KEY

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

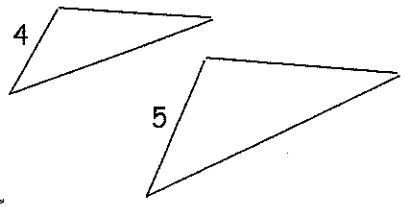
Change in Dimension $\frac{new}{old}$

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

(1) the ratio of their perimeters is $\frac{a}{b}$ and

(2) the ratio of their areas is $\frac{a^2}{b^2}$. $= \left(\frac{a}{b}\right)^2$

(3) the ratio of their volumes $\left(\frac{a}{b}\right)^3$



Example 1: The triangles at the right are similar.

(a) Find the ratio (larger to smaller) of the perimeters. $\frac{5}{4}$

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

$\frac{\text{large}}{\text{small}}$ $\quad \frac{5}{4} = \frac{x}{18}$

$4x = 90 \rightarrow x = 22.5$ cm

(c) Find the ratio (larger to smaller) of the areas. $\left(\frac{5}{4}\right)^2 = \frac{25}{16}$

(d) If the area of the larger triangle is 410 cm^2, find the area of the smaller triangle.

$\frac{25}{16} = \frac{410}{x}$

$x = 262.4$ 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^2. Find the area of the smaller octagon.

If ratio > 1 $\frac{\text{large}}{\text{small}}$

If ratio < 1 $\frac{\text{small}}{\text{large}}$

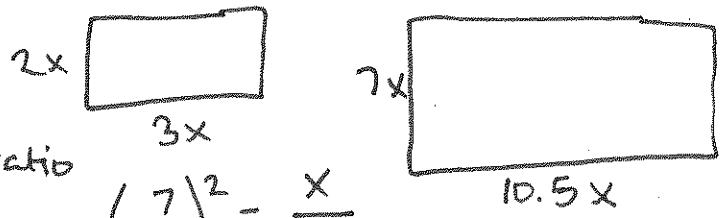
$\left(\frac{8}{3}\right)^2 = \frac{320}{x}$ $\quad \frac{\text{large}}{\text{small}}$

$\frac{64}{9} = \frac{320}{x}$ $\quad x = 45 \text{ ft}^2$

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 $3\frac{1}{2}$ times the dimension of the smaller field. Seeding the smaller field costs \$8. How much money does seeding the larger field cost?

$\frac{\text{large}}{\text{small}}$

$\frac{7x}{2x} = \frac{7}{2}$ ← ratio



$\left(\frac{7}{2}\right)^2 = \frac{x}{8} \rightarrow x = \$98$

Example 4: The areas of two similar polygons are 32 in.^{2} and 72 in.^{2} If the perimeter of the smaller polygon is 15 in, find the perimeter of the larger polygon.

$\frac{\text{large}}{\text{small}} = \frac{72}{32} = \frac{9}{4} = \left(\frac{3}{2}\right)^2$ ratio $= \frac{3}{2}$

$\frac{3}{2} = \frac{x}{15}$ $\quad x = 22.5$ in