

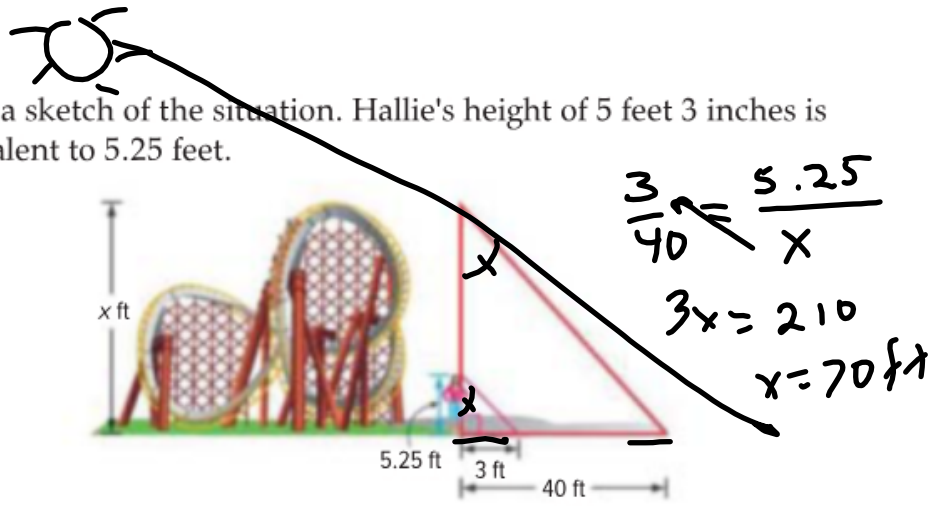
When you can represent real-world situations with similar triangles, you can use proportions and the properties of the triangles to find measurements. This is called indirect measurement.

**Real-World Example 4** Indirect Measurement

**ROLLER COASTERS** Hallie is estimating the height of the Superman roller coaster in Mitchellville, Maryland. She is 5 feet 3 inches tall and her shadow is 3 feet long. If the length of the shadow of the roller coaster is 40 feet, how tall is the roller coaster?

**Understand** Make a sketch of the situation. Hallie's height of 5 feet 3 inches is equivalent to 5.25 feet.

$$\frac{3}{12} = .25$$



**Plan** In shadow problems, you can assume that the angles formed by the Sun's rays with any two objects are congruent and that the two objects form the sides of two right triangles.

Because two pairs of angles are congruent, the right triangles are similar by the AA Similarity Postulate. Write a proportion.

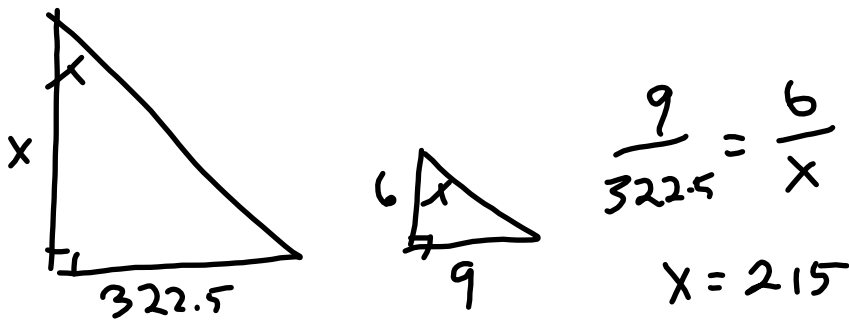
$$\frac{\text{Hallie's height}}{\text{coaster's height}} = \frac{\text{Hallie's shadow length}}{\text{coaster's shadow length}}$$

$$6 \text{ ft } 8 \text{ in } \frac{8}{12} =$$

$$6.6 \text{ ft}$$

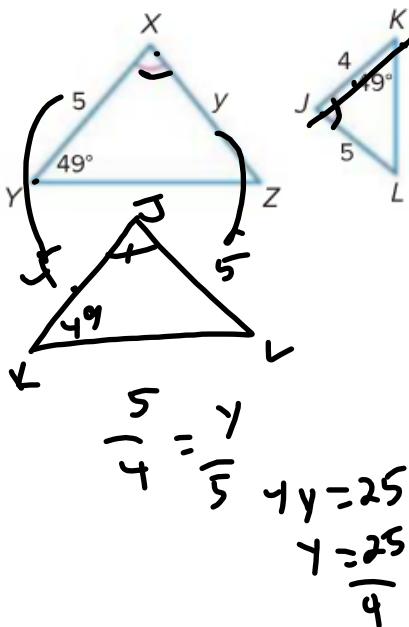
**Guided Practice**

4. **BUILDINGS** Adam is standing next to the Palmetto Building in Columbia, South Carolina. He is 6 feet tall and the length of his shadow is 9 feet. If the length of the shadow of the building is 322.5 feet, how tall is the building?

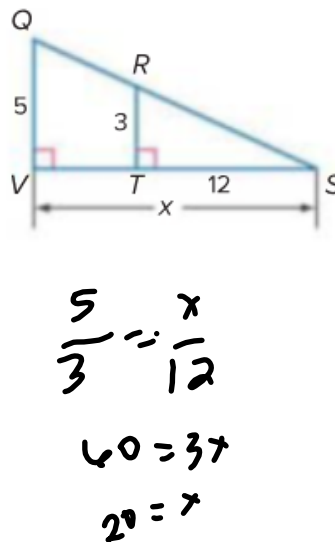


**MP STRUCTURE** Identify the similar triangles. Find each measure.

6. XZ



7. VS

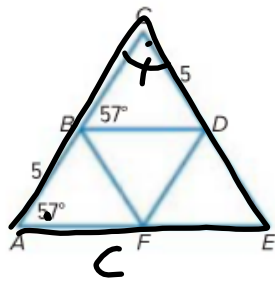


**Practice and Problem Solving**

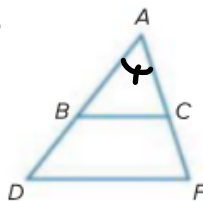
Extra Practice is on page R7.

**Examples 1, 2** Determine whether the triangles are similar. If so, write a similarity statement. Explain your reasoning.

9.  $\triangle ACE, \triangle BCD$

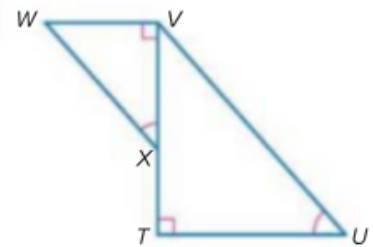


10.



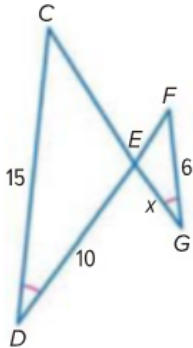
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11

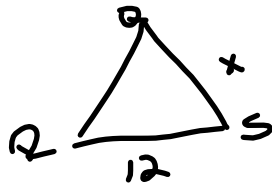
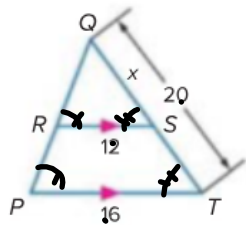


**ALGEBRA** Identify the similar triangles. Then find each measure.

16. EG



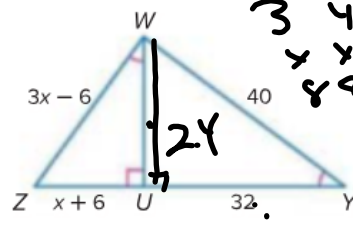
17. ST



$$\frac{12}{16} = \frac{3}{4} = \frac{x}{20}$$

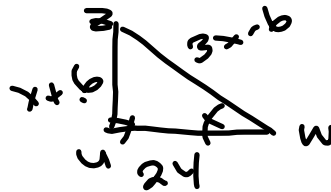
$$\begin{aligned} 60 &= 4x \\ 4 & \overline{) 60} \\ 15 &= x \end{aligned}$$

18. WZ, UZ



$$40^2 = 32^2 + x^2$$

$$\begin{array}{r} 3 \ 4 \ 5 \\ + \ x \ x \ 4 \\ \hline 8 \ 8 \ 4 \end{array}$$



$$\frac{24}{32} = \frac{3}{4} \neq \frac{24}{x+6}$$

$$\begin{aligned} 3x + 18 &= 96 \\ 3x &= 78 \\ x &= 26 \end{aligned}$$

22. **STATUES** Mei is standing next to a statue in the park. If Mei is 5 feet tall, her shadow is 3 feet long, and the statue's shadow is  $10\frac{1}{2}$  feet long, how tall is the statue?
23. **SPORTS** When Alonzo, who is 5'11" tall, stands next to a basketball goal, his shadow is 2' long, and the basketball goal's shadow is 4'4" long. About how tall is the basketball goal?



$$22) \frac{3}{10.5} = \frac{5}{x}$$

$$23) \frac{2}{4.33} = \frac{5.92}{x}$$

long. About how tall is the basketball goal?

24. **BIRDWATCHING** Taylor sees the nest of a rare bird near the top of a tree. He wants to report its position to the local conservation group. Taylor is 6 feet tall and casts a 3.5-foot shadow. The tree with the nest casts a shadow 6 feet long. About how far above the ground is the nest?



$$\frac{3.5}{6} = \frac{6}{x}$$

$$3.5x = 36$$

$$x = 10.29$$