

Proportions

What is a proportion?

An equation that states two ratios are equal.

$$\frac{a}{b} = \frac{c}{d}$$

* connected by a constant of proportionality *

Is it a proportion?

Method #1: Reduce Fractions

1. $\frac{9}{51}, \frac{6}{34}$ IS $\frac{9}{51} = \frac{6}{34}$?

$$\frac{3}{17} = \frac{3}{17}$$

TRUE

2. $\frac{12}{20}, \frac{32}{50}$

IS $\frac{12}{20} = \frac{32}{50}$?

$$\frac{3}{5} \neq \frac{16}{25}$$

FALSE

Method #2: Cross Multiply

3. $\frac{15}{24}, \frac{10}{16}$ 240

TRUE

4. $\frac{6}{11}, \frac{9}{16}$ 99

FALSE

Solving Proportions

3 Ways to Solve Proportions:

- Mental Math
- Algebraically
- Cross Multiplication

Mental Math

1. $\frac{5}{6} = \frac{x}{18}$

$$x = 15$$

$$\text{Constant rate} = \frac{5}{6}$$

2. $\frac{18}{42} = \frac{3}{t}$

$$t = 7$$

$$\text{Constant rate} = \frac{3}{7}$$

3. $\frac{x}{48} = \frac{6}{12}$

$$x = 24$$

$$\text{Constant rate} = \frac{1}{2}$$

4. $\frac{x}{5} = \frac{28}{35}$

$$x = 4$$

$$\text{Constant rate} = \frac{4}{5}$$

HINT: Constant rate = reduced fraction

Algebraically

5. $\frac{g}{15} = \frac{78}{90}$

~~$\frac{g}{15} = \frac{78}{90}$~~

$g = \frac{78}{6}$

$g = 13$

Constant rate = $\frac{13}{15}$

6. $\frac{2}{7} = \frac{x+3}{21}$

~~$\frac{2}{7} = \frac{x+3}{21}$~~

$6 = x+3 -3$

$3 = x$

Constant rate = $\frac{2}{7}$

Gross Multiplication

7. ~~$\frac{16}{p+3} = \frac{10}{45}$~~

$(16)(45) = 10(p+3)$
 $720 = 10p + 30 - 30$
 $\frac{690}{10} = \frac{10p}{10}$

$69 = p$

Constant rate = $\frac{2}{9}$

8. ~~$\frac{0.4}{6} = \frac{18}{z}$~~

$(18)(6) = .4z$
 $\frac{108}{.4} = \frac{.4z}{.4}$

$270 = z$

Constant rate = $\frac{1}{15}$

9.

~~$\frac{9}{b} = \frac{1.5}{7}$~~

$(9)(7) = 1.5b$
 $\frac{63}{1.5} = \frac{1.5b}{1.5}$

$42 = b$

constant rate = $\frac{3}{14}$

10. ~~$\frac{x-1}{2} = \frac{20}{10}$~~

$(2)(20) = 10(x-1)$
 $40 + 10 = 10x - 10 + 10$
 $\frac{50}{10} = \frac{10x}{10}$

$5 = x$

Constant rate = 2