**Dilations**

The transformations you studied in Chapter 1 (translations, rotations, and reflections) are called rigid transformations because they all maintain the size and shape of the original figure.

However, a **dilation** is a transformation that maintains the shape of a figure but multiplies its dimensions by a chosen factor. In a dilation, a shape is stretched proportionally from a particular point, called the **point of dilation** or **stretch point.** For example, in the diagram at right, Δ*ABC* is dilated to form Δ*A′B′C.*Notice that while a dilation changes the size and location of the original figure, it does not rotate or reflect the original.

Note that if the point of dilation is located inside a shape, the enlargement encloses the original, as shown below right.

**3-5.** Plot the rectangle *ABCD* formed with the points *A*(−1, −2), *B*(3, −2), *C*(3, 1), and *D*(−1, 1) onto graph paper. Use the method used in problem 3-2 to enlarge it from the origin by a factor of 3. Label this new rectangle *A′B′C′D′.*

1. What are the dimensions of the enlarged rectangle, *A′B′C′D′*?
2. Find the area and the perimeter of *A′B′C′D′.*
3. Find *AC* (the length of ).

**3-8.** On graph paper, graph line  if *M*(−1, 1) and *U*(4, 5).

1. Find the slope of .
2. Find *MU* (the distance from *M* to *U*).
3. Are there any similarities to the calculations used in parts (a) and (b)? Any differences?

**3-17.** Enlarge the shape below on graph paper using a zoom factor of 4.



**3-20.** **Examine** the relationships in the diagram below. Then solve for *x* and *y,* if possible.



*Advanced Extension:*

**3-19.** The temperature in San Antonio, Texas is currently 77°F and is increasing by 3° per hour. The current temperature in Bombay, India is 92°F and the temperature is dropping by 2° per hour. When will it be as hot in San Antonio as it is in Bombay? What will the temperature be?