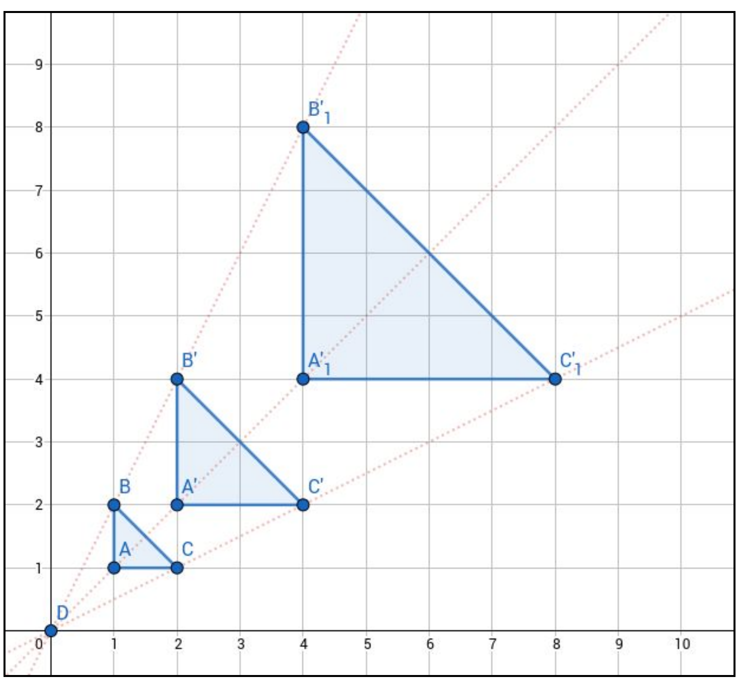
Name:__________________

Exploring Dilations Geogebra

Objective: Explore the idea of geometric dilations through the Geogebra software, and reach conclusions about what dilations are and how they work.

Part 1: Constructing dilations. Follow the directions below to construct a dilation of a shape in Geogebra.

1. Go to Geogebra.org/geometry
2. Turn on your axes and major gridlines.
3. Plot △ABC using the polygon tool. The coordinates of the vertices of the triangle should be as follows:
   a. Point A: (1,1)
   b. Point B: (1,2)
   c. Point C: (2,1)
4. Plot point D on the origin.
   a. Point D: (0,0)
5. Use the line tool to create 3 lines as follows.
   a. Line DA
   b. Line DB
   c. Line DC
6. (optional) Change the color of your line to red and make them thin dotted lines.
7. Perform two dilations of △ABC:
   a. Dilate △ABC about point D by a dilation factor of 2.
   b. Dilate △ABC about point D by a dilation factor of 4.
8. If you have completed the construction correctly, it should look like the diagram below. If something is different about your construction, figure out where a mistake was made and fix it.



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Part 2: Use your construction in the Geogebra software to answer the following questions.

1. List the coordinates of each vertex of each triangle in the diagram below.

△ABC	Ordered Pair	△A'B'C'	Ordered Pair	△A_1'B_1'C_1'	Ordered Pair
A		A'		A_1'	
B		B'		B_1'	
C		C'		C_1'	

2. Compare the ordered pairs of each point and its subsequent dilated points. What do you notice?

3. Find the lengths of each side of each triangle and use it to fill in the table below.

△ABC	Length	△A'B'C'	Length	△A_1'B_1'C_1'	Length
AB		A'B'		A_1'B_1'	
AC		A'C'		A_1'C_1'	
BC		B'C'		B_1'C_1'	

4. Compare the side lengths of the dilated triangles to the original triangle. What do you notice? Draw a conclusion about what this means about the side lengths of a dilated shape compared to side lengths of the original shape.

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5. Our dilation was performed using the origin (Point D) as the Dilation Center Point. Find the lengths of each segment below and fill in the table.

Segment	Length	Segment	Length	Segment	Length
DA		DA’		DA_1’	
DB		DB’		DB_1’	
DC		DC’		DC_1’	

6. What do you notice about the different segment lengths in the table above? Draw a conclusion about what this means when you dilate a shape about a given dilation center point.

7. Find the area of each triangle in your construction and fill in the table below.

Triangle	Area
$\triangle$ABC	
$\triangle$A’B’C’	
$\triangle A_1$’B_1’C_1’	

8. What do you notice about the areas of each triangle? What is different about the dilated areas compared to the dilated points or side lengths?

9. Explain why areas dilate differently compared to the side lengths.

10. If we were to dilate a 3 dimensional object, how would the dilated volume compare to the dilated side lengths?

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11. Click on △ABC and drag it around in Geogebra. How does dragging △ABC change the position of the two dilated triangles?

12. Click on Doint D and drag it around in Geogebra. How does dragging Point D change the position of the two dilated triangles?

13. Does dragging △ABC or Point D change the size of the dilated triangles?

14. Why does dragging △ABC or Point D change the location of the dilated triangles, but not their size?

15. Click and drag Point A. What happens?

16. Why does dragging Point A change the size and shape of the dilated triangles, but not their location?

17. Try clicking and dragging one of the dilated triangles. Why won't the Geogebra software let you click and drag the dilated points or triangles?