

### Solving Word Problems with Ratios and Proportions

$\frac{2}{3}$  part  
whole

2 : 3

Sample unit a    =    Total unit a

unit b    =    unit b

- Set one ratio up with information about the sample. Set the other ratio up with information about the total. Label these to avoid later confusion.
- The numerators on each side of the proportion should describe the same thing. One should describe the sample and the other should describe the total. **SAME UNITS!**
- The denominators on each side of the proportion should describe the same thing. One should describe the sample and the other should describe the total. **SAME UNITS!**
- If your variable is in the denominator, take the reciprocal of both sides before solving. **Flip both sides**
- Solve for the variable.
- Substitute to verify your solution.

$\frac{5}{4} = \frac{2}{x}$

↓

$2 \cdot \frac{4}{5} = \frac{x \cdot 2}{2}$

$\frac{8}{5} = x$

Sep 5-8:22 AM

Antonio read the first 60 pages of his book in 40 minutes. At this rate, how long should it take Antonio to read the rest of his 210 page book?

Sample pages 60 = 210 Total pages

min 40 = x min

$210 \cdot \frac{40}{60} = \frac{x \cdot 210}{210}$

$140 = x$

$\frac{140}{40}$  (min total)  
-  $\frac{40}{40}$  (min already read)

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**100 min left**

The ratio of boys to girls in Ms. Hagan's classes is 4 to 5. Ms. Hagan has 90 students. How many students are girls?

boys girls  
4 to 5  
students = 9

Sample students 9 = 90 Total students

girls 5 = x girls

$(90) \frac{5}{9} = \frac{x}{90}$   $(90) \frac{450}{9}$

$x = 50$

Sep 5-8:30 AM

Nikki ate 15 grapes in one minute and twenty seconds. At this rate, how long should it take her to eat 85 grapes?  $\rightarrow 80 \text{ sec.}$

grapes  $\frac{15}{80} = \frac{85}{x}$  grape  
 sec.  $\frac{80}{x}$  sec

$85 \cdot \frac{80}{15} = \frac{x \cdot 85}{85}$   $x = 453.\bar{3}$

Dave typed the first 8 pages of his report in 24 minutes. At this rate, how long should it take Dave to finish typing the rest of his 60 page report?

pages  $\frac{8}{24} = \frac{60}{x}$  pages  
 min  $\frac{24}{x} = \frac{60}{60}$  min

$x = 180 \text{ min}$

$180 \text{ min} - 24 \text{ min}$   
 $156 \text{ min}$

Sep 5-8:30 AM

Solve each proportion.

1)  $\frac{3}{2} = \frac{v-3}{4}$   $\frac{3}{1} = \frac{2v-6}{4}$

$6 = v - 3$   
 $+3 \quad +3$   
 $9 = v$

2)  $\frac{p-3}{4} = \frac{2}{3}$   $\left\{ \frac{17}{3} \right\}$

3)  $\frac{4}{n+4} = \frac{3}{2}$   $\left\{ -\frac{4}{3} \right\}$

4)  $\frac{3}{2} = \frac{4}{x+3}$   $\frac{4 \cdot 2}{3} = \frac{x+3}{4}$

$\frac{8}{3} = x + 3$   
 $-\frac{9}{3} \quad -3$   
 $-\frac{1}{3} = x$

5)  $\frac{2}{4} = \frac{v+4}{2}$   $\left\{ 3 \right\}$

6)  $\frac{4}{2} = \frac{3}{v+1}$   $\left\{ \frac{1}{2} \right\}$

$3(x+3) = (4)(2)$   
 $3x + 9 = 8$   
 $-9 \quad -9$   
 $3x = -1$   
 $\frac{3x}{3} = \frac{-1}{3}$   
 $x = -\frac{1}{3}$

Sep 5-8:31 AM