

Proportions

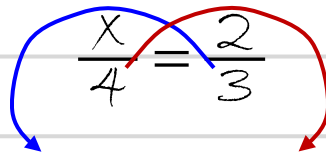
Objective 1 Solve Proportion Problems

A proportion is an equation with two ratios! The equation $\frac{x}{4} = \frac{2}{3}$ represents a proportion and it can be solved using a technique call cross-multiplying. It can also be solved by first using an LCD to clear the fractions.

Sometimes it may be easier to clear the fractions, but most students tend to like to cross-multiply.

Here we will solve the proportion problem using the cross-multiplication technique.

$$\frac{x}{4} = \frac{2}{3}$$



$$\frac{x}{4} = \frac{2}{3}$$

$$3x = 8$$

$$x = \frac{8}{3} \text{ or } 2\frac{2}{3}$$

Now we will solve the proportion problem using the clearing fraction or "Kung Fu" fraction technique.

$$\frac{x}{4} = \frac{2}{3} \quad \text{LCD} = 12$$

$$12 \left(\frac{x}{4} \right) = 12 \left(\frac{2}{3} \right)$$

$$3x = 8$$

$$x = \frac{8}{3} \text{ or } 2\frac{2}{3}$$

Remember that you can **only** cross-multiply across an equals (=) sign and you should only do this when you have a proportion. **Do not attempt to cross-multiply** on the equation below. It is not a proportion. Use the clearing fractions technique in this case.

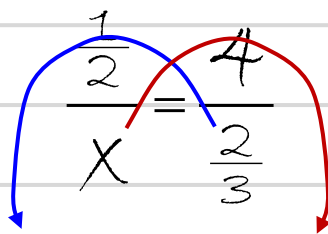
$$\frac{x}{2} = \frac{3}{4} + \frac{1}{5} \quad \text{LCD} = 20$$

$$x = \frac{19}{10}$$

Example 1: Solve the proportion.

$$\frac{1}{2} = \frac{4}{x} = \frac{2}{3}$$

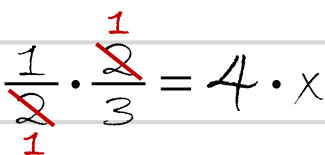
In this problem we will cross-multiply twice to reach the solution.



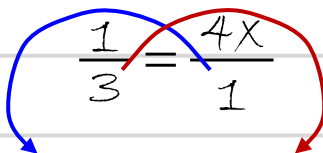
Remember, we can only perform "cross-multiplication" across an equals sign!

$$\frac{1}{2} \cdot \frac{2}{3} = 4 \cdot x$$

Remember, this is called "cross-cancelling" and can only be performed across a multiplication operation!



$$\frac{1}{3} = 4x$$



Here we rewrite $4x$ as a fraction by placing it over 1. This way we can again cross-multiply.

$$\frac{1}{12} = \frac{12x}{12}$$

$$\frac{1}{12} = x \text{ or } x = \frac{1}{12}$$

Example 2: Solve each proportion problem.

$$a) \frac{x}{4} = \frac{5}{8}$$

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

$$c) \frac{25}{100} = \frac{x}{4}$$

Answer the following homework questions.

In Exercises 1 - 9, solve each proportion problem. Try not to use a calculator.

$$1) \frac{4}{x} = \frac{2}{9}$$

$$4) \frac{x}{1.4} = \frac{0.15}{3}$$

$$7) \frac{x}{\frac{1}{2}} = \frac{\frac{6}{5}}{\frac{2}{3}}$$

$$2) \frac{3}{x} = \frac{10}{11}$$

$$5) \frac{x}{0.3} = \frac{0.5}{2.5}$$

$$8) \frac{\frac{2}{3}}{x} = \frac{8}{\frac{1}{2}}$$

$$3) \frac{0.5}{1.2} = \frac{1}{x}$$

$$6) \frac{x}{12} = \frac{0.05}{0.12}$$

$$9) \frac{\frac{1}{2}}{x} = \frac{\frac{1}{3}}{14}$$