

parently there was given no solution of Mr. Ireland's "New Diophantine Problem," proposed in the September Number for 1870. I have said *apparently*, for in reality this *new* problem is but another form of the other *new* problem proposed by Mr. Ireland, in the July Number for the same year, and solved in the August Number by Mr. H. G. Kidd, who at the same time, pointed out that the problem is an old "college" one. Mr. Kidd's solution, adapted by multiplying the lengths of the sides into $\frac{780}{1309}$ and subtracting 1 from the first perpendicular, is $\frac{3120}{1309}$ and $\frac{1031}{1309}$, (+ 1, + 2, + 3), giving for the new triangles the hypotenuses $\frac{3900}{1309}$, $\frac{4801}{1309}$, $\frac{5858}{1309}$. The value of the problem, even as a mathematical curiosity, is too small to induce me to ask for the insertion of the general solution. The base,

$$\text{common to the four triangles,} = \frac{8m(m^2-1)\{(m+1)^4-4m^2\}}{\{(m+1)^4-4\}\{(m+1)^4-4m^4\}}$$

$$m \text{ being any rational number} > \frac{454 - \sqrt{949}}{230} \text{ but } < 1 + \sqrt{2}.$$

Regarding the "Indian Reserve" problem, I would respectfully suggest to Mr. Ireland that possibly no solution was offered because mathematicians saw merely a particular case of a problem of which the general solution is given as an example of "Maxima and Minima" in some of our college text books. See Todhunter's Diff. Calc. Chap. XVI., Ex. 2. The answer in the proposed case is $2\sqrt{6}$.

Strathroy, August, 1872.

III. Papers on Practical Education.

1. WHAT TO TEACH.

The Rev. Charles Brooks, father of the State Normal Schools in America, was asked by a teacher this question:

"What shall I teach my pupils?"

He answered—"Teach them very thoroughly these five things:

- "1. To live religiously.
- "2. To think comprehensively.
- "3. To reckon mathematically.
- "4. To converse fluently; and
- "5. To write grammatically.

"If you successfully teach them these five things, you will have nobly have done your duty to your pupils, to their parents, to your country, and to yourself."

2. INTEREST RULES.

For finding the interest on any principal for any number of days. The answer in each case being in cents, separate the two right-hand figures of answer to express it in dollars and cents.

Four per cent.—Multiply the principal by number of days to run; separate right-hand figure from product, and divide by nine.

Five per cent.—Multiply by number of days, and divide by seventy-two.

Six per cent.—Multiply by number of days; separate right-hand figure, and divide by six.

Eight per cent.—Multiply by number of days, and divide by forty-five.

Nine per cent.—Multiply by number of days; separate right-hand figure, and divide by four.

Ten per cent.—Multiply by number of days, and divide by thirty-six.

Twelve per cent.—Multiply by number of days; separate right-hand figure, and divide by three.

Fifteen per cent.—Multiply by number of days, and divide by twenty-four.

Eighteen per cent.—Multiply by number of days; separate right-hand figure, and divide by two.

Twenty per cent.—Multiply by number of days, and divide by fifteen.

3. HOW AND WHY, IN ARITHMETIC.

There is a general satisfaction with the *how* of a thing, while the *why* is not inquired about. Yet the "whys" are the mainsprings of thought and action; they are in the van of all progress in science and art; to them we owe our better farming and better teaching; they comprize the intelligence, and are the leaders of society, while the "hows" are satisfied to follow in the ruts of old fogies, or new fogies who can do their thinking. All know how the apple falls, but Newton said, "why?" and Science will honour him through

all time. The why of certain things inspired Columbus till the New World gave him and us the answer.

A teacher was hearing a class in Arithmetic for the first time. An intelligent boy divided $\frac{1}{2}$ by $\frac{1}{4}$ and obtained the quotient $\frac{1}{2}$. "How did you work it?" he asked. "By inverting the divisor," etc., said the boy. "Why?" asked the teacher. "The rule says so." "Why?" "I don't know; I didn't know we were to learn that." It had never occurred to him that he could give the reason for a rule. This was in Illinois, not long since, and too many teachers allow such work to pass. Hence I say these words, hoping that they may help some of them to say "why."

Pupils should be taught, from the first, to look for the cause of things everywhere. Do not bind them down to certain processes, or to accept certain results, because the rule or the book says so. I should lead them to know why the subtrahend must be written under the minuend; why, in Alligation, the cost of the several ingredients must be joined by lines; and why, in Proportion, "we make the larger of the remaining numbers the first term or the second," if there be a reason. Pupils should know why the divisor multiplied by the quotient will give the dividend; why we multiply numerators, etc., in fractions; why we point off a certain number of places in decimals; why the Amazon is so large a river; why Chicago is not at the head of Lake Michigan; why British America is so marshy and wet; and why, in the earlier wars, the armies had a certain line of march between the United States and Canada.

I have given these as representative points. And let the reasoning be clear. It will make no difference with the result whether four be multiplied by five (concrete) or the reverse, but it may make difference with the "why" of it.

Hang this motto over your school-room door: "be able to give a reason for the faith that is in you."—H. in *Illinois Teacher*.

4. TEACHING SPELLING.

Some of the Western Educational Journals have recently been discussing the merits of the different methods of teaching spelling, now most commonly in use. There has been manifested, by several writers, a want of confidence in some of these methods, and especially in those where spelling-books, so called, and oral spelling, are discarded. We sympathize, most fully, with those writers, for we are satisfied that most of the teaching at the present day, in this branch, is the departure from the best course. And we are by no means alone in this opinion; for there has been a growing dissatisfaction with the results of spelling, as taught quite generally in our schools. Formerly, spelling was entirely oral, and from spelling-books. Many now discard spelling-books and have all spelling exercises written. We have no hesitation in saying that the change from one extreme to the other, was unfortunate. The results achieved do not recommend the method when used exclusively. We believe the two methods, oral and written, must be combined, and that more prominence must be given to the former, with young pupils, while the latter should receive more attention from pupils further advanced. The orthography of a word must be associated with its pronounced sound, and the earlier this habit is acquired by the young learner, the easier it will be for that pupil to have correct associations formed in regard to the spelling. We believe in spelling-books, for the reason that by the arrangement and classification of words as there found, we can facilitate the formation of the habits above spoken of; and also show the few rules by which the orthography of our language is governed. The practice of assigning a portion of the reading lesson for a spelling exercise is not a good one for children. The argument, usually adduced in its favour, that in such connection pupils see and understand the meaning of the words, at the same time they learn to spell them, is not a correct one; for children do not, until a latter stage in their education, form such habits to any considerable extent. Lessons thus assigned are not usually studied as carefully as those in a spelling-book. All teachers will acknowledge that this is almost universally the case. The most probable explanation of this is to be found in the well-known fact that every word in a spelling-book lesson is usually spelled. The pupil expects that such will be the case, and makes no calculation on the probability that he may be called upon to spell one word rather than another. While in a reading-lesson, assigned as a spelling lesson, many of the words are not spelled, and the pupil knows and calculates upon such a fact. The certainty, in the expectation of the pupil, that every word will be spelled, is the only thing that will secure on his part a thorough preparation of the lesson.

5. SPELLING AS AN EDUCATOR.

With pupils who can write with facility, the spelling-lesson may be made a means of culture. Some one has justly remarked of labour, that he who gets only his pay is cheated. So we regard the