, of George Washington, or of Hon. W. E. Gladstone, or we can see in miniature what appearance Niagara's thundering cataract presents.

Next in educational value to the living reality is a picture of it. A South American mechanic recently constructed a serviceable safety bicycle with a picture as his only guide. This proves how decidedly superior it was to a letter-press description, for practical purposes.

One of life's privileges is to gaze on such a masterpiece as Raphael's St. Cecilia. We can realize that the soul of the old master has been infused into a creation of transcendent splendor and purity of delineation, and a more absorbing interest only quickens our latent imagination, making us fancy that in modulated distant chorus we hear the symphonies of the attendant heavenly host.

Such is the potency of illustration, and such its inspiration, which may be merely momentary; nevertheless, by reason of its intensity, its influence is permanent, preaching us an impressive sermon, though, like the greatest of all forces, it is silent.

Taking a utilitarian view of the subject, we are led to consider the commercial value of drawing, for in this practical age nothing commends itself to the world so well as that which may be readily converted into current coin. There is to-day, an ever-increasing demand for illustrators on newspaper and magazine work, and there is, perhaps, no more remunerative employment for young men, and young women, too, who are competent for such positions. Every newspaper of any importance in Canada to-day has its staff artists, so that it is no longer necessary for them to adopt a patent medicine cut for Mrs. Langtry one day, and the same for Queen Lil, of Honolulu, the next. Probably every one of these staff artists first manifested his inclination to draw in the Public Schools. DuMaurier's Trilby would not have been so widely read and admired had it not been that the author immortalized his heroine, not only by his story,

but by his pictures of her—her faultless feet included. Nor is he the only eminent writer who enhanced the value of his writing by apt illustration, for Thackeray contributed accompanying cuts of his ideal characters. Had Shakespeare done likewise, we would not need to speculate so much on the personal appearance of Macbeth, Hamlet, or Richard III.

Of all special departments of drawing, varying in difficulty, I have selected object-drawing as the basis of further observations, because it is most useful, most rational, and because it comprises all the others. Let us look at what some of the most distinguished educational reformers say with regard to the subject.

Jacotot maintained that a teacher could teach that which he did not know, and the underlying root of this paradoxical principle, if applied at all, may be applied to drawing. A teacher may not be able to draw himself—a condition attributable only to early neglect of his powers—yet he can by passing comment cause his pupils to attain a measure of skill simply by stirring up their enthusiasm; and this is the highest type of teaching, in that, far from making the pupil a passive recipient of another's ideas, it makes him a zealous worker and active searcher after truth in his own behalf. It is much easier in our day to inculcate a love for the art than it was in the time of our progenitors, for the reason that artistic environment is more accessible.

Rousseau says: "Children, who are great imitators, all try to draw. I should wish my 'Emile' to cultivate this art, not exactly for the art itself, but to make his eye correct and his hand supple." Then mark the contrast between the natural method and that of the authorities in nearly all the art schools, even of our present day. He further states: "Emile is always to draw from the *object*; my intention is not so much that he should get to *imitate* the objects, as to *know* them."

We see that Rousseau strikes the keynote of the proper method in drawing, contending that all valuable knowledge in this subject, as in all others, must, in the earlier stages, be conveyed to the understanding through the senses, in close communion with nature, without compelling the pupil to become an imitator of imitators.

Furthermore, Pestalozzi declares that "a person who is in the habit of drawing, especially from nature, will easily perceive many circumstances which are commonly overlooked, and will form a more correct impression even of such objects as he does not stop to examine minutely, than one who has never been taught to look upon what he sees with an intention of reproducing a likeness of it.

The attention to the exact shape of the whole, and the proportion of the parts which is requisite for the taking of an adequate sketch, is converted into a habit, and becomes productive both of instruction and amusement." If for no other reason than for producing in our pupils the habit of accurate observation, or for making them more devoted to nature and natural history, I think we should pay a due share of attention to the subject.

The sixteenth century brought us the Renaissance in arts and letters, but I think the nineteenth is ringing in the Renaissance of Public School drawing. As an indication of this, we have only to look at our present Public School drawing books, and compare them with those of ten years ago. We must all admit their superiority over the preceding ones, because they are more in accord with the natural method, for the reason that a more prominent place is given to object-drawing.

Now, object-drawing includes memory-drawing, or it is comparatively useless, inasmuch as a person who cannot remember cannot draw objects. Of course, the figures in the rudimentary stages are all composed of straight lines and simple curves.

In order to determine whether a pupil should spend the greater part of his time at school in learning to draw freehand, straight lines and circles, let us look to an infallible guide in nature's forms around us. Outside of the horizon and certain minute crystalline forms, one cannot find a single straight line in nature. Upon this fact I base the assumption that all straight lines should be drawn with rulers, and all circles with compasses. Such work is necessary in manual training for the arts of mechanical and industrial designing, but in the former a drawing is of no value unless it possess clearness, and in the latter its value is proportionate only to its truth to the harmony and symmetry of nature. The elementary

work in the course is mechanical, but as the classes progress we find they are introduced gradually to object-work, first in mere outline, then shaded, and then in perspective grouping. But all this work assumes the form of slavish copying from printed forms. Granting that the cuts in the drawing books are accurate and true to nature, a pupil receives a training in examination and reproduction of detail that is valuable if supplemented by work from the object or from memory. Yet it is surprising that pupils who are expert copyists often fail to portray even the most prominent features of objects set before them. If judiciously controlled, by selecting for him suitable objects graded in difficulty, the pupils efforts lead him to solve by intuition the problems of perspective and of light and shade. Such theories are hard to expound as rules, but are much simpler when unconsciously induced by observation, properly concentrated and directed. The teacher's part in the work is to lead the pupils to notice discrepancies in their work, and, after they have had a sufficient number of examples in the concrete, to enunciate a few general rules in perspective or shading, as the case may be. But copying is only intended as a means to an end, and we are not to mistake the means for the end in view, which is originality. Copying leads the pupil to observe closely general contour, proportion, and the exact features of the copy, but he seems to lack that mental satisfaction that is afforded by original research, and economizes the precious time of both teacher and pupil.

With all deference due to the older and more learned heads, I firmly and conscientiously believe that every man, woman, and child, who is not physically incapacitated, can draw; just as every man, woman, and child can sing; nevertheless, the character of their drawing may vary in the same degree as their musical expression.

I cannot deny that there is such an existing condition as a talent, or a taste, for drawing, which varies considerably, and will materially affect results. But I do contend that the reason that most people cannot or will not draw is because they ignore from childhood up the heritage of a beneficent Providence; in other words, they do not apply those powers with which all are naturally endowed, viz., observation, memory, and imagination. My criterion for perfect observation is embodied in the alternative. "Can you, or can you not, reproduce an image or draw a picture of the object examined that will portray every detail?"

If you cannot, one of two things is obvious. Either your observation or your memory is defective in its workings, and in all cases defective memory is directly traceable to incomplete apprehension by the senses or by the mind; and without memory imagination is impossible. Charles Kingsley says: "The art of learning consists, first and foremost, in the art of observation."

Then, to my mind, the person who wishes to learn to draw must cultivate, first, his powers of observation, and dexterity of touch, and all other requirements will speedily be added to him.

For this reason, in teaching a class to draw any natural object, I should first ascertain by questioning, whether his sense impressions have been accurate or not. Some of the answers that display the ignorance of most pupils on commonplace objects are astounding. For instance, I have been told that a horse's eye was behind his ear, that a hen had five toes, that a sofa had two legs, and other things of a like kind, too numerous and ridiculous to bear repetition.

For such, observation lessons and tentative drill are a most important factor. Lead a pupil to use his eyes for the purpose for which they were intended, and you have passed the Rubicon in drawing.

It has been said, and this gravesin of omission confronts us, that most people go through this world with their eyes shut, but it is in our power to make our pupils more observant day by day, and more susceptible to the marvellous display of beauty, harmony, and wise arrangement that nature unfolds.

(To be concluded.)

If I can put one touch of sunset into the life of any man or woman, I shall feel that I have worked with God.—George McDonald.

ALL worldly joys grow less to the one joy of doing kindnesses.



## Primary Department.

### AS GOOD AS A GAME.

RHODA LEE.

As good as a game to the lowest class is a lesson on changing words. It is a good drill on the sounds, and may be used with advantage occasionally.

The class is, of course, at the black-board, chalk and brush on the ledge for use, and every pupil should try and be able to make the change as soon as the word is mentioned. Hands may be raised to denote their readiness.

Suppose the word *top* to be taken as a beginning. The teacher says, "Change it to *stop*." Up go the hands at once. One scholar is selected to make the change. If he does it correctly, the hands go down again. "Change to *shop*" is the next problem, then *shod*, *shed*, and so it goes on through, *bed*, *bad*, *bat*, *sat*, *slat*, *slap*, *sleep*, *creep*, *screen*, etc.

A second plan consists in the teacher making the change, while the children recognize and tell her the word.

A seat exercise may also be given by starting with a word such as *mit*, or *man*, and changing only one letter at a time. Make as many words as possible.

### STORY TELLING.

RHODA LEE.

A number of primary teachers were once asked to send to the president of a society of which they were members a statement of what they considered the most necessary and desirable characteristics and equipments of a good junior teacher. Among other replies received was the following: "A successful primary teacher should have a wide knowledge of children's literature, and be able to properly adapt a story, and tell it well."

To me that was by no means the least important of the characteristics mentioned. The primary teachers who have the gift of "story-telling"—and let me say, by the way, that it is one that can be largely cultivated—should be thankful. Many of us date our first acquaintance with good literature from our earliest memories, when, in the home, some one read aloud, or told "bedtime stories." Others may recall a second or third book teacher who gave first a liking for reading, and an acquaintance with good literature.

I am glad to think that the children now growing up will be able to go even farther back in school-life for this impression. It is possible to introduce little children to a great deal of good literature, and do much toward cultivating their taste aright.

Many people imagine that our object in telling stories is merely to entertain the children, thus giving a necessary relaxation from the strain of work. We grant that they entertain; that is one of the indications of fitness in the story; but that is not our aim in devoting a definite time to this work.

In the first place, stories may be of great importance on account of their ethical value. They may be a powerful agent in character-building. A moral truth, apparelled in the attractive dress of a story, will find its way to a child's heart when formal precepts and preaching go unheeded. One does not need to think long to recall instances in which a story, straight to the point, did more good than any amount of moralizing would have done.

Secondly, the telling of stories, either in prose or poetry, is the only method we have of presenting good literature to the little ones. While they are learning to recognize words and thoughts for themselves, we need not feed their minds solely on the simple stories they are able to read. We can, and should, be sowing the seeds of a love for good literature by reading to them the best we can find suited to their years. There is not the slightest excuse for the use of trashy literature when we have among the writers for children such names as Nathaniel Hawthorne, Edward E. Hale, Hans Anderson, Alice and Phoebe Cary, Joel Chandler Harris, Celia Thaxter, Mary Mapes Dodge, Julia Dewey, and many other well-known authors.

The pure, simple, yet exquisite language of Hawthorne's "Wonder Book" and "Tangleword Tales" is an education I wish every child could have the benefit of. Many of the works of these authors are to be found in public libraries, although child literature does not receive the place it should in the ordinary library. However, they are published in cheap form, and I do think every primary teacher should have some of them upon her shelves.

A third argument in favor of story-telling is its utility in language work. Reproduction of stories is one of the best, most definite exercises in language that we have. The oral reproduction in response to the questioning of the teacher, of a story told on a former occasion, is the foundation of a great amount of after work. This work is, of course, written as soon as possible.

The telling of stories suggests to me the opening of a broad door that lets into the child heart an unspeakable radiance of sunshine, and clears the way to an appreciation of all that is good and beautiful in the world of books.

### CARE OF THROAT AND LUNGS.

Cold weather is here, and have you said anything to the children about the care of their throat and lungs while in the frosty air?

If not, don't wait another day. Begin by a little talk about breathing through the nose. Make them understand that they are expected to breathe through the nose and not through the mouth. Did you ever hear the advice that is given by experts in throat diseases, "Shut your mouth and live"?

The little ones can be taught to understand that if the cold air strikes directly upon the throat it irritates it, but that if

it is breathed through the nose it becomes warmed and softened before it reaches the throat. If the nose is not used for breathing, the nostrils partly close up after awhile for want of use, so that the mouth-breathers cannot breathe through their noses even if they try to.

After a time, if nose-breathing is not observed, catarrh and throat troubles begin, and sometimes deafness follows from breathing this cold, unfiltered air through the mouth.

It would not be extreme if delicate children were advised not to talk in the cold frosty air at all. This is a good thing for you to remember, teachers, with all the talking you have to do through the day. On your way to school in the morning keep your mouth closed, and if you must express yourselves in the cold air use pantomime. It is great fun, and you will soon become artists in it, and save your voice and throat besides.

Encourage the little ones to tell you when they have "sore throat," and look into the little mouths yourselves and send the children home with personal notes to parents as soon as trouble begins. Swollen tonsils should not be neglected a day among the children.

Give a little talk about using cold water on the throat in the morning, followed by a hard rubbing with a coarse towel. Ask the children if they have done it, for a few mornings, and start the current of thought that way. Counsel them, also, not to wrap the throat too much in the open air.

Back of all this, are the children dressed warmly enough? You may not have been "hired" to look after the flannels and underclothing of the pupils, but if you are the right kind of a primary teacher you could no more help putting your hand on the little arm or leg to see if it is too thinly dressed than you could keep from hurrying to pick up a little toddler who had tumbled down in the school-yard, and there wasn't a word said about that sort of thing when you "signed your contract," if you ever did.

A parting word on the tender point of sympathy with the children this cold weather. No matter what becomes of the programme the first hour in the morning, if the little ones come in cold, with aching fingers and toes, and little trembling lips and chins, above all things thaw them out body and soul the first thing, and cuddle them up and get them to smiling. No "morning talk" ever given was equal to morning sympathy for the babies when they need it. An iron teacher talking sentiment or science or morals to chilly, uncomfortable children, because it is the schedule time for it, is a spectacle to make gods and men clamor for common sense and freedom in the schoolroom. One last word, Does any primary teacher who reads this ever permit children to stand shivering in the cold because it "isn't time to file in?" "Filing in" in cold weather is a nineteenth century abomination.—E.D.K., in *Primary Education*.

LIFE is rich in what it gives, and not in what it gets.

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## Editorials.

### SCIENTIFIC TEACHING.

WE have just happened upon a brief report of the address on the above subject, which was delivered, some weeks since, in the public hall of the Toronto Normal School, by Dr. Rice, of New York. Dr. Rice will be remembered by many of our readers as the writer of a series of articles, largely disparaging criticisms, on the public schools of the United States. These articles appeared in *The Forum* and in various educational journals, and attracted a good deal of attention, being highly approved by some and sharply criticized by others. Dr. Rice seems at least to have the power of presenting his thoughts in so attractive a form as to win the close attention of readers and hearers. Though his articles probably showed a good many of the misconceptions and crudities which are pretty sure to mark the work of the educational critic who is not himself a practical teacher, and thus exposed their writer to the shafts of sarcastic teachers, piqued, he would probably say, by the home truths they contained, yet they have no doubt been the means of doing much good in revealing the weaknesses and

improving the methods of many in the profession.

Dr. Rice accords to the Germans the palm for scientific teaching, and his animadversions were drawn largely from German authorities and from his own observation of German methods. He concurs heartily with the current opinion that scientific teaching has attained its highest development in that country. Though the German teacher does not, he thinks, know so well as the American how to make the child happy and the school-room attractive, yet he "does know how to develop the power of observation, imagination, and reasoning." In this remark Dr. Rice, no doubt, puts his finger upon one of the conspicuous defects of much of the teaching in the United States, and—though we hope to a smaller extent—in Canada. In his or her most laudable ambition to make the school pleasant to the children, the teacher too often commits the serious error of trying to make everything easy. This tendency reveals itself in too many of the methods and devices which we find occupying so large an amount of space in our American exchanges. These are by no means to be condemned indiscriminately. To suggest to a teacher a better method of conducting a class, or of teaching a given subject, or even to put before him some suitable device for fixing the attention and arousing the activity of the pupils, is to render that teacher a real and lasting service. The mistake is, as we have often had occasion to observe, in assuming, in the first place, that it is possible to find an easy way to surmount every difficulty that may be met with in the ordinary course of study; in the second place, that the desired educational result is reached as soon as the child has been enabled to surmount the difficulty; and, in the third place, that the child-mind likes best the easiest way of reaching the point aimed at, or, in other words, the way which makes the smallest possible draft upon his own thinking and reasoning powers. On the other hand, it would not be difficult, we believe, to show that there is no easy way to the real mastery of many of the difficulties best worth mastering in a suitable school course, that the real education can be obtained only through the process which calls into the most vigorous exertion the pupil's utmost power of independent thinking, and that, other things being equal, and the inductive method being wisely and skilfully used, the ordinary child will enjoy the struggle which results in conscious victory much better than being led and assisted along a path from which every obstacle has been

removed. It is a serious question whether the average American or Canadian school makes sufficient demand upon the pupil to put forth his very best effort to do the thinking required himself before asking or receiving help.

When Dr. Rice goes on to say that in many of the American schools the teacher simply listens to the child repeat what has been learned by rote from the textbook, one is inclined to distrust the accuracy of his information. That such was the old-time pedagogical method in Canadian as well as American schools, some of us know but too well; but with all the teaching of Normal schools and educational lectures and journals, it is hard to believe that the old machine process still survives in schools in either country. And yet when Dr. Rice tells us that he himself has heard a teacher say to a child, "Oh, don't stop to think; tell me what you know," our mouths are shut!

Dr. Rice proceeded to quote with approval two German educational generalizations. The first has long been familiar. It is that the teacher should tell the children nothing which they can find out for themselves. The soundness of this maxim, if interpreted in a reasonable sense, will be readily admitted by most thoughtful and successful teachers. But it must, of course, be taken with certain broad limitations. It is, for instance, obvious that in order to its validity the things to be found out, and the process of finding them out, must both be of educational value. It would be a waste of time, for which school-life is too short, to insist upon every child finding out for himself, say, a mere historical, or statistical, or geographical fact, which must at the last be taken upon the authority of some one. Why not upon that of the teacher? Nothing could be much more unscientific and opposed to all sound pedagogical principles than to send the pupil to search through great dictionaries and encyclopædias for information of this kind, merely that he may be said to have found out the thing for himself. Of course, up to a certain point, even this kind of work is valuable, as training the pupil to know where and how to look for information necessary to the work in hand—a thing in respect to which we sometimes find even good students wonderfully helpless or reprehensibly lazy. But even in such studies as Language or Mathematics, it is, we believe, quite possible to err on the side of wasting time by requiring too prolonged an effort on the part of the student to find out for himself. Looking back over our own student days, we are convinced that

we often wasted valuable hours in the effort to solve a difficult problem, or translate a crooked sentence, through a kind of pride which forbade asking assistance. Still, the opposite error is much more common, and we deem it one of the injurious effects of the cramming system, which is the almost inevitable result of the overcrowded programmes in the schools and colleges of Ontario, that the learner has not time for prolonged, independent effort, and is, in a manner, driven to his "pony" or his tutor for help to do that which he would be much the better for doing by his own efforts.

The other pedagogical law referred to is that the first step to reform is to banish the text-book from the classroom. This is one of the rash statements which, while containing some pedagogical wisdom, becomes pedagogical folly when made without limitations and explanations. To require children to learn by rote and recite from a text-book, as many of us were required to do in our school days, is most unscientific and mischievous. But an indiscriminate banishment of the text-books might be far worse. In some subjects, such as Arithmetic and English Grammar, the use of a text-book, save for practice of principles and rules already acquired by an inductive process, is worse than useless. And so of all subjects which appeal directly to the thinking and reasoning powers, such as philosophy in all its branches. But in History, descriptive Geography, and similar subjects, the text-book is, if not absolutely indispensable, a most valuable time-saver for both teacher and pupil. Then, again, if these distinctions be accepted, it is obvious that their application must be subject to a multitude of varying conditions. What may be unmistakably the best method with a class of fifteen or twenty may be quite impracticable in one of sixty. Moreover, the abolition of the text-book postulates that the teacher must be master, not only of the subject, but of the science and art of inductive teaching.

What Dr. Rice gave as the foundation ideas of the German educational methods, viz., "a clearly distinguishable aim in all lessons, a steady development of the idea aimed at, and a thorough drilling of the pupils in the facts"—"principles" or "truths" would be a better word—may be commended to every teacher as furnishing a chart to guide his course in all his class-room labors.

#### THE SPELLING PROBLEM.

"EXAMINER" writes us as follows: "Among the 'comicalities' of candidates' answers, the following, culled from the answer papers of the last 'En-

trance,' may be worthy of preservation. In the dictation paper the word 'aborigines' occurred, and was rendered by one writer 'average age and ease.' 'Ethiopian' became 'ether-opium,' and 'aqueous vapor,' 'aquisphere.' 'Appellation' was spelled in twenty-eight different ways by candidates, 'aborigines' in fifty-nine ways, and 'Ethiopian' in thirty-eight ways. The list is sent herewith, and, if space allowed, might be published as a magnificent example of 'how not to do it.'

"In the literature paper two lines of the selection read:

"Comfort came down the trembling wretch to  
raise,  
And his last faltering accents whispered praise."

"The question proposed was: 'Show the appropriateness of comfort came down.' One candidate replied: 'It was a great relief to have the load of sin removed from their hearts.' My corrector (examiner), 'is your sin removed? If not, have it done.'"

The lists kindly sent by "Examiner" are to hand. If we can find room we will publish them in the next number, as they afford an interesting study for the teacher of spelling, and afford a wonderful illustration of orthographical possibilities as well as perversities.

But when we have had the laugh to which we are fairly entitled, it may be worth while to sit down and think whether there may not be also a serious side to the matter, which demands more thought than it has yet received. Probably every teacher of experience will at once assent to the opinion that there are wider contrasts in the success of fellow-pupils in spelling than in any other subject on the public school programme. It will, we believe, be found also that the success of a given pupil in spelling is not always in ratio with his success in other subjects. An atrociously bad speller is not necessarily a very inferior student in other subjects. Probably it is not very unusual to find him or her making very fair progress in arithmetic, or grammar, or history. We should be glad to be corrected by teachers if this is not the case.

We have another impression, moreover, which we should be glad to have verified or removed. It is that these glaring anomalies, assuming that such exist, in the ability of pupils to learn to spell correctly, depend largely upon the method in which the subject is taught, and that they will be found to be most conspicuous in the cases of those who have been drilled chiefly by the oral method. Is it not true that the ability to spell correctly a column of words orally is no guarantee that the pupil will spell them correctly in writing? It was but the other day that we saw a test-paper, brought home by a

boy of ten from a school examination, in which about one-third of all the words in a considerable list were mis-spelled. Taking the paper in our hand, we asked the lad to spell orally each of the marked words. We have no reason to suppose that he had done more than glance cursorily over the list, with its marked but not corrected words, yet, with not more than two or three exceptions, he spelled every word correctly. The inference is that the eye and the ear do not necessarily work in harmony in orthographical matters.

This is, we are well aware, no new discovery. The fact has been pointed out a thousand times by teachers and writers. Yet we have of late been astonished to find to how great an extent the practice of prescribing lists of words for oral exercises still exists in the schools. We fancied that it had been superseded twenty-five years ago, but are led to believe that it has now been to a considerable extent restored. We should be glad to know whether this is merely because of the great difficulty and toil involved in teaching by dictation, with the immense classes which are almost the rule in Ontario schools, or whether the old method is approved by experience, or by the Normal schools.

We do not wish to dogmatize on this or any other educational question. It is useless to propound pedagogical theories didactically, unless and until they have been amply tested in practice. But we have long been convinced that the primary cause of bad spelling is in some defect of the eyesight. In many cases this defect may not be organic, but due merely to the lack of proper training of the eye. We have no doubt that in most cases it can be overcome, to a great extent at least, by such training. To the same cause we are disposed to attribute the fact that one boy reads much more imperfectly than another, whose abilities seem about equal, and whose opportunities have been as good. It will generally be found that the better reader is also the better speller, and that he is much fonder of reading, and, consequently, reads much more, than the other. "That last fact accounts for all the rest," someone may exclaim. Perhaps not. Is it not quite as likely that the defect of eyesight, which makes it a much more laborious business for the one than the other to recognize and minutely picture the words, is the primary cause of all the other differences?

The question is an interesting one, and intensely practical. We may return to it in another number.



# Entrance Department

Edited by A. McINTOSH, Headmaster Boys' Model School, Toronto.

## ISSUED SEMI-MONTHLY

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Every teacher should follow a carefully prepared time-table, but not slavishly. Whenever any subject is found to be difficult for the pupils, on account of previous neglect or other reasons, it will be found that an alteration in the time of taking up the subject will be helpful in overcoming the difficulty. Such a subject should be taken early in the day, for a time at least. In the case of history, for example, an interchange may fairly be made with arithmetic, without disturbing the working of the whole school. Teachers who are preparing pupils for examinations should have complete freedom to do what they consider best for the pupils and for the school as a whole, and should not be unnecessarily restricted either by inspectors or by school boards.

For the average pupil, the most difficult subject on the whole entrance course is History. This is owing mainly to the wide field covered, especially in British history. As a rule it will be found that more time is required for teaching this subject than for any other. An examination of the marks given will show that, in the majority of cases, history is marked lower than other subjects. Of course, there may be exceptions to this; but from an inspection of the lists sent in from different examination centres, the foregoing conclusion has been reached. It is proposed, therefore, to outline the entrance history in this and subsequent issues of the journal. The first part will deal with Canadian history up to the Peace of Paris.

### PART I.

(By MR. R. W. MURRAY, Model School, Toronto.)

#### CANADIAN HISTORY—(French Period.)

In attempting to give something that may be helpful to teachers of the fourth class in this presentation of this part of Canadian history, let us begin by dividing the subject-matter so that it may be taken up under the following chapters:

- A. The period of discovery.
- B. The period of exploration and settlement.
- C. The seven years' war.

It will be readily conceded that this period is one that may be made very interesting to the class, if the teacher be prepared to take up the subject in detail. The school text-books do not give much of the story, and such works as those of Parkman and Withrow will be required, that the teacher may be master of that which is so attractive to the class. With the subject-matter taken up as indicated, there are many opportunities given for composition exercises, valuable as such and as history review at the same time.

#### A. THE PERIOD OF DISCOVERY.—1492—1542.

Under this heading the work done by Columbus, the French fishermen, Cabot, Verazzano, and Cartier, will be worthy of attention.

#### B. THE PERIOD OF EXPLORATION AND SETTLEMENT.

1. *The career of Champlain*; his early days, his exploration of the St. Lawrence; his assistance given De Mouts in the settlement of St. Croix, afterwards at Port Royal; his explorations of the coast of New England; settlement at Quebec; explorations from 1609 to 1616; his efforts in introducing missionaries; his Indian alliances and their results; difficulties in controlling trade; formation of company of one hundred associates; their charter and their failure; the capture of Quebec, 1629; Champlain's return to Canada; his death, 1635.

2. *From the death of Champlain to introduction of Royal Government, 1635-1663.*—The most im-

portant events during these years are: The founding of Montreal, 1642; the extermination of the Huron Indians, 1648-9; the "Reign of Terror," 1650-1660: (heroes of the Long Sault); the end of the rule of the company of one hundred associates.

3. *From the introduction of Royal Government to the Treaty of Ryswick, 1697.*—In these thirty-four years we may notice: The efforts of the French to overawe the Iroquois, and thus to encourage the settlement of Canada; the beginning of trouble with the English colonists of New England and New York; Talon's efforts to encourage the industries and trade; Frontenac's administration contrasted with that of LeBarre and Denonville; the exploration of the West by Macquette, Joliet, and La Salle; the massacre of La Chéne; Frontenac's efforts to restore confidence; his expeditions against the English settlements; Phipp's attempt to capture Quebec; Treaty of Ryswick, 1697: its terms.

5. *From Ryswick to Aix-la-Chapelle, 1648.*—The border warfare is resumed, especially during the period of Queen Anne's war and that of the war of the Austrian Succession; the Treaty of Utrecht, 1713, its terms; the thirty years of peace, 1713-1743, during which there is decided progress made in settlement in Canada; Pepperell captured Louisburg, 1745; the Treaty of Aix-la-Chapelle, 1748; its terms.

#### C: THE SEVEN YEARS' WAR.

1. To understand the causes leading to the great war, it would be well to dwell upon De Bieuville's expedition, 1749, to take possession of the Ohio Valley for Canada; the formation and enterprise of the Ohio Company, 1749-50; the efforts made by the French and by the English to win the Iroquois; Marin's expedition succeeds in possessing the Ohio Valley; the skirmish between Washington and Jumonville that "set the world on fire"; the complete success of the French in driving the English beyond the Alleghany Mountains.

2. The events of the war may now be taken up with the class, arranging them under the various campaigns.

- Campaign of 1755.*—Plan of campaign: Braddock to attack Duquesne, Shirley to proceed against Niagara, Johnson to capture Crown Point, and Monckton to proceed against Beausejour.

- Campaign of 1756.*—The French and English in America as to their resources and preparations for the war; war declared; Oswego captured and destroyed by Montcalm; Webb, Abercrombie, and Loudon were sent to command the English forces; Winslow remained inactive at Fort William Henry.

- Campaign of 1757.*—Partisan conflicts (Rogers, Kennedy, Marin, etc.); Montcalm besieged and captured Fort William Henry; Loudon and Admiral Holbourne failed in an attempt to capture Louisburg.

- Campaign of 1758.*—Amherst and Boscawen captured Louisburg; Abercrombie defeated by Montcalm at Ticonderoga; Bradstreet captured Frontenac; Forbes' famous march, ending in the capture of Duquesne.

- Campaign of 1759.*—Amherst drove the French from Ticonderoga and Crown Point; Prideaux and Johnson captured Niagara; Stanwix relieved Duquesne; Wolfe captured Quebec.

- Campaign of 1760.*—Murray defeated at St. Foye by Du Levis; Quebec relieved by an English fleet; the march upon Montreal by Murray from Quebec, Amherst from Lake Ontario, and Haviland from Lake Champlain; the capitulation at Montreal, September, 1760.

3. Pontiac's rebellion: the cause, important engagements, and its failure.

4. "Peace of Paris," 1763; its terms.

## LITERATURE.

"THE SONG OF THE SHIRT"—P. 263, FOURTH READER.

This poem was written by Hood in his last illness. His occupation as a journalist had given

him special opportunities for observing the condition of the struggling poor in London, and his own sufferings caused him to more fully sympathize with those who labor without any adequate return. Although the poem refers to the seamstress, it is in reality a plea for all who work honestly and yet suffer from want.

The title—*The Song of the Shirt*—means the song of the shirtmaker. This idea will be found in stanza 4, where the shirt is spoken of as the life of the maker. The "of" here means the same as in "Songs of Solomon."

*General subject.*—Unrewarded labor, illustrated by a description of the condition and work of the seamstress. The author's purpose in writing the poem is stated in line 8 of the last stanza.

The poem consists of three main parts—the introduction, stanza 1; the song proper, stanzas 2-10; the conclusion, stanza 11.

*Stanza 1.*—The picture of the poor seamstress as outlined by the author.

1. 3. *Unwomanly.* Unbecoming a woman. It is used descriptively.

1. 6. The order in which these words are used should be noted. *Poverty* was the cause of *hunger*, and the bodily weakness which soon followed led to a disregard for cleanliness.

1. 7. *Still.* Continually. *Dolorous.* Wailing.

*Stanza 2.*—This stanza is the beginning of the song proper. The slavish drudgery which calls forth the complaint against the unchristian treatment she receives.

1. 5. *It's oh!* It is better. The meaning of the last four lines of this stanza seems to be, that since this condition is to be found among Christian people who promise much, it is better to be a slave along with the barbarian Turk, where little consideration is expected by woman.

*Stanza 3.*—The body and mind enfeebled. The monotonous character of her work is impressed by repetition.

*Stanza 4.*—The appeal to men, reminding them of tender family ties. The shirt is here spoken of as the life of the maker. This stanza contains the climax of the poem.

1. 7. *Double thread.* The material thread and the thread of life. The former for the shirt and the latter for the imaginary shroud. The completed shroud means death.

*Stanza 5.*—Absence of the fear of death. If the author had represented the seamstress as here appealing from man to God for relief from her trials and sufferings, the poem would be complete, without the additional stanzas, in representing a perfect life—one passing through affliction and ending in rest and happiness; but this would not represent facts as they are in the great majority of cases. The poor unfortunates suffer in body and in spirit, and it is clearly the aim of the poet to give a true picture of what actually exists. Although there is no fear of death, there is no hope.

1. 2. *Phantom of grisly bone.* This refers to death as it is commonly represented, by a hideous skeleton. ll. 7, 8. The seamstress cannot understand why the results of her labor should cost her so much and her employers so little. Her sufferings have only placed her in doubt. She does not fully realize the true purpose of affliction, namely, a means of discipline.

*Stanza 6.*—The scanty reward of labor. Note the minute details—her food, clothing, shelter, all of the worst kind. The naked floor, table, broken chair, and blank wall complete the picture of wretchedness. Her only companion was her own shadow on the wall.

*Stanza 7.*—Her work compared to that of criminals.

1. 4. For. On account of. Criminals do not generally hope for any reward; therefore they can take no interest in their work. The only result of the monotonous toil is to deaden.

*Stanza 8.*—Work continues throughout the year.

1. 8. *Twit.* This word does not here imply blame. *Twit me of the spring* means remind me of the spring.

*Stanza 9.*—The seamstress longs to see the

country in spring. She thinks of her earlier and happier days.

1. 8. *The walk that costs a meal.* She earns barely enough to supply her scanty food. If, therefore, she were to take time for a walk, it would be at the cost of a meal, for her wages would not be earned.

*Stanza 10.*—Hopeless misery. She may grieve, but she has no time for weeping, as that would interfere with her work. The conclusion of the song proper.

*Stanza 11.*—The picture given in stanza 1, reproduced with the expressed wish that the cry of distress could be heard by all those able to give relief.

Although his humorous verses gained for the author the means of support, yet they were not the nearest to his heart. The inscription which he desired for his monument was—

"He sang The Song of the Shirt."

## GEOGRAPHY.

### NOTES OF A FIRST LESSON ON AFRICA.

*Introduction.*—(1) The great land-mass of the eastern hemisphere is known as the Old World. (2) The ancient geographers, who lived in Greece and Egypt, gave the names Asia, meaning *eastern land*, to that portion of the then known world lying to the east of their own countries, and Europe, meaning *western land*, to the western portion. The name Eurasia (Europe and Asia) is now generally given to the great double continent, including Europe and Asia. (3) The Greeks gave the name Libya to the continent which we now call Africa, a Latin substitute for Libya. (4) At first the names Asia and Libya were used in a restricted sense, the former being applied to the country around Ephesus, and the latter to that about Carthage. (5) Africa has also been called "The Dark Continent."

2. *Position.*—Compare with the other continents. It is connected with Asia by the Isthmus of Suez, which is only about 100 miles wide. It comes within fifteen miles of Europe at the Strait of Gibraltar. The three northern continents—Europe, Asia, and North America—lie close together; the three southern continents—Africa, South America, and Australia—are separated by wide expanses of ocean.

3. *Extent.*—Africa is about three times the size of Europe; Asia, five times; North America, two and one-sixth times; South America, a little less than twice; and Australia about three-fourths.

4. *Shape, Boundaries, and Coast-line.*—An outline map should be drawn on the blackboard, which might afterwards be drawn by pupils in their exercise books, or "map books." The boundaries should be taken generally at first, and afterwards in detail. The coast line may be examined in detail on the map. The term *contour* might very properly be introduced at this stage. In dealing with the coast-line, compare and contrast Africa with the other continents, noting specially the similarity between Africa and the other continents of the southern group, and the marked difference there is between the three southern and the three northern continents.

5. *Gulfs, Bays, Capes, Islands, Straits, and Isthmus.*—Teach these from the map.

6. *The Build of Africa.*—Introduce the term *vertical relief*. Compare with the other continents generally, and with India in particular, if that country has been studied.

Note the following:

(1) There is no central elevation as in Europe or Asia.

(2) There is no main axis as in North and South America.

(3) Africa has the highest mean elevation of all the continents. It is an immense plateau, almost entirely surrounded by mountains. The general slope of the continent is towards the north. The southern portion is much higher than the northern.

## SOLVING PROBLEMS.

W. GEORGE WARD, GREENWOOD.

In solving problems I have invariably adopted the following method, particularly with Fourth and Fifth classes, and I observe that my pupils "think."

- (1) The literature of the problem.
- (2) What is to be found.

(3) Facts stated or to be remembered.

(4) Solution.

Example.—"Find the duty @  $2\frac{7}{8}$  cts. lb. net on 15 casks, each weighing 780 lbs gross, deducting  $\frac{5}{8}$  of the gross weight for tare."

(1) Literature—meaning of duty, net, gross, deducting, tare, etc.

Pupils explain all they can, the teacher the rest.

(2) Find—duty.

(3) Facts— $2\frac{7}{8}$  c. duty on 1 lb.

15 casks.

780 lbs. in each.

$\frac{5}{8}$  of gross weight tare.

Pupils should be able to tell 2 and 3 from the problem.

(4) Solution.—Duty =  $\frac{5}{8}$  of  $(15 \times 780 \times \frac{7}{8} \text{ c.}) = \$306.34\frac{1}{2}$ . Ans.

Pupils should be able to give a solution (not necessarily in the above form) from the problem as presented above. When pupils form the habit of dealing with a problem in this way, the solution is only of minor importance. When a pupil is unable, at first, to solve a problem assigned, I question thoroughly on the literature, then require the pupil to write what is to be found, and the facts, in order, on separate lines. If the pupil is still unable to give a solution, I require him to repeat what is to be found and the facts, until these are clearly presented to his mind. If the pupil is now unable to give a solution, I conclude that the problem is too difficult. I then seek the missing link in the pupil's mathematical training, and present the problem again at some future date.

## NOTES AND ANSWERS TO QUESTIONS.

"The scenery of the surrounding country is at present very beautiful."

In this sentence the phrase "*at present*" is an elliptical expression for *at the present time*. *Present* may be parsed as an adjective in attributive relation to the noun *time* understood, or as a noun, object of the preposition "*at*."

A pupil is not free from the teacher's control until he reaches his father's house.

If the "shanty on the side of the road" is within the school section, and if the occupants are too poor to supply books, etc., for the children, it would not be wise to send the children home. See the parents first, and, if they are unable to provide the necessary supplies, then consult the trustees, and it will generally be found that they will meet the difficulty by granting free books to those really in need. It may be legal to send pupils home under the circumstances mentioned; but it is clearly not good policy, nor considerate treatment.

The Departmental Regulations contain the following, bearing on the commercial course for the Public School Leaving Examination:

*Commercial Course.*—Writing; bookkeeping, single entry; commercial forms; general business transactions.

(1) Each candidate shall submit for examination his school work in bookkeeping and commercial transactions, to the extent of one set of at least ten foolscap pages or the equivalent thereof, comprising the necessary books of original entry with cash book, ledger, and bill-book. The set shall be specially suitable for farmers and artisans, or for retail merchants and general traders. Three accounts shall be made from the set in proper form and submitted to the examiners. The candidates shall also submit at least two examples of each kind of commercial forms and correspondence pertaining to the set. A descriptive index shall accompany the set, and the transactions in the set worked out in a school shall be different from year to year.

The next issue of this journal will contain a paper on drawing by Mr. C. Casselman, instructor in drawing in the Toronto Normal School and School of Pedagogy, in which an analysis of Book 5 of the Public School course in drawing will be given.

Explain briefly the difference in meaning between—

(a) "Happier than any king" and "happier than any other king."

The first implies that a certain individual, who is not a king, is happier than any king; and the second, that a certain king is happier than any other king.

(b) "I found the way easy," and "I found the way easily."

The first means that the way itself is easy; the second, that there was no difficulty in finding the way.

## CHATHAM CITY SCHOOLS PROMOTION EXAMINATIONS.

December, 1895.

### PHYSIOLOGY AND TEMPERANCE—JUNIOR 3RD TO SENIOR 3RD.

1. (a) Describe the changes which our food undergoes before it is made into blood.

(b) What is the effect of alcohol on the stomach?

2. (a) What are muscles, and where are they found?

(b) What is necessary for the growth and repair of the muscles?

(c) Show that alcohol is injurious to the muscles of the body.

3. Give two reasons why bathing is necessary. How often should we take a bath? What kind of water should we use? Give reasons for your answer.

4. How would you treat a case of fingers frozen?

5. How many teeth should a child five years of age have? A person twenty-five years of age? Why is it so necessary to care for the teeth? How should they be cared for?

Values—5, 5, 5, 5, 10, 6, 10.

### PHYSIOLOGY AND TEMPERANCE—SENIOR 3RD TO JUNIOR 4TH.

1. Name the four great systems of organs, with the work of each.

2. Describe the process of digestion.

3. Describe how the blood is carried about the body.

4. Tell the effects of alcohol on the heart and the arteries.

5. What would you do in a case of clothes on fire?

6. Why are alcohol and tobacco more injurious to a child than to a grown person?

Values—8, 10, 10, 8, 8, 6.

### PHYSIOLOGY AND TEMPERANCE—JUNIOR 4TH TO SENIOR 4TH.

1. Name the organs of the digestive system and describe the process of digestion.

2. Give the action of alcohol and tobacco on the muscles.

3. Explain clearly the objects in bathing and any dangers to be avoided.

4. What are the effects of alcohol on the skin?

5. In the following accidents, how should the patient be treated until the arrival of a doctor:

1. An artery is cut?

2. A child is scalded with boiling water?

3. Clothes catch fire?

4. A boy sprains his wrist?

Values—12, 8, 8, 6, 16.

## HALF-YEARLY PROMOTION EXAMINATIONS—CITY PUBLIC SCHOOLS, PETERBOROUGH.

December, 1895.

### GRAMMAR—JUNIOR 3RD CLASS.

Time,  $2\frac{1}{4}$  hours.

(A maximum of 5 marks may be added for neatness.)

(1) When can you come with me for a ramble in the old woods by the river?

(2) Children, write your answers down neatly, with pen and ink, on foolscap paper.

(3) "In childhood's hour, I lingered near That hallow'd seat with listening ear."

1. Analyze the three sentences above.

2. Parse the words printed in italics.

3. Give the other number-form of the following nouns: *Teeth, woman, mosquito, potato, valley, study, pea, beau, index, oases, mother-in-law, teaspoonful, and brother.*

"It was New Year's eve, and a cold, snowy evening."

"On this night a poor little match-girl walked slowly along the street with naked feet."

"The snow fell fast upon her pretty yellow hair and her bare neck; but she did not mind that."

4. Rule your paper into seven spaces (one for each part of speech); then write the words in the sentences above in their proper spaces.

Draw one line under the transitive verbs, and two under the intransitive verbs.

5. Write out the phrases from the following sentences about the match-girl, and draw one line under the adjective phrases, and two lines under the adverbial phrases.

6. Make these nouns indicate ownership: *Ladies, Queen Victoria, river, Mr. Jones.*

Write the other gender noun corresponding to *poet, countess, lass, filly, beau, hind, Jew, Canadian, negro, deacon, hero, and czar.*

7. Tell what you understand by *objective case, adverb, transitive verb, modifier of a noun, and object of a transitive verb*, and write one example of each.

8. Correct any errors in the following, giving reasons for the corrections:

(1) An old man was setting by the road sunning himself.

(2) Every one of the boys is doing their best.

(3) There is some boys who never works.

NOTE.—In question 5, deduct one mark for each error or omission.

Values—7+8+7=22, 8×2=16, 7, 12, 3, 12, 8, 8, 4, 4, 4.

#### GRAMMAR—SENIOR 3RD CLASS.

Time, 2¼ hours.

(A maximum of 5 marks may be allowed for neatness.)

(1) "There was one *clear star* that always came out in the sky, *very early*, near the church spire, above the graves."

(2) "When the tube of the thermometer *is immersed* in melting ice, the mercury stands *always* at one point."

(3) "By *Nebo's* lonely mountain,  
On *this side* of Jordan's wave,  
In a vale in the land of Moab,  
There lies a *lonely* grave."

1. Fully analyze the first sentence.

2. Point out the dependent clause in the second sentence, tell the kind, and what duty it does in the sentence.

3. Write out the phrases in sentence (3), and state the kind, and the duty each does in the sentence.

4. Parse the words printed in italics, in all three sentences.

Whole ages have fled, and their works decayed,  
"And nations have scattered been.

But the stout old ivy shall never fade

From the hale and hearty green.

The brave old plant, in its lonely days,

Shall fatten upon the past,

For the stateliest building man can raise

Is the ivy's food at last."

5. Rule eight columns on your paper (two for the verbs and one for each of the other parts of speech); then arrange the words of the stanza in their proper columns, but putting the transitive verbs in one column and the intransitive verbs in another.

NOTE.—Deduct one mark for each error or omission.

6. Compare the words that admit of it in the lists (columns) above.

7. Write the other number form of the nouns in the list above.

8. Correct any errors in the following sentences, giving your reasons:

(1) That man just ordered two black spools of thread, two new pair of shoes, and a rope fifty foot long.

(2) We had only went a short distance when a boy come running after us with a telegraph which he gave to my sister.

(3) Whom was them men who we met in front of Jones's store?

Values—15, 5, 12, 26, 15, 6, 7, 4, 5, 5.

#### GRAMMAR—JUNIOR 4TH CLASS.

Time, 2 hours.

(A maximum of 5 marks may be added for neatness.)

(a) "Whilst I was *thus* musing, I cast my eye towards the summit of a rock *that* was not far from *me*, where I discovered *one* in the habit of a shepherd, with a *musical* instrument in his hand."

(b) "Between the dark and the *daylight*,

When the night is beginning to lower,

Comes a pause in the *day's* occupations;

That is known as the *children's* hour"

(c) "*Meanwhile*, from street and lane, a noisy

*crowd*

*Had rolled* together, like a *summer* cloud,

And told the story of the *wretched* beast,

In five-and-twenty *different* ways, at least."

1. Analyze sentence (a).

2. In (b) and (c), point out the clauses and phrases, and tell the kind, and relation of each.

3. Parse the italicized words in all three sentences.

4. Divide your paper in three columns; in the first write all the intransitive verbs in (a), (b), and (c) above; in the second column write all the transitive verbs; draw a line under each verb in the passive voice, and two under those in the active voice; in the third column write the objects of the verbs.

5. (a) State clearly the duties which a noun, an adjective, and an adverb may perform in a sentence, illustrating your answers by examples.

(b) How does a knowledge of this help you in distinguishing the different kinds of clauses?

6. (a) Decline *he, who, I, and they.*

(b) Compare *wearry, little, supreme, quickly, much, Eastern, and German.*

(c) Give principal parts of *rise, run, beseech, lie* (to recline), *gild, teach, lay, do, and sink.*

7. Give definitions of *transitive verb, nominative case, relative pronoun, adjective phrase, adverb, and noun in opposition.*

8. Correct the following where necessary, giving reasons in each case:

(1) Says I to myself, "Them is the very men I saw yesterday."

(2) I seen Mr. Tilley to-day, him who teached us to read so good last week.

(3) Mother, will I go to the store for the groceries, or shall you wait till they sends them?

(100 marks a full paper.)

Values—15, 15, 34, 10, 3, 2, 1, 2, 2, 3½, 4½, 6, 3, 3, 3.

#### UNIFORM AND PROMOTION EXAMINATION, UNITED COUNTIES OF STORMONT, DUNDAS, AND GLENGARRY.

November 28th and 29th, 1895.

#### ARITHMETIC—1ST CLASS.

1. Write in words—60; 101; 890; 999.

2. Write in figures—eighty-seven; three hundred and ten; four hundred and fifty; nine hundred and nine.

3. Add 46, 95, 107. Add 304, 82, 295, and 6.

4. How much greater is 67 than 49? 405 than 68?

5. Work these questions in addition:

4789	528
7463	844
8534	975

6. Work these questions in subtraction:

8476	810546
3254	304283

7. What will two pounds of sugar at 8 cents a pound and two yards of print at 15 cents a yard come to?

8. Find the result of 8+4+13-5+17-19.

9. John earns 325 cents in a week. Henry earns in the same time 49 cents more than John. How much do they both together earn?

10. A boy earns 9 cents an hour. He begins to work at 2 o'clock and works till six. How much has he then earned?

Values—10 each.

#### ARITHMETIC—2ND CLASS.

1. Add together—8946; 7958; 8095; 10965; 7825; 99887; 95462.

2. Find the difference between 10000843 and 9890695; between 10008094 and 9009095.

3. Multiply 8975948 by 6; by 9.

4. Multiply 84569 by 37; by 9040.

5. Divide 758632 by 2; by 8.

6. Divide 94588 by 13; by 87.

7. Write in figures—one thousand and nine;

five hundred and nineteen thousand and seventy.

8. A woman takes 35 lbs. of butter to the store. How many yards of cloth worth 95 cents a yard would she get if the storekeeper allows her 19 cents per lb. for the butter?

9. A man buys a horse for \$85; a cow for \$16.50; a buggy for \$75.60; and a harness for \$17.40. He pays \$148.50. How much more does he owe?

10. Which is worth more, and how much, 47 cords of wood at 350 cents a cord, or 39 tons of hay at 950 cents a ton?

11. If I buy 8 lbs. of sugar at 5 cts.; 3 lbs. of tea at 45 cts.; 7 doz. of eggs at 15 cts.; and 11 yds. of cotton at 7 cts., and give a \$4 bill in payment, how much change do I get back?

Values—10 each. A maximum of 5 marks may be given for neatness.

#### ARITHMETIC—3RD CLASS.

1. (a) Multiply the sum of 87956 and 49845 by their difference. (b) Divide their sum by their difference.

2. Write out the Table of Time.

3. Change 6894543 seconds to days.

4. How many hours are there from noon on the 15th of March till noon on the 31st day of December following?

5. A man bought 47 acres of land for \$982.30. He gives two acres for a village park. What must he sell the remainder for per acre so as to get \$229.53 more than he paid in the first place?

6. Two trains are 50 miles apart. They start at the same time in directions towards each other, one at the rate of 25 miles, and the other at the rate of 40 miles per hour. How far apart will they be at the end of 10 hours, the faster train having stopped on the way 30 minutes?

7. The side of a square field is 1386 ft. How many rods are there clear around the field?

8. A man has 3 fields. In the first there are 3 acres, 110 rods, 25 yds., 8 ft., 125 in.; in the second, 3 acres, 90 rods, 30 yds., 7 ft., 110 in.; in the third, 27 acres, 150 rods, 28 yds., 5 ft., 130 in. How much land has he altogether?

9. Find the value of 3 bus., 3 pks., 3 qts., 1 pint of wheat at 1½ cts. per pint.

10. A piece of land is 6880 ft. long and 4840 ft. wide. What is the length of the longest line that will measure exactly both a side and an end of the land?

11. The sum of \$1107.60 is to be divided among John, Frank, and Henry. Henry is to have twice as much as John, and Frank three times as much as John. Find each one's share.

Values—10 each. 3 marks off for each mistake in each part of No. 1. A maximum of 5 marks may be given for neatness.

#### ARITHMETIC—4TH CLASS.

1. (a) Multiply 986054 by 980760; (b) divide 79958647 by 98976 to two decimal places.

2. Find the value of  $\frac{3\frac{1}{2}-2\frac{1}{4}}{3\frac{3}{4}+2\frac{1}{2}} \div \frac{4\frac{5}{8} \times \frac{1}{11}}{8\frac{3}{4}-7\frac{1}{5}}$

3. (a) Change .66666 to its equivalent vulgar fraction in its lowest terms. (b) Find the value in days of .428571 of the month of February last.

4. (a) Resolve 1728, 864, and 240 into their prime factors, and (b) from these prime factors find the G.C.M. of the given numbers.

5. A borrowed from B, on January 1st last, \$345.50, at 6 per cent. interest. How much was required on 27th of May to discharge the debt? (365 days to the year, and no days of grace.)

6. A dealer buys paper at \$2.40 per ream. How much must he get for 10 sheets so as to gain 20 per cent.?

7. There are 2150½ cubic inches in a bushel. How long must a bin be that is 5 ft. high and 4 ft. wide to hold 150 bushels?

8. When first after 3 o'clock will the hour and minute hands be at right angles?

9. A man buys 48 gallons, wine measure, of American coal oil, at 10 cents a gallon. He pays 6 cents Imperial gallon, duties. What must he sell it at per Imperial gallon to gain 11½ per cent., allowing the Imperial gallon to be equal to 1½ wine gallons?

10. A man travels 200 miles and back, by rail, in 13 hours. He goes at the rate of 25 miles per hour, and returns at the rate of 40 miles per hour. Find how long it took him to go.

11. In an orchard there are 12 rows of trees with 34 trees in a row. The trees are 15 feet apart each way. The orchard is surrounded by a fence at the distance from the outside rows of one rod. Find the value of the land enclosed by the fence, at \$40 per acre.

Values—10 each. 2 marks off for each mistake in each part of No. 1. A maximum of 5 marks may be given for neatness.

#### MARY ANN'S PIECE.

Afternoon of a winter's day, many years ago. An old-time, low-ceiled room, not a bit artistic in its furnishings, but suggestive of comfort and industry and family affection—a "living-room," in short; and, when that is said, no other description is needed.

By one of the windows a pleasant-faced woman was seated in a low rocking-chair that gave out a cosy, cheerful little squeak as she swayed to and fro. She was sewing busily on a long-sleeved gingham "tyer," and listening, at the same time, to the sing-song of a high-pitched, childish voice.

It was the voice of Mary Ann, her only child, practising the "piece" she was going "to speak" in school the next day.

Mary Ann was sitting on a low cricket, with a yellow kitten asleep on her lap. She was a solemn-looking little thing, with apple cheeks, clear gray eyes, and straight brown hair parted exactly in the middle, put behind the ears, and cut very straight around the neck. She wore over her plaid wool frock a gingham tyer, like the one her mother was at work upon.

In the days when Mary Ann was a little girl, all children had to "speak pieces" in school; and the piece Mary Ann was reciting was a very popular one. It began as follows:

"Why, Phœbe, have you come so soon?  
Where are your berries, child?  
You surely have not sold them all:  
You had a basket piled."

"No, mother; as I climbed the fence,  
The nearest way to town,  
My apron caught upon a stake,  
And so I tumbled down."

"I scratched my arm, and tore my hair,  
But still did not complain;  
And, had my blackberries been saved,  
Should not have cared a grain."

"But, when I saw them on the ground,  
All scattered by my side,  
I picked my empty basket up,  
And down I sat and cried."

"Just then a pretty little miss  
Chanced to be passing by:  
She stopped, and, looking pitiful,  
She begged me not to cry."

On and on went Mary Ann's voice through the pathetic story to its happy ending—how Phœbe had longed to go to Sabbath school, and how her father, a poor laboring man, had promised that, if she could earn the money for bonnet and shoes, he would "try to buy the gown"; and now there lay the berries she had picked on the ground, "all mixed with sand and dirt," whereupon the "pretty little miss" had given Phœbe the bonnet from her own head, saying:

"I've got another one at home,  
And one's enough for me!"

and Phœbe's tears were dried, and she had gone home as happy as possible.

Mary Ann knew the lines perfectly; and her mother, after telling her to speak up loudly and not too fast, decided that it would do very well indeed.

Mary Ann drew her cricket nearer to the big air-tight stove, dropped her round chin into her plump hands, and fell into one of her "thinking spells."

For some time nothing was heard in the room but the ticking of the tall clock in the corner, the snapping of the fire, the purring of the yellow kitten, and the squeak, squeak, of Mrs. Clements' rocker. Suddenly Mary Ann drew a long breath, as she always did when coming out of one of her "spells" for a plunge into conversation.

"It was real good of the little miss to give Phœbe her bonnet, wasn't it, mother?" said Mary Ann.

"Very good," answered Mrs. Clements, hitching nearer to the window, she was so anxious to finish the last buttonhole by daylight.

There was another pause, then another deep breath, and another question.

"Do you s'pose the little miss's mother scolded her when she got home?"

Mary Ann's gray eyes were very serious as she asked this question; but her mother, intent on that last buttonhole, did not look around at her.

"Scold her?" she repeated, in a far-away tone. "What for?"

"Why, she gave her bonnet away, you know, without asking her mother if she might," said Mary Ann, with that earnest, puzzled look still on her face.

"Oh, well," answered Mrs. Clements, breaking off her thread with a satisfied air, "of course it would have been better to have asked. But I suppose she was a long way from home, and it was an act of kindness; and I guess her mother didn't scold her."

Mary Ann looked relieved. After a little more thinking, she woke up the kitten, tied an apple to a string, and went in for a nice frolic until supper time.

When Mary Ann started for school the next morning it was bitterly cold; but she was wrapped up from head to foot so warmly that only her nose was exposed to the air, and there was so little of that it really did not matter.

She had a pleasant day at school, and spoke her piece in such a loud, clear voice, and with so much expression, that the children listened spellbound, quite as if they had not heard it twenty times before. The teacher smiled at her, and said, "Very well, indeed, Mary Ann"; and she came down from the platform covered with glory and confusion. After school the big girl she liked best put on her wraps for her; and she started home a very proud and happy little girl.

Mary Ann's home was some distance from the village; and just in the coldest, loneliest part of the road she met two strange little figures. One was a boy of nine or ten years, with tow-colored hair, big blue eyes, and a mild, pink face; and he was leading by the hand a wee little girl. Both children were scantily clothed in faded rags, and the younger was crying pitifully. At sight of these forlorn objects Mary Ann stopped. In her short life she had known only the thrifty New England people of the village, and it was her first glimpse at real poverty.

"What is the matter with her?" she asked of the blue-eyed boy.

"She have cold an' hunger," said the boy, simply. "Me, too."

Mary Ann stood doubtfully. The words had a strange sound, and it took her some time to get their meaning.

"Cold!" she cried presently. "Of course she's cold! Why didn't you put on her coat and mittens? The poor little thing!" she added with indignation.

The boy looked at her, only half understanding what she said.

"Why don't you go home to your mother?" asked Mary Ann, severely.

"No got home," said the boy, with a sad smile. "No got mudder."

Mary Ann's gray eyes darkened. She took a doughnut from her basket, and gave it to the little girl, who seized upon it greedily. The boy gave her a grateful smile. Mary Ann's eyes grew darker still. She set her basket on the snow, and, pulling off her mittens, thrust them into the boy's hands.

"Put them on to her quick!" said Mary Ann.

The boy hesitated, then did as he was told, saying something to the little one in a queer, guttural jargon. The child looked up with a shy smile.

Mary Ann looked at them a moment, then unbuttoned her long, thick coat, and pulled it off.

"Here," she said, her voice trembling a little, "help me put it on her!"

"I've got another one at home,  
And one's enough for me!"

she quoted.

The boy looked almost scared now; but he helped Mary Ann button the coat around the child and turn back the sleeves, which were much too long. All the while he was talking to the little

one in his odd-sounding language. The baby looked up, and said something after him. She was laughing now, with her poor little mouth full of doughnut.

"She say, 'T'ank, pretty miss,'" said the boy.

Mary Ann nodded, seized the basket, and started off on a run for home.

Mrs. Clements was frying doughnuts when a glowing, breathless little girl, without coat or mittens, burst into the kitchen.

"Mary—Ann—Clements. What—"

The astonished woman got no further.

"It was a boy and a girl," gasped Mary Ann. "And they hadn't any warm things on, nothing but rags; and the little girl was crying, 'cause she was cold and hungry,—the boy said so,—and he couldn't speak plain. He said 'mudder' and 't'ank you'; and I didn't have but one doughnut left, and I remembered 'Why, Phœbe,' and I gave the little girl my mittens and coat. And the little miss's mother didn't scold her; and you are going to scold me, Mother Clements, you know you are!"

"You dear, blessed child!" cried Mrs. Clements, in a choking voice, as she gathered the sobbing Mary Ann in her arms. "No, mother isn't going to scold, either,—not one mite! You precious—There! Sit right up to the fire in the rocker, while I hurry and make some ginger-tea; for, if you haven't got your death a-cold, I'll never guess again! You poor, blessed"—And she rushed into the pantry after the ginger (which was not kept there) with suspicious haste.

It was curious; but when Mr. Clements heard the story that evening, he, too, had to go out into the woodshed for something in a great hurry, and came in with his eyes and nose in such an inflamed condition that Mary Ann insisted upon his sharing her ginger-tea, as she sat closely cuddled against his shoulder.

"Those children must belong to some o' those Norwegians down at the mills," said Mr. Clements. "I heard there was sickness down there, but I didn't know they were sufferin.' I'll speak to the selectmen about 'em to-morrow; and you women-folks better get some things together, and go down there and see what's goin' on."

The "women-folks" did get a good many things together, and found plenty of use for them among the poor foreigners thrown out of work by the closing of the mills. The selectmen bestirred themselves, too; and there was no more suffering that winter that human kindness could prevent.

There was a great deal of happiness added to the Clements family, too, "Though," said Mr. Clements, who dearly loved a joke, "I guess, wife, you'd better be kind o' careful what pieces you pick out for Mary Ann to speak, after this. Some o' 'em seem to be kind of expensive!"

"Well," said Mrs. Clements, solemnly, "why that child didn't catch her death a-cold that day, in spite of ginger-tea, is more than I can understand!"

But Mary Ann only hugged the yellow kitten closer, and said happily, "I'm so glad I learned to speak 'Why, Phœbe.'"—*Julia Schayer, in the Independent.*

#### SUPPOSE.

How dreary would the meadows be  
In the pleasant summer light,  
Suppose there wasn't a bird to sing,  
And suppose the grass was white!

And dreary would the gardens be,  
With all its flowery trees,  
Suppose there were no butterflies,  
And suppose there were no bees.

And what would all the beauty be,  
And what the song that cheers,  
Suppose we hadn't any eyes,  
And suppose we hadn't any ears?

For though the grass were gay and green,  
And song birds filled the glen,  
And the air were purple with butterflies,  
What good would it do us then?

And think of it, my little friends;  
And when some pleasure flies,  
Why think it and still be glad  
That you have your ears and eyes.

—*Alice Cary.*



## Science.

Edited by W. H. Jenkins, .A., Principal Owen Sound Collegiate Institute.

EDUCATION DEPARTMENT, ONTARIO  
ANNUAL EXAMINATIONS, 1895.

THE HIGH SCHOOL JUNIOR LEAVING AND UNIVERSITY PASS MATRICULATION.

### CHEMISTRY.

- Describe how you would separate alum from a mixture of powdered alum and blue vitriol.
- (a) Compare the action of hot iron on steam with the action of sodium on warm water. Give equations.  
(b) Define *chemical equivalent*, and show how your definition applies to the two foregoing reactions.
- Describe experiments to show how you would distinguish between finely powdered charcoal and manganese dioxide; between a jar of carbon monoxide and one of hydrogen; between a jar of hydrochloric acid gas and one of sulphur dioxide.
- The average composition of coal gas is: hydrogen, 45%; methane, 35%; carbon monoxide, 7%; olefiant gas, 4%; butylene (C<sub>4</sub>H<sub>8</sub>), 2.4%; sulphuretted hydrogen, 0.3%; nitrogen, 2.5%; carbon dioxide, 3.8%. What volume will the products of the combustion of 100 litres of such a gas occupy at 20°C. and 750 mm. pressure?
- Explain, using equations, what changes take place in the following experiments:
  - Dry sulphurated hydrogen is passed over iron filings in a glass tube.
  - Sulphur dioxide is passed into a vessel containing nitrogen peroxide.
  - Carbon dioxide is passed over ignited sodium.
- Ferrous sulphide (FeS) is heated strongly in a hard glass tube open at both ends. Express the reaction which takes place by an equation.
- The percentage composition of a gas is nitrogen 46.67, oxygen 53.33. Its vapor density (H=1) is 15. Calculate the formula of the gas.
  - When 50 c.c. of hydrogen and 30 c.c. of chlorine are exploded in a eudiometer, what are the volume and the composition of the resulting gas at standard temperature and pressure?
  - 50 c.c. of hydrochloric acid gas are placed in a eudiometer over mercury; some sodium amalgam is then introduced and the lower end of the tube is firmly closed with the finger and the whole inverted a number of times so that the gas may come freely into contact with the amalgam. The tube is again inverted over mercury and the volume measured. What changes have taken place? Explain.
  - Show the relation of these experiments to the statement that "hydrogen is represented by the symbol H<sub>2</sub>."
- Sketch the chemistry of iodine.

### ANSWERS.

- Completely dissolve the mixture in water, and set aside the solution in an open vessel for some time. The salt, which dissolves with the greater difficulty, will crystallize out first from the mixed solution. Decant the liquid remaining after the first salt has crystallized out, and evaporate to dryness to secure the other salt.
- (a) Steam acting on hot iron produces hydrogen and oxide of iron,  $4\text{H}_2\text{O} + 3\text{Fe} = \text{Fe}_3\text{O}_4 + 4\text{H}_2$ .  
Sodium on warm water decomposes it readily, yielding hydrogen, which, if the water is warm enough, will ignite and burn. Sodium hydroxide is formed also, and is found dissolved in the water.  
 $\text{H}_2\text{O} + \text{Na} = \text{NaOH} + \text{H}$ .  
(b) In the first of the above experiments iron displaces hydrogen from water. If it should be found by weighing that 168 grams of iron displace 8 grams of hydrogen, then 21 of iron is the chemical equivalent of 1 of hydrogen. Similarly, if 23 grams of sodium displace 1 gram of hydrogen by weight, 23 of sodium is the chemical equivalent of 1 of hydrogen.

- To distinguish charcoal from manganese dioxide:
  - 1st way. Heat each in a test tube. Charcoal will glow and burn away. Manganese dioxide will not, but will give off free oxygen, which may be detected by thrusting into the tube a glowing splint.
  - 2nd way. Treat each separately with hot HCl. Manganese dioxide will give off a yellow gas—chlorine. Charcoal will not.
- To distinguish carbon monoxide and hydrogen:
  - Set fire to each, and hold over the flames dry bottles. Water will be formed in the bottle held over the hydrogen flame, and carbon dioxide in the bottle over the carbon monoxide flame.
- To distinguish hydrochloric acid gas from sulphur dioxide:
  - Bring the mouth of the ammonia bottle to the mouth of each jar; dense white fumes are formed near the mouth of the jar containing the HCl gas. Also add water to each jar, shake, then KMnO<sub>4</sub> solution to each. The jar in which the KMnO<sub>4</sub> solution is decolorized contained SO<sub>2</sub>.
- $\text{H}_2 + \text{O} = \text{H}_2\text{O}$ . At 20°C. and 750 mm. pressure this water would be a liquid; similarly with the water formed in the other cases of combustion.
  - 45 p.c. of 100 litres = 45 litres of hydrogen.
  - 22.4 litres of hydrogen weigh 2 grms.
  - 45 " " " 4 grms. (nearly)
 By the combustion of 4 grms. of hydrogen there would be formed 36 grms. of water, which would occupy 36 cubic centimetres.  
 $\text{CH}_4 + 2\text{O}_2 = 2\text{H}_2\text{O} + \text{CO}_2$ .  
 Calculate the volume of water similarly to the above.  
 From 35 litres of methane would come 35 litres of CO<sub>2</sub>.  
 $\text{CO} + \text{O} = \text{CO}_2$ .  
 7 litres of CO, when burned, would yield 7 litres CO<sub>2</sub>.  
 $\text{C}_2\text{H}_4 + 3\text{O}_2 = 2\text{H}_2\text{O} + 2\text{CO}_2$ .  
 4 litres of C<sub>2</sub>H<sub>4</sub> yield on combustion 8 litres CO<sub>2</sub>.  
 $\text{C}_4\text{H}_8 + 6\text{O}_2 = 4\text{H}_2\text{O} + 4\text{CO}_2$ .  
 2.4 litres of butylene yield 9.6 litres CO<sub>2</sub>.  
 $\text{H}_2\text{S} + 3\text{O} = \text{H}_2\text{O} + \text{SO}_2$ .  
 .3 litres H<sub>2</sub>S yield .3 litres SO<sub>2</sub>.  
 Of nitrogen there will be 2.5 litres.  
 Of carbon dioxide 3.8.  
 Collecting all the gaseous products and neglecting the water formed, there will be 35 litres + 7 + 8 + 9.6 + .3 + 2.5 + 3.8 = 66.2 litres of gas.  
 The volume of this at 20°C. and 750 mm. would be  $66.2 \times \frac{273}{293} \times \frac{760}{750}$  litres.
  - $\text{H}_2\text{S} + \text{Fe} = \text{FeS} + \text{H}_2$ .
  - $\text{SO}_2 + \text{NO}_2 = \text{SO}_3 + \text{NO}$ .
  - $\text{CO}_2 + 2\text{Na}_2 = \text{C} + 2\text{Na}_2\text{O}$ , and also  $3\text{CO}_2 + 2\text{Na}_2 = \text{C} + 2\text{Na}_2\text{CO}_3$ .
- $2\text{FeS} + \text{O} (\text{from air}) = \text{Fe}_2\text{O}_3 + 2\text{SO}_2$ .  
But the products formed here will vary with the temperature employed.
- $\frac{46.67}{14} = 3.33$ .  
 $\frac{53.33}{16} = 3.33$ .  
∴ Nitrogen and oxygen are combined in equal proportions by volume, and the formula is NpOp.  
The vapor density 15 is one-half the molecular weight.  
∴ Molecular weight is 30.  
NpOp = 30. From which the value of p is 1.  
∴ formula is NO.
- (a) 1 vol. of H unites with 1 vol. of Cl to form 2 vols of HCl.  
∴ 30 c.c. H unites with 30 c.c. of Cl to form 60 c.c. of HCl.  
This leaves 20 c.c. of H uncombined.  
∴ volume is 80 c.c.  
(b) The Cl of the HCl has united with the sodium to form a solid NaCl, whose volume will be small, and from the statement made in 8 (a) above there will be left 25 c.c. of hydrogen.

- If 30 c.c. H unite with 30 c.c. of Cl to form 60 c.c. of HCl, then by Avogadro's hypothesis, supposing in 30 c.c. of a gas there are 30 molecules, 30 molecules of H with 30 molecules of Cl form 60 molecules HCl, but to be HCl each molecule of it must contain at least one atom of H. ∴ 60 molecules HCl contain at least 60 atoms of H, but these 60 atoms came from 30 molecules. ∴ the molecule of H is represented by H<sub>2</sub>.

### PHYSICS FOR PRIMARY CANDIDATES.

N.B.—Diagrams must be given wherever possible.

- Define a chemical change; give an example of one. Define a chemical element; name six. Name six compounds.
- Give an example of tempering and annealing, and define each.
- How would you show that matter is indestructible?
- How would you test the relative tenacities of two wires?
- Define limit of elasticity by an example.
- Define amorphous, viscosity, cohesion, mobility, capillarity, and give the laws of capillarity.
- State and give an experimental proof of Pascal's principle.
- State and give an experimental proof of Archimedes' principle.
- A piece of iron weighs 10 lbs. in air, and 8 lbs. in water. Compare the weights of equal bulks of iron and water.
- Prove that air presses in all directions. What is the cause of this?
- State and give an experimental proof of Boyle's law.
- Sulphuric acid is 1.8 times as heavy as water. What would be the height of a sulphuric acid barometer when the mercury barometer is 75 c.m., mercury being twelve times as heavy as water?
- Define solution. How may solids most readily be got into solution? How would you show that gases may dissolve in water? How would you separate a gas from the liquid in which it is dissolved?
- Explain  $g=9.8$ , also  $g=32$ , also  $g=980$ . What velocity will a ball have when it strikes the ground, after falling a distance of 144 feet?
- Give diagrams of apparatus to show
  - Air has weight.
  - Air has a buoyant force.
- How would you determine the pressure of the atmosphere on an area of 1 sq. c.m.?

### A LESSON IN NATURE STUDY FOR YOUNG CHILDREN.

F. O. FAYNE, M.S.C.

#### I. THE APPLE.

The apple is a type of core fruits. Apples are so common that they are admirable as objects for lessons. Another advantage in using the apple is that it is to be had all the year round.

*The First Lesson.*—Attend first to the external description—shape, size, color, texture of the skin, stem-end, blow-end, etc.

In the winter apples often feel quite greasy, due to the presence of a sort of oil or wax in the rind. The stem has a woody texture. The blow-end has the remains of last spring's blossoms. The various kinds of apples have obvious differences. If, in getting your supply for the lesson, you ask the children to bring each one an apple, there will often be found to be a great variety on hand.

*Second Lesson.*—Half of the pupils may cut their apples from top to bottom exactly through the centre of the core. The other half of the class may cut theirs exactly through the centre from side to side. This will present the inside of the apple in two sections. Now have each pupil give one half his own apple to a pupil who has cut his in the opposite direction. Each child will now have two half apples, one cut up and down, and the other from right to left, through the centre.

Study each section—the thickness of skin, color, texture, taste, and juiciness of the outer ring of flesh; also the same features of the meat around the core. Compare these two kinds of meat. Study the core itself, its seed-cavities (carpels) with their shiny, horny walls.



Examine the position of the seed—where it is attached to the celi, and how. Remove the seeds and examine them. Find their coats and seed-leaves. Find the germ. What of its position and size? Quarter the apple and remove the core. See how easily the core separates from the outer flesh of the apple. Make drawings of the apple in its various positions, of the sections, or the seeds, etc.

Describe fully all you have done with the apple, illustrating your description with the drawings. Have the children talk with farmers about various kinds of apples and their culture, and bring into the class the information. Assign to different pupils different topics relative to this subject, and let them state their knowledge completely. Tell them how all our fine apples have been produced from the wild crab-apple by cultivation.

## ANSWERS TO CORRESPONDENTS.

TEACHER OF PHYSICS.—What is meant by the equally tempered scale?

ANS.—The scale of equal temperament is a series of notes whose vibration numbers are in the ratios of  $1, 1^2\sqrt{2}, 1^2\sqrt{4}, 1^2\sqrt{8} \dots 2$ . There are, consequently, 12 notes in this scale.

Will you kindly give a series of questions suitable for the Primary Examination in Physics.

ANS.—In another column will be found such a list. It, however, covers but a portion of the course.

N.M., Ontario.—Is microscopical work no longer required for the Senior Leaving Examination in Botany?

ANS.—Yes, it is required. A microscopical knowledge of the structure of the bean and Indian corn.

## SCIENCE CLIPPINGS.

## SUICIDAL WASPS.

M. Henry, a Frenchman, being curious to see the effect of benzine on a wasp, put some of it under a glass in which a wasp was imprisoned. The wasp immediately showed signs of great annoyance and anger, darting at a piece of paper which had introduced the benzine into his cell. By and by he seems to have given up the unequal contest in despair, for he laid down on his back, and, bending up his abdomen, planted his sting twice into his body, and then died. M. Henry allowed his scientific interest to overcome his humanity so far as to repeat the experiment with three wasps, only to find that the other two did likewise. He is, therefore, of opinion that wasps, under desperate circumstances, commit suicide.

## IS SPACE A VACUUM?

Professor Young tells us that interplanetary space is a vacuum far more perfect than anything we can produce by air pumps, and in it the lightest bodies move as freely and swiftly as the densest, since there is nothing to resist their motion. In a vacuum a feather falls as swiftly as a stone. If all the earth were suddenly annihilated except a single feather, the feather would keep right on regularly, and continue the same orbit with unchanged speed.—*Mary Proctor.*

## MAGNIFYING POWER.

Few persons have a clear notion of the magnifying powers that have been, or can be, obtained by means of the microscope. The following will be found trustworthy: A common hand magnifier, 1 inch focus, magnifies ten times; very strong glasses, twenty times; small globule lenses, such as were sold for twenty-five cents, about fifty to seventy-five times; the most powerful single lenses that can be generally used, 150 times; the most powerful single lenses ever found available, 300 times; ordinary compound microscopes, highest power, from 250 to 500 times; highest power ordinarily obtained with the best microscopes, 1,500 times; highest power yet obtained, giving fair light and definition, 15,000 to 20,000 times. Claims have been made for much higher powers, but such claims are generally ignored by the microscopists. By times we mean, in all cases, diameters. Sidewalk opticians generally mean areas when they speak of times. Areas are found by multiplying the diameters by themselves. Ten times, mentioned above, is 100 areas. The cheap microscopes, said to magnify 1,000 times, magnify about 33 diameters.

## School-Room Methods

## A LESSON IN PRIMARY GEOGRAPHY.

Teacher. "Tell me which you can see better, the earth or the sky."

Pupils. "The sky is easier seen than the earth."

Teacher. "How does the sky look to you?"

Pupils. "It seems blue, round, and high."

Teacher. "Does all of the sky seem the same distance from the earth?"

Pupils. "It seems highest in the middle, and to come down to the earth at the sides."

Teacher. "Think of something that has the shape of the sky."

Pupils. "It looks like the half of a hollow ball."

Teacher. "The sky looks like a hollow hemisphere."

The word "hemisphere" is assumed to be new in form and meaning, and, therefore, should be taught as to spelling and use, care being taken to broaden the idea to include all kinds of hemispheres. It is, perhaps, judicious to connect with the hemispherical form of the sky the notions of zenith (point directly overhead), and horizon (line where the earth and sky meet). The notion of the form of the sky is chiefly valuable as an introduction to the way the earth looks.

Teacher. "Tell me how the earth looks compared with the sky."

Pupils. "The earth seems flat, the hills being rough places on it."

Teacher. "Suppose you were in Massachusetts (pointing to the map), or in England, or in China; how would the sky look? How would the earth look?"

Pupils. "The sky would look round, and the earth flat, as it looks here."

Teacher. "Look at this globe; how does its outside look to your eye?"

Pupils. "It bends in every direction, like the inside of the sky above our heads."

Teacher. "Now look inside this thimble which I have placed on the globe, while the rest of the globe is shut off with a piece of paper; how does the part inside the thimble look?"

Pupils. "It seems flat, the same as a part of the table looks under it."

Teacher. "That is because one sees so little of the globe that its bending does not show itself. The part of the earth we see is, too, a very little part of it. One cannot see the bending of the earth, as he can that of the sky. But the earth bends in all directions like the sky. Then, in going to a place like England, over land and sea, does one travel along a surface like the table, or around a surface like that of this globe?"

Pupils. "One travels around a surface like that of the globe."

The object sought is to set in contrast the surface, as it looks to the eyes of the children, and the notion they must get of it in direct opposition to the sense of sight. The play of their minds is to be from their home locality to the representation of it, and all other places, by means of a globe, and from this representation back again to reality, by thinking of distant places and the means by which they are reached.

The globe is a symbol. Like other symbols, it carries with it the danger of letting the mind finally rest on the mere representation, without making its way back to the reality which is represented. Third-grade children who have read, and had read to them, books like "The Seven Little Sisters," "Aunt Martha's Corner Cupboard," "Children of the Cold," etc., have notions of countries like India, Lapland, England, Africa, and the like. The way out of the globe as a mere symbol lies in having them trace the space between themselves and these countries, in thought, over plain, mountain, and sea, taking care that they figure to themselves the kind of path one must take to go to them. The symbol will still be in the mind, but it will be more than a mere representation.

Teacher. "Name a country which is far away."

Pupils. "Africa."

Teacher. "Start in North America and point out the way to Africa."

Pupils. "(Drawing a pointer over the globe) "This is the way to Africa."

Teacher. "If one were here in Africa, how would the sky look?"

Pupils. "Round, like it does here."

Teacher. "How would the earth look?"

Pupils. "Flat, as it does here, except it might be roughened by hills."

Teacher. "Is the way from here there, then, a flat way, or does it take some other form?"

Pupils. "The way is around the earth, as the way is represented around the globe."

The idea of place and of places must be a gradual growth realized in the mind of the child. But by fixing the notions of distant places, building them up out of the experiences of the home locality, and tracing their connections upon the earth, then gradually grows up the idea of place, as a connecting relation for all the facts of geography. The two eyes of the subject are place and the connection of one link with another in the chain of cause. Through these points of view the subject can be built into an ordinary whole, of which the sure foundation may be laid in the primary grades.—*S. S. Parr, in Popular Educator.*

## HOW TEACHERS SHOULD TALK.

BY CAROLINE E. LEROW.

It is necessary for a teacher to talk a great deal, and to talk so as to be heard and understood. But in order to be heard and understood it is not necessary to talk loudly, much less to snap and scream, as is the custom with too many teachers, especially those who are impatient, nervous, or irritable, who are obliged to work in a noisy room, or with a rebellious class of children.

The secret of talking easily and intelligibly in a large or noisy room is to fill the lungs fully, and to refill them at every pause; to speak slowly; to speak with careful articulations, and to make all effort at the waist. This last is the important matter, and can be accomplished only by those who can fill the lower part of the lungs and use the muscles of the diaphragm.

The average teacher talks from the throat, filling only the upper part of the lungs, and the delicate vocal chords, which should be merely the passive instrument of vibration, are compelled to do the active service which properly belongs to the larger and stronger muscles of the diaphragm. It is not to be wondered at that huskiness and indistinctness of tone, irritation and soreness of the throat, fatigue and nervous exhaustion, should speedily follow such perversion and such muscular strain. The only wonder is that so many can persist in this abuse, year after year, without entirely losing their power of speech.

The vocal chords, although thus strained, being inadequate to the amount of voice required, the teacher in order to be more plainly heard tries to increase her power by raising her natural degree of pitch to an unnatural one; by straining the vocal chords still further in a vain attempt at increased force; or by directing the breath into the nostrils, thereby giving the tone a nasal quality, and a consequently sharper and more penetrating sound.

These devices may be temporarily successful; in a few cases they are, unfortunately, permanently so; but as a general thing the teacher so using and abusing her voice finds at the end of a few months that she has lost control of it, retaining the disagreeable habits of speech thus formed, but being unable to command loudness or distinctness of tone.

Simple slowness of speech—for one reason because it is so very unusual—always attracts attention. This fact is noticeable in any company. Slow speech is intrinsically quiet, and has a marvellously soothing effect in the schoolroom. Being unusual, it arrests the attention and stimulates curiosity as to what is to follow. A very few experiments in this direction will be sufficient to convince any teacher who may be skeptical concerning this statement.

To this extreme slowness add very distinct articulation, and, unless it is difficult to do so, a little lower degree of pitch than the natural conversational one, and there is produced a tone which, although made without effort, is heard distinctly in the furthest corner of the room and becomes a most impressive utterance. It is a tone which not only arouses curiosity, it commands respect, giving a strong impression of reserve force and settled determination upon the part of the speaker, and has a most satisfactory psychological effect in holding attention and compelling obedience upon the part of the pupil.—*The School Journal.*

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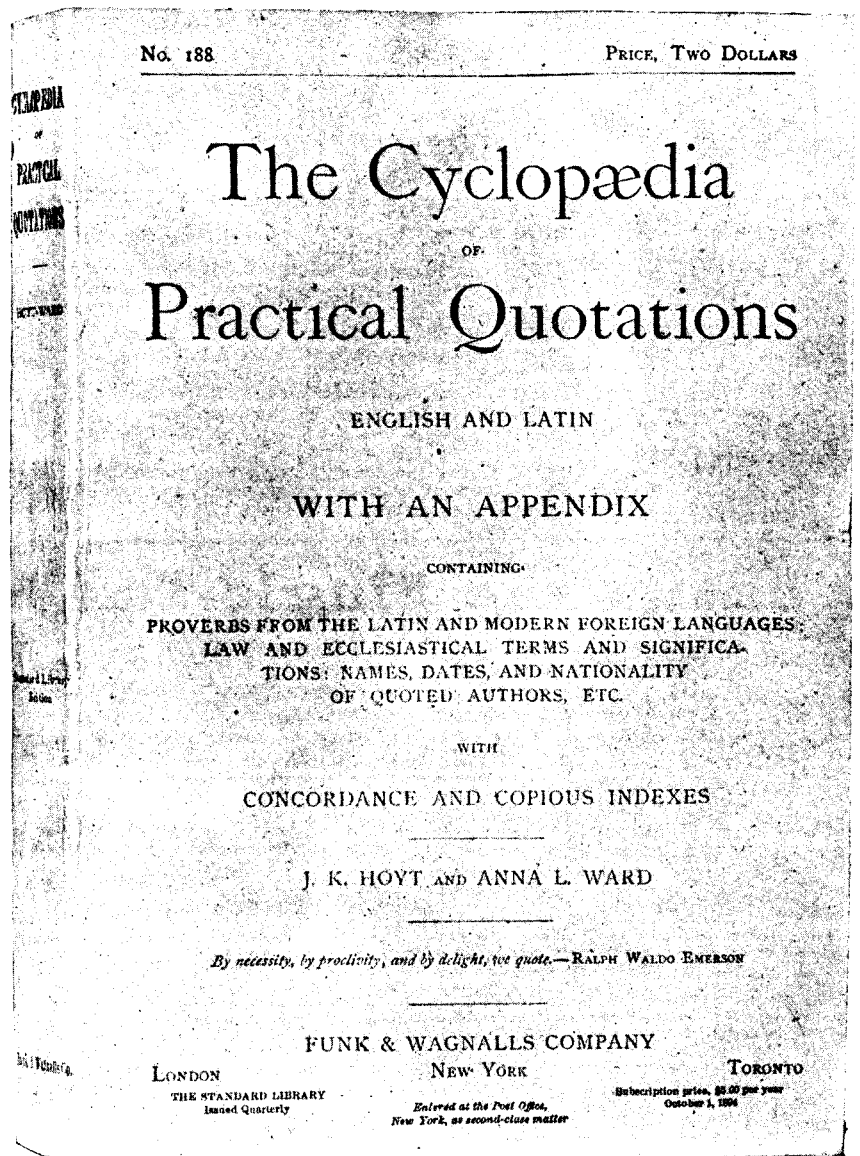
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