Indirect Measurement Notes

Indirect Measurement - allows you to use the properties of similar triangles to find measurements that are difficult to measure directly.

Two Common Types
1) Shadow Reckoning - using shadows to find heights.
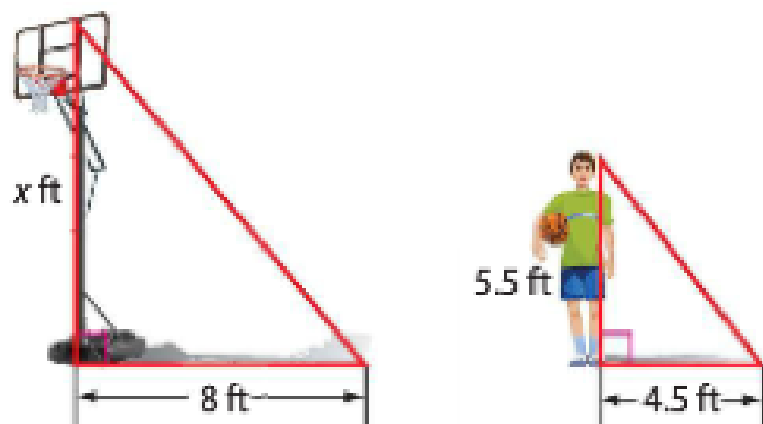2) Surveying Method - distances can be calculated using proportions.

A basketball hoop in Miguel's backyard casts a shadow that is 8 feet long. At the same time, Miguel casts a shadow that is 4.5 feet long. If Miguel is 5.5 feet tall, how tall is the basketball hoop? Round to the nearest tenth. (Example 1)

x ft

5.5 ft

8 ft

4.5 ft

One Method

$$\frac{x}{8} = \frac{5.5}{4.5}$$

$$4.5x = 44$$

$$x = 9.8 \, ft$$

Another Method

$$\frac{x}{5.5} = \frac{8}{4.5}$$

$$4.5x = 44$$

$$x = 9.8 \, ft$$

Suppose a bell tower casts a 27.6-foot shadow at the same time a nearby tourist casts a 1.2-foot shadow. If the tourist is 6 feet tall, how tall is the tower?

One Method

$$\frac{27.6}{1.2} = \frac{x}{6}$$
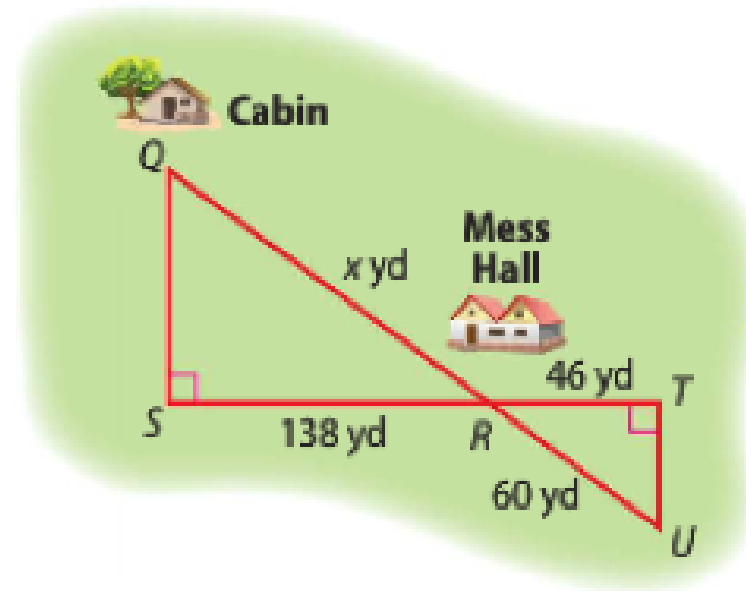
$$1.2x = 165.6$$

$$x = 138 \text{ ft}$$

Another Method

$$\frac{27.6}{x} = \frac{1.2}{6}$$

$$1.2x = 165.6$$

$$x = 138 \text{ ft}$$

In the figure, $\triangle QRS \sim \triangle URT$.
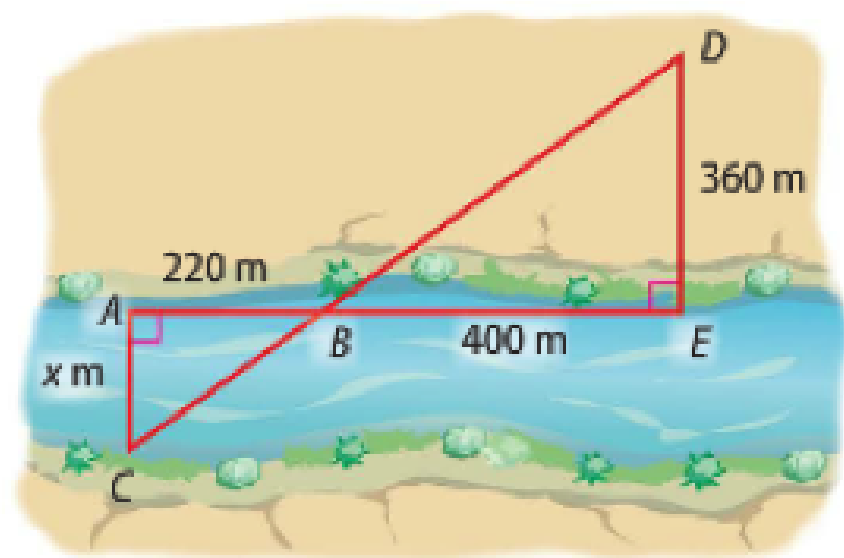Find the distance from the cabin
to the Mess Hall.

Cabin

Q

x yd

Mess
Hall

46 yd   T

S   138 yd   R

60 yd

U

$$\frac{QR}{RS} = \frac{RU}{RT}$$

$$\frac{x}{138} = \frac{60}{46}$$

$$46x = 8280$$

$$x = 180 \, yd$$

In the figure, $\triangle ABC \sim \triangle EBD$. Find the distance across Stallion Ravine. (Example 2)

$$\frac{x}{360} = \frac{220}{400}$$

$$400x = 79200$$

$$x = 198 \text{ m}$$

$$\frac{x}{220} = \frac{360}{400}$$

$$400x = 79200$$

$$x = 198 \text{ m}$$