Dilations (Using Geometer's Sketchpad 4.0)

Discover what happens when you dilate a triangle.

Open software and set up: Open Geometer's Sketchpad 4.0.
Expand the screen to full screen view. On the left vertical
toolbar, be sure that the arrow is clicked. Under **DISPLAY**,
choose **Show Text Palette**.

Set the graph grid: Under **GRAPH**, choose **Grid Form**, **Square Grid**.

Plot the points for the triangle: Under **GRAPH**, choose **Plot Points** and plot (2,1), (6,2), (3,4).
In the drop down box for Plot Points, use your mouse (or TAB key) to enter the coordinates.
Hit PLOT.

Complete the triangle: To draw the triangle, highlight (by clicking on) the three points. Choose
CONSTRUCT, Segments. If you would like to label your triangle vertices, choose the A
from the left vertical toolbar, and click on each point.
Highlight the three vertices only of the triangle. Choose **CONSTRUCT**, **Interior**. Adjust your
color by right clicking in the triangle interior and choosing a new color.

Measure the coordinates: Highlight one point. Be sure only the point is highlighted. Under
MEASURE, choose **Coordinates**. This will place the coordinates on the screen. Repeat this
process for each of the points.

Mark the point of dilation: Highlight the origin. Under **TRANSFORM**, choose **Mark center**.
We are getting ready to dilate the triangle about the origin.

Dilate the figure: You will need to select the triangle by drawing a marquee around the figure.
With your arrow clicked, use your mouse to click a starting corner to draw a box (marquee)
around the triangle. The triangle will become highlighted. Under **TRANSFORM**, choose
Dilate and enter ¼ .
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Now investigate:

1. Measure the coordinates of the image triangle. What do you notice?_____
   _____
   Generalize your hypothesis into a rule that will illustrate the changes in the coordinates:

Dilate: $D_{O,k}$ (x, y) → (,   )

2. Highlight one side of the original triangle. Choose MEASURE, Length. Record this length. _____
Highlight the corresponding side in the image triangle. MEASURE, Length. Record this length. _____
Do the sides of a triangle maintain their lengths through a dilation with a scale factor between 0 and 1?_____

3. Describe what happens to the original triangle when the dilation scale factor is between 0 and 1:
_____

4. Choose an angle in the original triangle by highlighting three vertices in order. Choose MEASURE, Angle. Record this measurement. _____
Highlight the corresponding angle in the image triangle. MEASURE, Angle. Record this measurement. _____
Do the angles of a triangle maintain their measurements through a dilation?_____

5. Delete everything except the original triangle. Choose a scale factor of 2 and dilate the triangle.
Highlight one side of the original triangle. Choose MEASURE, Length. Record this length. _____
Highlight the corresponding side in the image triangle. MEASURE, Length. Record this length. _____
Do the sides of a triangle maintain their lengths through a dilation with a scale factor greater than one? _____

6. Describe what happens to the original triangle when the dilation scale factor is greater than 1:
_____

7. Delete everything except the original triangle. Choose a scale factor of -1.5 (enter as -3/2) and dilate the triangle.
Describe what happens to a triangle when the dilation scale factor is negative:_____
_____