

## 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.

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

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

method 2 (clearing the fractions)

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

↪

$$12 \left( \frac{x}{4} \right) = 12 \left( \frac{7}{6} \right)$$

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

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

NOTE: clearing the fractions  
ALWAYS WORKS !!!

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

The Heart method:

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

*(Note: In the original image, the equation above is crossed out with a large 'X' and arrows point from it to the equation below.)*

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

$$2x + 2 = 3x$$

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

$$2 = x$$

so  $x=2$  is the solution.

clearing the fractions:

↳

LCD = \_\_\_\_\_

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

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

$$2x + 2 = 3x$$

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

$$2 = x$$

OR

$$x = 2$$

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

using the heart method, we get

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

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

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

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

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

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

$$14 \quad \quad 14$$

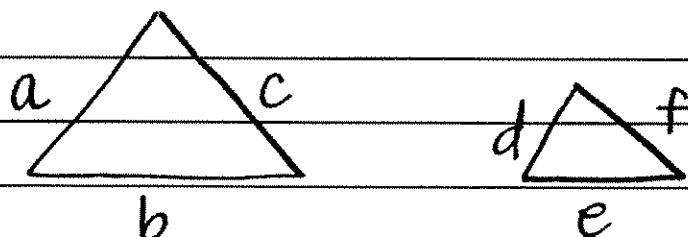
$$z = \frac{26}{14} \quad \text{now reduce}$$

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

## similar triangles

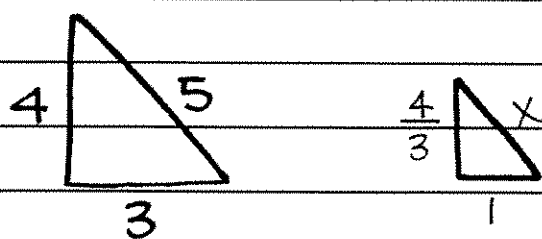
Two triangles are said to be similar if corresponding angles are the same measurement.

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 is similar.



We can set up a proportion to solve for x.

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

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

using the Heart method, we get

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

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

## 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 is similar.

