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The Educational Journal

And Practical Teacher

Editorial.

THE retiring editor has on hand several manuscripts of considerable length, which he has not hitherto been able to use. In some cases, while he has the name he has not the address of the writers, and consequently is unable to communicate with them. Will the writers of any of these articles, who may specially wish to have their manuscripts returned, kindly write him personally at the old address? Their wishes shall be promptly attended to, as far as possible.

WELL-FOUNDED complaints are constantly heard, deploring the tendency of young Canadians in the country to forsake the farms and go to High School or College, with a view to fitting themselves for some business or professional pursuit. All thoughtful persons must deplore this tendency, as being inimical to the best interests of the country, and, in many cases, to those of the individuals themselves. But we have no sympathy with those who make this incidental effect a reason for deprecating the education itself, or for crying out that the facilities afforded for secondary and higher education are excessive and harmful. It should be too late in the day for argument to be necessary to show that the education is a good thing in itself, and that the fault is in the wrong use to which it is put, or in wrong ideas in regard to its true nature and ends. We hope to see the day when large numbers of the youth of both country and city will seek higher education with a view to becoming better prepared for the ancient and noble pursuits of agriculture and its related industries, and will leave the universities, prepared to develop the natural resources of the country, and earn comfort and content by the scientific cultivation of farm and orchard, woodland and prairie. Of one thing we are sure: the depopulation of the country and the rush to the cities will never be checked by diminishing in quantity or quality the facilities for higher education.

A PARTING WORD.

WITH this number, THE EDUCATIONAL JOURNAL withdraws from the journalistic arena to make room for its young, practical, and hopeful successor, THE CANADIAN TEACHER. THE JOURNAL was brought into existence by the amalgamation, about ten years ago, of *The Canada School Journal*, edited and published by the writer, and *The Educational Weekly*, founded and published by The Grip Printing and Publishing Company. That company undertook and continued for about seven years the publication of THE JOURNAL. Since the expiration of that period the proprietorship has once or twice changed hands, but the paper has been from the first

under the editorial management of the present writer. Two aims have been kept steadily in view—the supplying of practical help for the schoolroom, with special reference to the demands of the Ontario school system; and the putting within reach of the teachers of this Province, and of the Dominion, of a bi-monthly supply of such educational matter, original and selected, as seemed best adapted to promote the intelligence, efficiency, and enthusiasm of Canadian teachers.

In striving to promote these ends, it has always been our desire to draw as largely as practicable upon our own home resources, and to encourage Canadian teachers to give one another through our columns the benefit of their own individual study, observation, and experience. Though we have never been satisfied with the measure of success attained in this direction, we congratulate ourselves and the many teacher friends who have come to our aid during these ten years that we have been enabled to set before our readers a very large and valuable mass of educational material, much of it of excellent quality, our patrons themselves being judges. For the invaluable help thus rendered from time to time by so many, and for the uniform kindness and courtesy we have received from our numerous subscribers in all parts of the Dominion and some parts of the United States, we desire, now that our pleasant relations are about to be severed, to make our sincerely grateful acknowledgments. We are also deeply grateful for the very many warm words of satisfaction and appreciation which we have been constantly receiving from our subscribers and readers all over the Dominion. Such messages have been our chief encouragements, from time to time, in the work, and now that we are about to leave it the memory of them is doubly grateful, as enabling us to hope that, in spite of many shortcomings, of which none can

be better aware than we, our labor has not been wholly in vain.

Circumstances having now made it necessary that we should sever the pleasant relations which have so long existed between him and our readers, the Editor cannot retire without assuring them that he does so with sincere regret, and that he will still continue to take a deep interest in the welfare and success of Canadian teachers of all grades. He will at all times hold himself in readiness to say or do whatever may be in his power to promote the cause of education in Canada, and, especially, to improve the condition of the Public School teachers, on whom the people must always rely for the foundation work upon which the excellence and stability of the whole educational structure depends. Especially and most gladly would he, should it ever be in his power, lend a hand in correcting the crying injustice to which these teachers, as a class, are now forced to submit in the receipt of altogether inadequate salaries.

For whatever of success THE JOURNAL has been able to achieve, the credit is very largely due to the very efficient staff of editors who have had charge of the special departments of the paper. Those who have been profited by the helpful matter regularly furnished by these writers will, we are sure, join heartily with us in grateful acknowledgment of the ability and faithfulness of those who have in this way done so much to make this JOURNAL what it has been.

With sincere well wishes for subscribers and readers, one and all, I remain,

Very sincerely yours,

J. E. WELLS.

THE TARIFF DISCUSSION.

THE largest and most important practical question now before the people of Canada is undoubtedly the tariff ques-

tion. Though it can hardly be said to be, in its present shape, the question of Protection *versus* Free Trade, yet that is the underlying principle, and it is one of those great fundamental questions of Political Economy which should be thoroughly studied by the teacher, in common with every other intelligent and patriotic citizen. How many of our readers have been following the course of the Tariff Commission, as it has been going from place to place and from province to province, seeking to elicit the opinions of people of different classes and occupations on the subject? Those who have kept pace with this process will not envy the position of the Government which will presently have the task of attempting to harmonize all these conflicting opinions, which really represent, to a very great extent, as many conflicting personal interests, or what are supposed to be such, though it is quite possible, in many cases, mistakenly. No doubt a prolonged debate upon the subject will take place in Parliament during the approaching session. From the difficulty of the subject and the ability of many of those who will be likely to take part in this debate, the discussion can hardly fail to be highly educative as well as interesting, and so well worth careful reading by all young Canadians who wish to become clear thinkers, as well as to hold sound views.

THE UNIVERSITY AND ITS NEEDS.

FROM the statements of a deputation appointed by the Senate of the Provincial University, which waited upon the Government a few weeks since, it appears that the institution is just now in serious financial straits. Its income fell short of its expenditures last year by about eighteen thousand dollars. There is no reason to expect any better showing for the year now passing, or for other years to come. The immediate request made on behalf of the University to the Government is for twenty thousand dollars to meet the deficiency for the current year, while it is plainly intimated that a claim will be made for an increase of endowment, in the shape of a land grant, to provide for the future. Twenty thousand a year represents an endowment of four hundred thousand, at five per cent.

Will the people's representatives in the Legislature, with the fear of the taxpayers of the Province before their eyes, vote such an appropriation for the support of a State University, to run practically as a competitor with the voluntary universities endowed by private benefactors, or dependent upon the free-will offerings of their friends and patrons, some of whom, no doubt, will be found in the Legislature itself? That is the question which will probably come up for final decision at the approaching session, for the Government can hardly afford to ignore the request of the Senate of the Provincial University, so influentially urged upon its attention. The Cabinet will, of course, be under the necessity of reaching some decision upon the prior question of its own policy. It must decide whether it will make the voting of the additional endowment asked for a matter of Government policy, or will leave its followers free to support or oppose any bill or resolution which may be brought forward, whether by a supporter or by an opponent of the Government. In the former case the proposed measure may, we suppose, be expected to pass. In the latter it will probably meet with strong support from members on both sides of the House, and with opposition no less keen and determined from others on both sides. The question of Political Economy involved is a large and much-vexed one. Viewed from the standpoint of what we may call, without any

disparaging connotation in the use of the term, educational expediency, it is equally debatable. The two questions, briefly put, are:

(1) Are the government and legislature of a democratic state justifiable in appropriating a portion of the public funds for the establishment and support of a national university? If the principle is affirmed, it follows, as a matter of course, that the institution should be liberally provided for, and kept at the highest possible grade of efficiency. Or,

(2) Is the work of university education, the direct benefits of which can, in the nature of things, be enjoyed only by the few, outside of the legitimate sphere of state appropriations? May it be properly and safely left to the liberality of the wealthy and enthusiastic friends of higher education, who have done so much, both in the United States and Canada, for the endowment of well-equipped universities and colleges?

These are questions of the highest interest to all educators of every grade, of general interest to every intelligent citizen, and of personal interest to every taxpayer. Regarded from the educational rather than the political (we use the word in its higher sense) side, two subordinate questions are involved:

(a) Which source of support can be most safely relied on as able and willing to supply promptly and continuously the very large sums which are indispensable, in the present stage of educational development and expansion, to enable a university to keep abreast of the demands of the time?

(b) Which arrangement is most likely to leave the institution free to do its work, and pursue those investigations which are now considered an important part of that work, in the true, fearless, scientific spirit, unfettered by partisan or other illegitimate considerations of any kind? These are matters which are worthy of the serious study of every one interested—as what good citizen is not?—in the progress of education.

A HINT ON COMPOSITION TEACHING.

IN the course of an elaborate article on Composition Teaching, in the January number of the *School Review* (University of Chicago Press), Samuel Thurber holds that " the special teacher of composition should be abolished," and that " all the teachers of a school should share equally the task of supervising the English writing." The feasibility of this suggestion is doubtful, though the method, if feasible, would have much to recommend it. But we fear that in most cases it would be assuming too much to assume that all the teachers of a school, being "gentlemen and ladies of culture," "are competent to correct errors, and to appreciate the good qualities of writing." It is, we have reason to fear, one of the consequences—not a necessary one, perhaps, but one of too frequent occurrence—of the modern system of specialization that it tends to diminish that thoroughness and symmetry of culture, even in the knowledge and use of the mother tongue, which should be characteristic of those who have taken complete courses of study, and have entered upon any branch of the teaching profession. One step in the direction indicated we should, however, be able to insist upon at once. All teachers of specific subjects should be required to make it a point that none of the class or other exercises presented by their pupils should be submitted in slipshod English. Is it not sometimes true that, by the acceptance of examination papers and other exercises written in slovenly English, the specialist teacher does much to counteract the work of the teacher of composition, and to confirm the glaring faults in style of thinking and expression which it is the special work of the teacher of English to reform.

Special Papers.

TRAINING PUPILS TO THINK.*

WILLIAM W. WHINNEY, MAXWELL.

Man stands far above all other created beings in having the power of reason. To train and to develop this power is the true work of education, from an intellectual standpoint, and to give a child a well-trained power to reason is one of the highest aims we, as teachers, can set before us.

Before proceeding further it may be well to consider more fully the necessity for this training. It is a well-known fact that physical growth can proceed properly only when adequate exercise is given to the parts of the body to be developed. The blacksmith, by the constant exercise of wielding his hammer, produces those muscles "strong as iron bands," of which the poet sings. The physical system, deprived of proper exercise, dwindles or ceases to develop. The mind, without the exercise of the thinking faculty, becomes stagnant, and growth of mental power ceases. Through the avenues of the senses and the powers of perception and memory ideas may be taken into the mind and retained, but unless the elaborative faculty of reason is brought to bear on these perceptions they remain as useless loads on the mind. Food is of no use in sustaining the physical life until it is properly acted upon by the digestive organs and prepared to enter the blood, and be conveyed throughout the body to build up the various tissues. In a similar manner sense-perceptions are the avenues through which mental food is received. By memory it is retained, and by thought or reason it is digested or assimilated until it becomes our own mental property.

It is scarcely necessary here to speak of the great value of this ability of the reasoning faculty to properly perform its work. One can see at a glance that upon it depends the expansion and growth of true mental power. Without this power we are mere plagiarists, or parasites, subsisting mentally upon the product of other brains. By the thinking faculty each sense-perception should be unified and generalized until each idea assumes its proper place in the mind, as each volume in a library under a systematic librarian is put in the place where it naturally belongs.

Just here it may be well to notice some of the causes which may produce the mental apathy we, as teachers, so often meet with in children. One very common cause is the pupil's not being trained

by the proper exercise of his faculties to use the knowledge he already possesses in the acquirement of new knowledge. He should be allowed to " learn to do by doing." By this, of course, we mean that every item of new knowledge should be impressed and made the child's own mental property by his being made to use it in the acquiring of kindred knowledge, and the expansion of that already obtained. In harmony with this is the well-known educational maxim : " Do nothing for a pupil that he can do for himself." Another cause that may be assigned for this is the failure of the teacher to see that each new idea taught is thoroughly understood. The child's perceptions are dim and hazy, memory has then nothing definite to retain, nor reason fit material on which to work in elaborating new ideas. This is, in some respects, very injurious, because, when the mind tries to grasp the new idea and fails, discouragement is the result. In the third place we cannot fail to see that in this age of rush and hurry, with an examination looming up like a dark spectre in the distance, we, as teachers, are often tempted to push our pupils on by forced marches in our anxiety to reach the desired goal. Thus the great end, mental development, is forgotten or neglected, and the pupil becomes lost in the throng of new ideas or perceptions which are thrust upon him faster than he can receive and assimilate them. This system of cramming does, perhaps, more to becloud, confuse, and prevent proper mental growth than anything else.

Having thus briefly noticed the importance and necessity of this training of the reasoning faculty, as well as some of the causes which produce mental inaction, let us turn our attention to a few of the ways by which the work of proper training may best be done. As a first means to this end I would say, place the pupil in a class as nearly as possible suited to his attainments. If he be placed in a class too low, the natural desire of the child-mind to reach out after something new is not satisfied, and hence it relapses into quiet inaction, because old things and ideas have lost their power of attraction and something new is needed as a stimulant. Again, if the pupil be placed in a class too far advanced for him the result is even worse. In this case the mind is prevented from working properly, because of the break or gap in the chain of ideas which should connect all new work with the old. Thus the fundamental principle of proceeding from the known to the unknown is violated. The mind becomes clogged with perceptions which are not clear to the pupil and which he cannot understand, until at last, like a traveller in a dense forest, he becomes hopelessly lost and

entangled in a maze of dim, spectral ideas. In rural schools, especially, much difficulty is experienced in the matter of grading. Very often one has to choose between two evils. But in our opinion, unless the pupil possesses more than average ability, he is better, as a rule, to be placed in a class slightly beneath him than in one above. As a second means to this end, the teacher should carefully grade the work of each class. Let each lesson be a carefully arranged development of what preceded it. By this means the mind is led along a natural line of thought from a known thing to something new, and as it reaches out after more knowledge it is satisfied step by step. The mental faculty also has a connected series of perceptions on which to act in the work of discovering relations, and unifying and generalizing the material before it. In proceeding from one part of a subject to another care should be taken that no link be omitted. For instance, in grammar or language, whichever you choose to call it, the child is led to express some thought in the complete form of a sentence. After the pupil grasps this idea he can readily be made to see that a part of this sentence names the thing about which he is speaking, and another part says or asserts something about the thing named. Hence he grasps the ideas of complete subject and complete predicate. He may then be led to see that the naming and asserting are done each by a particular word. Other words have each a particular use. Soon the child will want names for each of these different kinds of words. Thus one lesson or part of a lesson should grow out of the preceding, and as this goes on the child's mind will broaden and expand as naturally as spring develops into summer and summer again into autumn.

Judicious and well-arranged questioning is another means of aiding and inducing thought. At the beginning of a lesson a few well-directed questions should be used to recall such previous knowledge as will be needed in presenting the new ideas, so that the pupil may clearly understand them. All questions should be clear and pointed. In teaching, each question and answer should be a natural development from the preceding. Often in a class there may be pupils whose minds seem naturally sluggish. Special attention is needed with these. Often a question is carelessly answered. By a series of simpler questions the pupil should be made to see his mistake, and to correct it by giving the right answer. A few such probings as this will, as a rule, lead to more careful thought in the future before an answer is given. Thus by deductive questioning pupils are made to think and discover truth for themselves.

Again, each lesson should be invested with as much interest as possible, and if the mind is once attracted to a certain thought it will tend to recur

to the interesting part again and elaborate ideas of its own. Thus incidents of travel and history may be employed to clothe with life and interest the drier facts of geography, and biography may lend attractiveness to history. Pupils may also be led to the exercise of thought by the sympathetic effect of the teacher's mind upon theirs. By a word, by a look, we may show to our pupils our interest in their successful solution of the questions before them. Let the teacher so project his own mind into contact with that of his pupils that he may fully understand that pupil's difficulties. This sympathetic effect of mind upon mind is a power which we, as teachers, do well to cultivate. Its far-reaching capabilities we cannot wholly estimate. Again, a cheerful, lively manner on the part of the teacher will tend to cause a similar feeling in the pupil. In addition, cheerfulness will throw a halo of brightness around the lesson that will do much to draw the pupil towards it.

In conclusion, let me say that, as thoughtful, intelligent work is necessary in intellectual development, so in our efforts to build up the moral characters of our pupils should we lead them to think and see the difference between right and wrong. It is not always what we say to our pupils, but the time and the manner in which it is said, that may lead them to think over the results of an evil habit, and resolve to give it up. A single word sometimes, fitly spoken, may lead to such reflection that the whole current of a life may be changed. Let us pay goodly heed to the words of Longfellow when he says :

" In the elder days of art
    Builders wrought with greatest care
  Each minute and unseen part—
    For the gods see everywhere.

  Let us do our work as well,
    Both the unseen and the seen,
  Make the house where gods may dwell
    Beautiful, entire, and clean."

Mathematics.

REPORT OF A LESSON IN ALGEBRA.

—

OBJECT.

To give a junior pupil an introduction to quadratic equations. The pupil already knows simple equations.

STARTING POINT.

Equals multiplied by equals give equal products.

If $x - 5 = 0$ be one equation, and

$x - 4 = 0$ be another simple equation, form the equation from the product of these.

Ans. : $(x-5)(x-4)=0$

i.e., $x^2 - 9x + 20 = 0$. What do you call this equation which contains the second power of x? A quadratic. What is the value of x in the first equation? Ans. : $x = 5$. What is the value of x in the second equation? Ans. : $x = 4$. Do you think either of these values would suit the quadratic? Let us try 5; thus, $5^2 - 9 \times 5 + 20 = 0$. Is that true? Yes. Well, try 4 in the same way. Is it true? Yes. Very good. A number that makes both sides come out the same is called a *root* of the equation. What was the root of the first equation? Ans. : 5. Of the second? Ans. : 4. Well, these are called *simple equations*, because they have *one* root only. How many values did we substitute for x in the third equation? Two. How many *roots*, then, has a *quadratic?* Ans. : Two. How, if I write this equation $x^2 - 9x + 20 = 0$, can you solve it? Can you find the root? Is there any way of finding $x = 5$, $x = 4$? Ans. : Factor it up. Do you know how to factor the left-hand quantity? Yes, sir; split the middle term. But how? Same as we did in factoring trinomials. Well, split the $-9x$, then. Ans. : $-5x - 4x$. Well, factor, then. Ans. : $(x-5)(x-4)=0$. Now, how do you know that $x = 5$? Does this factoring show it? (No answer.) How many factors? Two. What is their product? Ans. : Zero. Now, if you had only the left-hand side given, $(x-5)(x-4)$, could you think of any way of making the product $= 0$? Yes; make one of the factors $= 0$, and then the product would be $= 0$. Try it, and write $(5-5)(x-4)$; how much does that make? Ans. : Zero. Why? Because $0 \times (x-4)$, or any other quantity, must $= 0$. Well, then, if $x - 5 = 0$, *i.e.*, if $x = 5$, we find the equation true? Yes, sir. Can you make it true in some other way? Yes. Make the second factor $= 0$. How would you do that? Say $4 - 4$ instead of $x - 4$. Then what value are you giving x? Ans. : $x = 4$. Then, if I give you a quadratic that can be factored in this way, do you think you can find the two roots? Yes, sir. Try a new one and see. Here it is : $6x^2 + 17x + 12 = 0$. Can you factor that? Yes. $12 \times 6 = 72 = 9 \times 8$. Split the $17x$ into $9x + 8x$. Just so; what then? The factors are $(2x + 3)$ $(3x + 4)$. What must the product be? Ans. : Zero. Now, if $(2x + 3)(3x + 4) = 0$, what are the roots? Tell me one. Ans. : Make $2x + 3 = 0$, or $2x = -3$, *i.e.*, $x = -\frac{3}{2}$. Do you think that is a root, the $-\frac{3}{2}$? Yes. Well, substitute that value for x, and see if the equation is true for that root. $6(-\frac{3}{2})^2 + 17(-\frac{3}{2}) + 12 = 6(\frac{9}{4}) - \frac{51}{2} + 12 = \frac{54}{4} - \frac{102}{4} + \frac{48}{4}$

$= 0$. Yes, sir. Name one value of x that satisfies the equation. Ans. : $x = \frac{3}{2}$. Is there any other? Yes. Put the other factor, $(3x + 4) = 0$. Hence, $x = -\frac{4}{3}$. Is that the second root? Yes. Verify it. $6(-\frac{4}{3})^2 + 17(-\frac{4}{3}) + 12 = 6(\frac{16}{9}) - \frac{68}{3} + 12 = \frac{96}{9} - \frac{204}{9}$ $+ \frac{108}{9} = 0$. Is the equation true, then, for this second value? Yes, sir. How many roots have we found? Two. Do you think there are any more? Can you find another root? Ans. : There are only two factors, $2x + 3$ and $3x + 4$. If we had another factor we could get another root? Can't you get it now? No, sir. Why? There is not another factor. Right. If there was another factor we should get x^3 in the product, and the equation would not be quadratic, but cubic. We shall learn about cubic equations later on. How many roots has a simple equation? One. A quadratic? Two. How many do you think a cubic equation must have? Three. Why? Because there will be three factors. All right; we will go on with quadratics.

SECOND STAGE.

Now, suppose you did not know how to split the middle term of a quadratic expression? Ans. : We could not get the factors. Can you factor $x^2 - 8x + 20 = 0$? No, sir. Why? Because no two integral factors of 20 will make 8. Are you sure? Yes. What are the factors of 20? Ans. : 2, 4, 5, 10, 20. What do these give, taken 2 and 2? Ans. : 6, 7, 12, 9, 14, etc. Not 8? No, sir. Well, then, has this equation no roots? Ans. : It ought to have two. I will show you how to find them. Now attend! Add -20 to both sides, and what have you? $x^2 - 8x = -20$. Yes. Now notice that x^2 is a square. Yes, sir. Do you know the square of $a - b$? Yes; $a^2 - 2ab + b^2$. Does $x^2 - 8x$ look at all like this? Yes, sir. How? The x^2 is like the a^2, and the $-8x$ is like the $-2ab$. Is there anything wanting in $x^2 - 8x$ to make it entirely like $a^2 - 2ab + b^2$? Yes. It wants another term. What do you think that other term must be? (No answer.) What is $2ab$? Ans. : It is twice a multiplied by b. What corresponds to a? Ans. : x. What corresponds to b? Don't know, sir. Well, if $8x$ corresponds to $2ab$, *i.e.*, $= 2ab$, and $x = a$, what must be the value of b? Ans. : $8a = 2ab$, $4 = b$. Then what must be the other term? Ans. : 4. Right. Then add 16 to both sides, and what have you? $x^2 - 8x + 16 = -4$. Do you recognize $x^2 - 8x + 16$? Look at it. Ans. : It is the square of $x - 4$. Write it that way. Ans. : $(x - 4)^2 = -4$. If these two sides are equal, will their square roots be equal? Yes. Can you tell the square root of the left-hand side? Ans. : $x - 4$. What is the square root of the other side?

Ans.: -2. No! $-2^2 = +4$; this is -4. What *is* the square root? Don't know, sir. Neither do I, at present, but I can indicate it by a mark or symbol, thus, $\sqrt{-4}$. Do you see that? Yes. Then take the square root of both sides. Ans.: $x - 4 = \pm \sqrt{-4}$. Why do you put the double sign? Ans.: Because $(-a) \times (-a) = a^2$, and $(+a) \times (+a) = a^2$, so that both $+a$ and $-a$ are the square root of a^2. There are always two square roots. Very good. Then, $x - 4 = \pm \sqrt{-4}$. What is the value of x? Ans.: $x = 4 \pm \sqrt{-4}$. Quite right. Now you see why you could not split the 8x. These roots are irrational, *i.e.*, they are not like 5 and 4, rational numbers.

THIRD STAGE.

Now, see whether you can solve $6x^2 + 17x + 12 = 0$ by this method. Ans.: Please, sir, $6x^2$ is not a perfect square like x^2. Well, make it like x^2. Ans.: Divide it by 6. That would do, and we should get $x^2 + \frac{17}{6}x + 2 = 0$, but the fraction would be awkward. There is a better way. I will show you. Attention! What is the smallest square number after 1? Ans.: 4. Well, how much is 4 times 6? Ans.: 24. Well, multiply through by 4 times the coefficient of x^2. What is that? Ans.: 24. Now, what have you? Ans.: $144x^2 + 408x + 288 = 0$. Is $144x^2$ like a^2 now? Yes, sir, it is $= (12x)^2$. Well, go on. $144x^2 + 408x = -288$. Right. Now, if the a in $a^2 + 2ab + b^2$ is $= 12x$, what about the 408x? It must $= 2ab$. Then what is the value of b? Ans.: $2ab = 408x = 2 \times 12x \times 17$, $\therefore$ b $= 17$. Then what must be added to make $144x^2 + 408x$ correspond to $a^2 + 2ab + b^2$? Ans.: 17^2. What was the equation at first? Ans.: $6x^2 + 17x + 12 = 0$. What are we adding to complete the square? Ans.: 17^2. What is that? Ans.: The coefficient of the second term. Yes. Well, let us go on. Add $17^2 = 289$. Ans.: $144x^2 + 408x + 289 = -288 + 289 = 1$. Now the square root? $12x + 17 = \pm 1$. What is the value of $\sqrt{1}$? Ans: ± 1, because $(+1) \times (+1) = +1$, and $(-1) \times (-1) = +1$. Right. What is the value of x? $12x = \pm 1 - 17 = -16$, or -18; $x = -\frac{4}{3}$, or $-\frac{3}{2}$. Is that what we got before? Yes. Do you think these values are correct? Yes. Why? We verified them before. Well, now, tell me how we got them the second time. Ans.: We first transposed the 12, and then multiplied through by 4 times 6, and added 17^2. Then the square root came out exact, and we found the two values of x.

FOURTH STAGE.

Right you are! Now, here is a quadratic with letters only: $ax^2 + bx + c = 0$. Can you solve that? What must we do first? Transpose c. Well, what have you then? $ax^2 + bx = -c$. Now, then? Multiply through by 4a. Yes; what have you? Ans.: $4a^2x^2 + 4abx = -4ac$. Correct. Now what? Ans.: Add b^2. Yes; then what have you? Ans.: $4a^2x^2 + abx + b^2 = b^2 - 4ac$. What next? Take the square root. Well? $2ax + b = $ square root of $b^2 - 4ac$. Is the right-hand side a perfect square? No, sir. Well, what will you do? Ans.: Use the radical sign to indicate the square root. Yes; do it. Ans.: $2ax + b = \pm \sqrt{b^2 - 4ac}$. Now what? Ans.: Transpose b. Yes; well? Ans.: $2ax = -b \pm \sqrt{b^2 - 4ac}$. How then?

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

CONCLUSION.

Very well done, indeed! Now, I want you to learn that result by heart. What are the roots of $ax^2 + bx + c = 0$? Ans.: $x = xc$. What is $-b$? Ans.: The coefficient of the second term, with its sign changed. Yes; what is c? The absolute term that does not contain x. What is a? The coefficient of x^2. Well, then, make a rule for solving $ax^2 + bx + c = 0$ in all cases. Ans.: Transpose the absolute term; multiply through by 4 times the coefficient of x^2; add the square of the coefficient of x; and take the square root. What is the result?

$$\text{Ans.: } x = \frac{1}{2a}(-b \pm \sqrt{b^2 - 4ac}).$$

At the next lesson we will apply this rule to a number of questions.

REMARKS ON PROBLEM A.

BY A. N. MYER, B.A., DUNNVILLE.

I would like to make a remark or two about problem A, in your issue of Jan. 1st.

I find the following method useful in *most* arithmetic problems:

	Selling price.	Com.	Frt.	Amt. left.	Buy. pr.	Com.	Frt.
A..	50	1	1	48			
B..				1835	1800	27	8
C..	50×1835	1835	1835	48×1835	1800×48	27×48	8×48

It will be noticed that in A the ratio of certain magnitudes to one another are set down; also in B. In C the unit is made the same for each of the magnitudes. Now, any one or any combination of the seven magnitudes being given, any one or any combinations of the remaining magnitudes can be found. In this particular problem the selling price and first freight are given; it is required to find the buying price. The ratios of the

magnitudes in B are easily found by considering 1 cwt.

The method seems to be in accordance with the "measuring" process to which F. J. Voaden draws attention in your columns. When "true discount" and interest problems are solved in this manner, it at once becomes apparent that there is no necessity for the term "true discount"; *e.g.*, a sum of money is put out for one year at 3 %.

	Principal.	Interest (or discount).	Amount.
Measures...	100	3	103

Any one of these quantities being given, the others can be found. If the first or second is given we usually speak of the problem as a case of interest; if the third, "true discount." Why?

An article (by Mr. Ballard, of Hamilton, I think) on the preceding method of solution can be found in the report of the proceedings of the Ontario Educational Association.

Science.

EDUCATION DEPARTMENT, ONTARIO, ANNUAL EXAMINATIONS, 1896.

### THE HIGH SCHOOL AND UNIVERSITY EXAMINATIONS.

FORM III.—CHEMISTRY.

1. State *fully* what is meant by the following terms, and give examples in illustration of your statements :
   (a) Chemical compound.
   (b) Chemical change.
   (c) Physical change.

2. (a) How would you prepare dry oxygen?
   (b) What weights of materials would you require to furnish 10 litres of the gas measured under normal conditions?

3. State, in words, all the facts that are expressed by the following equation :
$$Zn + 2HCl = ZnCl_2 + H_2.$$
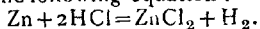
4. Make the following calculations :
   (a) The percentage composition of washing soda, from the formula, $Na_2 CO_3, 10H_2O$.
   (b) The formula of a substance which gives the following percentage numbers on analysis :

Sodium,	-	18.55
Sulphur,	- -	25.81
Oxygen,	-	19.35
Water,	- -	36.29

   $(Na = 23 ; S = 32 ; C = 12.)$

5. Give a general sketch of the chemistry of sulphur, under the following heads :
   (a) Occurrence and properties.
   (b) Compounds with hydrogen.
   (c) Compounds with oxygen.

6. Ten litres of air is contained in a close glass vessel, at a temperature of 60° C. and a pressure of 700 mm. barometer. Make the following calculations :
   (a) The pressure on the sides of the vessel, if the temperature be raised to 100° C.
   (b) The weight of the air in the vessel. (Density of air in terms of hydrogen is 14.44.)

7. Describe experiments that may be done with ammonia, and state the conclusions as to its *composition* and *properties* which are justified thereby.

ANSWERS.

1. (a) When two or more substances combine so as to form a substance differing in properties from any of the original constituents, and in which none of the properties of the original substances can be identified, a chemical compound is said to have been formed. Carbon is a black odorless solid ; sulphur is a yellow odorless solid. These two substances may be combined so as to form a colorless liquid with very disagreeable odor. In this liquid neither C nor S can be detected by any of the properties they ordinarily exhibit. A chemical compound of C and S has been formed.

Moreover, in *chemical* compounds the constituents invariably unite in the same proportions to form a given substance.

(b) When a substance is so changed that it ceases to be the same substance it is said to undergo a chemical change. It is a change in the composition of a body. When a small lump of pure charcoal is burned in oxygen it entirely disappears, and a substance is formed resembling neither carbon nor oxygen.

(c) Water, a liquid, may by heat be converted into steam or gas, or by abstraction of heat into ice, a solid. There has here been a change in the condition and appearance of the original substance, but no change in the materials of which water is composed. A given weight of water will produce the same weight of ice or of steam. Such changes are spoken of as physical changes.

2. (a) Dry oxygen may be prepared by heating a mixture of potassium chlorate and manganese dioxide in a test tube and causing the gas to bubble through strong sulphuric acid or to pass over dry calcium chloride. It should then be collected over pure dry mercury.

(b) $2KClO_3 + MnO_2 = MnO_2 + 2KCl + 3O_2$
$2(122.6) + 87 = 87 + 2 (74.6) + 96.$
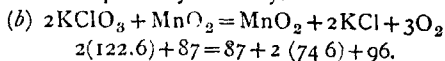
245 grams $KClO_3$ and 87 grams MnO_2 produce 96 grams oxygen.

22.4 litres of oxygen, at normal temperature and pressure, weigh 32 grams, ∴ 10 litres under

similar conditions weigh $\dfrac{32+10}{22.4}$ grams, which is therefore the *weight* of the oxygen to be obtained.

To obtain 96 grams of oxygen require 245.2 grams $KClO_3$.

To obtain $\dfrac{32 \times 10}{22.4}$ grams of oxygen $\dfrac{245.2}{96} \times \dfrac{32 \times 10}{22.4}$

3. This equation states that an atom of zinc, when treated with two molecules of hydrochloric acid, yields a molecule of zinc chloride and a molecule of hydrogen.

4. (a) $\begin{cases} Na_2 \ CO_3 \\ 46+12+48 \end{cases} \begin{cases} 10 \ H_2O \\ + \quad 180 \end{cases}$

$106 + 180 = 286.$

286 grams washing soda yield 180 grams water,

100　　"　　　"　　　"　　　" $\dfrac{180 \times 100}{286}$

　　　　　　　　　　　　　　　$= 62.9$ per cent.

286　　"　　　"　　　"　　　" 46 grams sodium,

100　　"　　　"　　　"　　　" $\dfrac{46}{286} \times 100$

　　　　　　　　　　　　　　　$=$ grams sodium.

Similarly for C and O.

(b) Sodium $\dfrac{18.55}{23} = .80$

Sulphur $\dfrac{25.81}{32} = .80$

Oxygen $\dfrac{19.35}{16} = 1.21$

Water $\dfrac{36.29}{18} = 2.01$

These are in the proportions of 1, 1, 1½, 2½, or 2, 2, 3, 5.

The formula would therefore be :

$Na_2 S_2 O_3, 5H_2O.$

5. Sulphur.—(a) Sulphur occurs native in small quantities in volcanic regions, but generally combined as in iron and copper pyrites, zinc blend, gypsum. It is a yellow solid, exists in three allotropic forms, is soluble in carbon disulphide, but not in water ; burns readily in air ; may be vaporized ; melts at a low temperature ; forms compounds with most metals, and with many directly.

(b) The only well-known compound with hydrogen is H_2S. This is a gas with offensive odor, slightly acid properties, easily decomposed, much used in chemical analysis. It is prepared by acting on ferrous sulphide with dilute sulphuric acid. The gas is collected by downward displacement of water.

$FeS + H_2SO_4 + aqua = aqua + H_2S + FeSO_4$

(c) Sulphur forms two compounds with oxygen, viz., sulphur dioxide SO_2 and sulphur trioxide SO_3. The last is not usually prepared in an ordinary laboratory.

Sulphur dioxide may be prepared by burning sulphur in air or oxygen or by heating copper with sulphuric acid. In the last case the equation is :

$Cu + 2H_2SO_4 = CuSO_4 + 2H_2O + SO_2$

The SO_2 must be collected by upward displacement of air.

It is a colorless gas, readily attracts moisture, dissolves readily in water, forming sulphurous acid. It is a good disinfectant and a good bleaching agent.

SO_3 may be prepared by passing sulphur dioxide over platinized asbestos heated in a porcelain tube. The SO_3 escapes in white fumes, and readily forms sulphuric acid with water.

6. (a) Ten litres of air at 60°C. would, at 100°C., tend to become $10 + \dfrac{373}{333}$ litres, but, as the gas is prevented from expanding, the pressure becomes proportionately greater. Pressure ∴ would be $700 \times 10 \times \dfrac{373}{333}^{mm}$.

(b) 10 litres of air at 60°C. and 700^{mm} become $10\dfrac{333}{373} \times \dfrac{700}{760}$ litres at 0°C. and 760^{mm}

22.4 litres hydrogen at 0° and 760^{mm} weigh 2 grams

22.4　　"　　air　　"　　　"　　　" 2×14.44

$10 \times \dfrac{333}{373} \times \dfrac{700}{760}$ litres air at 0° and 760^{mm} weigh

$$\dfrac{2 \times 14.44 \times 10 \times 333 \times 700}{273 \times 760}$$

6. Experiment.—Smell the gas. Observation. —A strong, pungent odor.

Experiment.—Fill a bottle with gas and invert over water.

　　Observation.—Water rises to nearly fill bottle.

　　Conclusion.—Ammonia is soluble in water.

Experiment.—Plunge a glowing and lighted splint into gas.

　　Observation.—Flame is extinguished.

　　Conclusion.—The gas does not support ordinary combustion.

7. Experiment.—Bring a moistened red litmus paper near mouth of a bottle containing the gas.

　　Observation.—The paper turns blue.

　　Conclusion.—The gas is basic.

Experiment.—Place a given volume of the dry gas in a eudiometer over mercury. Pass a series of electric sparks through gas. Then pass in dry oxygen and again pass spark. Examine remaining gas.

　　Observation.—Moisture is formed. Therefore the gas must contain hydrogen.

　　The gas remaining is nitrogen.

　　Therefore the original gas must contain at least nitrogen and hydrogen.

FOR YOUNG OBSERVERS.

The following notes on spiders and their ways may furnish to teachers many bits of interesting

information, which they may utilize with their classes in nature study or as an object lesson.

The spider is not an insect. All of the class insects in the adult *form* possess three pairs of legs ; the spider has four pairs. Its body is divided into two main portions. Its mandibles serve to grasp and kill its food. A figure shows their
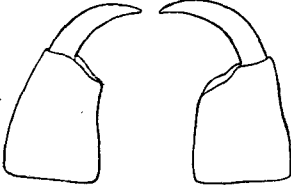
SPIDER'S MANDIBLES (ENLARGED).

general form. Through a little hole at the very end they can eject poison into the wound they have made.

The spider has eight eyes. Why is it hard to catch a spider ? Can they see as well by night as by day ? Near the hind end of the body, on the under side, are the spinnerets, two, three, four, pairs. The thread comes from these spinnerets, and from it are built webs, nests, and the egg coverings, or cocoons. The female spider is usually the larger, and frequently eats up her husband. Spiders may replace a lost leg. Where have you found spiders ? What kind of places do they like best ? You know the places where some may be found. Some bur-

SPIDER'S CLAW (ENLARGED).

row, some live under water. Do they build their webs in concealed or exposed places ? Draw a web. What is it for ? The hunting spiders leap and hop; the house spiders run ; some float in air. The thread comes in a liquid form out of the spinnerets, and hardens as soon as it meets the air. No one has ever made a thread as fine as the spider's.

Thoreau calls the little webs we see over the ground in the dewy mornings "the napkins of the fairies."

Spiders often get into open flowers and wait till insects come. The mud wasp is a great enemy of the spider. Many spiders spend the day in burrows in the ground covered by a trap door. These roam abroad at night and catch night beetles. Catch a spider and put it under a large tumbler and feed it with flies.

An old proverb says :

If you wish to live and thrive,
Let a spider run alive.

ANSWERS TO CORRESPONDENCE.

Rural Teacher, Huron : What is the cause of the colors in the rainbow ?

ANS.—Sunlight is not a simple light, but is composite, the colors being red, orange, yellow, green, blue, and violet.

If " white " light, *i.e.*, ordinary sunlight, fall on a wedge-shaped piece of glass, the colors of which it is composed are separated or dispersed. The drops of rain act towards the sunlight as does the glass referred to.

Ignoramus : In teaching the Gulf Stream I have told my pupils that the water being warmer than that underlying floats on top. How can I show my pupils that warm water will float on cold water ?

ANS.—Half fill a tumbler with cold water and place on its surface a small chip or cork. Heat some water almost to the boiling point and color it with ink. Then pour it into the tumbler so that as it falls it will first strike the chip to break the fall. Does this answer your purpose ?

THE HOWLERY GROWLERY ROOM.

BY LAURA E. RICHARDS.

It doesn't pay to be cross—
It's not worth while to try it ;
For mamma's eyes so sharp
Are very sure to spy it ;
A pinch on Billy's arm,
A snarl or a sullen gloom,
No longer we stay, but must up and away
To the Howlery Growlery room.

Chorus : Hi ! the Howlery ! ho ! the Growlery
Ha ! the Sniffery, Snarlery, Scowlery !
There we may stay,
If we choose, all day ;
But it's only a smile that can bring us
away.

If mamma catches me
A-pitching into Billy ;
If Billy breaks my whip,
Or scares my rabbit silly ;
It's " Make it up, boys, quick !
Or else you know your doom !"
We must kiss and be friends, or the squabble ends
In the Howlery Growlery room.

Chorus.

So it doesn't pay to be bad ;
There's nothing to be won in it ;
And when you come to think,
There's really not much fun in it.
So, come. The sun is out,
The lilacs are all a-bloom,
Come out and play, and we'll keep away
From the Howlery Growlery room.

Chorus.   —*St. Nicholas.*

CHATS WITH OUR READERS.

Subscriptions are pouring in at our 5-cent club rate. You are not too late, send along your list, and see if THE ENTRANCE JOURNAL will not help to brighten your school and help your pupils in their work.

Master Percy Patterson, Toronto, aged eleven years, sends us a few verses written on our composition picture of January 15th. They came too late for publication.

Compositions from all over Canada have come to hand. We are sorry that space forbids us publishing all We are pleased to notice such excellent work from our old friends of S.S. No. 14, Hay, Huron county. Admirable work was also sent in by S.S. No. 12, Warwick, Lambton county. We should mention also Bessie V. Brand, S.S. No. 8, Trafalgar, Halton county. Our old friend, John Peat, Petrolia Central School, also sends a good composition on " My Native Town."

As several of our readers have pointed out, the nouns " Jane " and " Cassius," in the article on Grammar, January 15th, were classified as common instead of proper.

In answer to M. O'Brien, Rat Portage, No. 6 copybook, either slant or vertical, will be accepted at the Entrance examination.

Mr. W. E. Verrall, in sending a club order for ENTRANCE JOURNAL, says : " Your JOURNAL is *just the thing.* I find it an invaluable aid, both to myself and my pupils."

Miss Lizzie McTague, Drumbo, Ontario, in sending a very deserving composition, says : " I am reading your issues with pleasurable interest, and have become quite enamored of them. They are proving a *veritable treasure ground* to draw from."

Flora Hooper, Third Class S.S. No. 5, Delaware, Middlesex, sends in a very good composition. We have also received a creditable effort from Harvey McCordick, aged eleven, S.S. No. 6, North Gwillimbury.

M. McLellan, Kingston, asks : " Is the sentence ' Mary's and Annie's book are here' grammatical ? " This means Mary's book and Annie's book ; this is two books, and therefore the verb is properly plural.

A great many of our correspondents ask us what we would recommend for physical exercise. We know of nothing better than a " Whiteley exerciser." Can be put up in five minutes in any room. Write to Harold A. Wilson Co., 35 King street west, Toronto, mentioning this paper, and they will send you an illustrated circular fully describing the exerciser.

Drawing.

BY A. C. CASSELMAN.
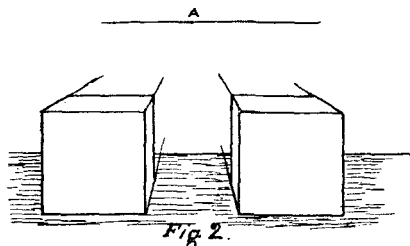
THE CUBE.

(Continued.)

Figure 1 is another method of finding experimentally the appearance of the top face of a cube when the front face is at right angles to the direction the observer is looking. B, C, D, E is a large flat book, such as a geography, placed horizontally on the desk directly in front of the pupil, with its back towards him. Pass a string under the top

Fig. 1.
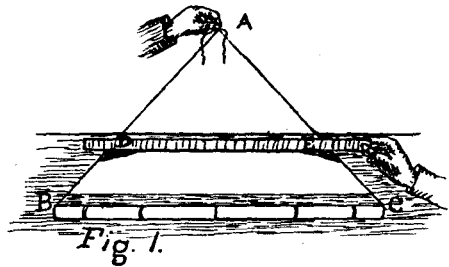
cover of the book and as far towards the back as possible. Hold the strings in a vertical position, as the pencils were held in the last exercise. Incline the strings to the right or left, keeping them in a vertical plane until the strings just hide the receding edges of the book when looking with one eye. It will be found that the strings meet. Where ? What part of the person is on the same level as the point where the strings meet ? Take a ruler in the left hand and place it against the strings, so that its lower edge appears to meet the far horizontal edge of the book. The space B, D, C, E is the apparent shape of the top of the book when drawn on a vertical plane. The strings give the apparent slant of the edges, and the vertical distance between the ruler and the near edge of the book the apparent width of the top. We learn from this that (1) *edges that recede in the direction we are looking appear to meet on the horizon, which is represented by a line on the paper called the level-of-the-eye line.* (2) *These edges meet on the level-of-the-eye line at a point opposite the eye.* (3) *Edges that are parallel converge to a point.*

All should try this experiment, as it is the fundamental principle of the representation of receding edges.

Place two cubes as in figure 2. Look horizontally at a point which is in a vertical plane be-

Fig 2.

tween the cubes. See that the front faces of the cubes are at right angles to the direction you are looking. Apply the principles just explained in figure 1 to draw the appearance of the cubes. Draw the front faces first, then the receding edges, then lines that will represent the horizontal and vertical edges that do not recede. Where do the receding edges appear to meet? Why do they appear to meet at a point? What does the point A represent? What name is given to the horizontal line through A? What does it represent?

Place the cube below the eye as before, but with all its horizontal edges receding. Place a ruler against the nearest vertical edge at its lower end as at 2. Figure 3. To draw the appearance of the cube in this position, draw the nearest vertical edge, then a line to represent the ruler, and an-

Fig. 3.
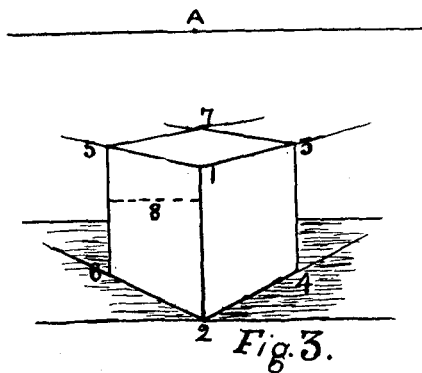
other line to represent the level of the eye. By holding the pencil in a vertical plane and inclining it to the right or left till it just hides one of the lower receding edges the apparent slant of these may be found. Draw lines as 26 and 24 to represent these edges. From 1 draw lines to represent the apparent slant of the upper edges. Should the parallel edges meet? If so, where? Why should 26,15, and 24,13 meet on the horizontal

line passing through A? To get the vertical edges 56 and 34, judge of the apparent horizontal distance between the nearest vertical edge and the others. The dotted line 8 shows this. The points 5, 6, 3, and 4 are now got. How are the edges receding from these points obtained? Explain fully two methods and show that one will prove the other. In the case of figure 3 the receding edges make equal angles with the ruler. How will the distance of the two converging points of the receding eges from the point opposite the eye compare with each other? Place the cube so that the receding edges do not make equal angles with the ruler.

Draw the cube.

Arithmetic.

ANSWERS TO QUESTIONS IN OUR LAST ISSUE.

---

(1) 5,760 acres; (2) $27\frac{3}{11}$ minutes after 2; (3) 150 acres; (4) $\frac{6}{13}$ of a day; (5) 35 miles; (6) 10 feet; (7) 85 pounds and 95 pounds; (8) $113.75; (9) 120.33\frac{1}{2}$; (10) $75.

SOLUTIONS.

---

1. 18 miles represented by $2\frac{1}{4}$ inches.

1 mile represented by $\frac{9 \times 1}{4 \times 18} = \frac{1}{8}$ inches.

∴ 1 square mile is represented by $\frac{1}{64}$ square inches.

$\frac{1}{64}$ square inches represents 1 square mile.

And a square whose side is $\frac{3}{8}$ of an inch represents $\frac{9}{64}$ square inches.

$\frac{9}{64}$ square inches represents 9 square miles.

1 square mile contains 640 acres.

9   " " " $640 \times 9 = 5,760$ acres.

3. Sold $\frac{2}{5}$ of farm

∴ $\frac{3}{5}$ of farm remained.

Sold $\frac{3}{5}$ of $\frac{3}{5} = \frac{9}{25}$ of farm.

$\frac{2}{5} + \frac{9}{25} = \frac{19}{25}$, amount sold.

$\frac{25}{25} - \frac{19}{25} = \frac{6}{25}$ of farm left.

$1\frac{620}{45} = 36$ acres left.

$\frac{6}{25}$ of farm $= 36$ acres.

$\frac{25}{25}$ of farm $= 150$ acres. Ans.

4. A. does work in $\frac{3}{4}$ day

∴ A. does $\frac{4}{3}$ of work in 1 day.

B. does work in $1\frac{1}{4}$ days

∴ B. does $\frac{5}{8}$ of work in 1 day.

Then $\frac{4}{3} + \frac{5}{8} = \frac{13}{8}$ of work done in 1 day.

∴ $\frac{8}{8}$ of work done in $\frac{6}{13}$ days. Ans.

5. In 3600 seconds the man goes 5 miles.

"   6   "   "   " $\dfrac{5280 \times 5 \times 6}{3600}$

$= 44$ feet.

Then train went $264 + 44 = 308$ feet.

In   6 seconds train goes 308 feet.

" 3600   "   "   " $\dfrac{308 \times 3600}{6 \times 5280} = 35$ miles.

6. $6\frac{1}{4}$ gallons $= 1$ cubic foot.

2,375   " $= 380$ cubic feet.

Let h $=$ depth of water.

Then $38h = 380$ cubic feet.

∴ $h = 10$ feet, depth of water.

8. Width of room, $15'\ 2''$, or 182 inches.

Width of carpet, 27 inches.

∴ $182 \div 27 = 6\frac{20}{27}$, or 7 strips required.

Length of room is 21 feet 8 inches, and 1 yard of carpet costs $2.25.

∴ $7 \times \dfrac{65}{3} \times \dfrac{2.25}{3} = \$113.75$, cost of carpeting.

10. $200 \times 6 \times 4 =$ number of cubic feet in pile.

$\dfrac{200 \times 6 \times 4}{128} =$ number of cords of wood.

$\dfrac{200 \times 6 \times 4 \times 2}{128} = \$75$, cost.

Literature.

AFTER DEATH IN ARABIA.

To understand this poem it will be necessary for the pupil to have some knowledge of Mohammedanism.

Mohammed, the founder of the sect, was born at Mecca (570-632), of very poor parents. He is called the "camel driver of Mecca." Before he died his doctrine and power had spread over Arabia, parts of Persia, Syria, etc. He accepted the Old Testament, believed in one supreme God, and regarded Christ as a prophet of God. His teaching did a great deal to raise and enlighten the people among whom he lived.

The Mohammedans regarded the five great duties of man to be :

1. Bearing witness that there is (*La Allah illa Allah*) no god but God, and Mohammed is His apostle.

2. Reciting in daily prayer.

3. Giving the legal alms.

4. Observing the monthly fast.

5. Making a pilgrimage to Mecca once in a lifetime.

They have six articles of faith : (1) God ; (2) the angels of God ; (3) the books of God ; (4) the prophets of God ; (5) the day of judgment ; (6) predestination.

This poem is written to teach us how a Mohammedan regards death from the point of view of the hereafter.

ANSWERS TO QUESTIONS IN OUR LAST ISSUE.

1. The theme of this poem is,—The Mohammedan's belief concerning death and the future state.

2. The plan of the poem is as follows :

The poem is in the form of a letter from the dead Abdullah to his sorrowing friends. It may be divided into the following parts :

(*a*) The *introduction* or *address*. This is in the Eastern form, mentioning first the writer, and, second, the person to whom sent. (Contrast our form of address in a letter.)

(*b*) Stanza I. shows us the friends of the dead Abdullah mourning around the body, which he assures them is not his real self.

(*c*) Stanza II., by three metaphors, illustrates the distinction between the body and the real personality or soul.

(*d*) Stanza III., by two more beautiful metaphors, still more strongly impresses this distinction.

(*e*) Stanza IV. shows us what death really is, the entering into an endless life.

(*f*) Stanza V. still further illustrates what death is ; the entrance into the only true life, a form of Allah's love.

(*g*) The *conclusion* or *subscription*, again in Eastern form, first names the writer and then those who carried the letter. (There were no post offices then, letters were sent by some messenger ; compare the address and superscription of the epistles.)

3. The story of the poem is as follows :

Abdullah, a follower of Mohammed, had died when the "call for prayer" (Azan) was being chanted, from the balconies surrounding the tall round towers of the Mohammedan temples, by the muezzins (miu-ez'-ins) or public criers, who call the faithful to prayer at sunrise, noon, and sunset of each day.

From the land beyond the grave he sends a message, in the form of a letter, to comfort his sorrowing friends who are gathered about his lifeless body. He tells them not to sorrow for him, as the lifeless clay over which they mourn is not him, but only the " hut," " garment," or " cage " from which his real self or soul has escaped, to live a higher and a never-dying life in an " enlarging paradise."

He further comforts them by stating that they, too, will soon be with him to enjoy the pleasures of

the new life, and exhorts them to be "stout of heart" and press "bravely onward to your home."

4. In Roberts' edition of "Pearls of Faith," from which this poem is taken, the title is given as "A Message from the Dead."

5. The poem is in the form of a letter, and the first two lines constitute the address, and the last two the subscription.

STANZA I.

"Azan." The call to prayer chanted by the muezzin, a crier, from the balconies surrounding the round towers—minarets—of the Mohammedan temples—mosques.

"Sends this." The letter or message contained in the poem.

"It lies." The dead body from which the soul, or real self, had departed.

"I know." The soul, or real self, which is speaking to the sorrowing friends.

"Ye." This form is used as more in keeping with the solemn style of the poem.

"Yet I smile." The spirit, or soul, smiles to see the friend sorrowing over what is not the real person, but only its cast-off garment.

"Thing." This word is used to express a mild contempt for the cast-off body. This will also be noticed in "let it lie."

"It was mine, it is not me." This indicates that, even in life, the body is not the real person, but merely a resting-place for the soul, or "I."

STANZA II.

"Which the women lave." "Lave" is preferable to "wash" because it is not such a common word, and therefore more "poetic." This refers to the custom of Eastern nations washing the dead before burial.

"Last bed of the grave." This is a metaphor. It is appropriate because a bed is a place for taking rest, and the grave is the place where the "last" rest is taken.

"Garment no more fitting." The garment no longer was "fitting" because of the enlargement of the powers of the soul in the new state.

"Falcon." A bold bird of prey belonging to the hawk family. They were domesticated and trained to catch other birds. Falconry was once a favorite sport.

"Bars which kept him from the splendid stars." This is very descriptive of the falcon, which is a strong, swift-winged bird, given to shooting up high in the air. "Splendid," used to describe the stars, means shining.

In this stanza the body is compared to a "hut," a "garment," a "cage," and the spirit, or soul, to

an "inmate," a "wearer," the "plume of a falcon." You will notice the fine development of the series of metaphors, the "room," "garb," and "bars" corresponding to the "hut," "garment," and "cage." Then, also, what could be more fitting than to speak of the body as a "hut," the soul as the "inmate," of the body as a "garment," the soul as the "wearer," of the body as a "cage," the soul as the "falcon"?

STANZA III.

"Be wise." Abdullah asks his friends to be wise because they are unwise in mourning over his dead body.

"Straightway." Means at once. This is an example of an "archaic" (old-fashioned) word, and since it is uncommon it is poetical and pleasing to us.

"What ye lift upon the bier." This means the dead body. This form of expression is used because it suggests onl   he material substance, "What ye lift."

"Wistful tear." Wistful or "wish ul" means longing. It is generally applied to "eye" or "look."

"'Tis an empty sea-shell." This is a metaphor. The dead body is compared to an empty shell. The dead body is useless; all that was valuable, the "soul," has departed. So in the empty sea-shell it is worthless; all that is of value, the "pearl," has gone. Oyster-shell would not do as well, being too commonplace.

"Pearl has gone." The pearl is found in the shell of the pearl oyster, and in this case the shell is broken and the pearl gone.

"The shell is broken." Death is often spoken of as a breaking of the "silver cord," or "golden bowl." "Or ever the silver cord be loosed, or the golden bowl be broken, or the pitcher be broken at the fountain, or the wheel be broken at the cistern."—*Ecclesiastes xii. 6.*

"It lies there." "It" is the dead body. "There" is on earth.

"The pearl, the all, the soul." The order is appropriate because the most important, "the soul," is left to the last, thus securing a climax.

"'Tis an earthern jar——loved Him." Here the body is compared to a "jar" and the soul to the "gold." The worthlessness of the "jar" and the great value of the "gold" make the comparisons very fitting.

"Whose lid Allah sealed." God breathed into man the breath of life, the soul, enclosing it there till in His pleasure it should depart. You will here see that the Mohammedan believes in the predestination of the human soul.

"Allah." The Mohammedan name for God.

"The while." "While" is here a noun meaning time.

"That treasure of his treasury." That is the most valuable "treasure" among all his treasures. The "treasure" was "a mind that loved Him."

"Let it lie." "It" is the dead body. The connection between "Let it lie" and the context is— The writer, whose thoughts are carried away in contemplating the value of the soul, is, by the strength of his imagination, brought back through contrast to the worthlessness of the body.

"Shard." A shard is a fragment of an earthen vessel. It is introduced here to keep up the figure in "an earthen jar."

"Be earth's once more." Let the body return to the dust from which it was made.

"Gold shines." This means the soul enjoys heaven. "Gold is an appropriate word to compare to "a mind that loved Him," since both are noted for their purity and value.

"His store." Means God's storehouse, "His treasury."

STANZA IV.

"Now thy world is understood." Now the spirit is in paradise, what was mysterious in this life is understood.

"Long, long wonder." The reason for the existence in this world of sin, sorrow, and suffering is revealed to the spirit after death, and the "wonder" they caused during life is over.

"Erring friends." Mistaken friends. They are called "erring friends" because they wept for one in paradise.

"Unspoken bliss." Bliss that could not be expressed in words, unspeakable.

"Instead." In place of being dead as you suppose.

"Lost, 'tis true, by such light as shines on you." Having only human intelligence to guide you, you look upon death as a loss. "Lost." Gone from them never to return.

"Such light." The light of human reason.

"Light ye cannot see." The light of paradise, which they cannot see, being mortal.

"Unfulfilled felicity." Happiness that is never completed, but is always bringing new joys to the soul.

"Enlarging paradise." A happiness ever increasing, because the capacity of the soul for enjoyment is ever enlarging.

"Lost, 'tis true—that never dies." While the soul is lost, as regarded by persons on earth, it lives a never-ending life in paradise, where it ever grows more perfect and more happy.

STANZA V.

"Farewell friends—yet not farewell." He says "farewell" because he is leaving them, and "yet not farewell," because they will soon join him.

"Where I am ye, too, shall dwell." They will also die and go to dwell in paradise.

"I am gone before your face." I am gone from where you can see me.

"Where I have stepped." When you have the same experiences I have had.

"Ye will wonder why ye wept." Because then all things will be so plain to them.

"By wise love taught." Wise love is intelligent love.

"That here is all and there is naught." This in paradise is all, and on earth nothing.

"Fain." Desirous.

"Sunshine still must follow rain." This line gives the reason for the statement in the preceding line. That is, after a time of weeping the mourners would be more contented, and therefore happy, just as sunshine follows rain. "Sunshine," then, stands for happiness, "rain" for sorrow, weeping, and "still" means ever, always.

"Only not at death." The connection of this phrase is "weep if ye are desirous of weeping," but do not weep on account of death.

"For death—life centre." Death I now know is only the beginning of the true life of the soul in paradise. There is a beautiful metaphor in these lines. "Death" is spoken of as "first breath," and this is beautiful to us because although "death" and "first breath" are entirely dissimilar, yet they agree in so far as the "first breath' ushers us into this life, and "death" ushers us into the life to come. We experience the pleasure in mentally finding this similarity.

"First breath." Beginning of life. "Enter life." Enter paradise.

"Life centre." All life proceeds from paradise.

"Be ye certain—Allah's throne above." Be ye convinced that every experience in this life can be traced to God's love. This will be plain to us when we reach Allah's throne, paradise. "Viewed." As seen. "Allah's throne." Heaven.

"Stout of heart." Courageous.

"Your home." Heaven.

"La Allah illa Allah." "No God but the one God." This is the watchword and the battle-cry of the Mohammedan soldiers.

"Thou love alway." Alway means in every varied experience God is alway and ever "love."

The moral teaching in school is by far the most difficult part of a conscientious teacher's work.

THE BELL OF ATRI.

Before commencing the study of this poem it would be well for the teacher to give the class the plan of the "Tales of a Wayside Inn " from which this lesson is taken.

Longfellow lay the scene in the famous old Red-Horse Tavern at Sudbury, near Cambridge and Boston, in the State of Massachusetts. Here are gathered, the host, a student, a young Sicilian, a Jew, a theologian, a poet, and a musician, telling stories in turn. The host tells the first tale, " Paul Revere's Ride." Other stories told are " The Legend of Rabbi Ben Levi," by the Jew, and " King Robert of Sicily," by the Sicilian.

They continue until the landlord's snore warns them it is time to retire, and next morning they awake to find all outdoor amusement impossible on account of a drizzling, misty rain.

Looking out of the window of the inn the Sicilian sees :

Down the road with mud besprent,
And drenched with rain from head to hoof,
The rain-drops dripping from his mane
And tail as from a pent-house roof,
A jaded horse, his head down bent,
Passed slowly limping as he went.

This, he tells his companions, reminds him of a tale, when, with their assents, he told " The Bell of Atri."

You should, if possible, read with your class a number of these tales.

QUESTIONS TO BE ANSWERED IN OUR NEXT ISSUE.

1. In a single phrase or short sentence give the main idea brought out in this poem.

2. Into what natural divisions may the poem be divided ?

3. Does this poem please you ? If so, why ?

DIVISION I.

" Atri." A-trē. Where and what ?
" Abruzzo." A-brut'-sō. Where and what?
" Ancient Roman date." What does this mean ?
" Scant renown." Give in your own words
What do you consider beautiful in lines 3-6 ?
" Re Giovanni." Rā-jō--vän' ne. What is meant ?
" Proclamation." Put this in a word of your own.
" Syndic." Who is meant ?

DIVISION II.

" Suffice it that." Put this in your own words.
" Strand." What is meant ?

" Braids of briony." What is there beautiful in this expression ? Explain the meaning.
" Votive garland." Explain fully.

DIVISION III.

" Falcons with their crimson hoods." What does this mean ?
" Prodigalities of camps and courts." Explain this.
" Love of gold." Put this in one word.

DIVISION IV.

" Naked stall." What is meant ?
" Brooding." Explain.
" How best to hoard and spare." Write this in your own words.

DIVISION V.

" Eating his head off." What does this mean ?
" Provender." What ?
" Long, lonely, silent, shadeless street." What do you consider is beautiful in this line ?
" Suburban lanes." Explain.

DIVISION VI.

" Loud alarm of the accusing bell." Put this in your own words.
" With reluctant pace went panting forth." What does this add to the strength of the poem ? What do you mean by " reluctant pace" ?
" Reiterating—jargon." Write this in your own words.
" Some one—wrong." What do you consider is the beauty of this line ?
" Belfry's light arcade." What is meant ?
" Domeneddio." Dō-men-ed-dē'-ō. Give the meaning of this.

DIVISION VII.

" Gesticulation." What ?
" Appeal to heathen gods." What is meant ?
" That he should do——his own." Was the knight right or wrong when he said this ? Why ?

DIVISION VIII.

What do you consider is the application of the two proverbs in the case of the knight ?
" What fair renown—poor brute." Why did the author put these lines in this form ?
" He who serves well—loudest at the door." Write this in your own words.

DIVISION IX.

" Abashed." Give the meaning.
" Church bells at best—my bell doth more." Explain fully.
" Unknown to the laws." What does this mean ?
" Christian clime." What is meant ?

ADDITIONAL QUESTIONS FOR TEACHER.

1. Write a description of Atri under the following heads :

(a) Its geographical position.

(b) Its date.

(c) Its history.

(d) Its situation.

(e) A comparison of the town to a person.

2. Tell in your own words the story of the " Bell of Atri " under the following heads :

(a) The setting up of the bell.

(b) The king's proclamation.

(c) The use made of the bell.

(d) The condition of the bell at the time of our story.

3. Write a description of the Knight of Atri, paying full attention to :

(a) An account of how he lived formerly.

(b) An account of how he lived at the time of our story.

(c) An account of his treatment of his horse.

4. Give a description of the Syndic of Atri, noting :

(a) His personal appearance.

(b) His character, as far as shown in the poem.

5. An account of the steed's appeal for justice, using the following heads :

(a) The time the appeal was made (Atri at noonday).

(b) The effect of the ringing of the bell.

(c) The coming of the syndic.

(d) The appearance of the horse ringing the bell.

(e) The gathering of the people.

(f) The knight questioned by the syndic.

(g) The knight's contempt.

(h) The syndic's judgment.

(i) The king's approval.

You will find that, if you use these five subjects for themes in composition, insisting that the essays are properly paragraphed, and only the one leading thought allowed in each paragraph, you will have no trouble in getting your class to write well.

Did you ever try to encourage your class to illustrate the literature lesson ? If not, try this one ; let them draw " the bell as it appears to them "; " the appearance of the horse as he rang the bell " ; or " the appearance of the knight as the syndic pronounced his judgment."

Physiology.

The following questions will be found useful in testing the Entrance class :

1. Name the organs of respiration. Where are they ? Name the two movements of breathing.

2. What two objects are gained by breathing ?

3. Describe the diaphragm, and give its use.

4. Describe the changes which take place in the atmosphere of the schoolroom from breathing.

5. State the object of ventilation.

6. Give two modes of ventilating rooms.

7. How is heat produced in the body ?

8. Name some impurities in the air which are injurious to health.

9. Give five reasons why singing is a useful exercise in schools.

10. Explain why the use of cigarettes is one of the most harmful of the forms in which tobacco can be used.

11. What effect has the use of alcohol on the respiratory organs ?

ANSWERS TO QUESTIONS IN OUR LAST ISSUE.
PHYSIOLOGY AND HYGIENE.

1. They are used, to some extent, as a guide in rejecting unsuitable food and drink.

2. When the ventilation is good the requisite amount of oxygen is introduced into the lungs by less frequent acts of inspiration than when the air is deprived of some of its oxygen, as is the case when the ventilation is imperfect.

3. The greater the amount of exercise, the greater the amount of food and fresh air is needed. Because exercise causes waste of tissue, and food repairs waste, while oxygen is the agent for reducing the waste material to a form capable of being removed by the blood.

4. Carbon, in carbon dioxide or carbonic acid, and watery vapor.

5. A valve, opening from the ventricle into the artery. From the auricle just above it.

6. Nutrition and exercise.

7. Oxygen. When it is well provided with means of introducing pure or oxygenated air, and of removing foul air.

Composition.

The following poetical rendering of our historical picture has been received from Asa Petapiece, Merrickville, Ontario. We consider the lines of merit, and we are sure our readers will appreciate this result of our efforts in the Composition column :

DEATH OF WOLFE.

A wail ! a screeching roar
Of unseen things, that o'er,
Through, around, these brave men
Harbingers of Death : Then
Wolfe gave the order, " Fire ! "
A trembling sound, entire

As one single shot flashed
From the Saxon line : crashed
The din of battle loud ;—
" Advance !" stately and proud
They march upon the foe.
Death ! it is here, we know,
But what is death ? alas,
It covers all the grass.

Our gallant leader dies,
A sight that saddens eyes
Of those brave men. " Support
Me," without an effort,
He said, " that my brave men
May not see me fall." When
A cry, " They run !" " They run !"
Aroused the dying one.
Said he, clear, without a quiver,
" Go one to the Saint Charles River
        To cut off the retreat ":—
        'Twas needless to repeat.

" Now, God be praised," said he,
" That I may die happy."
At that he resigned his breath,
And his eyelids closed in death.

Spelling.

Have you tried our plan of securing interest in
the spelling lesson ? Get each member of your
class to bring twenty-five words chosen from
the newspapers, and use these as your spelling
lesson. From all over the Province come letters
acknowledging the usefulness of this device.

Below we give two lists taken from many sent
in. Send on the work of your classes.

By Gertie McLean, S.S. No. 3, Trafalgar, chosen
from the *Daily Mail and Empire :*

1. Melancthon	2. reiterated
3. optical	4. arbitration
5. hierarchy	6. reorganization
7. agrarians	8. ad valorem
9. amiability	10. pantomimes
11. Manigua	12. patriotic
13. dynamite	14. legislatures
15. negotiations	16. contemporary
17. vigilance	18. obvious
19. applause	20. dogmatic
21. hectoring	22. unique
23. altercation	24. financially

25. congressional.

By Cassie Long, S.S. No. 3, Trafalgar, chosen
from *Golden Hours :*

1. Comicalities	2. advertisements
3. treachery	4. convention

5. performance	6. valentine
7. excruciating	8. correspondents
9. vindictively	10. hypocrite
11. conversational	12. development
13. punctured	14. phosphorated
15. enthusiasm	16. prosperity
17. proprietary	18. luxuriously
19. summons	20. denounced
21. recognized	22. recollection
23. representatives	24. democratic

25. computation.

Grammar.

ANSWERS TO QUESTIONS IN OUR LAST ISSUE.

Some ran to the boat to recover their arms ;
two discharged their muskets at random ; while
others, with more self-possession, held their loaded
guns, ready to shoot any Indian who should ap-
proach, and urged their companions not to fire
without deliberate aim. For some moments the
conflict raged, the Indians being very cautious not
to expose themselves, and the Pilgrims sending
their bullets with unerring aim, wherever they
could catch sight of the foe.—*John S. C. Abbott.*

(1) ANALYSIS.

1. Clause—" Who should approach ? "
   Kind and connection—Adjective, restrictive,
      modifying " Indians."
   Clause—" Wherever they could catch sight of
      the foe."
   Kind and connection—Adverb of time, modify-
      ing " sending."

(2) INFINITIVES.

" *To recover.*" Function—Used adverbially, modi-
      fying " ran."
" *To shoot.*" Function—Used adverbially, modi-
      fying " ready."
" *To fire.*" Function—Used objectively, direct
      object of " urged."
" *To expose.*" Function—Used adverbially, modi-
      fying " being cautious."

(3) PARTICIPLES.

" *Loaded.*" Relation—" Loaded guns."
   Classification— Perfect participle, attributive.
   Function—Used attributively, modifying "guns."
" *Being.*" Relation—" Indians being."
   Classification—Imperfect participle, appositive.
   Function—Used appositively, modifying " In-
      dians."
" *Sending.*" Relation—" Pilgrims sending."
   Classification—Imperfect participle, appositive.
   Function—Used appositively, modifying " pil-
      grims."

(4) PRONOUNS.

"*Some.*" Relation—"Some ran."
Classification—Indefinite, simple.
"*Two.*" Relation—"Two discharged."
Classification—Indefinite, simple.
"*Others.*" Relation—"Others held."
Classification—Indefinite, simple.
"*Who.*" Relation—"Who should approach."
Classification—Relative, simple.
"*Themselves.*" Relation—"To expose them-selves."
Classification—Reflexive, demonstrative, com-pound.
"*They.*" Relation—"They could catch."
Classification—Demonstrative, simple.

(5) PARSING.

"*Arms.*" Function—A noun used objectively, as the direct object of "to recover."
"*Others.*" Function—A pronoun used subject-ively, as the subject of the verb "held"
"*Indians.*" Function—A noun used absolutely.
"*Pilgrims.*" Function—A noun used absolutely.
"*Cautious.*" Function—An adjective used predi-catively, to complete "being."
"*Wherever.*" Function—A conjunction used to join the clauses of which the verbs are "send-ing" and "could catch."

(6) ADJECTIVES.

The adjectives in this extract are : The, their, their, more, their, loaded, ready, any, their, delib-erate, some, the, the, cautious, the, unerring, their, the.

COMPARISON.

Much, more, most, deliberate, more deliberate, most deliberate, cautious, more cautious, most cautious.

English.

These exercises are intended to help the busy teachers. Have one of your pupils write the ex-ercise on the board and the Entrance and Junior Fourth Classes write the answers on their slates.

Combine each of the following sets of statements into a sentence with a compound element :

1. I did not blame him.
   I did not praise him.

2. He is stupid.
   He is also lazy.

3. Towser is a good watch dog.
   So is Snap.

4. Henry has a watch.
   He also has a gun.

5. It was glue.
   If not, it was paste.

6. To profess is one thing.
   To possess is another.

7. The officer came into the house.
   He also came into the room.

8. The birds flew wildly about.
   The beasts went howling away.

9. I have cut my finger.
   For this reason I cannot write.
   My brother will write for me.

10. I have nothing to give.
    If I had anything, I would give it.

11. The horse is running away.
    If not, my eyes deceive me.

12. I will not go to the city to-day.
    The reason is that I expect some friends.
    They are to dine with me.

13. Rowing is good exercise to expand the chest.
    It is also good to strengthen the chest.
    It is also good to harden the muscles.

Write a description of the picture suggested by these lines :

Here is the place ; right over the hill
  Runs the path I took ;
You can see the gap in the old wall still,
  And the stepping stones in the shallow brook,
There is the house, with the gate red-barred,
  And the poplars tall,
And the barn's brown length, and the cattle yard,
  And the white horns tossing above the wall.
                              —*Whittier.*

Punctuate the following :

Everything in Uncle Abel's house was in the same place manner and form from year's end to years end there was old Master Bose a dog after my uncle's own heart who always walked as if he were studying the multiplication table there was an old clock forever ticking in the chimney corner with a picture of the sun upon its face forever set-ting behind a perpendicular row of poplar trees.
                              —*Mrs. Stowe.*

Mark the nouns with one line, the pronouns with two, and the adjectives with three, in the fol-lowing paragraph :

"Of all the birds of our groves and meadows the bobolink was the envy of my boyhood. He crossed my path in the sweetest weather and the sweetest season of the year, when all nature called

to the fields, and the rural feeling throbbed in every bosom ; but when I, luckless urchin ! was doomed to be mewed up during the live-long day, in the schoolroom.

O, how I envied him ! No lessons, no tasks, no school, nothing but holiday, frolic, green fields, and fine weather."

—Irving.

Public School Leaving.

ARITHMETIC.

ANSWERS TO PROBLEMS IN OUR LAST ISSUE.

(1) A.'s gain, $1,514.13 ; B.'s gain, $2,708.20 ; (2) $42\frac{6}{7}$ per cent.; (3) $5,163.96.; (4) $1,064 ; (5) $26\frac{1}{2}$ miles.

SOLUTIONS.

5. Let A.'s capital be $12,000,
   then B.'s capital is $20,000.
   $\frac{1}{4}$ of $12,000 = $3,000 taken out by A. at end of 5 months,
   $12,000 - $3,000 = $9,000 left for 7 months.
   $\frac{1}{3}$ of $20,000 = $6,666$\frac{2}{3}$ taken out by B. at end of 9 months,
   $20,000 - $6,666$\frac{2}{3}$ = $1,333$\frac{1}{3}$ left for 3 months.
   $12,000 for 5 months = $60,000 for 1 month.
   $ 9,000 for 7 " = $63,000 for 1 month.
   $20,000 for 9 " = $180,000 for 1 month.
   $13,333$\frac{1}{3}$ for 3 " = $40,000 for 1 month.

   Total.............. $343,000 for 1 month.

A. invests $123,000 o r 1 month and B. $220,000 for 1 month.
   On $343,000 gain is $4,222 33.
   On $123,000 gain is $\dfrac{\$4,222\ 33 \times \$123,000}{\$343,000}$
   = $1,514 13, A.'s gain.
   $4,222 33 − $1,514.13 = $2,708.20, B.'s gain.

4. Present worth of $3.19 for 4 months at 8 per cent. is $\dfrac{319 \times 100}{102\frac{2}{3}} = \$3.10\frac{5}{7}$.
   Present worth of $3.04 for 2 months at 8 per cent. is $\dfrac{3.04 \times 100}{101\frac{1}{3}} = \$3.00$. And cash price is $3.01.
   Therefore the most advantageous terms are $3.04 at a credit of 2 months.
   ∴.Cost is $3 50 × $3.04 = $1,064 at the end of two months. Or $1,050 now.

5. In 3,600 seconds man goes 4 miles,
   in 8 seconds man goes $\dfrac{4 \times 8}{3,600} = 15\frac{29}{45}$ yds.
   88 yards + 15$\frac{29}{45}$ yards = 103$\frac{29}{45}$ yards, distance travelled by train.

In 8 seconds train goes 103$\frac{29}{45}$ yards.
   In 3,600 seconds train goes $\dfrac{4,664}{45} \times \dfrac{3,600}{8}$
   = 26$\frac{1}{2}$ miles. Answer.

LITERATURE—DEAR HARP OF MY COUNTRY.

(1) What is the main idea brought out in this poem ?

(2) What is there peculiar in the form of the poem ?

(3) Show what part each stanza plays in the development of the theme.

(4) What is there revealed of the circumstances of time, place, and mood under which the poem was written ? Give reasons for your answer.

(5) What is there revealed in the poem of the personality of the supposed author ? Give reasons for your answer.

(6) Show in what ways the poet has given force and beauty to the poem.

STANZA I.

" Dear harp of my country." What is meant ?

" In darkness I found thee." Explain fully.

" Cold chain of silence." What figure is used here ? Is it pleasing to you? Why ?

" When proudly." Why proudly ?

" I unbound thee." What does this mean ?

" All thy chords." What is meant ?

" Light freedom and song." What do you think suggested these words to the poet ? What do they mean

STANZA II.

" The warm lay of love." What does this mean ?

" The light note of gladness." Put this in your own words. What words add most to the beauty and force of this line ? What is the connection in sense between line 2 and line 1 ?

" The deep sigh of sadness." Explain fully.

Paraphrase lines 3 and 4.

What is the force of the word "echoed" as used here ?

What poetic artifice has the poet adopted in lines 3 and 4 to give beauty to the poem ?

STANZA III.

" Farewell to thy numbers." What does this mean ? Explain.

" This sweet wreath of song." What makes this expression especially beautiful ? Explain fully.

" Last we shall twine." Why ?

What poetic artifice has been adopted in line 3?

" Sunshine of fame." Explain.

What does the poet mean in the last line ?

STANZA IV.

" Pulse of the patriot." What is meant ?

Why is the " patriot," " soldier," and " lover " introduced in this line ?

" Throbbed to our lay." Give the meaning.

" 'Tis thy glory alone." What does this mean ?

Why does the poet say this

Explain the last two lines.

Show the appropriateness of " heedlessly " and " wild."

GRAMMAR.

ANSWERS TO QUESTIONS IN OUR LAST ISSUE.

Sunset and evening star,
 And one clear call for me !
And may there be no *moaning* of the bar
 When I put out to sea.

But such a tide *as* moving seems asleep,
 Too full for sound and foam,
When *that* which drew from out the boundless deep
 Turns again *home*.

Twilight and evening bell,
 And after that the dark !
And may there be no *sadness* of farewell
 When I embark ;

For tho' from out our bourne of Time and Place
 The flood may bear me far,
I hope to see my Pilot *face* to face
 When I have crost the bar.

<div align="right">—Alfred Tennyson.</div>

I. ANALYSIS.

(*a*) Clause—When I put out to sea.

 Kind and connection—Adverbial of time, modifying " may be."

(*b*) Clause—As seems asleep.

 Kind and connection—Adjective, restrictive, modifying " tide."

(*c*) Clause—When that which drew from out the boundless deep turns again home.

 Kind and connection—Adverbial of time, modifying " may be."

(*d*) Clause—Which drew from out the boundless deep.

 Kind and connection—Adjective, restrictive, modifying " that."

(*e*) Clause—When I embark.

 Kind and connection—Adverbial of time, modifying " may be."

(*f*) Clause—Tho' from out our bourne of Time and Place the flood may bear me far.

 Kind and connection—Adverbial of cause, modifying " to see."

(*g*) Clause—When I have crost the bar.

 Kind and connection—Adverbial of time, modifying " to see."

NOTE.—The last stanza commencing with " for " would be regarded by many as a subordinate clause ; others regard it as a principal clause, co-ordinating causal with the last two lines in the preceding stanza. See H.S. Grammar, chap. xi., sec. iv., d.

That is, " for " is a co-ordinating causal conjunction when it implies the ground of the preceding statement, and subordinating when it implies the cause of the previously mentioned action. For instance, in—" It will rain, for the barometer is falling," " for " is co-ordinating causal, " for the barometer is falling " giving the speaker's reason for confidence in his statement, " it will rain." But in—" He would not venture, for he was afraid," for is subordinating, " for he was afraid " giving the cause of " He would not venture."

II. PARTICIPLES AND INFINITIVES.

Moving—Participle, imperfect.

 Function—Used appositively, modifying "tide."

(*To*) *bear*—Infinitive, gerundial.

 Function—Used as the objective complement of " may."

To see—Infinitive, gerundial.

 Function — Used objectively, the object of " hope."

NOTE.—To decide whether " may bear " in the second line of the last stanza is a verb clause, or whether " may " is the principal verb, and " bear " an infinitive complement to the principal verb " may," refer to H. S. Grammar, chapter viii., section 148.

Asking ourselves the question, Is my being borne far by the floo a possibility? we get the answer, " The floo1 may bear me far." Again, the sentence may be changed into, My being borne far by the flood is a possibility. This confirms us in saying " may " is the principal, and " bear" an infinitive complement.

III. PARSING.

Moaning. Relation—" May be moaning."

 Classification—Verbal, common, abstract noun.

 Inflection—Singular number, nominative case.

 Function—Used as the " logical " subject of " may be."

As. Relation—As seems asleep.

 Classification—Pronoun, relative, simple.

 Inflection—Singular number, nominative case.

 Function—Used to connect the clauses of which the verbs are " may be " and " seems asleep."

That. Relation—" That turns."
 Classification—Pronoun, demonstrative, simple.
 Inflection—Singular number, nominative case.
 Function—Used subjectively, the subject of
 " turns."
Home. Relation—Turns home.
 Classification — Noun, common, concrete,
 simple.
 Inflection—Singular number, objective case.
 Function—Used adverbially, the adverbial ob-
 ject after " turns."
Sadness. Relation—May be sadness.
 Classification—Noun, common, abstract, deriva-
 tive.
 Inflection—Singular number, nominative case.
 Function—Used subjectively, the " logical " sub-
 ject of " may be."
Face. Classification—Noun, common, concrete,
 simple.
 Inflection—Singular number, nominative case.
 Function—Used absolutely in the nominative
 case.

IV. SENTENCES.

1. Infinitive used as the object of a verb :—
 I like *to skate.*
2. Infinitive used as a predicate noun :—
 Seeing is *believing.*
3. Adjective clause introduced by " where " :—
 This is the city *where he lived.*
4. Noun clause used in apposition with a noun :—
 The fact *that it was written by him* is well
 known.
5. Clause used as the subject of a verb :—
 That the man was tipsy is painfully ap-
 parent.

SPELLING.

—

The following list will be found useful in testing
your Leaving class :

1 trophies,	18 daughter,	35 apprehension,
2 occasion,	19 consummate,	36 favor,
3 Druids,	20 policy,	37 maintenance,
4 novels,	21 liquor,	38 parties,
5 beaux,	22 solitary,	39 apothecary,
6 anecdote,	23 dismal,	40 having,
7 criticized,	24 flaunting,	41 civil,
8 reproaches,	25 nerves,	42 neither,
9 relieved,	26 precipitation,	43 veteran,
10 sciences,	27 bicycle,	44 distracted,
11 engagement,	28 merely,	45 mistletoe,
12 cronies	29 horror,	46 excellence,
13 conscience,	30 attorney,	47 Champlain,
14 jingling,	31 embarrassment,	48 colors,
15 honest,	32 rival,	49 quadrille,
16 mottled,	33 ambition,	50 precisely.
17 seized,	34 fashionable,	

GEOMETRY.

—

ANSWERS TO QUESTIONS IN OUR ISSUE OF
JANUARY 15TH.

(This matter was crowded out of our issue of February 1st.)

1. A problem is a proposition in which some geo-
 metrical construction is to be effected.
 (Something to be done.)
 A theorem is a proposition in which some geo-
 metrical property is to be demonstrated.
 (Something to be proved.)
2. A postulate is an elementary principle of con-
 struction taken for granted by Euclid. (A self-
 evident problem.)
 An axiom is an elementary geometrical property
 taken for granted by Euclid. (A self-evident
 theorem.)
3. A straight line is said to be drawn at right
 angles to a given straight line if it be drawn
 from a given point in the same.
 A straight line is said to be drawn perpendicular
 to a given straight line if it be drawn from a
 given point without it.
4. A triangle is a plane figure enclosed by three
 straight lines.
 According to angles triangles are divided into :
 (*a*) Right-angled triangles.
 (*b*) Obtuse-angled triangles.
 (*c*) Acute-angled triangles.
 According to sides, triangles are divided into :
 (*a*) Equilateral.
 (*b*) Isosceles.
 (*c*) Scalene.
5. The two tests of equality assumed by Euclid
 are :
 1. The first axiom (things equal to the same
 thing are equal to one another).
 2. The ninth axiom (magnitudes which fill
 the same space are equal).
6. Take a point in the unlimited line and then
 from this point cut off a part equal to the given
 straight line by proposition 3.
7. Any two angles of a triangle are not necessarily
 greater than a third ; for instance, the angles of
 a right-angled triangle.
8. The lengths 1, $\sqrt{2}$ and $\sqrt{3}$ are equal to 1, 1·
 414 and 1·732, any two of which are greater
 than the third ; therefore a triangle may be
 formed from them.
9. The converse of the second case of proposition
 26, Book I., would be as follows :
 If two triangles are equal in area, and have one
 angle of one triangle equal to an angle of the
 other, and also one side of each triangle equal
 to one side of the other, then the two triangles
 shall be equal in all respects.

COMMUNICATIONS.

—

In answer to "W.S." we give the following relating to the "carrying trade" on our lakes and rivers :

Vessels are laden at Chicago, Duluth, or Port Arthur, and carry their cargoes directly to European ports. At the present time, however, no vessel drawing more than 9 feet when loaded to her Plimpsoll mark can make the trip without lightening a part of her cargo at one or more places. Let us follow a vessel from Duluth to the mouth of the St. Lawrence. He first lockage will occur at Sault Ste. Marie rapids. This canal is about one mile long ; the lock will carry a vessel 500 feet over all drawing 16 feet. Thence she will pass through several deep straits through Lake Huron, St. Clair River, Lake St. Clair, Detroit River, and Lake Erie. At the lower end of Lake Erie she enters the Welland Canal. Here she must go down stairs through twenty-six locks a distance of 326.75 feet ; the locks on the recently enlarged canal are 270 feet long, with 14 feet of water on the sills. From the head of Lake Ontario to Cardinal, a point in Canada, just below Ogdensburg, N.Y., there are no obstructions. From this point, if ascending, she will probably have to pass through short lines of canals aggregating 44 miles in length, and having only 9 feet of water on the lock sills ; if descending, she can avoid several of them. The canal farthest down the river extends from Lachine to Montreal, and avoids the Lachine rapids. From this point there are no other obstructions except the winter accumulation of ice at the mouth of the St. Lawrence.

———

R. S. asks us : " What are shooting stars ? "

The following from *Our Times* will give a very full answer :

What are shooting stars ? Flammarion, the famous astronomer, says they are small bodies, weighing at most a few pounds, and consisting mainly of iron and carbon. They traverse space in swarms, and also revolve around the sun in long, elliptical courses like the comets. When these little bodies enter the earth's orbit they are attracted toward the earth, and great numbers are seen in a single night. Their brightness is due to the heat caused by the energy of their motion.

Their speed is about twenty-six miles in a second, or nearly twice that of the earth in its orbit. When they strike our atmosphere the friction, due to the resistance of the air, raises them to such enormous heat that they burst into flame. If they are not vaporized they pass through and beyond the upper strata of our atmosphere and pursue their proper course around the sun ; but, as a rule, they are vaporized, in which case the vapor mingles with the atmosphere, to fall later as meteoric dust.

The dates on which most shooting stars are usually seen are Aug. 10th, 11th, and 12th, and Nov. 14th and 27th. Sometimes when the sky is clear and the moon not too bright they may be counted by the thousand. The fact that the earth takes three days to pass through the shower of shooting stars affords a measure of the enormous space they occupy, the more so that they cross our orbit at right angles to the earth's course. Their orbit is a long one, and corresponds with that of the great comet of 1862.

Every thirty-three years, on Nov. 14th, the shooting stars fall as thick as snowflakes. Two hundred and forty thousand are estimated to have fallen on Nov. 14th, 1833 ; the phenomenon repeated itself in 1866, and we look forward to its recurrence in 1899. The November shooting stars appear to come out of the constellation Leo.

The latest conclusions of science are that shooting stars are the fragments of shivered comets. Comets, in fact, are comparatively short-lived bodies, few of them persisting beyond a few thousand years, and the smaller ones for a much less period only, while the duration of a planet like our earth extends to millions of years. The great comets which frightened our ancestors would doubtless be found to have lost much of their brilliancy, if we could see and identify them ; for during their course around the sun they continually throw off vapor and fragments, and are thus constantly subject to diminution.

———

HINTS FOR TEACHING GEOGRAPHY.

—

In the study of some of the rivers history will prove an important help. It is not enough to know where a river rises, and that it flows in a southerly and then southeasterly direction, continues in a southwesterly course, and so on, until it empties into such and such a body of water. In studying about the Mississippi River, for instance, much would be gained by the scholars learning of the fearful suffering caused by the river's overflowing its banks. Explain the cause of the delta, and the meaning of the word. Let the class learn something of the battles that have taken place on or near the banks of the river. If the important cities along the river have already been studied, review them and fix them in the pupil's mind in connection with the river. We have, in America, a great field for this work. Very many of our rivers have interesting facts connected with them, as the coming of the early settlers, or the founding of towns, or the battles fought in their vicinity, or other interesting historical facts.

Intermediate P.S. Department.

Designed specially for teachers of Second and Third Classes.

THE CAPTURE OF A WHALE—JAMES FENIMORE COOPER.

MISS M. A. WATT.

This extract is from "The Pilot," the best of his naval stories. Cooper was a naval officer for six years, and writes from experience in this line, writing as well, however, in the line of Indian stories and American historical novels. "The Last of the Mohicans" is a fine story of Indian and early American and French life; "The Prairie," "The Pathfinder," "The Spy," "The Deer-slayer" are all delightful books. Cooper died in 1851, aged sixty-two years, having lived principally in New Jersey. Other well-known writers of his time were Longfellow, Willis, Edgar Allan Poe, the historian Bancroft, Washington Irving, Hawthorne, Harriet Beecher Stowe (Uncle Tom's Cabin, 1850), Emerson, Holmes, and a host of others whose names are household words to us, though the last of them is gone, probably, from this earth. Word-study will come first, pronunciation and synonyms, for there are many very obscure words for young readers in this lesson. All through the lesson very liberal paraphrasing is needed; in fact, it will be required again and again in several places. When all is done, test by the questions given at the end of this paper, carefully examine the answers, and be ready to go over the lesson again.

Three divisions of description run through this extract, the two leaders, the relative positions, of the boat and the whale, and lastly and chiefly the actions of the whale. In the book itself, Long Tom Coffin is the notable feature, and a grand fellow he is.

In the first, the children will notice that the lieutenant or superior officer follows the directions of the cockswain, because of the experiences of the latter, yet the sailors take their orders from the lieutenant. Tom's coolness and composure and Barnstable's excitement will be remarked upon. The lack of cruel feeling, combined with the keen delight of the skilful huntsman, is noticed when Tom refuses to use "a soldier's weapon." This exact reckoning and prudence are worthy of remark, as well as the obedience shown by the older man to his young commander, who in his turn yields a due meed of respect for the cockswain's powers and character.

In the second place, the positions of the vessel and the whale should be settled as nearly as pos-sible, a few strokes being put on the board to give them "a local habitation." Some idea should be got of a whaling vessel, and of its accoutrements. Confused ideas cause blurred reading. Some children put in "an" and "the" and other words not printed on the page before them; making a mere noise of words. This disappears before clear painting of the scenes and thoughts of the lesson; and vigorous reading takes its place.

We now have the men in the boat pulling to-wards the whale, who is disporting himself with "immense" gayety. We pause to behold him, as Long Tom did, "poising his harpoon ready for the blow." Paraphrase freely. On moves the scene. The whale, so strong, yet so weak, falling a hope-less victim to man, so weak, yet so strong!

By the following questions a review of the les-son may be made, after the class are familiar with it, and can read it so as to give pleasure to the listeners. Books should be open.

Questions.—By what sense did Barnstable know there was a whale near? Was it the same sense which gave Long Tom warning? Explain the mean-ing of "undisturbed composure." How many times is a phrase which means much the same used in reference to Tom? What would you say of Tom's character from this? Give some words which tell of another side to Tom's character. What words give a key to Barnstable's character? Was he old or young? What were his position and duties? How did he treat Tom?

Give words which would do very nearly as well as—shoal, coolly (pronounce this one), conclude reckoning, blue water, joyous, spontaneously, sol-emn visage, relax, courser, goal, etc., etc.

Write out all the different names by which the whale is called.

Describe the noise made by the whale when playing—when dying. What was the greatest difference in its actions at these two times? Why did not the whale attack the men, who were very much smaller than he? Explain the great power of the men.

If you were painting this picture which part would you take, and why?

Write out the words you consider to be very full of meaning. Write out those that you see no meaning in. Make sentences, using "cautiously,' "trebled," "achieved," "obstructed," "ardor," etc., etc.

At what part of the sport would you have liked to be present? When would you have preferred to be farther off?

Describe the whole affair. What difference is there now in whaling? etc., etc.

Draw a picture of the scene. Write under it the words which express its meaning.

RAPIDITY AND ACCURACY IN JUNIOR ARITHMETIC.

—

BY MISS M. SCOTT, SWINTON PARK.

(Concluded.)

The devices for obtaining rapidity in adding are numerous and varied, but the result can be obtained only by careful, constant, and systematic drill.

To teach carrying both in subtraction and addition, all that is required is a thorough understanding of notation. If the child can analyze numbers into hundreds, tens, and units he will readily understand carrying in addition. In subtraction let him actually perform the taking-away process by using splints. Begin with a number of tens and units for the minuend and a number less than ten for the subtrahend 53-7. Exhibit the compound number, as 50+3 ; then after the borrowing process has been performed by use of the splints, as 40+13. This process will be more readily comprehended by the pupils if they have previously had practice in analyzing numbers into various groups of tens and units, thus 53 = 5 tens, or 50 +3 units. 40+13, 30+23, 20+33, etc., 64=60+ 4 ; 50+14 ; 40+24, 30+34, 20+44, 10+54

When the addition table has been thoroughly mastered, the multiplication table will present very little difficulty to the pupils. They have already learnt the lower combinations of the multiplication table while studying addition. They have pictured nine as composed of three groups of three each, twelve as three groups of four each, twenty as four groups of five each, etc., so that the process is not a new one. To teach the table use objects or the ball-frame; to make the meaning clear, place the balls in groups and let the pupils give the results, two sixes are twelve, three sixes are eighteen, etc. Then reverse the order of questioning. How many sixes in 12? In 18? How many groups of six must I take to make 24? 36? etc.

The pupils may also construct and write the table for themselves by using objects or dots. For drill work on the multiplication table time-questions may also be given, the teacher writing on the board the numbers to be multiplied and the multiplier, the pupils writing the products in a given time. Another good exercise is to combine addition with multiplication. Let the teacher write on the blackboard a number, as "9." Then when asked the product of any two numbers, as 8x7, the pupil is expected to give the product+9, that is, "65." Another device is to use a wheel with the multiplier in the centre and the number to be added just outside ; the teacher points rapidly to the

numbers in the circumference and the pupils give the products + the number to be added. This is of practical value, as rapid multiplication requires, first, the multiplication of the numbers given, and then the addition to the product, as quickly as possible, of the number carried from the previous product.
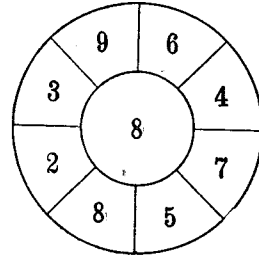
For another form of time-question which will supply seat-work, a number may be written on the board and the pupils asked to multiply it by a certain number, and each product by the number, as often as possible in a given time.

For drill work on the division part of the table, first drill on exact division. "How often is four contained in 16? 24? 32?" etc. Then combine division with subtraction. "How often is four contained in 17? 21? 27? 29?" etc.

Give numerous problems both mental and written to illustrate the principles which you are teaching. Begin with the simplest of problems and by degrees proceed from the easy to the difficult. Suppose the principle to be taught is "gain and loss." Begin with a problem which involves only subtraction. "A man bought a horse for $40 and sold it for $45. Did he gain or lose and how much?" Then gradually proceed to those involving not only subtraction, but addition and multiplication also, but still having the same principle implied.

In all problem teaching, aim to secure logical reasoning and accurate results. Train the pupil to think: (1) What the problem tells us. (2) What we are asked to find. (3) How may we find what is required from what is given.

Sinclair says : " Many of the failures of life are due to inability to sit down quietly and concentrate the mind upon a problem, weighing it carefully and arriving at a wise solution."

Problems, then, are to be made use of, not only to illustrate some principles, but by logical and accurate reasoning to apply this principle to the solution of other practical problems.

*A paper read at the meeting of the South Grey Teachers' Institute held in Dundalk, Oct. 22nd and 23rd, 1896, and requested for publication in THE EDUCATIONAL JOURNAL.

LIKE LIGHTNING.

Educational circles are in a pitch of excitement over the introduction in the Public Schools of Chicago of a system of instruction in what may be termed lightning arithmetic. Many of those interested maintain that the proposition is impracticable on the theory that only such persons as have natural arithmetical genius can be able to use to advantage any sort of rapid calculation.

One of the most rapid calculators in the state, Mr. O. D. Hinkle, of this city, says : " It is natura computation, and it is just as easy to teach a child or grown person the relationship of numbers as it is to teach them the relationship between persons. Use 100 for the head of the genealogical tree of the family of figures, and it is just as easy and natural to teach a child that 25 per cent. of any amount is one-fourth of it, because 25 is one-fourth of 100, as it is to teach him that that old gentleman is his grandfather because he is his mother's father, or that 12½ per cent. is one-eighth of any amount, because it is one-eighth of 100, as it is to teach him that the curly head over there is a cousin because he is his father's brother's child.

HOW TO GET AT IT.

" I'll give you some examples in short mental arithmetic for a change. Say you buy 80 yards of carpet at 62½ cents ; 62½ cents is five-eighths of 100 ; five-eighths of 80 is 60. Easy number, yes. Take an odd one. Say, 83 yards at 62½ cents ; five-eighths of 80 is $60 ; add three times 62½ cents, which is $1.87½ ; total, $61.87½. Say you buy 167 yards of dress goods at 33⅓ cents ; 33⅓ cents is one-third of 100 ; one-third of 167 is $55.66⅔. Say you sell 350 pounds of wool at 16⅔ cents ; 16⅔ is one-sixth of 100 ; one-sixth of 350 is $58.33⅓. Say you buy 100 bushels of potatoes at 50 cents, $50. Easy, isn't it ? But if it were 99 bushels at 49 cents, you couldn't do it so easily, and yet it is no harder, if you only knew it. Say 99 times 50 is $49.50, less once 99, which is $48 51, and it is no more difficult than 100 times 50.

" Almost every child can do multiplication up to 12, but how many older people can go higher than 12 easily ? Yet it is easy to go to 500 if he is a quick adder. For example, start at 12. Twelve twelves is 144. To get the square of 13, add 13 and 12 to square of 12 ; 13 and 12 make 25 ; 25 to 144 is 169. Square of 14—14 and 13 equals 27 ; add to 169 makes 196. To square 15—15 and 14 equals 29, added to 196 is 225. The square of 50 is 2,500. To get square of 51—51 and 50 are 101, added to 2,500 equals 2,601. To square 49—49 and 50 are 99 ; subtract from 2,500 is 2,401. The square of 100 is 10,000. To get square of 99—99 and 100 are 199 ; subtract from 10,000, equals 9,810. To square 101—101 and 100 are 201, add to 10,000 equals 10,201.

IT IS A SURE THING.

" This may look hard to some, but when one has been drilled in multiplying larger numbers mentally it is as easy as falling off a house. Some will complain that I have no right to say in 80 yards of carpet at 62½ cents, five-eighths of 80 is $50, that I don't point off according to rules. Well,

that's just what I don't want to do—that is where time is lost. With the drilling which a pupil would get prior to doing this work, one of the important things taught him would be to know that 80 yards at 62½ cents or five-eighths of 80, as in this case, would be $50, and not $5, or $500, or $5,000,which often occurs with pupils who use the old rules for pointing off. One is mechanical and liable to disastrous blunders ; the other has become intuitive from good drilling, and is a sure thing always.— *Columbus, O., Dispatch.*

Primary Department.

DIRECTION.

RHODA LEE.

" Good Morning, Merry Sunshine," and other such songs, serve to impress the directions *east* and *west*, and, proceeding from these, we can easily develop the other cardinal points of the compass.

There are many devices with which to fix the points in the schoolroom. For example :

1. The teacher names the direction, and the class, as a whole, point to it. This may be varied by asking for individual answers.

2. The teacher points, and the children give the direction.

3. The children stand, and as the direction is named turn to face the side of the room indicated.

4. The pupils are asked to walk in the different directions.

5. The teacher walks in a certain direction, pupils naming it.

6. A pupil is sent to the *north* side of the room, another to the *south, east,* and *west.* These scholars are then asked to change places. The teacher says : " East change places with south," " North with east," etc. Those in their seats watch with interest and see that it is done correctly.

7. Send pupils from their seats to shake hands with those standing in the positions mentioned in Ex. 6.

8. Prepare mail matter for a post-office service. Procure fifteen or twenty envelopes of different sizes and colors, address, and put on old stamps. A few papers and parcels may also be added. Then, by means of little messengers, send the letters, parcels, and papers to the make-believe post-offices in the different directions.

It is next necessary to extend the work to the surrounding district, the direction of streets, roads, etc., being noted.

Do not try to teach too much of this at once. Give the children time to think. Urge them to notice the directions they follow in going to their homes and coming to school. However much time be spent, do not tell them anything they can find out for themselves. Many of the so-called dull and unobservant pupils fail to see and understand because they have not been trained to use their eyes, and we must do what we can to make them *see*.

I have always found it well to intersperse these lessons with others included in primary geography. There is more in the subject of direction than we at first think, and by keeping constantly at it the children become wearied, and naturally lose their interest.

After allowing time for " thinking," tell the children that you are going to ask them next day to tell you the way to their homes. They will take great pleasure in telling you the different turns and directions followed during their progress home.

Some Friday night ask the pupils on Saturday to make a list of all the objects seen from the four sides of their home. If they have windows in all directions, well and good ; if not, they can go outside for their observations. Of course, they must be able to write before having this exercise. One paper I received was particularly interesting and concise. It read as follows :

South window—A store, pigs, chickens, geese, and a quarter of beef.

East window—A house, windows, chimneys, curtains, black cat.

North window—Trees, woodshed, roofs, church spire.

West, no window—Brick wall.

GEMS FOR THE MORNING TALK.

—

" If we speak kind words we shall hear kind
    echoes."

A recipe for happiness :

> " Do all the good you can,
> In all the ways you can,
> To all the people you can."

A SPELLING LESSON FOR SENIOR FIRST-BOOK CLASS.

—

RHODA LEE.

A useful spelling lesson for a First-Book Class consists of the names of the months of the year :

January.	May.	September.
February.	June.	October.
March.	July.	November.
April.	August.	December.

There is very little difficulty in the lesson, as the majority of the names are purely phonetic. Impress the fact that they are always written with a capital letter. Then give the abbreviations of each name—for use in dating a letter, etc. :

Jan.	*May.*	Sept.
Feb.	*June.*	Oct.
Mar.	*July.*	Nov.
Apr.	Aug.	Dec.

The three months which are not abbreviated are May, June, and July. Note the fact that a period must always follow the shortening of a name.

In connection with the lesson teach the familiar rhyme :

> Thirty days hath September,
> April, June, and November ;
> February has twenty-eight alone,
> And all the rest have thirty-one ;
> But leap year coming once in four,
> February then has one day more.

After the above lines have been memorized, put the following questions to the class :

1. How many months have thirty days ?
2. How many months have thirty-one days ?
3. Which two months in succession have thirty-one days ?
4. When was the last leap year ?
5. When is the next leap year ? (Ans. 1904.)
6. Why is 1900 not a leap year ?
7. Which one has the shortest name ?
8. Which one has the longest name ?
9. Which one do we hear mispronounced most frequently ?
10. In which month does your birthday come ?

CLASS RECITATION.

THE WINDS.

Which is the wind that brings the cold ?
　The north wind, Freddy ; and all the snow ;
And the sheep will scamper into the fold
　When the north wind begins to blow.

Which is the wind that brings the heat ?
　The south wind, Katy ; and corn will grow,
And cherries redden for you to eat,
　When the south wind begins to blow.

Which is the wind that brings the rain ?
　The east wind, Tommy ; and farmers know
The cows come shivering up the lane,
　When the east wind begins to blow.

Which is the wind that brings the flowers?
　The west wind, Bessy ; and soft and low
The birdies sing in the summer hours,
　When the west wind begins to blow.

　　　　　　　　　—C. E. Stedman.

NOTE.—Let a single pupil ask the question given in the first line of each verse, the class giving the remainder. Suitable motions may be given with the words. The winds may be denoted by the swaying of the arms raised above the head ; the north wind strong and boisterous, the south and west winds gentle, while the east wind is accompanied by the dashing of rain (the hands brought in a slant).

TALKING IN THEIR SLEEP.

" You think I am dead,"
　The apple tree said,
Because I have never a leaf to show ;
　Because I stoop
　And my branches droop,
And the dull gray mosses over me grow.
But I am all alive in trunk and shoot ;
The buds of next May I fold away,
But I pity the withered grass at my foot."

" You think I am dead,"
　The quick grass said,
" Because I have parted with stem and blade ;
　But under the ground
　I am safe and sound,
With the snow's white blanket over me laid.
I am still alive and ready to shoot,
Should the spring of the year
Come dancing here."
　　　　　　　　　—Selected.

THE DRESSED TURKEY.

One of the parish sent one morn—
　A farmer, kind and able—
A nice fat turkey, raised on corn,
　To grace the pastor's table.

The farmer's lad went with the fowl,
　And thus addressed the pastor :
" Dear me, if I ain't tired !　Here is
　A gobbler from my master."

The pastor said : " Thou shouldst not thus
　Present the fowl to me ;
Come, take my chair, and for me act
　And I will act for thee."

The preacher's chair received the boy,
　The fowl the pastor took—
Went out with it and then came in
　With pleasant smile and look ;

And to his young pro tem. he said :
　" Dear sir, my honored master
Presents this turkey, and his best
　Respects to you, his pastor."

" Good !" said the boy ; " your master is
　A gentleman and a scholar !
My thanks to him, and for yourself
　Here is a half a dollar !"

The parson felt around his mouth
　A most peculiar twitching ;
And, to the gobbler holding fast,
　He "bolted" for the kitchen.

He gave the turkey to the cook,
　And came back in a minute,
Then took the youngster's hand and left
　A half a dollar in it.
　　　　　　—Prose and Poetry for Young People.

A PROSPEROUS YEAR.

North American Life.

The annual meeting of this Company was held at its head office in Toronto, Tuesday, January 26th. Mr. John L. Blaikie, President, was appointed Chairman, and Mr. Wm. McCabe, Secretary.

The Directors' report presented at the meeting showed marked proofs of continued progress and solid prosperity in every leading branch of the Company's business. Details of the substantial gains made by the Company during the past year are more particularly referred to in the remarks of the President and the report of the Consulting Actuary.

Summary of the Financial Statement and Balance Sheet for the Year ended December 31st, 1896:

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Cash income ...........$  641,788 08
Expenditure (including
     death  claims,  endow-
     ments,  matured  invest-
     ment   policies,  profits,
     and all other payments
     to policy-holders)......   436,545 14
Assets ................. 2,515,833 41
Reserve Fund.......... ... 1,991,526 00
Net  Surplus  for  policy-
     holders............. ...   421,546 20
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WM. McCABE, Managing Director.

Audited and found correct,
JAS. CARLYLE, M.D., Auditor.

Mr. W. T. Standen, of New York, the Company's Consulting Actuary, in his full and detailed report of the years operations, said : " I have examined the Investment Policies for whose dividend periods mature in 1897, and have apportioned to them the dividends accruing thereon. These settlements, like those for 1896, will be found to compare very favourably with the results attained by the best managed companies. This is cause for congratulation on the part of your policy-holders, as, notwithstanding the large payments for investment policies maturing in 1896, you have been able to close the year again with an increased surplus to your credit. The large amount of your new business for 1896—2,603 policies for $3,554.960—being half a million dollars in excess of any previous year, shows that the plans and operations of the Company are becoming better known and appreciated. Your results show a good surplus-earning power, indicating that your business is of a paying character."

The President, Mr. John L. Blaikie, in moving the adoption of the report, said :

" I am fully warranted in congratulating every policy-holder and every person interested in the Company upon the splendid position to which it has attained, and upon the results of the past year's business.

"An examination of the figures before you reveals many most interesting and important particulars.

" If we compare the business of the year just closed with that of the previous year, viz., 1895, we have the following results :

Assets increased $215,315.26, or over 9 per cent.
Cash income increased $60,309.34, or over 10 per cent.
New insurance issued increased $542,110.00, or over 18 per cent.
Total insurance in force increased $1,714,785.00, or over 10 per cent.
Reserve Fund increased $195,704.00, or over 10 per cent.
Payments to policy-holders increased $150,459.94, or over 142 per cent.
In no former year have such magnificent results been attained.

The financial strength of a company may be seen by the relation of its assets to its liabilities. In this respect the North American exceeds that of its chief competitors in Canada, having $120 for each 100 of liability."

Hon. G. W. Allan, in seconding the resolution, said : "The President has spoken fully on the satisfactory position of the Company, yet there are one or two points to which I will briefly refer. There are our investments in which all are interested, and will be pleased to learn that they were very carefully made, and have turned out exceedingly satisfactory, as evidenced by the prompt manner in which our interest has been paid."

There is another point of comparison which will show favourably for our Company, that is, as to the relative profit earnings. I am satisfied that those interested in the Company have every reason to feel exceedingly gratified at the very prosperous condition which it holds a the present moment."

Mr. J. N. Lake, in moving a vote of thanks to the Company's provincial managers, inspectors, and agency staff, referred in very complimentary terms to the splendid work done by the outside staff in 1896, as evidenced by the grand business secured during that year, and also that the new business in January, 1897, was already largely in excess of the whole amount received for the same month last year.

James Thorburn, M.D., Medical Director, presented a full and interesting report of the mortality experience of the Company from its organization, which illustrated fully the care which had been exercised in the selection of the Company's business.

After the usual votes of thanks had been passed, the election of Directors took place, after which the newly-elected Board met, and Mr. John L. Blaikie was unanimously elected President, and the Hon. G. W. Allan and Mr. J. K. Kerr, Q.C., Vice-Presidents.