Practical Methods.

A BLACKBOARD EXERCISE.

The following is an extract from an English publication:

"I *got* on horseback within ten minutes after I *got* your letter. When I *got* to Canterbury, I *got* a chaise for town; but I *got* wet through before I *got* to Canterbury; and I have *got* such a cold as I shall not be able to *get* rid of in a hurry. I *got* to the Treasury about noon, but first of all I *got* shaved and dressed. I soon *got* into the secret of *getting* a memorial before the Board, but I could not *get* an answer then; however, I *got* intelligence from the messenger that I should most likely *get* an answer the next morning. As soon as I *got* back to my inn, I *got* my supper, and *got* to bed. It was not long before I *got* to sleep. When I *got* up in the morning, I *got* my breakfast, and then *got* myself dressed, that I might *get* out in time to *get* an answer to my memorial. As soon as I *got* it I *got* in the chaise, and *got* to Canterbury by three, and about tea-time I *got* home. I have *got* nothing more to say, and so adieu."

1. Copy the extract carefully as regards spelling and punctuation, the use of capitals, etc.
2. Give a synopsis of the verb *get*.
3. Give mode and tense of each *got* in the above extract.
4. Rewrite the extract, substituting a word for *got* in each clause.
5. Write as many synonyms as possible for the word *got*, and put each synonym in an original sentence.
6. Of the words that you have substituted for *got*, select those that you regard as perfect synonyms and write them in a column giving your reason for the selection.

S. H. Thompson.

HOW TO TEACH FRACTIONS.

The remainder of a division sum suggests the necessity of dealing with the parts of unity. Here an appeal may be made to the eye:

and it may be demonstrated that one-seventh of two inches is the same as two-sevenths of one inch. I need not say that in your early lessons in fractions, the method of visible illustration is especially helpful, and that by drawing squares or other figures, and dividing them first into fourths and eighths, then into thirds, sixths and ninths, or by the use of a cube divided into parts, you may make the nature of a fractional expression very evident even to young children, and may deduce several of the fundamental rules for reduction to a common denominator, and for addition and subtraction.

Fractions afford excellent discipline in reasoning and reflection. No one of the rules should be given on authority, every one of them admits of being thought out and arrived at by the scholars themselves, with very little of help and suggestion from their teacher. What for example can be more unsatisfactory than the rule for division of fractions, if blindly accepted and followed. "Invert the divisor and treat it as a multiplier." This seems more like conjuring with numbers than performing a rational process. But suppose you first present the problem and then determine to discover the rule. You here find it needful to enlarge a little the conception of what division means. "What is it" you ask, "to divide a number?" It is

(1) To separate a number into equal parts;

(2) To find a number which multiplied by the divisor will make the dividend;

(3) To find how many times, *or parts of a time*, the divisor is contained in the dividend.

It will have been shown before, that this expression, "the parts of a time," is necessary in dealing with fractions and involves an extension of the meaning of the word divisor, as ordinarily understood in dealing with integer numbers. You may then proceed to give four or five little problems graduated in difficulty; e.g.,

(1) Divide 12 by $\frac{1}{3}$. What does this mean? To find how many times $\frac{1}{3}$ is contained in 12. But $\frac{1}{3}$ is contained three times in 1, so it must be contained 3×12 times in 12. Wherefore to divide by $\frac{1}{3}$ is the same as to multiply by 3.

(2) Divide 15 by $\frac{3}{4}$. This means to find how many times $\frac{3}{4}$ are contained in 15. But $\frac{1}{4}$ must be contained in it 15×4 or 60 times. So $\frac{3}{4}$ must be contained in it one-third of 60 times or $\frac{4 \times 15}{3}$. Wherefore to divide by $\frac{3}{4}$ is the same as to multiply by 4/3.

Divide 5/7 by $\frac{3}{4}$. This means to divide by the fourth part of 3. Let us first divide by 3. Now 5/7 divided by 3 $= \frac{5}{7 \times 3}$ or 5/21. But since we were not to divide by 3 but by the fourth part of 3, this result is too little, and must be set right by multiplying by 4. Hence $\frac{4+5}{21}$ is the answer. Wherefore to divide 5/7 by $\frac{3}{4}$ is the same as to multiply by 4/3.

(4) To divide 5/7 by $\frac{3}{4}$ is to find how often 3/4 is contained in 5/7. Let us bring them to a common denominator, 5/7=20/28, and $\frac{3}{4}$=21/28. The question therefore is, How often are 21/28, contained in 20/28? Just as often as 21 dollars are contained in 20 dollars: that is to say not once, but 20/21 of a time, for this fraction represents the number of times that 20 contains 21. Wherefore $5/7 \div \frac{3}{4} = 5/7 \times 4/3$.

(5) To divide 5/7 by $\frac{3}{4}$ is to find a fraction which if multiplied by $\frac{3}{4}$ will make 5/7. That means that $\frac{3}{4}$ of this unknown fraction will make 5/7. But whenever A is $\frac{3}{4}$ of B, B must be 4/3 of A. Hence the desired fraction must be 4/3 of 5/7. But this is the same fraction which would have produced by inverting the divisor and making it as a multiplier.

Wherefore to divide by any fraction is to multiply by its reciprocal, or

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}.$$

I recommend that after each of these short exercises the numbers be altered, and the scholars required one by one to go through the demonstration orally. This will be found to serve exactly the same purpose as the proving of a theorem in geometry. It calls out the same mental qualities, demands concentration of thought and careful arrangement of premises and conclusion, and furnishes an effective though elementary lesson in logic and in pure mathematics.—J. G. Fitch, M.A., in *Central School Journal*.

AN EXPEDIENT IN LONG DIVISION.

The little device presented below was first brought to my attention at an institute at Humboldt, Tennessee, in 1884. I have tried it with young pupils, and it is a good thing.

EXAMPLE.

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3451)45873964(13292
     3451
     11363
     10353
      10109
       6902
       32076
       31059
        10174
         6902
Remainder—3272
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3451 ×	1= 3451
	2= 6902
	3=10353
	4=13804
	5=17255
	6=20706
	7=24157
	8=27608
	9=31059

EXPLANATION.

The pupil writes the dividend and divisor in the usual position. Before proceeding further he stops and makes out his *table*: that is, he multiplies the divisor by the first nine digits and retains the products as a table of reference. A glance is sufficient to show him what is the proper quotient figure, the corresponding product is subtracted from the partial dividend, and so on to the end. The advantages are many and obvious. I will name two: The chance of making a mistake is reduced to a minimum, and there is eliminated the troublesome "How many times will it go?" But it is longer than the ordinary method, provided the pupil can work by the old method without making mistakes. In that case he needs no new helps.

—E. Grace, in *Southwestern Journal of Education*.

Have occasional pronunciation tests. Prepare and put on the board at least ten words commonly mispronounced. Do this soon enough to enable earnest pupils to consult the dictionary.