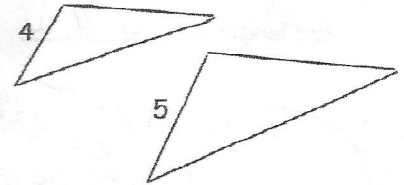


Study Guide - 10-4 Perimeters and Areas of Similar Figures

If the similarity ratio of two similar figures is  $\frac{a}{b}$ , then

- (1) the ratio of their perimeters is  $\frac{a}{b}$  and
- (2) the ratio of their areas is  $\frac{a^2}{b^2}$ .



Example 1: The triangles at the right are similar.

- (a) Find the ratio (larger to smaller) of the perimeters.

$$\boxed{4:5}$$

- (b) If the perimeter of the smaller triangle is 18 cm, find the perimeter of the larger triangle.

$$\frac{18}{P} = \frac{4}{5} \quad 4P = 90$$

$$\boxed{P = 22.5 \text{ cm}}$$

- (c) Find the ratio (larger to smaller) of the areas.

Similarity ratio: 4:5  
 area ratio:  $4^2:5^2 \rightarrow \boxed{16:25}$

- (d) If the area of the larger triangle is 410 cm<sup>2</sup>, find the area of the smaller triangle.

$$\frac{A}{410} = \frac{16}{25} \quad 25A = 6560$$

$$\boxed{A = 262.4 \text{ cm}^2}$$

Example 2: The ratio of the lengths of the corresponding sides of two regular octagons is  $\frac{8}{3}$ .

The area of the larger octagon is 320 ft<sup>2</sup>. Find the area of the smaller octagon.

Similarity ratio: 8:3

$$\frac{64}{9} = \frac{320}{A}$$

$$64A = 2880$$

area ratio: 64:9

$$\boxed{A = 45 \text{ ft}^2}$$

Example 3: Benita plants the same crop in two rectangular fields, each with side lengths in a

ratio of 2:3. Each dimension of the larger field is  $3\frac{1}{2} = \frac{7}{2}$  times the dimension of the smaller

field. Seeding the smaller field costs \$8. How much money does seeding the larger field cost?

$$\boxed{2} : \boxed{7}$$

$$\frac{4}{49} = \frac{8}{M}$$

$$4M = 392$$

Area ratio:

$$4 : 49$$

$$\boxed{M = 98}$$

Example 4: The areas of two similar polygons are 32 in.<sup>2</sup> and 72 in.<sup>2</sup> If the perimeter of the smaller polygon is 15 in, find the perimeter of the larger polygon.

Area ratio: 32:72

$$\frac{4\sqrt{2}}{6\sqrt{2}}$$

$$\frac{4}{6} = \frac{15}{P}$$

Perimeter ratio:  $\sqrt{32} : \sqrt{72}$

$$4P = 90$$

$$\boxed{P = 22.5}$$