THE EDUCATIONAL REVIEW.

reasoning powers, and if in this study the teacher does the reasoning and the scholar merely assents, the chief value of the subject is gone. If the teacher patiently explains over and over again the way to do certain typical problems, until at length the child grasps the idea, the child's reasoning power is exercised to the minimum rather than to the maximum degree.

It is, therefore, of the highest importance that the child should be taught independence in the matter of attacking problems, and it is often a good plan to concentrate on this for a considerable time at the beginning of the school year. Practise attacking problems in class. Never mind arriving at the answers. That may be done later, and it is incidentally very good for children to learn that the answer is not everything. Most children think that "so long as you get the answer" all is well, and that is a pernicious idea. Select, then, a considerable number of easy problems, and

I.

Problem :- A train travelling 42 miles an hour, takes 16 hours to go from Newton to Avonmouth. How far is it from Newton to Avonmouth? What quantities are mentioned in this problem? What will be the denomination of the answer? Is it more or less than 42 miles from N. to A? What possible ways are there of making 42 bigger?

(If the class does not at once see that there are but two possible ways, question as follows:-What four ways have you learnt of dealing with numbers? Does dividing make a number bigger or smaller? Does adding etc., until you have elicited that only by adding or multiplying can any number be increased). Shall we add 161/2 hours to 42 miles? If adding is no use, what is left to try? Are you positive adding is no use? (Find out what the class thinks on this point, but do not express any opinion yourself.) If any pupil thinks adding might be of service, let him demonstrate. If all think it of no use here, let the answer pass, and continue). How far did the train go the first hour? Have written on board:-

After the 42's have been added, ask:-How many 2's are there in the units column? What does 16 times 2 make?

How many 4's in the tens column?

What does 16 times 4 make?

But if you say 16 times 2, and 16 times 4, that in not adding, it is _____?

Then what is the sensible way to set down that clumsy column of 42's?

Is the answer the same whether you add or multiply? Do it and see.

Try the same process with 4 times 37, and 6 times 53, etc.

Why then should we multiply in this problem rather than add?

Which do you suppose was invented first, adding or multiplying?

Show that the man who invented multiplication was a little like the man who invented printing. They both wanted to save time.

Can you do this sum by multiplying?

618 + 917 + 314.

Can you do this one by multiplying?

618 + 618 + 618 + 618

What is the difference?

II

Problem: -- 68,179,600 pounds of pork were exported from the United States in a certain year. How many barrels of 200 lbs. each were exported? What quantities are mentioned in this problem?

What will be the denomination of your answer? Will there be as many as 68,179,600 barrels of pork exported?

Then will your answer be greater or less than 68,179,600.

What two ways do you know of making a number less?

What quantity have we in this problem that we could subtract from 68,179,600?

If we took 200 lbs. away, how many bbls. would it fill?

Take away 200 lbs. enough times to fill ten barrels.

Have you used up all your pork? Could you go on subtracting 200 lbs. until you found how many bbls. 68,179,600 lbs. would fill?

42

Train went 42 miles first hour. How far did it go the second hour? Set that down exactly under the first statement. Continute this form of question until 16 hours are accounted for on the board. Now, who can find out how far the train went in 16 hours?

Would it be a good way to solve the problem? Why not?

In what other way could you solve it?