

7.3 Indirect Measurement with Similar Triangles-Notes

Learning Target:

I can solve application problems using the properties of similar triangles.

Warm - up. Solve the proportions.

$$1.) \frac{35}{x} = \frac{5}{8}$$

$$5x = 35 \cdot 8$$

$$5x = 280$$

$$x = 56$$

$$2.) \frac{12}{7} = \frac{96}{x+2}$$

$$12(x+2) = 96 \cdot 7$$

$$12x + 24 = 672$$

$$12x = 648$$

$$x = 54$$

$$3.) \frac{4}{x} = \frac{9}{x-15}$$

$$4(x-15) = 9 \cdot x$$

$$4x - 60 = 9x$$

$$-60 = 5x$$

$$-12 = x$$

$$4.) \frac{x}{12} = \frac{x-10}{7}$$

$$7 \cdot x = 12(x-10)$$

$$7x = 12x - 120$$

$$-5x = -120$$

$$x = 24$$

Thales is known as the first Greek scientist, engineer, and mathematician. Legend says that he was the first to determine the height of the pyramids in Egypt by examining the shadows made by the sun.



He considered three points: the top of the objects, the lengths of the shadows, and the bases.

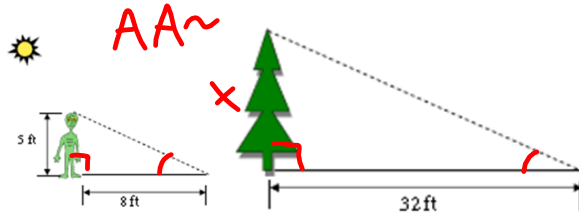
a.) What appears to be true about the corresponding angles in the two triangles?

b.) If the corresponding sides are proportional, what could you conclude about the triangles?

Indirect measurement allows you to use properties of similar polygons to find distances or lengths that are difficult to measure directly.

Guided Practice. Draw a diagram, write a proportion and solve the problem.

1.) At a certain time of day, a 5 ft alien casts an 8 ft shadow. At the same time of the day, a tree casts a 32 ft shadow. How tall is the tree?



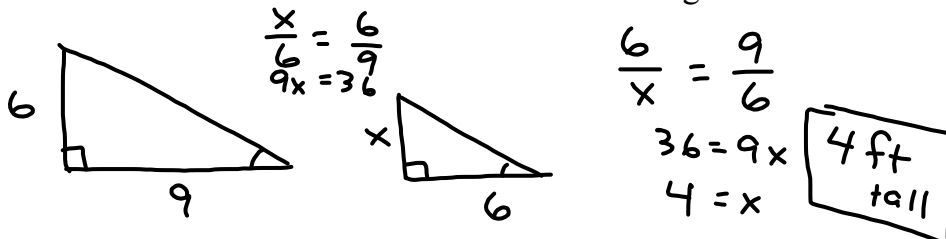
$$\frac{5}{x} = \frac{8}{32}$$

$$8x = 160$$

$$x = 20$$

20 ft

2.) A 6 ft. tall tent standing next to a cardboard box casts a 9 ft. shadow. If the cardboard box casts a shadow that is 6 ft. long then how tall is it?



$$\frac{x}{6} = \frac{6}{9}$$

$$9x = 36$$

$$\frac{6}{x} = \frac{9}{6}$$

$$36 = 9x$$

$$4 = x$$

4 ft
tall

3.) A map has a scale of 3 cm. 18 km. If Riverside and Smithville are 54 km apart, how far apart are they on the map?

$$\frac{54 \text{ km}}{18 \text{ km}} = 3$$

$$3 \text{ cm} \times 3 = 9 \text{ cm}$$

or →

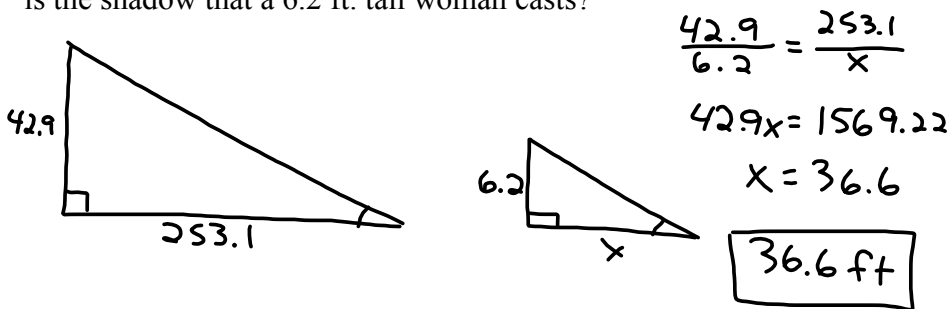
$$\frac{\text{actual } 54}{\text{map } 18} = \frac{x}{3}$$

$$18x = 162$$

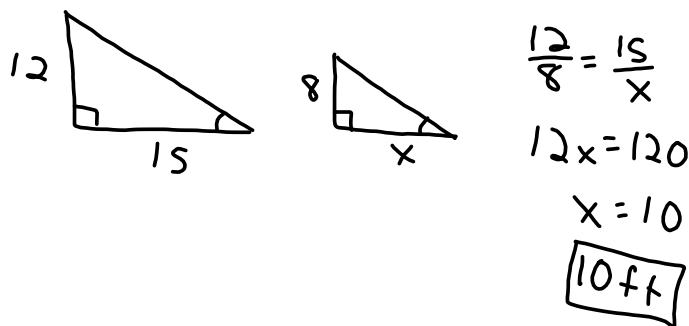
$$\text{or } x = 9$$

$$\frac{3}{18} = \frac{x}{54}$$

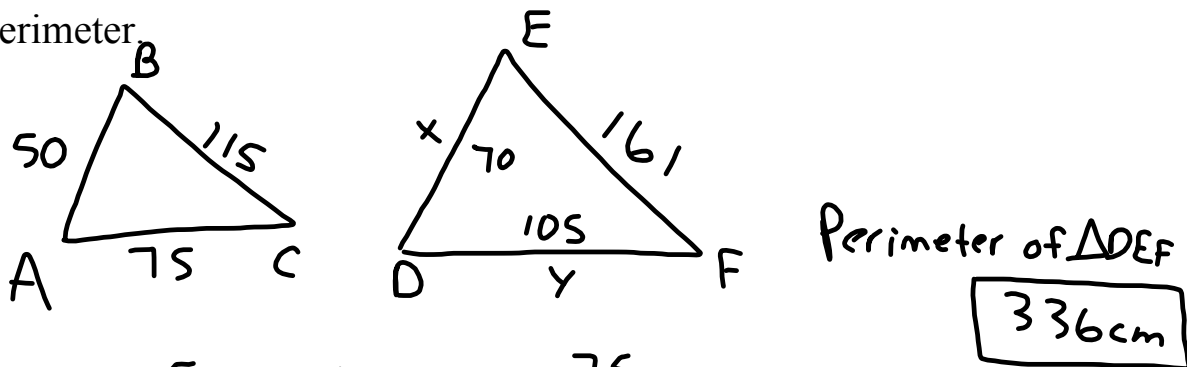
4.) If a 42.9 ft. tall flagpole casts a 253.1 ft. long shadow then how long is the shadow that a 6.2 ft. tall woman casts?



5.) A statue that is 12 ft. tall casts a shadow that is 15 ft. long. Find the length of the shadow that an 8 ft. flagpole casts.



6.) $\triangle ABC$ is similar to $\triangle DEF$. The lengths of the sides of ABC are $AB = 50\text{cm}$, $BC = 115\text{cm}$ and $AC = 75\text{cm}$. The length of the longest side in $\triangle DEF$ is 161cm . Find the other two sides and then find the perimeter.



$$\frac{50}{x} = \frac{115}{161}$$

$$115x = 8050$$

$$x = \boxed{70\text{ cm}}$$

$$\frac{75}{y} = \frac{115}{161}$$

$$115y = 12075$$

$$y = \boxed{105\text{ cm}}$$

Assignment: 7.3 Worksheet.