

Ratios and Proportions

The **ratio** of a to b is $\frac{a}{b}$ ($b \neq 0$).

A **proportion** is an equation of two ratios.

Example 1:

$$\frac{x}{4} = \frac{7}{6}$$

Method 1: (The "Heart" Method)

$$\frac{x}{4} = \frac{7}{6}$$
$$6 \cdot x = 4 \cdot 7$$

$$\frac{6x}{6} = \frac{28}{6}$$

$$x = \frac{28}{6}$$

We must reduce the fraction.

$$x = \boxed{\frac{14}{3}}$$

NOTE: The Heart Method (sometimes referred to as cross-multiplication) **ONLY** works for **PROPORTIONS!**

Method 2: (Clearing the Fractions)

Find the LCD.

$$\text{LCD} = \underline{\hspace{2cm}}$$

$$12 \left(\frac{x}{4} \right) = 12 \left(\frac{7}{6} \right) \quad \text{Multiply both sides by the LCD}$$

$$\frac{3x}{3} = \frac{14}{3} \quad \text{Reduce.}$$

$$x = \boxed{\frac{14}{3}}$$

NOTE: Clearing the fractions ALWAYS WORKS!!!

Example 2:

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

The Heart Method:

$$\frac{x+1}{3} = \frac{x}{2}$$
$$\underline{2(x+1)} = \underline{3 \cdot x}$$

$$2x + 2 = 3x$$

$$\underline{-2x} \quad \underline{-2x}$$

$$2 = x$$

So $x = 2$ is the solution.

Clearing the Fractions:

Find the LCD.

$$\text{LCD} = \underline{\hspace{2cm}}$$

$$6 \left(\frac{x+1}{3} \right) = 6 \left(\frac{x}{2} \right)$$

$$2(x+1) = 3x$$

$$2x + 2 = 3x$$

$$\underline{-2x \quad -2x}$$

$$2 = x$$

$$\text{OR } x = 2$$

Example 3:

$$\frac{4-z}{3} = \frac{3z-2}{5}$$

using the Heart Method, we get

$$5(4-z) = 3(3z-2)$$

$$20 - 5z = 9z - 6$$

$$\underline{\quad +5z \quad +5z \quad}$$

$$20 \quad = 14z - 6$$

$$\underline{\quad +6 \quad \quad \quad +6 \quad}$$

$$\frac{26}{14} = \frac{14z}{14}$$

$$z = \frac{26}{14}$$

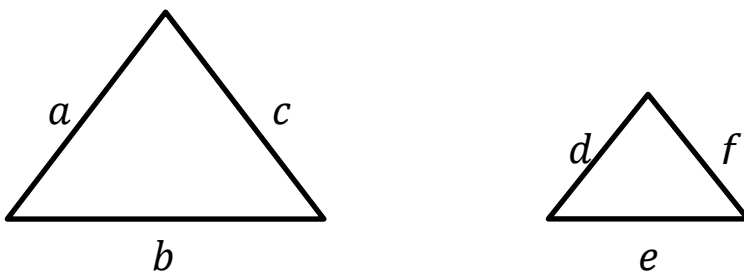
Reduce.

$$z = \boxed{\frac{13}{7}}$$

Similar Triangles

Two triangles are said to be **similar** if the corresponding angles are the same measurement.

For similar triangles, the ratios of corresponding sides are equal.



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

Example 4:

Solve for x given that the pair of triangles are similar.



We can set up a proportion to solve for x .

$$\frac{x}{5} = \frac{1}{3}$$

using the Heart Method, we get

$$3x = 5 \quad \text{Solve for } x, \text{ by dividing by } 3.$$

$$x = \boxed{\frac{5}{3}}$$

Ratios and Proportions

Practice Problems

Solve each equation.

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

2. $\frac{x+2}{6} = \frac{x+4}{4}$

3. Solve for x given that the pair of triangles are similar.

