GUIDED NOTES (MODEL NOTES)

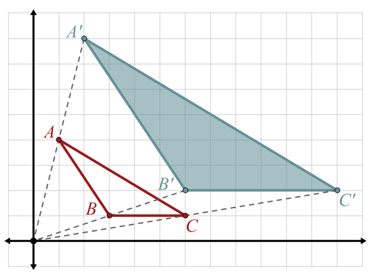
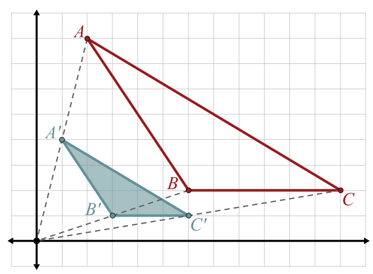
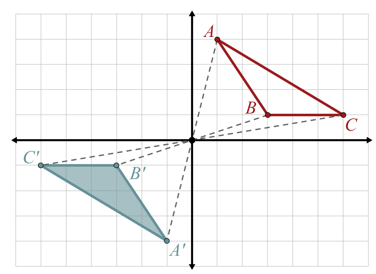
Vocabulary

- **Dilation:** a type of transformation where a preimage is resized with respect to a fixed point and a certain ratio; the preimage is **enlarged or reduced** by a *scale factor, k*
- **Scale Factor:** k; the ratio of corresponding side lengths of the preimage to image
- **Center of Dilation:** the fixed (unchanging) point, which is the origin unless stated otherwise, that the image dilates from

Is a dilation an example of rigid motion?

No, because the preimage and image are similar, not congruent

Scale Factors (k-Values):

Graph			
k-values	$k > 1$	$0 < k < 1$	$k < 0$
Verbal	*enlargement, magnification, scale up, zoom in, increase the size*	*reduction, shrinkage, scale down, zoom out, decrease the size*	*resized and rotated 180°*

Algebraic

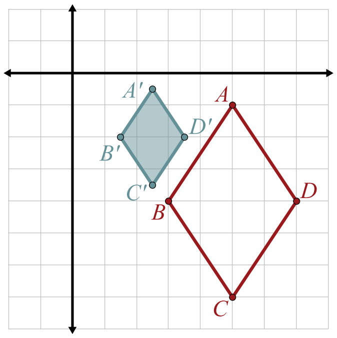
- When the center of the dilation is at the origin, then the ***algebraic rule*** is

  $(a, b) \rightarrow (k \cdot a, k \cdot b)$.

- If $(image) = k \cdot (preimage)$, then the scale factor: $k = \dfrac{image}{preimage}$.

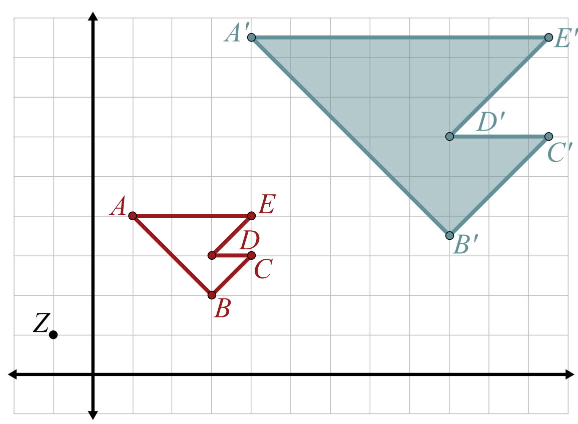
Applying Algebraic Rules

1) Draw the image and complete the table below for the unshaded preimage.

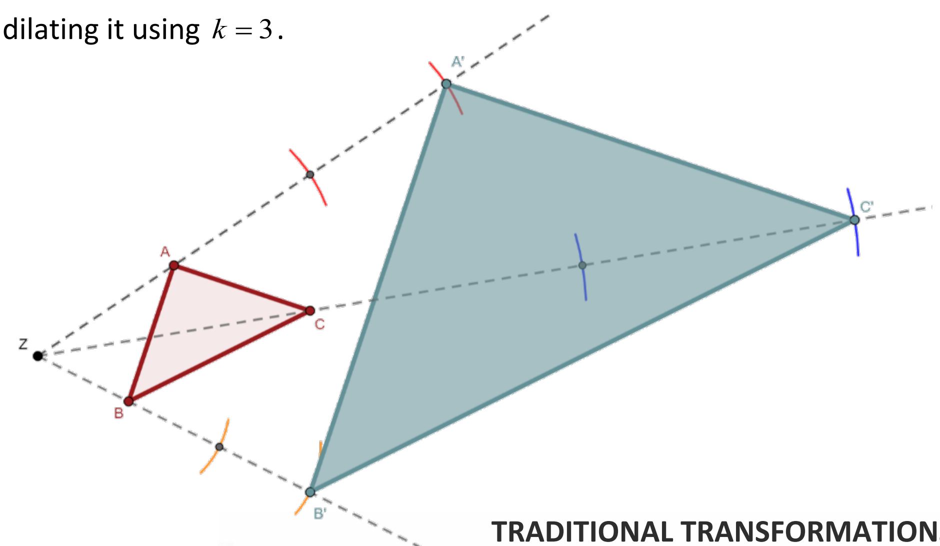
Graph	Verbal Description	Algebraic Rule
	The image is a dilation centered at the origin with a scale factor of $\frac{1}{2}$.	$(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

Other Centers of Dilation

2) What if we dilate a figure with respect to a point other than the origin? Dilate the following preimage with a center of dilation at point $Z(-1, 1)$ and a scale factor of 2.5.



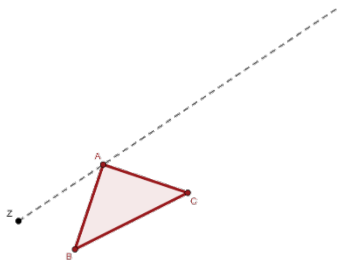
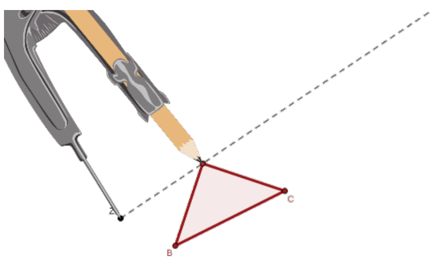
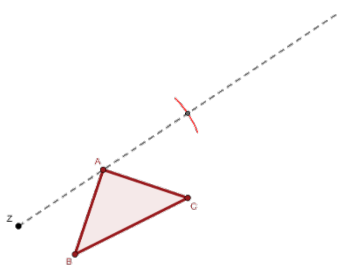
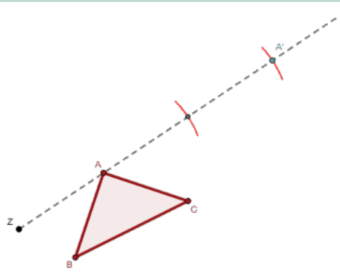
3) What if the preimage was not on the coordinate plane? How would we construct the image? Construct the image given the following preimage and the given center of dilation, Z, dilating it using $k = 3$.

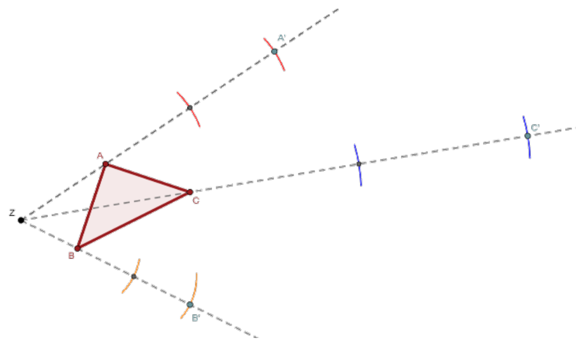
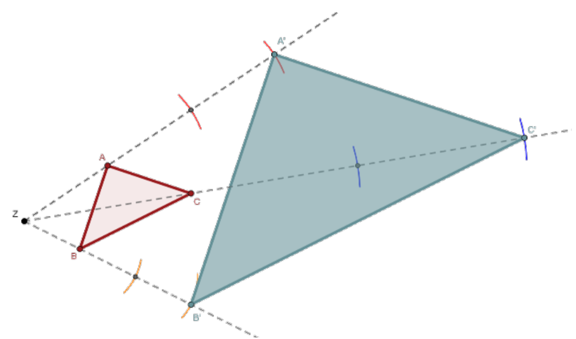


GUIDED NOTES (TEACHER GUIDE)

Example 3

How to construct a dilation with a compass and straightedge.

Construction	Instruction
	**Step 1:** Use the straightedge to draw a ray from the center of dilation, $Point\ Z$, through $Point\ A$.
	**Step 2:** Use the compass to measure the distance from $Point\ Z$ to $Point\ A$.
	**Step 3:** Use this measurement to construct an arc with a center at $Point\ A$ along the line from Step 1.
	**Step 4:** Repeat Step 3 but now with the center at the intersection of the arc and line from Steps 2. Label that point of intersection A'. *Notice the length of* $\overline{ZA'}$ *is three times the length of* $\overline{ZA}$.

Construction	Instruction
	**Step 5:** Repeat Steps 1-4 for the remaining points.
	**Step 6:** Use the straightedge to create the polygon (image).