Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Unit 10 – Area of Similar Figures**

Monica

Geometry Period:\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **OUTCOME** | **RATING** |
| #9: Discerns and applies concepts of similarity in two triangles or polygons | NY MS ES |
| #10: Discerns and applies concepts of perimeter, area, surface area, and volume for two and three dimensional figures | NY MS ES |

**DIRECTIONS PART 1**: Today you will use Geometer’s Sketchpad to explore the relationship of the area of similar figures. Open the GSP program , follow each of the steps below and answer the questions.

1. Under “Graph” choose “Define Coordinate System”.
2. Using the segment tool, draw triangle ABC anywhere on the graph. Label your points.
3. Select points A, B, and C, and then choose “Triangle Interior” under the “Construct” menu.
4. Double-click the origin to mark it as the point of Dilation.
5. Select triangle ABC (and its points and segments) and choose “Dilate” under the “Transform” menu. Make sure the fixed ratio is . Label your new points. (This should be done automatically for you as A’, B’, and C’.)
6. Measure the ratio of . To do this, select and and choose “Ratio” under the “Measure” menu. Then measure the ratio of  and . (Note: GSP will rename your segments as lower case letters such a j, j’, k, k’, l, and l’. This is fine.)

**QUESTION #1:**  What do you notice about the ratios of the side lengths? Why did this happen? What does this tell you about the two triangles ? (Hint: Think back to our last unit.)

1. Find the area of the two triangles. To do this, select the interior of and and choose “Area” under the “Measure” menu. (Note: GSP will label your areas as P and P’. This is fine.)
2. Calculate the ratio of the areas ofand . To do this select “Calculate” under the “Measure” menu and click on the area of , the division symbol, and then the area of . Record your results in the table below. (Note: The ratio is given to you as a decimal. Record it in the table as a fraction.)

**QUESTION #2:** Change the size of your triangles by dragging around points A, B, and C. Observe how the areas change. What do you notice about the ratio of the side lengths and the ratio of their areas as you change the coordinates of your points? Why do you think this happens?

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| **SCALE FACTOR** | **RATIO OF AREAS (write as a fraction)** |
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1. Delete . Repeat steps 5 – 8 using the scale factor provided in the chart above. If at any point your triangle goes off the screen you can either use the scroll bar on the right side of the screen or shrink the size of your starting triangle. Record all results in the chart above.

**QUESTION #3:**  Look at the last scale factor given in the chart. Based on your observations, what do you think the ratio of the areas of the similar figures would have to be if the scale factor is ? Record your answer in the chart below and provide a brief explanation below.

**DIRECTIONS PART 2:** Based on what you discovered in today’s investigation, answer the questions below. Be sure to show all of your work where necessary.

1) The similarity ratio of two similar figures is 3:4. If the area of the larger figure is 38 square inches, what is the area of the smaller figure?

2) The ratio of the areas of two similar figures is 9:16. If the length of one of the sides of the smaller is figure is 6 inches, what is the length of the corresponding side of the larger figure?

3) If there are 12 inches in 1 foot, how many square feet are in 2160 square inches?

4) Make a conjecture: If the similarity ratio of two similar **solids** is h:k, what will be the ratio of their **surface areas?** Why?