

## 4-2 Similar Figures

### 4-2 Proportions and Similar Figures

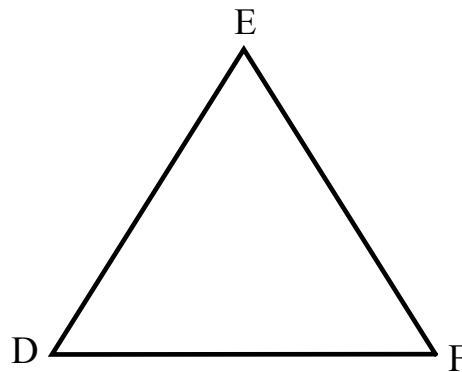
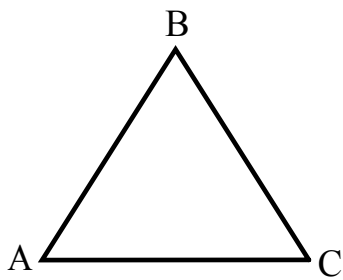
Similar figures have the same shape, but not the same size.

The symbol for "similar" is  $\sim$

In similar figures, corresponding angles are congruent (equal in size) and corresponding sides are consistently proportional in size.

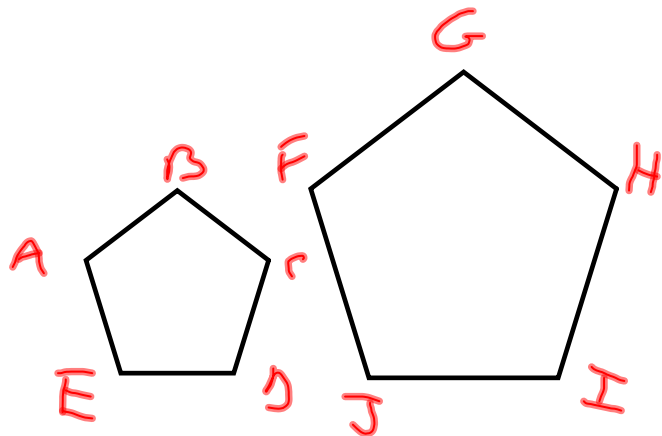
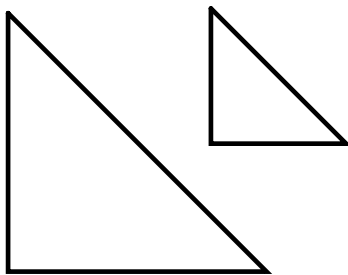
Here are some similar figures and their corresponding parts:

$$\triangle ABC \sim \triangle DEF$$



$$\begin{aligned} m\angle A &= m\angle D \\ m\angle B &= m\angle E \\ m\angle C &= m\angle F \end{aligned}$$

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

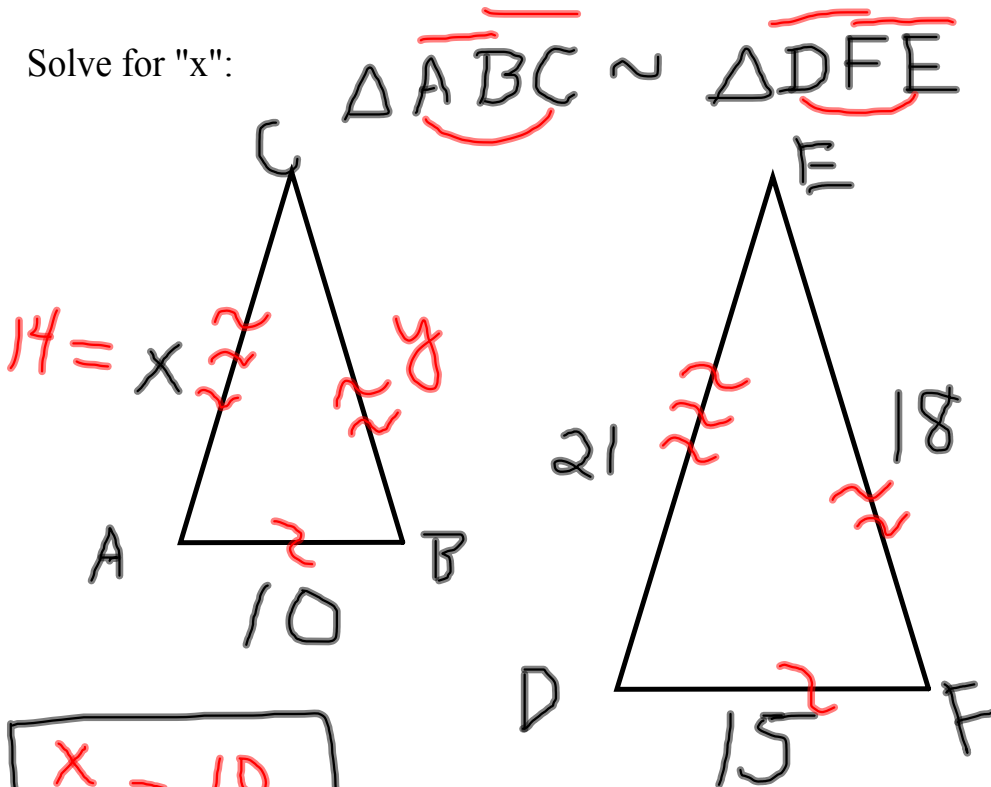


$$ABCDE \sim FGHIJ$$



## 4-2 Similar Figures

Solve for "x":



$$\frac{x}{21} = \frac{10}{15}$$

$$\frac{x}{10} = \frac{21}{15}$$

$$\frac{10}{x} = \frac{15}{21}$$

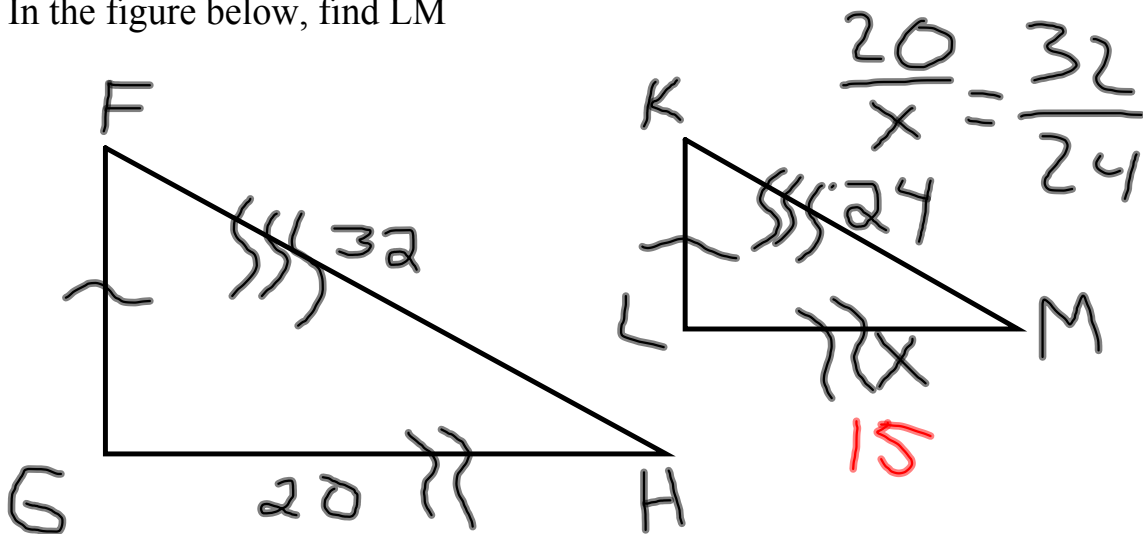
$$\frac{21}{x} = \frac{15}{10}$$

$$15x = 21(10)$$

$$\frac{15x}{15} = \frac{210}{15}$$

$$x = 14$$

In the figure below, find LM



$$\frac{20}{x} = \frac{32}{24}$$

$$\triangle FGH \sim \triangle KLM$$

## 4-2 Similar Figures

### Word problems using similarity:

A tree casts a shadow 7.5 feet long. A woman 5 feet tall casts a shadow 3 feet long. How tall is the tree?

$$\frac{7.5}{x} = \frac{3}{5}$$
$$\frac{3x}{3} = \frac{37.5}{3}$$
$$x = 12.5$$

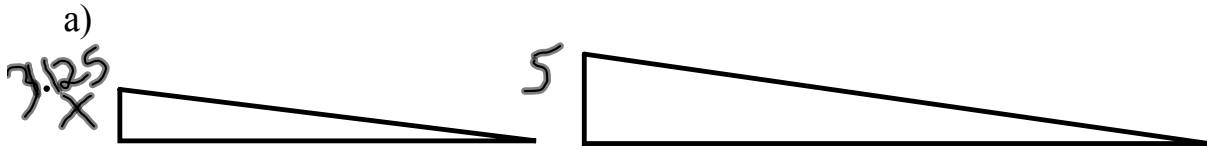
The scale of a map is 1 inch: 10 miles. How far apart are two towns in reality if they are  $1\frac{1}{2}$  inches apart on the map?

$$\frac{1}{10} = \frac{1\frac{1}{2}}{x}$$
$$x = 15 \text{ miles}$$

## 4-2 Similar Figures

### You try:

The figures in each pair are similar. Find the missing length.

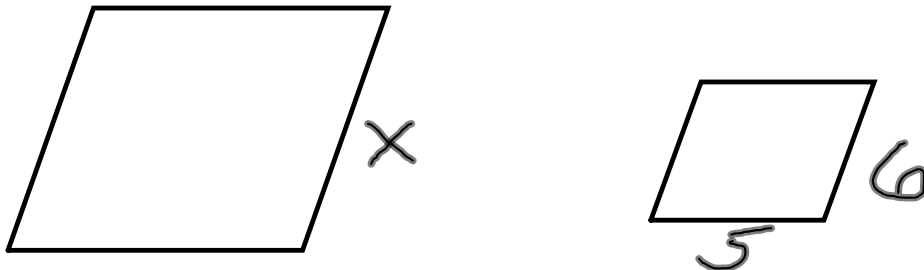


$$\frac{x}{5} = \frac{5}{8}$$

$$8x = 25$$

$$x = 3.125$$

b)



$$\frac{x}{6} = \frac{6}{5}$$

$$5x = 36$$

$$x = 7.2$$

c) A 3 foot child casts a 54 inch shadow. How tall is a tree that casts a 7.5 foot shadow? How long will the shadow be of a 12 inch cat?

$$\frac{4.5}{3} = \frac{7.5}{x}$$

$$\frac{4.5x}{4.5} = \frac{22.5}{4.5}$$

$$x = 5$$

$$\frac{4.5}{3} = \frac{x}{1}$$

$$\frac{3x}{3} = \frac{4.5}{3}$$

$$x = 1.5$$

## 4-2 Similar Figures

$$\frac{\text{sample}}{\text{actual}} = \frac{60}{1250} = \frac{31}{x}$$

$$\frac{31}{60} = \frac{x}{1250}$$

$$\frac{31(1250)}{60} = \frac{60x}{60}$$

## 4-2 Similar Figures

$$\frac{B}{T} = \frac{7}{4} = \frac{88-x}{x} = \frac{56}{32}$$

$$7x = 4(88-x)$$

$$\begin{array}{r} 7x = 352 - 4x \\ +4x \qquad \qquad +4x \\ \hline \end{array}$$

$$11x = 352$$

$$x = 32$$

## 4-2 Similar Figures

$$\frac{x^2 - 3}{5x + 2} = \frac{x}{5}$$

$$5(x^2 - 3) = x(5x + 2)$$

$$\begin{array}{r} 5x^2 - 15 \\ \underline{-5x^2} \end{array} = \begin{array}{r} 5x^2 + 2x \\ \underline{-5x^2} \end{array}$$

$$\begin{array}{r} -15 \\ \underline{-2x} \end{array}$$

$$x = -7.5$$

$$\frac{8}{b+10} = \frac{4}{2b-7}$$

$$8(2b-7) = 4(b+10)$$

$$16b - 56 = 4b + 40$$

$$\begin{array}{r} 16b - 56 \\ + 56 \\ \hline \end{array} \quad \begin{array}{r} 4b + 40 \\ + 56 \\ \hline \end{array}$$

$$\begin{array}{r} 16b \\ - 4b \\ \hline \end{array} = \begin{array}{r} 4b + 96 \\ - 4b \\ \hline \end{array}$$

$$12b = 96$$

$$b = 8$$