

It seems hardly worth while so far to judge here of the respective claims of the Rule of Three, and of the Unitary Method, to proprietorship in this and all in the next set of examples.

Ex. 8. If 9 horses can plough 46 acres in a certain time, how many acres can 12 horses plough in the same time?

Since 9 horses can in the given time plough 46 acres.
 1 horse can in the given time plough $\frac{46}{9}$ acres.
 $\therefore$ 12 horses can in the given time plough $\frac{46 \times 12}{9}$ acres
 or $61\frac{2}{3}$ acres.

Is that much better (simpler or more concise) than the old-fashioned answer to the question, "How many?" viz.: more than 46, just in proportion as 12 is greater than 9;
 $\therefore 9 : 12 :: 46 : \frac{46 \times 12}{9} = 61\frac{2}{3}$ acres?

The rule for stating in the Rule of Three : "If the answer is to be greater than the given single term, place the less term of the given ratio first : but if less, then the greater first," compares favourably with this "Note" II.:—"In simple questions of this kind we have a *supposition* and a *demand*. Each contains two kinds of things; in the *supposition* the magnitudes of *both* kinds are given; in the *demand* a magnitude of one kind is given, and the appropriate corresponding magnitude of the other kind has to be found. The first line of the solution contains the magnitudes of the supposition, so arranged that at the end of the line we have that kind of thing, of which the magnitude is required in the demand."

Then, just once more, compare this (expressed even in its clumsiest form) for the Rule of Three :—"The terms of a ratio must be reduced to the same denomination," with this Note III., "To one of the magnitudes in a supposition there is a corresponding magnitude of the same kind in the demand, and these magnitudes must be expressed in units of the same denomination."

As to problems involving fractions we have

Ex. If $\frac{2}{3}$ of an estate be worth £1,500, what is the value of $\frac{1}{3}$ of the estate.

Since $\frac{2}{3}$ of the estate is worth £1,500

$\frac{1}{3}$ of the estate is worth £ $\frac{1500}{2}$

$\therefore$ the estate is worth £ $\frac{7 \times 1500}{3}$

Hence $\frac{1}{3}$ of the estate is worth £ $\frac{4 \times 7 \times 1500}{5 \times 3}$ or £2,800.

Assuming, as we must do, that this is not the first example given to the student, but that he knows something of arithmetic by this time, and that his duty is now not to solve this problem by reference to first principles, but to make all or any of his present knowledge of the subject subservient to the solution; is it not better to say—this is an example in direct proportion, for the answer will be in the same ratio to £1,500 that $\frac{1}{3}$ is to $\frac{2}{3}$: the student remembers, too, that to divide by a fraction is to multiply by its reciprocal. All this stated *arithmetically* is:—

$\frac{1}{3} : \frac{2}{3} :: 1500 : \text{Ans.}$

$\therefore \frac{1}{3} \times \frac{3}{2} \times 1500 = £2800$ is the Ans.

Again in complex Problems (compound proportion).

Ex. 1. If 12 horses can plough 96 acres in 6 days, how many horses will plough 64 acres in 8 days?

In 6 days 96 acres can be ploughed by 12 horses.

In 1 day 96 acres can be ploughed by 6×12 horses.

In 1 day 1 acre can be ploughed by $\frac{6 \times 12}{96}$ horses.

In 8 days 1 acre can be ploughed by $\frac{6 \times 12}{8 \times 96}$ horses.

In 8 days 64 acres can be ploughed by $\frac{64 \times 6 \times 12}{8 \times 96}$ horses.

$\therefore$ The number of horses required is 6.

Apparently simple enough to be sure, though there might be some difficulty in deciding as to the arrangement of the first line in the solution. But how, or how much, is it better (or worse) than the old way?

The answer depends on the number of acres (directly), and on the number of days (inversely), and will be obtained by compounding these ratios. $\therefore$ *Arithmetically*:

$96 : 64 \} :: 12 : ? \therefore \frac{6 \times 64 \times 12}{8 \times 96} = 6$ is answer.

The *practical* convenience of cancelling is