7-5

More Proportional Relationships

OBJECTIVE

- ❖ To use ratios to make indirect measurements
- ❖ To apply the Proportional Perimeters and Areas Theorem

INDIRECT MEASUREMENT

Indirect measurement is used to find the measures of lengths that are difficult to measure directly including tall objects like trees and buildings.

Examples: mirror on the ground, shadows cast

1. At 4:00 P.M. Karl stands next to his house and measures his shadow and the house's shadow. Karl's shadow is 8 ft. long. The house's shadow is 48 ft. long. If Karl is 6 ft. tall, how tall is his house?

$$\frac{6}{x} = \frac{8'}{48_6}$$

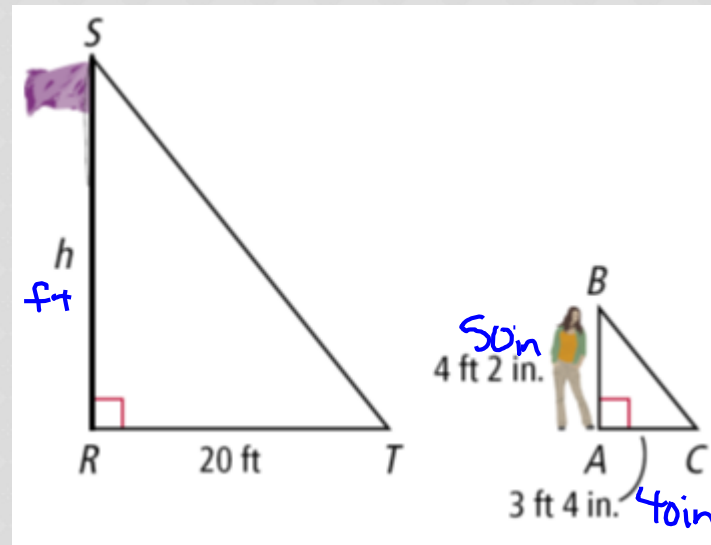$$\boxed{x = 36\,ft}$$

6ft

8ft

xft

48ft
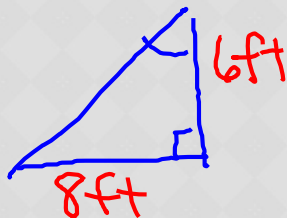
CLASS WORK

2. Maria is 4 ft. 2 in. tall. To find the height of a flagpole, she measured her shadow and the pole's shadow. What is the height of the flagpole?

$$\frac{h\ ft}{50\ in} = \frac{20\ ft}{40\ in}$$
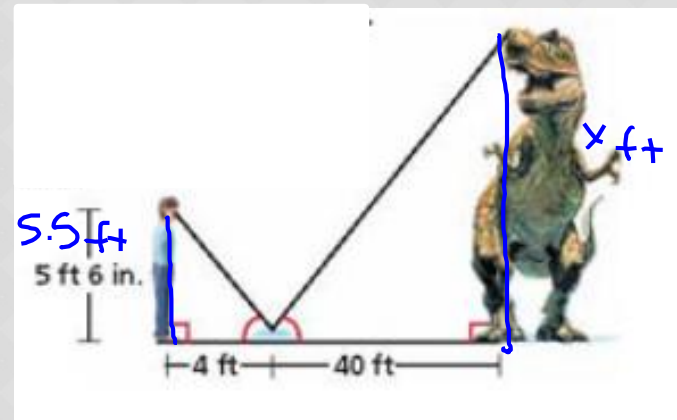
$$40h = 1000$$

$$h = 25\ ft$$

CLASS WORK

3. To find the height of a dinosaur in a museum, Amir placed a mirror on the ground 40 ft. from its base. Then he stepped back 4 ft. so he could see the top of the dinosaur in the mirror. Amir's eyes were approximately 5 ft. 6 in. above the ground. What is the height of the dinosaur?

$$\frac{5.5 \text{ ft}}{x \text{ ft}} = \frac{4 \text{ ft}}{40 \text{ ft}}$$

$$x = 55 \text{ ft}$$

5.5 ft
5 ft 6 in.

|—4 ft—|—40 ft—|

KEY CONCEPT

Proportional Perimeters and Areas Theorem:

SR If the scale factor of two similar figures is a:b,

RP then the ratio of their perimeters is a:b

RA and the ratios of their areas is a²:b².

4. Given that $\Delta MLN \sim \Delta RQS$, find
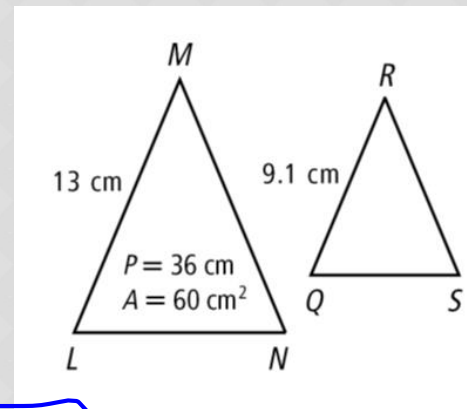   the perimeter and area of ΔRQS.

$SR: \dfrac{a}{b} = \dfrac{13}{9.1} = \dfrac{130}{91} = \dfrac{10}{7}$ $RP: \dfrac{a}{b} = \dfrac{10}{7}$ $\dfrac{10}{7} = \dfrac{36}{P}$

$RA: \dfrac{a^2}{b^2} = \dfrac{10^2}{7^2} = \dfrac{100}{49}$ $\dfrac{100}{49} = \dfrac{60}{A}$

$10P = 252$

$P = 25.2 cm$

$100A = 2940$ $A = 29.4 cm^2$

SUMMARY

❖ We can use indirect measurement to solve real-world distances that are difficult to measure

❖ We can use ratios for perimeter and area to find these measures for similar figures

HOMEWORK

Pages 505 – 507

12, 14, 16, 18, 19

24, 26, 28, 34, 36

39 – 42 all