Example: Question: *If* $px + qy = 10$
and $8x + 10y = 40$
and *p and q are constants.*
If the equations have many solutions, find the value of $\frac{p}{q}$

For speed, while solving something similar, only THINK the words in blue; WRITE only the words in other COLORS.

Given: 1) the two equation.

Road Map of Solution:
First Step: multiply both sides of the first equation with 4, so that RHS of both equations become equal.
Second Step: Compare the coefficients of variables "x" and "y" to find the values of "p" & "q".
Third Step: Now that we know the values of "p" & "q", we can find the value of $\frac{p}{q}$

$px + qy = 10$ ..... *eq#1*
$8x + 10y = 40$ ..... *eq#2*

Multiply both sides of the first eq#1 with "4", so that RHS of both equations become equal.
$(px + qy) \times 4 = (10) \times 4$
$4px + 4qy = 40$ ..... *eq#1b*

In eq#2 & eq#1b, since the RHS are the same, when we compare the coefficients of "x" & "y", we get,
$4p = 8$
$(4p) \times \frac{1}{4} = 8 \times \frac{1}{4}$
$p = \frac{8}{4}$ ..... *eq#3*
and
$4q = 10$
$(4q) \times \frac{1}{4} = (10) \times \frac{1}{4}$
$q = \frac{10}{4}$ ..... *eq#4*

From eq#3 & 4, we get,
$\frac{p}{q}$
$= p \div q$
$= \frac{8}{4} \div \frac{10}{4}$
$= \frac{\cancel{8}}{\cancel{4}} \times \frac{\cancel{4}}{\cancel{10}}$
$= \frac{4}{1} \times \frac{1}{5}$

$= \frac{4}{5}$ ..... *Answer*