=1 square acre, and 1210=a rood, and 160 square rods=1 acre. In most of our text-books we find in the tables a collection of old fossil remains that have drifted down to us from the age of kilderkins, chaldrons, fothers, angels, etc. They seem to us wholly out of place in our junior classes, having no bearing on actual business as now conducted, and serving to load the "mighty ten years" with old rubbish instead of precious seed.

The use of factoring in helping to shorten the mechanical work of arithmetic can scarcely be exaggerated, and the sooner young pupils can be taught to apply it the better. Thus, in the following question a little factoring actually abolishes the whole of the mechanical work:—A speculator borrowed \$5000, and immediately invested it in land. Six months afterwards he sold the land for \$7500 on 12 months credit with interest. Find the speculator's profit, supposing he pays back the \$5000 in 18 months after borrowing it, and taking all moneys worth 6%.

$$\text{Sum received for land} = \$7500\,(1{\cdot}06)$$
$$\text{" paid back} = \$5000\,(1{\cdot}09)$$
$$i.\,e.\ \text{profit} = \$7500\,(1{\cdot}06) - 5000\,(1{\cdot}09)$$
$$= 7500\,(1{\cdot}06) - 5000\,(1{\cdot}06) - 5000\,({\cdot}03)$$
$$= 2500\,(1{\cdot}06) - 2500\,({\cdot}06) = \$2500$$

The following illustrates a similar useful application of factoring. Find the area of a triangle whose sides are 760, 950, and 570. Applying the ordinary rule.

$$\text{area} = \sqrt{(1140 \times 380 \times 190 \times 570)}$$
$$= 100\sqrt{(114 \times 38 \times 19 \times 57)}$$
$$= 19 \times 1900\sqrt{(6 \times 2 \times 1 \times 3)}$$
$$= 19 \times 1900 \times 6 = \&c.$$

Closely connected with the preceding are the contracted methods of multiplication and division of decimals, and the method of dividing by successive factors and writing down the correct remainder.

We have often heard complaints against the ordinary rule for contracted multiplication, inasmuch as a little uncertainty occasionally arises as to where the decimal point should be placed. The following obviates that difficulty and can be applied by young pupils. First make the multiplier a whole number by removing the decimal point to the right. Remove the decimal point of the multiplicand as many places to the left, putting in cyphers if necessary. Count off towards the right from the decimal point of this multiplicand as many figures as are required to be correct in the product. Under the last of these figures place the first figure of the multiplier reversed. Now multiply each figure into the one immediately over it, in the ordinary way, carrying as usual. Lastly point off as many figures as there are from the decimal point of the multiplicand to the first figure of the multiplier. This is only a modification of the common rule.

Example: simplify $\dfrac{399{\cdot}075 \times 5{\cdot}4166}{105{\cdot}416}$

Using both contracted multiplication and division the operation stands

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         03990750
            66145
         --------
         19953750 .
          1596300
            39907
            23945
             2394
105416)2161629·6(20·505
          533096
            6016
```

After multiplication the decimal point stands between the 61 and 62, but in the division we make the divisor a whole number, and hence change the point in the dividend over to the right three places. In the division multiply and subtract at once. When the quotient is 0 bring down the 6 as well as the 9.

It should be borne in mind that circulating decimals can be conveniently managed either in division or multiplication without the trouble of reducing them to common fractions and then back again, if we carry out the circle for say five or seven figures and then apply the contracted methods. If we do not get the precise result we can generally see what the true circle is in the product or in the quotient as the case may be. Will some of our friends experiment on a few decimals and confirm what we have said?

Before we close we wish to refer to the most important point we intend to notice namely, *the use of the simple arithmetical equation.* From the day boys and girls begin to learn written arithmetic it is absolutely necessary to compel them to set down the theory of their operations before they begin the mechanical work required to find the answer. Perhaps no single omission does so much harm to the learner as the lack of proper training in the art of *indicating* the work to be done before attempting to execute it. Full and systematic solutions dispel a great part of the mystery which hangs about the subject. In this connection the application of the axioms to the arithmetical equation are of prime importance. Very often a little skill in factoring and in using the equation shorten the work by more than one half. The two examples given here will illustrate the preceding remarks. A commission merchant sold a consignment of goods on 3% commission, and was instructed to invest the proceeds in other goods on 2% commission, both commissions being deducted in advance and amounting to \$265. Find the proceeds of the consignment and the value of the goods.

$$\text{proceeds} = \text{commission} + \text{goods}$$
$$\text{Now 1st com.} = 3\%\text{ of proceeds} = 3\%\text{ com.} + 3\%\text{ goods}$$
$$\text{2nd com.} = 2\%\text{ goods}$$
$$i.\,e.\ \text{whole commission} = 3\%\text{ com.} + 5\%\text{ goods}$$

add 2% com. to each of these equals, and we have

$$102\%\text{ com.} = 5\%\text{ com.} + 5\%\text{ goods} = 5\%\text{ proceeds},$$

$i.\,e.\ \dfrac{102}{100}$ of \$265 $= \dfrac{5}{100}$ of proceeds. Multiply both sides by 20

and $\dfrac{102 \times 265}{100} \times 20 = \text{proceeds} = \$5406$

$$\therefore\ \text{goods} = 5406 - 265 = \$5141.$$

By selling out £4500 in the India 5% stock @ 112½, and investing the proceeds in Egyptian 7% stock, a person finds his income increased by £168 15s. What is the price of the latter stock?

$$\text{First income} = 45 \times 5$$
$$\text{2nd "} = \frac{45 \times 112\tfrac{1}{2}}{\text{price}} \times 7$$

Hence

$$\frac{45 \times 112\tfrac{1}{2} \times 7}{\text{price}} - 45 \times 5 = 168\tfrac{3}{4}$$

add 45×5 to both the equals, and

$$\frac{45 \times 112\tfrac{1}{2} \times 7}{\text{price}} = 168\tfrac{3}{4} + 225 = \frac{1575}{4}$$

Divide both numerators by 45×7, and we get

$$\frac{112\tfrac{1}{2}}{\text{price}} = \frac{5}{4}. \quad \text{Multiply both sides by 4 price}$$
$$450 = 5\ \text{price}$$
$$\therefore\ \text{price} = 90.$$

We feel sure from careful observation that it pays handsomely in the end to accustom learners to put down the *whole* process, and to use all the symbols with a precise meaning. Here is the proper place to introduce a few words of caution on the *abuse of the equation*, to show the absurdity, or, at least, the bad taste of writing such expressions as

$$\frac{5}{16} = \$80\ \therefore\ 1 = 256\ \&c.$$

instead of

$$\frac{5}{16}\ \text{amt.} = \$80\ \therefore\ \text{amt.} = \$265,\ \&c.$$

However we must cease for the present. We wish all our readers much enjoyment of the long holidays, and if we have opened a small chink by our previous rambling remarks, reflection and experience will no doubt reveal the extensive landscape that lies beyond.

Several answers to correspondents are held over till next issue.

Special Articles.

PHYSICAL DEVELOPMENT AND SCHOOL WORK.

(From a paper read by C. D Curry, M.A., M.D., before the East Victoria Association.)

[The former part of Dr. Curry's paper was devoted to showing the relation between the physical development of children on the one hand and good food, suitable clothing, pure air and exercise on the other. The latter part which is given below deals more particularly with school-work.—Ed.]

We now enter upon the second and more important portion of our subject, viz: the influence of school work upon development. Heretofore we have taken no notice of the influence of the brain and of intellectual exertion on the growth of the body. The brain as