Looking Back and Looking Ahead

Unit Reflections

Working on the problems in this unit helped you to understand the concept of similarity as it is applied to geometric shapes. You learned how to create similar shapes and how to determine whether two shapes are similar. You also discovered the relationships between the areas and perimeters of similar shapes and investigated applications using properties of similar shapes.

Using Your Understanding of Similarity — To test your understanding of similarity consider the following problems that ask you to recognize similar shapes and deduce their properties.

1. The square has been subdivided into six triangles and four parallelograms. Some pairs of triangles and some pairs of parallelograms are similar.

   a. List two pairs of similar triangles in the figure. For each pair, give a scale factor that describes the size relationship of the two triangles.

   b. Pick one pair of similar triangles and explain how their perimeters are related and how their areas are related.

   c. List several pairs of triangles in the figure that are not similar.

   d. List all pairs of similar parallelograms in the figure. For each pair, give a scale factor that describes the size relationship between the two parallelograms.

   e. Pick two similar parallelograms and explain how their perimeters are related and how their areas are related.

   f. List several pairs of parallelograms in the figure that are not similar.
Suppose that a triangle is drawn on a coordinate grid.

a. Which of the following rules will transform the given triangle into a similar triangle?
   - i. $(3x, 3y)$
   - ii. $(x + 3, y + 2)$
   - iii. $(2x, 4x)$
   - iv. $(2x, 2y + 1)$
   - v. $(1.5x, 1.5y)$

b. For each of the rules in part a that will produce a shape similar to the original triangle, give the scale factor from the original triangle to its image.

The seventh-grade class photograph at Tierra del Sol Middle School measures 12 cm by 20 cm. The class officers want to enlarge the photo to fit on a large poster.

a. Can the original photo be enlarged to 60 cm by 90 cm?

b. Can the original photo be enlarged to 42 cm by 70 cm?

Explaining Your Reasoning—To answer the questions in Problems 1–3, you had to use several basic properties of similar figures. You should be able to justify the answers you gave by applying those basic principles of similarity.

1. What condition(s) must be satisfied for two polygons to be called similar? What questions do you ask yourself when deciding whether two shapes are similar?

2. Suppose shape A is similar to shape B and the scale factor from A to B is a number $k$.
   - a. How will the perimeters of the two figures be related?
   - b. How will the areas of the two figures be related?

3. If two triangles are similar, what do you know about
   - a. the measures of sides in the two figures?
   - b. the measures of angles in the two figures?

4. Which of the following statements about similarity are true and which are false?
   - a. Any two equilateral triangles are similar.
   - b. Any two rectangles are similar.
   - c. Any two squares are similar.
   - d. Any two isosceles triangles are similar.

You will study and use ideas of similarity in several future Connected Mathematics units, especially when it is important to compare sizes and shapes of geometric figures. Basic principles of similarity are also used in a variety of practical and scientific problems when enlarging or shrinking of images is needed as in photography and photocopying.