

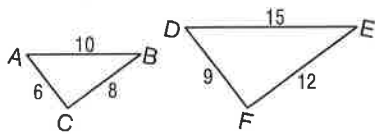
# 7-3 Study Guide and Intervention

## Similar Triangles

**Identify Similar Triangles** Here are three ways to show that two triangles are similar.

<b>AA Similarity</b>	Two angles of one triangle are congruent to two angles of another triangle.
<b>SSS Similarity</b>	The measures of the corresponding sides of two triangles are proportional.
<b>SAS Similarity</b>	The measures of two sides of one triangle are proportional to the measures of two corresponding sides of another triangle, and the included angles are congruent.

**Example 1** Determine whether the triangles are similar.



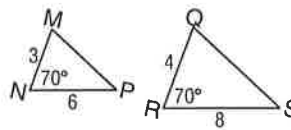
$$\frac{AC}{DF} = \frac{6}{9} = \frac{2}{3}$$

$$\frac{BC}{EF} = \frac{8}{12} = \frac{2}{3}$$

$$\frac{AB}{DE} = \frac{10}{15} = \frac{2}{3}$$

$\triangle ABC \sim \triangle DEF$  by SSS Similarity.

**Example 2** Determine whether the triangles are similar.



$$\frac{3}{4} = \frac{6}{8}, \text{ so } \frac{MN}{RQ} = \frac{NP}{QS}$$

$m\angle N = m\angle R$ , so  $\angle N \cong \angle R$ .

$\triangle MNP \sim \triangle RQS$  by SAS Similarity.

### Exercises

Determine whether each pair of triangles is similar. Justify your answer.

1.   
 yes; AA ~

3.   
 corresponding  $\angle$ s are  $\cong$    
 yes; AA ~

5.   
 $\frac{39}{26} = \frac{24}{16}$    
 $\frac{3}{2} = \frac{3}{2}$  ✓   
 yes; SAS ~

2.   
 not similar; ratios  $\neq$    
 $\frac{36}{24} = \frac{3}{2}$    
 $\frac{20}{18} = \frac{10}{9}$    
 $\frac{3}{2} \neq \frac{10}{9}$

4.   
 yes; SAS ~   
 $\frac{8}{4} = \frac{18}{9}$    
 $\frac{2}{1} = \frac{2}{1}$

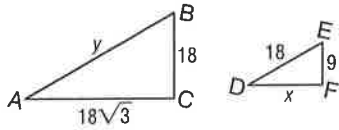
6.   
 yes; SSS ~   
 $\frac{24}{15} = \frac{32}{20} = \frac{40}{25}$    
 $\frac{8}{5} = \frac{8}{5} = \frac{8}{5}$  ✓

# 7-3 Study Guide and Intervention *(continued)*

## Similar Triangles

**Use Similar Triangles** Similar triangles can be used to find measurements.

**Example 1**  $\triangle ABC \sim \triangle DEF$ .  
Find  $x$  and  $y$ .



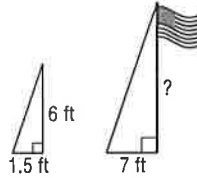
$$\frac{AC}{DF} = \frac{BC}{EF} \qquad \frac{AB}{DE} = \frac{BC}{EF}$$

$$\frac{18\sqrt{3}}{x} = \frac{18}{9} \qquad \frac{y}{18} = \frac{18}{9}$$

$$18x = 9(18\sqrt{3}) \qquad 9y = 324$$

$$x = 9\sqrt{3} \qquad y = 36$$

**Example 2** A person 6 feet tall casts a 1.5-foot-long shadow at the same time that a flagpole casts a 7-foot-long shadow. How tall is the flagpole?



The sun's rays form similar triangles. Using  $x$  for the height of the pole,  $\frac{6}{1.5} = \frac{x}{7}$ , so  $1.5x = 42$  and  $x = 28$ . The flagpole is 28 feet tall.

### Exercises

Each pair of triangles is similar. Find  $x$  and  $y$ .

1.  $x = 26; y = 17\frac{1}{2}$

2.  $x = 24; y = 30$

3.  $x = 12; y = 24\sqrt{2}$

4.  $x = 19\frac{3}{10}; y = 46$

5.  $x = 18; y = 10\frac{4}{5}$

6.  $x = 10\frac{2}{3}; y = 16\frac{1}{2}$

7. The heights of two vertical posts are 2 meters and 0.45 meter. When the shorter post casts a shadow that is 0.85 meter long, what is the length of the longer post's shadow to the nearest hundredth?  $3.78 \text{ m}$

7-3 (p. 22)

$$1.) \quad \frac{y}{35} = \frac{10}{20} = \frac{13}{x}$$

$$\frac{y}{35} = \frac{10}{20}$$

$$20y = 35(10)$$

$$20y = 350$$

$$y = 17\frac{1}{2}$$

$$\frac{10}{20} = \frac{13}{x}$$

$$10x = 20(13)$$

$$10x = 260$$

$$x = 26$$

2.)

$$\frac{20}{y} = \frac{26}{26+13}$$

$$\frac{20}{y} = \frac{26}{39}$$

$$20(39) = 26y$$

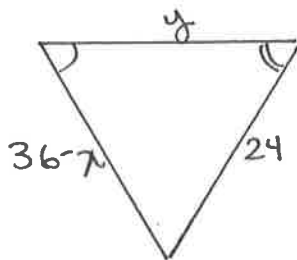
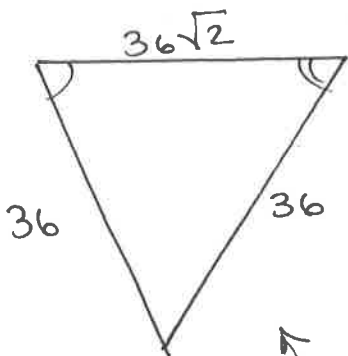
$$780 = 26y$$

$$y = 30$$

$$x + 2 = 26$$

$$x = 24$$

3.)



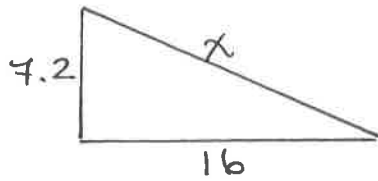
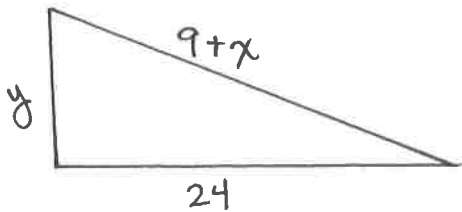
$$\frac{36}{24} = \frac{36\sqrt{2}}{y}$$

$$36y = 24 \cdot \frac{36\sqrt{2}}{36}$$

$$y = 24\sqrt{2}$$

Aha! This is isosceles, so this must also be  $\rightarrow 36 - x = 24$   
 $12 = x$

5.)



$$\frac{y}{7.2} = \frac{24}{16} = \frac{9+x}{x}$$

$$\frac{y}{7.2} = \frac{24}{16}$$

$$16y = 7.2(24)$$

$$16y = 172.8$$

$$y = 10\frac{4}{5}$$

$$\frac{24}{16} = \frac{9+x}{x}$$

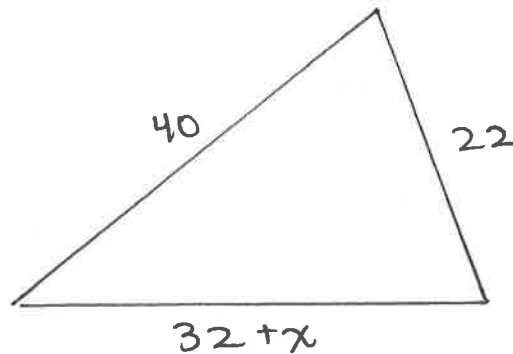
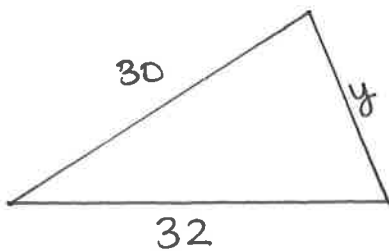
$$24x = 16(9+x)$$

$$24x = 144 + 16x$$

$$8x = 144$$

$$x = 18$$

6.)



$$\frac{30}{40} = \frac{y}{22} = \frac{32}{32+x}$$

$$\frac{30}{40} = \frac{y}{22}$$

$$30(22) = 40y$$

$$660 = 40y$$

$$y = 16\frac{1}{2}$$

$$\frac{30}{40} = \frac{32}{32+x}$$

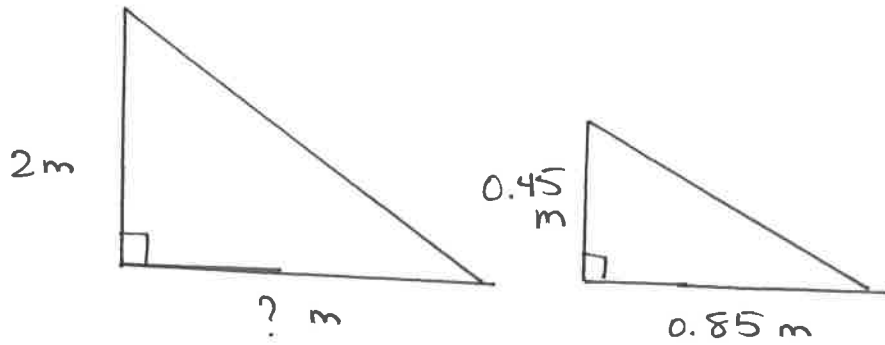
$$30(32+x) = 40(32)$$

$$960 + 30x = 1280$$

$$30x = 320$$

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

4.)



$$\frac{2}{0.45} = \frac{?}{0.85}$$

$$2(0.85) = 0.45 (?)$$

$$1.7 = 0.45 (?)$$

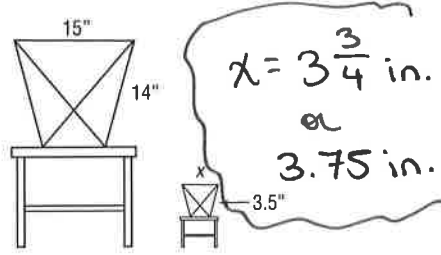
$$3.78 = (?)$$

The length of the longer post shadow is 3.78 m.

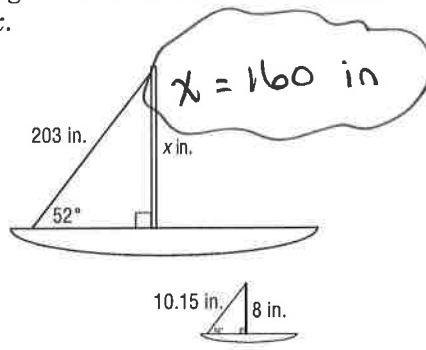
# 7-3 Word Problem Practice

## Similar Triangles

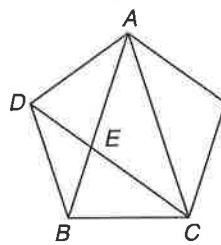
**1. MINIATURES** Marla likes her chair so much that she decides to make a miniature replica of it for her pet hamster. Find the value of  $x$ .



**2. MODELS** Jim has a scale model of his sailboat. The figure shows drawings of the original sailboat and the model. Find  $x$ .

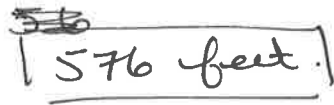


**3. GEOMETRY** Georgia draws a regular pentagon and starts connecting its vertices to make a 5-pointed star. After drawing three of the lines in the star, she becomes curious about two triangles that appear in the figure,  $\triangle ABC$  and  $\triangle BCE$ . They look similar to her. Prove that this is the case.



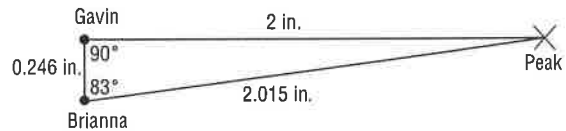
*This one is your challenge!*

**4. SHADOWS** A radio tower casts a shadow 8 feet long at the same time that a vertical yardstick casts a shadow half an inch long. How tall is the radio tower?



**MOUNTAIN PEAKS** For Exercises 5 and 6, use the following information.

Gavin and Brianna want to know how far a mountain peak is from their houses. They measure the angles between the line of site to the peak and to each other's houses and carefully make the drawing shown.



The actual distance between Gavin and Brianna's house is  $1\frac{1}{2}$  miles.

**5.** What is the actual distance of the mountain peak from Gavin's house? Round your answer to the nearest tenth of a mile.

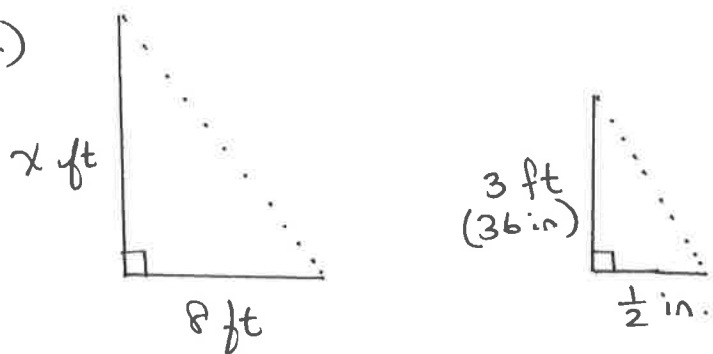
*≈ 12.2 miles.*

**6.** What is the actual distance of the mountain peak from Brianna's house? Round your answer to the nearest tenth of a mile.

*≈ 12.3 miles*

# 7-3 word Problem Practice

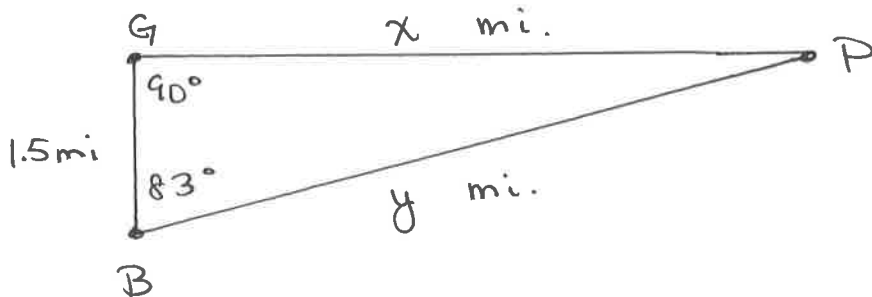
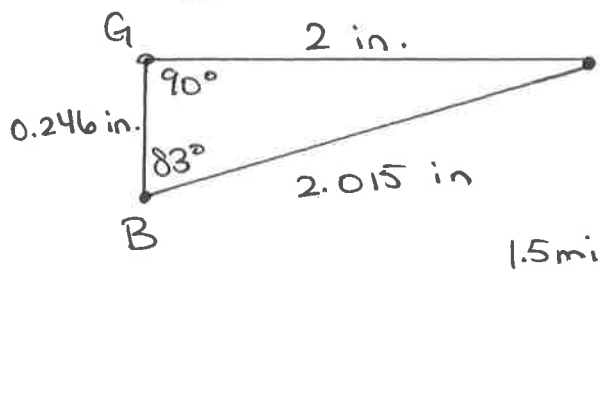
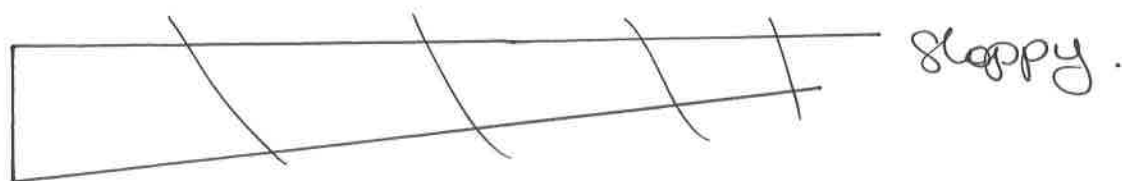
4.)



$$\frac{8}{\frac{1}{2}} = \frac{x}{36}$$

$$x = 576 \text{ ft.}$$

5.)



$$\frac{0.246 \text{ in}}{1.5 \text{ mi}} = \frac{2 \text{ in.}}{x \text{ mi}} = \frac{2.015 \text{ in}}{y \text{ mi}}$$

$$\frac{0.246}{1.5} = \frac{2}{x}$$

$$0.246x = 2(1.5)$$

$$0.246x = 3.0$$

$$x \approx 12.2 \text{ mi}$$

$$\frac{0.246}{1.5} = \frac{2.015}{y}$$

$$0.246y = 1.5(2.015)$$

$$0.246y = 3.0225$$

$$y \approx 12.3 \text{ mi}$$