

Mental Mathematics.

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Probably no part of elementary mathematics furnishes such a variety of interesting problems as does the "unitary method." It is in connection with such problems that teachers who delight in long written expressions can have their most ambitious desires in that direction gratified.

It must be admitted that these expressions, when neatly written upon the board, or in well-kept exercise books, present a pleasing appearance to the artistic eye; but they often represent but a mechanical expression of rules previously learned, without a clear comprehension of the relation existing between the terms involved. Besides, there are more appropriate subjects of the curriculum affording abundant opportunity for artistic workmanship; so we can well afford to limit the use of mathematics to the exercise of rapid and accurate reasoning. The following simple problem is a typical question of the unitary method: If 3 boys in 4 days earn \$10, how much can 15 boys earn in 12 days? This is usually solved in the following manner:

$$\begin{array}{r}
 3 \text{ boys in 4 days can earn } \$10 \\
 1 \text{ boy in 4 days can earn } \frac{\$10}{3} \\
 1 \text{ boy in 1 day can earn } \frac{\$10}{3 \times 4} \\
 15 \text{ boys in 1 day can earn } \frac{\$10 \times 15}{3 \times 4} \\
 15 \text{ boys in 12 days can earn } \frac{\$10 \times 15 \times 12}{3 \times 4} = \$150
 \end{array}$$

In mental arithmetic exercise, let the teacher write the question on the board:

- (a) 3 boys in 4 days can earn \$10
 (b) 15 boys in 4 days can earn ?
 (c) 15 boys in 12 days can earn ?

If it is the first lesson, the following dialogue might take place, pupils raising hands to give the answers: *Teacher*—How many more men in (b) than in (a)? *Pupil*—5 times as many. *T.*—Then, how much will 15 boys earn? *P.*—5 times \$10 = \$50. *T.*—How many more days in (c) than in (b)? *P.*—3 times as many. *T.*—Then, how much will 15 boys earn in 12 days? *P.*—3 times \$50 = \$150. After doing several questions in this manner, express the question in two lines:

$$\begin{array}{r}
 3 \text{ boys in 4 days earn } \$10 \\
 15 \text{ boys in 12 days earn } ?
 \end{array}$$

After many questions of this nature have been solved mentally, the following written forms will be plain:

- I. 3 boys in 4 days earn \$10
 15 boys in 12 days earn $\$10 \times 5 \times 3$
 II. 5 men in 4 days earn \$30
 15 men in 2 days earn $\$30 \times 3 \times 2$
 III. 4 men in 5 days earn \$30
 6 men in 7 days earn $\$30 \times 1\frac{1}{2} \times 1\frac{1}{2} = \63
 IV. 7 men in 9 days earn \$126
 20 men in 4 days earn $\$126 \times \frac{20}{7} \times \frac{4}{9} = \160

To enable the teacher to quickly place a number of questions on the board for rapid solution, the following form will be found convenient:

	Men	Days	Wages		Men	Days	Wages
(1)	5	4	\$30	:	15	2	?
(2)	6	7	\$63	:	2	14	?

To attain greater speed in mind and hand, I frequently try the following plan. I place upon the board about 10 problems in the above form; and allow the pupils to commence their solution about 10 minutes previous to the time for dismissal. When a pupil has shown me his exercise book with the required answers correctly filled in, he is permitted to retire. Any teacher who desires to witness a scene of the most intense activity should occasionally resort to such a method.

The following 8 questions were solved by one of my pupils in 6 minutes:

	Men	Days	Wages		Men	Days	Wages
(1)	3	2	\$10	:	12	4	?
(2)	7	5	\$60	:	14	15	?
(3)	4	11	\$66	:	12	33	?
(4)	10	13	\$260	:	30	26	?
(5)	14	17	\$300	:	28	51	?
(6)	4	4	\$32	:	12	12	?
(7)	7	10	\$105	:	?	10	\$420
(8)	4	5	\$30	:	4	?	\$90

"We owe the steel pen," said an inventor in the *Louisville Courier Journal*, "to a man named Joseph Gillott, an Englishman. He was a jeweller, and lived in Birmingham. One day, accidentally splitting the end of one of his fine steel jewel-making tools, he threw it peevishly on the floor. An hour later it was necessary for him to write a letter. Where was his quill pen? He searched high and low, but could not find it. Looking, finally, on the floor, he discovered, not the pen, but the broken steel tool. "I wonder if I couldn't make shift to write with this," he said. And he tried to write with the split steel, and, of course, succeeded perfectly. To this episode we owe the steel pen, which has superseded the quill all over the world."