**Supplementary Activities**

**Unit 4 Investigation 1**

**Dilating a point**

Open this file: <http://tube.geogebra.org/material/simple/id/2979995>

This applet illustrates what it means to dilate a point about another point.   You can move point *O* (the center of dilation) and point *A* anywhere in the plane.   You can also change the scale factor (*k*) of this dilation by either moving the slider or by typing it in the white box at the top of the applet. *A*' = the image of point *A* under dilation about point *O* with scale factor *k*.   Interact with the applet below for a few minutes BEFORE clicking the "Check This Out!" checkbox in the lower right corner.

1. Fill in the blank:  "The **image** of a point (*A*) under a dilation about another point (*O*) is a **point (*A'*)** that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with *O* and *A*.

2. Click the "Check This Out!" box now.  Move point(s) *O* and *A* around.  Be sure to adjust the scale factor (*k*) of this dilation as well.  Describe what you observe.

3. How is the ratio related to the scale factor *k*?

**Dilating a line**

Open the file: <http://tube.geogebra.org/material/simple/id/2692195>

In the applet, line *m* is dilated about point *A.*The *scale factor* of the dilation is given by the parameter *k*.

1. Show the image of line *m* under a dilation about point *A* with scale factor *k*.   What does the image of this line look like?  (*Be specific!*)

2. Set the slider k = 5 to start.  Then move the slider slowly to the left.  Observe.     What happens to the image of *m* as *k* approaches zero?

3.What happens to the image of the line if *k* = 1?

4. What happens to the image of the line if *k* = 0?

5.What happens to the image of the line if *k* < 0?

Change the locations of point *A* and the original line *m*.  Repeat steps 2-5 again.     
  
Now, click the "Check This Out!" checkbox.  Interact with the new slider you see.       Carefully observe what happens here.

6. What happens if the original line *m* passes through point *A*?   More specifically, what does the image of *m* look like if *m* passes through *A*?

7. What happens if the original line *m* does not pass through *A?*What does the image of *m* look like if *m* does not pass through *A*?

8. Complete the following statement by filling in each blank with an appropriate word  to make a true statement:

A dilation maps a \_\_\_\_\_\_\_\_\_\_\_ not passing through the center of the  dilation to another \_\_\_\_\_\_\_\_\_\_\_ that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the original     \_\_\_\_\_\_\_\_\_\_\_.  If, however, the original \_\_\_\_\_\_\_\_\_\_\_ passes through the     \_\_\_\_\_\_\_\_\_\_\_ of the dilation, the image of this line is the \_\_\_\_\_\_\_\_\_\_\_\_ as    the original \_\_\_\_\_\_\_\_\_\_.

**Dilating a Segment**

Open the file. <http://tube.geogebra.org/material/simple/id/2739419>

In the applet the red segment (with endpoints *B & C*) "preimage" has been dilated about the black point *O.* The image of this segment has endpoints *B'* and *C'.* The *scale factor* of the dilation is given by the parameter *k*.  At any time, feel free to change the locations of point *B, C,* and/or *O*.  Also, feel free to adjust the scale factor using the slider.   Select the "Check This Out!" box.  Interact with the elements you see there.  As you continue to interact with this applet, pay very close attention to the length and position of the image segment with respect to the preimage segment.   Then answer these questions.

1. The image of any segment under a dilation about a point is another \_\_\_\_\_\_\_\_\_\_\_\_\_.
2. What does the image look like if the scale factor *k =* 1? Describe.
3. What does the image segment look like if the scale factor *k =*0? Describe.
4. What does the image segment look like if the scale factor *k =*–1? Describe.
5. What happens to the location of the image of the original segment if *k* > 0 vs. *k* < 0?
6. Suppose the preimage has length = 4.8 cm.  If *k* = 3.2, determine the length of the image of this segment.
7. Suppose the image has a length of 12.5 cm.  If *k* = 1.5, determine the length of the preimage.
8. What does the action with the blue angles imply about the two segments?
9. *Let's generalize now:  Fill in the blanks to make a true statement:*

Suppose a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is dilated about a \_\_\_\_\_\_\_\_\_\_ with scale factor *k*.   Then the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of this original \_\_\_\_\_\_\_\_\_\_\_\_\_ is another \_\_\_\_\_\_\_\_\_\_that is both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the original segment  and has a \_\_\_\_\_\_\_\_\_\_\_\_ that is \_\_\_\_\_\_ times as \_\_\_\_\_\_\_ as the original \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.