

(DN) Copy and complete each statement

- (a) Translate along a _____
- (b) Rotate around a _____
- (c) Reflect _____
- (d) Dilate from a _____ with a _____

Name _____ Per _____

LO: I can perform transformations and explain the commonalities and differences between rigid transformations and dilations.

(1) **Transformations . . .**

ruler,
highlighters

Are functions (rules) that assign each point in the plane to a unique point

$$F(P) = P'$$

Rigid motions map a line to a _____, a ray to a _____, a segment to a _____, and an angle to an _____

Rigid motions preserve _____ of segments ($PQ = P'Q'$).

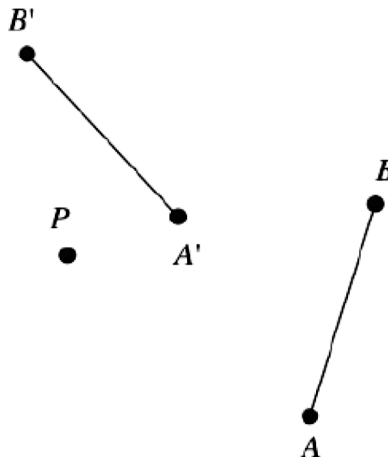
Rigid motions preserve the _____ of angles.

Based on our drawings in 5.1 through 5.5, do you think dilations are rigid motions? Why or why not?

(2) **Rigid Transformations Review**

compass

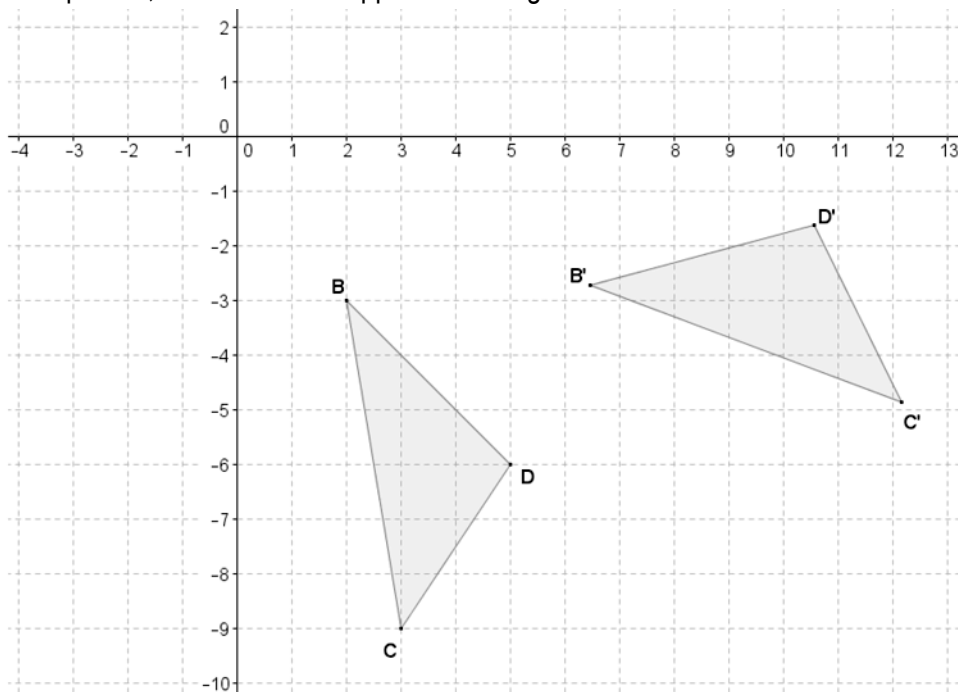
Find the center and the angle of the rotation that takes AB to $A'B'$. Find the image of P of point P under this rotation.



(3)
compass

Rigid Transformations Review

- (a) In the diagram below, $\triangle B'C'D'$ is the image of $\triangle BCD$ after a rotation about a point A . What are the coordinates of point A , and what is the approximate degree measure of the rotation?



(4)
compass

Rigid Transformations Review

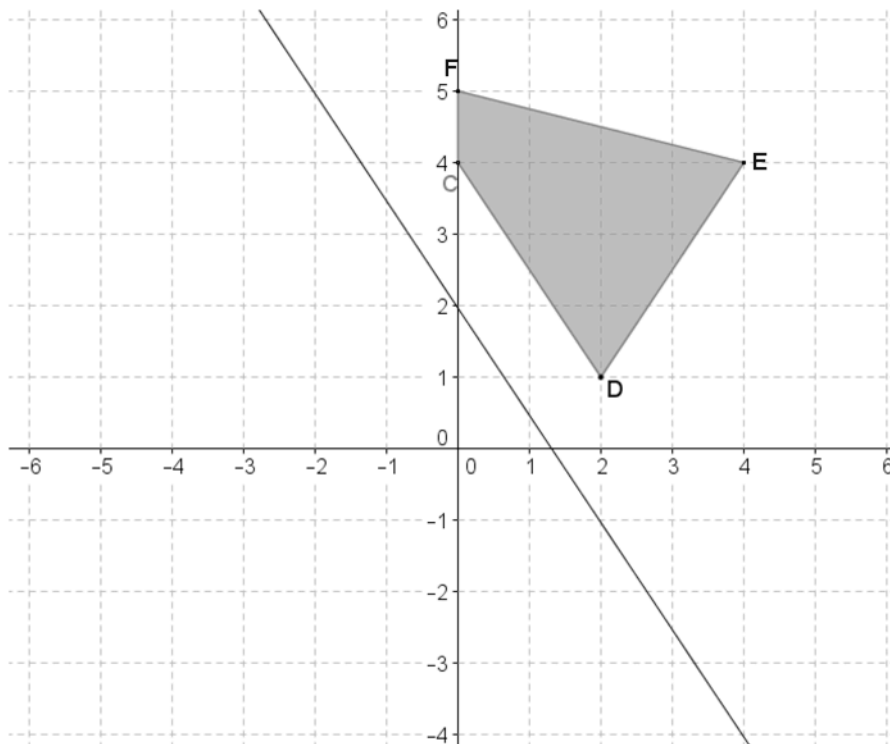
- Construct the line of reflection for the reflection that takes point A to point A' and label it m . Find the image P' under this reflection.



(5)
compass

Rigid Transformations Review

Michael tells you that the vertices of the image of quadrilateral CDEF reflected over the line representing the equation $y = -\frac{3}{2}x + 2$ are the following: $C'(-2,3)$, $D'(0,0)$, $E'(-3, -3)$, and $F'(-3,3)$. Do you agree or disagree with Michael? Explain.



(6)
compass

Rigid Transformations Review

A translation takes A to A' . Find the image P' and pre-image P'' of point P under this translation. Find a vector that describes the translation.

P ●

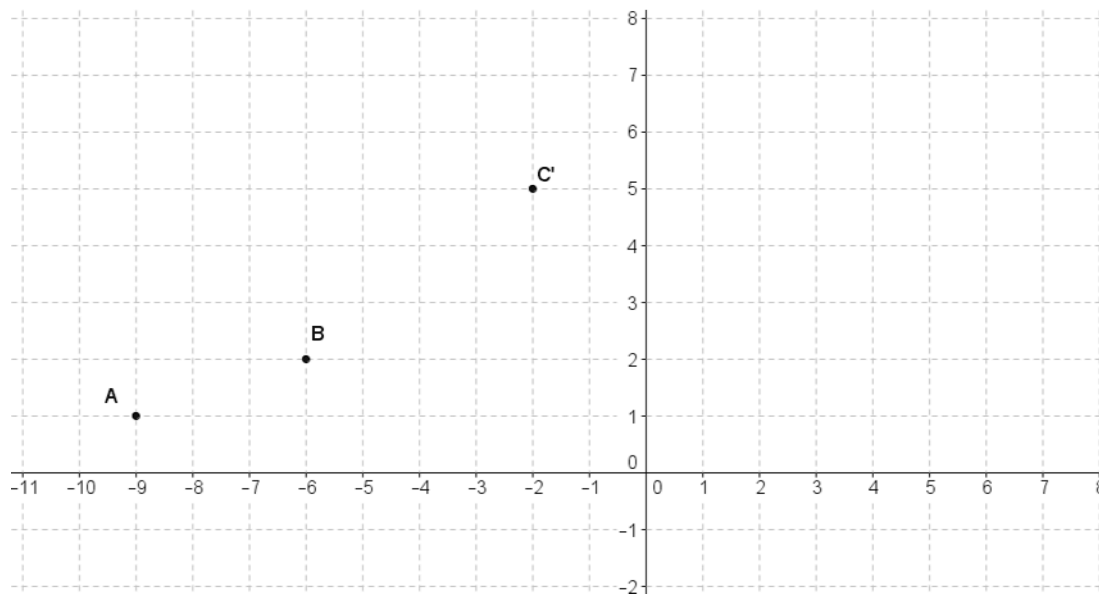
A ●

● A'

(7)
compass

Rigid Transformations Review

The point C' is the image of point C under a translation of the plane along a vector.



(a) Find the coordinates of C if the vector used for the translation is \overrightarrow{BA} .

(b) Find the coordinates of C if the vector used for the translation is \overrightarrow{AB} .

(8)
compass

Rigid Transformations Review

A dilation with center O and scale factor r takes A to A' and B to B' . Find the center O and estimate the scale factor r .

A' ●

A ●

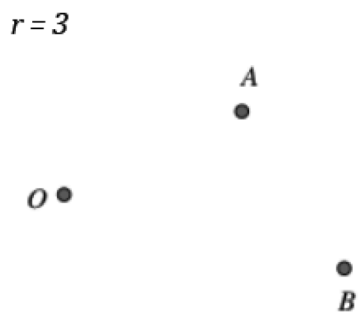
● B'

● B

(9)
compass

Dilations Review

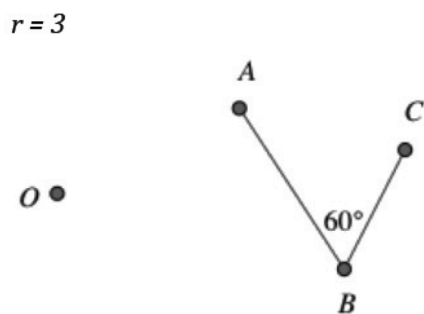
Given a center O , scale factor r , and points A and B , find the points $A' = D_{O,r}(A)$ and $B' = D_{O,r}(B)$. Compare length AB with length $A'B'$ by division; in other words, find $\frac{A'B'}{AB}$. How does this number compare to r ?



(10)
compass

Dilations Review

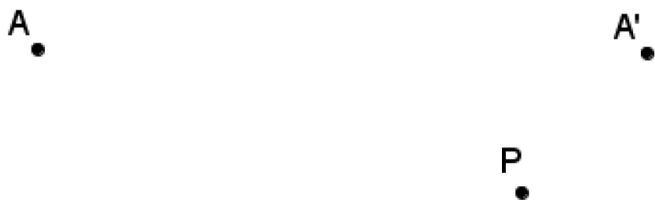
Given a center O , scale factor r , and points A , B , and C , find the points $A' = D_{O,r}(A)$, $B' = D_{O,r}(B)$, and $C' = D_{O,r}(C)$. Compare $m\angle ABC$ with $m\angle A'B'C'$. What do you find?



□ (11) All 4 transformations

compass

In the diagram below, A' is the image of A under a single transformation of the plane. Use the given diagram to show your solutions to parts (a) – (d).



- (a) Describe the translation that maps $A \rightarrow A'$, and then use the translation to locate P' , the image of P .
- (b) Describe the reflection that maps $A \rightarrow A'$, and then use the reflection to locate P'' , the image of P .
- (c) Describe a rotation that maps $A \rightarrow A'$, and then use the rotation to locate P''' , the image of P .
- (d) Describe a dilation that maps $A \rightarrow A'$, and then use the dilation to locate P'''' , the image of P .
-

(12) **Dilation behavior**
compass

On the diagram below, O is a center of dilation and \overleftrightarrow{AD} is a line not through O. Choose two points B and C on \overleftrightarrow{AD} between A and D.



- (a) Dilate A, B, C, and D from O using scale factor $r = \frac{1}{2}$. Label the images A', B', C', and D', respectively.
 (b) Dilate A, B, C, and D from O using scale factor $r = 2$. Label the images A'', B'', C'', and D'', respectively.
 (c) Dilate A, B, C, and D from O using scale factor $r = 3$. Label the images A''', B''', C''', and D''', respectively.
 (d) Draw a conclusion about the effect of a dilation on a line segment based on the diagram that you drew. Explain.

(13) **Inverse Transformations** All transformations have an inverse that returns points to their original location.

Write the inverse transformation for each of the following so that the composition of the transformation with its inverse will map a point to itself on the plane. (You may want to make a sketch for each to help you see how to “go backwards”)

(a) $T_{\overleftrightarrow{AB}}$

(b) $r_{\overleftrightarrow{AB}}$

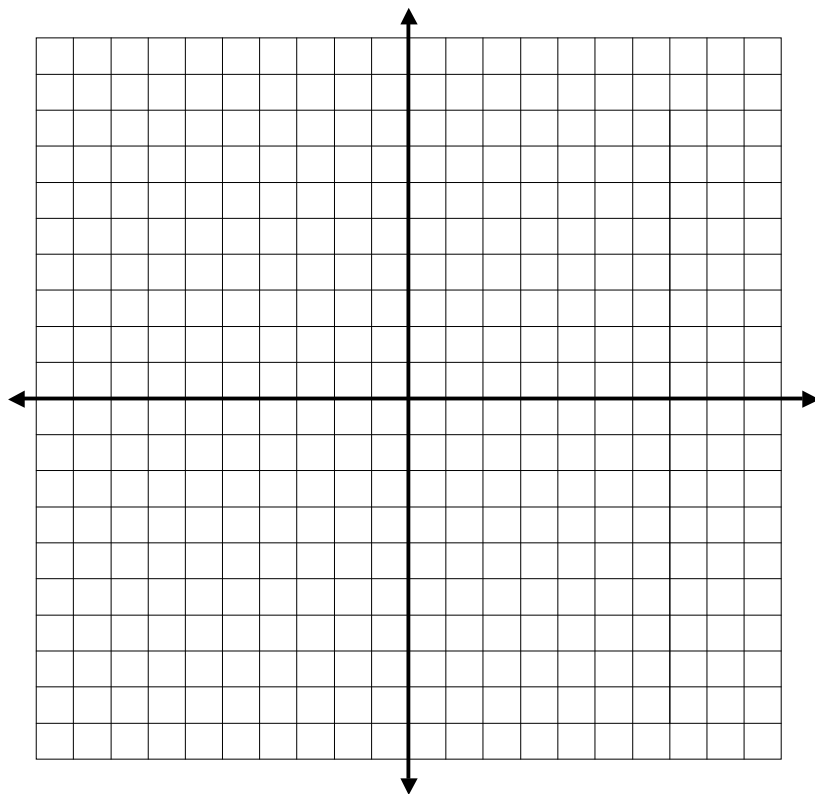
(c) $R_{C, 45^\circ}$

(d) $D_{O,r}$

(14) **Dilation behavior**

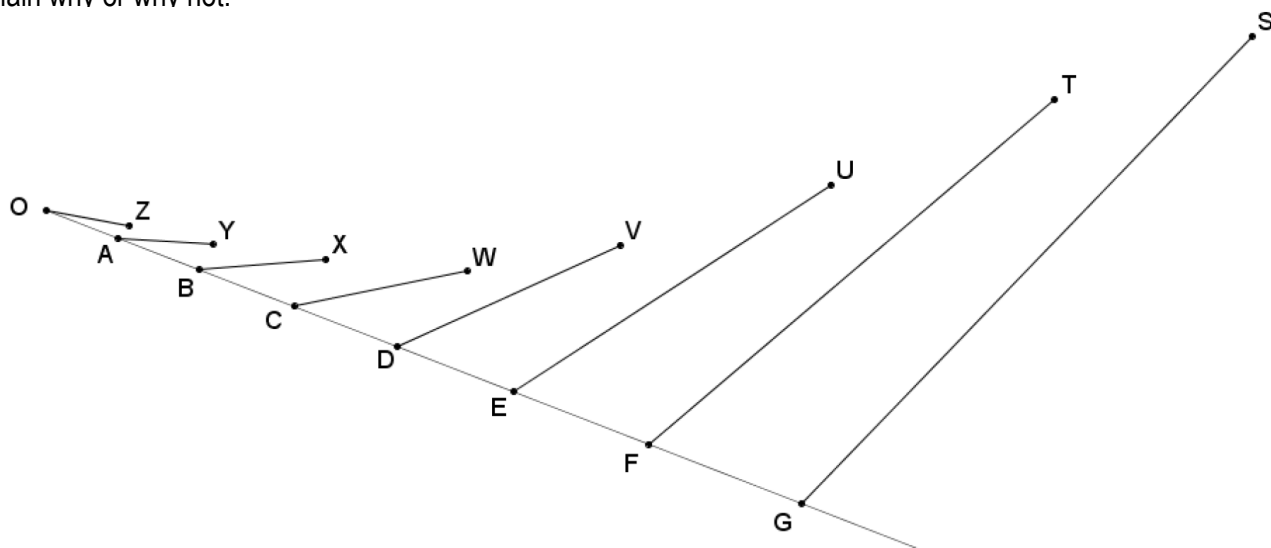
compass

Given $U(1,3)$, $V(-4,-4)$, and $W(-3,6)$ on the coordinate plane, perform a dilation of $\triangle UVW$ from center $O(0,0)$ with a scale factor of $3/2$. Determine the coordinates of images of points U' , V' , and W' , and describe a numeric relationship between the coordinates of the image points and the coordinates of the preimage points.


 (15) **Dilation behavior**

compass

Points $B, C, D, E, F,$ and G are dilated images of A from center O with scale factors $2, 3, 4, 5, 6,$ and $7,$ respectively. Are points $Y, X, W, V, U, T,$ and $S,$ all dilated images of Z under the same respective scale factors? Explain why or why not.



(16) **Exit Ticket**

ruler

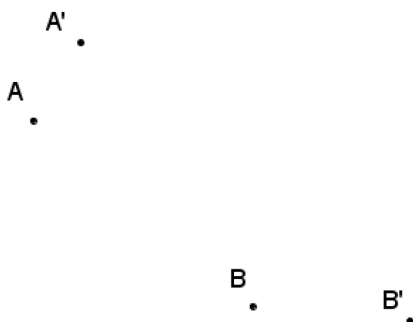
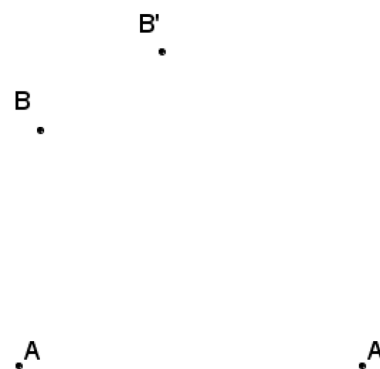
Read the lesson summary. Make an example sketch and use it to describe what dilations have in common with rigid transformations and how they are different. You may refer to problems from the lesson.

Lesson Summary

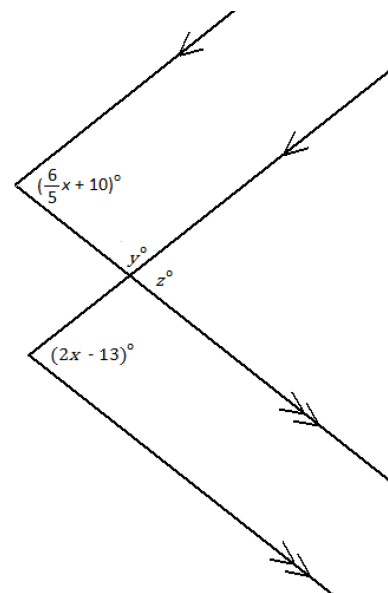
- There are two major classes of transformations; those that are distance-preserving (translations, reflections, rotations) and those that are not (dilations).
- Like rigid motions, dilations involve a rule assignment for each point in the plane and also have inverse functions that return each dilated point back to itself.

 (17) **Homework:**

(1) For each diagram, find the center and scale factor that takes A to A' and B to B' , if a dilation exists. Explain how you know that the dilation does or does not exist.

DIAGRAM #1

DIAGRAM #2


(2) Find the measure of x , y , and z . State any angle relationships you use.



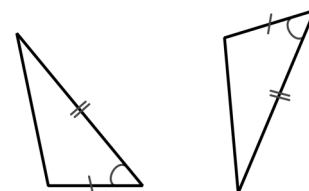
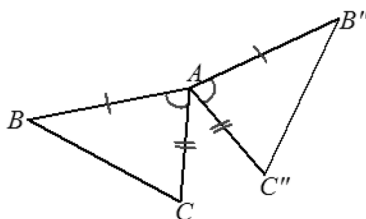
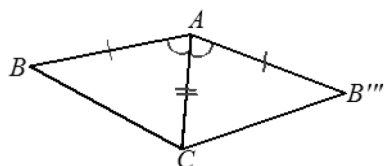
(17) **Homework:**

 compass,
 straightedge

e

 (3) If two triangles satisfy the SAS criteria, describe the rigid motion(s) that would map one onto the other in the following cases. First, match each part (a, b, and c) to the diagram it describes.

- (a) The two triangles shared a single common vertex?
 (b) The two triangles were distinct from each other (share no vertices or sides)?
 (c) The two triangles shared a common side?


 (4) Construct Square BOXY. BO has been drawn for you. (Hint: it may help to extend the length of BO).
