Understanding the Properties of a Dilation

Place a grid in the communicators.

Part I:

Draw the polygon 1 whose vertices are (1,1), (1,3) and (5,3), and (5,1). Create polygon 2 whose vertices are (3,3), (3,9) and (15,9), and (15,3).

What do you observe about the two polygons?

What do you observe about the corresponding sides of the two polygons?

Find the length of their sides and find the area of each figure. What do you notice?

Polygon 2 is said to be a dilation of Polygon 1. Do the angle measurements change in the two polygons? Do the measurements of the sides change? Does the area change?

Study the coordinates for each rectangle. Can the second set of coordinates be made from the first set of coordinates by multiplying by some number? This number is called the dilation factor or scale factor.

How is this number reflected in the measurements of the polygons.

Connect the corresponding vertices with a segment. Extend these lines. What happens with all these lines? This point is called the point of dilation. Study the distances of the vertices from this point. What do you notice?

Part II:

Draw the polygon whose vertices are (1,2), (2,4), (5,4), and (4,2). Find the length of each side. Find the area of the polygon.

Draw a second polygon that is a dilation of the first polygon, but whose sides are 3 times the sides of the first polygon. How do you know what the vertices should be? Name the vertices of the new polygon.

Connect the corresponding vertices with line segments. Extend these line segments. Locate the point of dilation.

What do you notice about the relationship of the coordinates for the two polygons?

Did the angles of the polygon change?

Part III:

Draw a right triangle whose vertices are (2,2), (5,2) and (2,6). Find the length of the sides and the area of the triangle.

Draw a line segment from the origin to each of the vertices. Notice the length of these segments. Extend these segments so they are twice as long as they presently are. Form this new triangle.

Is the triangle a right triangle? What are the vertices of the triangle? How are they related to the original vertices? How do the sides of the new triangle compare to the first triangle? How does the

area of the second triangle compare to the first?

What have you learned about a dilation from these three parts of the lesson.

Part IV:

Create a triangle whose one side in on the x or y-axis, whose vertices contain even numbers.

Create a dilation of the triangle using the scale factor or 1 ½.

What happened to the length of each side of the triangle, when it was dilated by a factor of 1 ½?

What happened to the area of the triangle?

What is the relationship between the corresponding sides of the triangle?

Part V:

Create a new polygon not located at the origin. Name the vertices.

Can you predict the vertices before you complete a dilation that will triple the length of the sides?

Create a dilation that triples the length of the sides.

What happened to the area? What happened to angles of the polygon?

Summary:

Ask students what a dilation does?

What does the dilation do to lines that are do not pass through the center of dilation? What does the dilation do to lines that pass through the center of dilation?

What affect does a dilation have on the lengths of the sides? What affect does a dilation have on the area of the polygon? What affect does a dilation have on the vertices of the polygon? How can you find the point of dilation?