10-4 Reteaching
Perimeters and Areas of Similar Figures

Corresponding sides of similar figures are in proportion. The relationship between the lengths of corresponding sides in the two figures is called the scale factor. The perimeters and areas are related by the scale factor.

<table>
<thead>
<tr>
<th>Scale Factor</th>
<th>Ratio of Perimeters</th>
<th>Ratio of Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{a}{b})</td>
<td>(\frac{a}{b})</td>
<td>(\frac{a^2}{b^2})</td>
</tr>
</tbody>
</table>

**Problem**

The hexagons at the right are similar. What is the ratio (smaller to larger) of their perimeters and their areas?

The ratio of the corresponding sides is \(\frac{6}{12}\).

\[
\frac{P_{\text{smaller}}}{P_{\text{larger}}} = \frac{6}{12} = \frac{1}{2}
\]

Simplify.

The ratio of the areas is the square of the ratio of the corresponding sides.

\[
\frac{A_{\text{smaller}}}{A_{\text{larger}}} = \left(\frac{1}{2}\right)^2 = \frac{1}{4}
\]

**Problem**

The rectangles at the right are similar. The area of the smaller rectangle is 72 in.\(^2\). What is the area of the larger rectangle?

The ratio of corresponding sides is \(\frac{6}{9} = \frac{2}{3}\).

Set up a proportion and solve:

\[
\frac{A_{\text{smaller}}}{A_{\text{larger}}} = \left(\frac{2}{3}\right)^2
\]

\[
\frac{72}{A_{\text{larger}}} = \frac{2^2}{3^2}
\]

Substitute.

\[
A_{\text{larger}} = 72 \cdot \frac{9}{4} = 162 \text{ in.}^2
\]

Cross Products Property

**Exercises**

The figures in each pair are similar. Compare the first figure to the second. Give the ratio of the perimeters and the ratio of the areas.

1. \(\frac{\text{3 in.}}{\text{6 in.}}\)
2. \(\frac{\text{4 cm}}{\text{7 cm}}\)
3. \(\frac{\text{15 ft}}{\text{6 ft}}\)
The figures in each pair are similar. The area of one figure is given. Find the area of the other figure to the nearest whole number.

4. Area of smaller pentagon = 112 m²

5. Area of smaller rectangle = 78 in²

6. Area of larger triangle = 75 cm²

7. Area of smaller octagon = 288 ft²

The scale factor of two similar polygons is given. Find the ratio of their perimeters and the ratio of their areas.

8. 4 : 3

9. 5 : 8

10. \( \frac{3}{7} \)

11. \( \frac{9}{2} \)

12. The area of a regular nonagon is 34 m². What is the area of a regular nonagon with sides five times the sides of the smaller nonagon?

13. A town is installing a sandbox in the park. The sandbox will be in the shape of a regular hexagon. On the plans for the sandbox, the sides are 4 in. and the area is about 42 in². If the actual area of the sandbox will be 168 ft², what will be the length of one side of the sandbox?

14. The longer sides of a parallelogram are 6 ft. The longer sides of a similar parallelogram are 15 ft. The area of the smaller parallelogram is 27 ft². What is the area of the larger parallelogram?

15. The shortest side of a pentagon is 4 cm. The shortest side of a similar pentagon is 9 cm. The area of the larger pentagon is 243 cm². What is the area of the smaller pentagon?

16. The scale factor of two similar floors is 5:6. It costs $340 to tile the smaller floor. At that rate, how much would it cost to tile the larger floor?