

Date:

Section: 10.2

Objective: Transformations on Graphs -- Dilations

Transformation: A change in the position, shape, or size of a geometric figure.

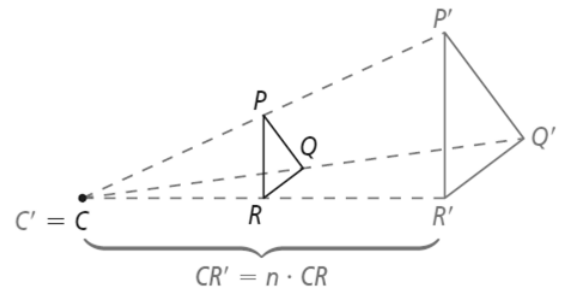
Examples of Transformations:

- *reflections* (flips)
- *translations* (slides)
- *rotations* (twists)
- *dilations* (enlargements or reductions)

Preimage: The original figure in a transformation.

Image: The resulting figure after the transformation.

Dilation: A transformation in which a larger or smaller copy of a figure is made that is similar to the original figure.



Enlargement: A dilation with a scale factor greater than 1. The image is larger than the preimage.

Reduction: A dilation with a scale factor between 0 and 1. The image is smaller than the preimage.

Properties of Dilations:

- If the scale factor is n , the segments in the image are n times as long as the corresponding segments in the preimage.
- The angles in the image are congruent to the corresponding angles in the preimage.
- The points on the image are n times as far away from the **center of dilation** as the points on the preimage.

Dilations with the Center at the Origin

If the center of dilation is the origin and the scale factor is n , the image of the point $A(x, y)$ will have coordinates $A'(nx, ny)$. In other words, multiply both the x and y coordinates by the scale factor to find the coordinates of the new point.

Examples: A dilation has center $(0, 0)$. Find the image of each point for the given scale factor.

a) $L(3, 0)$; scale factor = 5

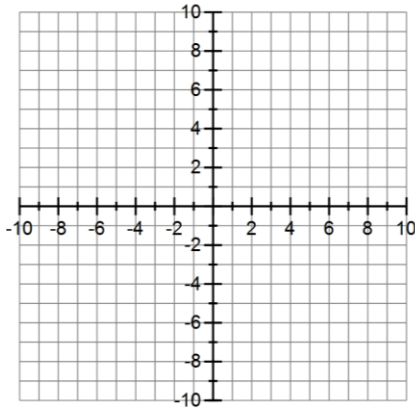
b) $N(-4, 7)$; scale factor = 0.2

c) $A(6, 2)$; scale factor = 1.5

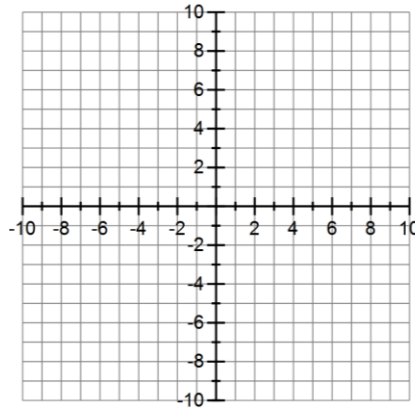
d) $F(3, -2)$; scale factor = $\frac{1}{3}$

Examples: Graph and label the figure with the given vertices. Then dilate the figure by the given scale factor with center $(0,0)$. Give the coordinates of the new vertices and graph the image.

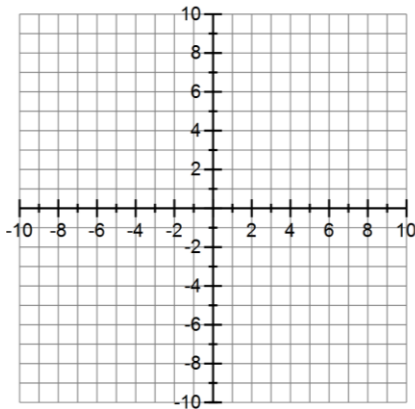
- a) $A(1, 2)$, $B(3, -2)$, $C(-1, -1)$
scale factor = 3



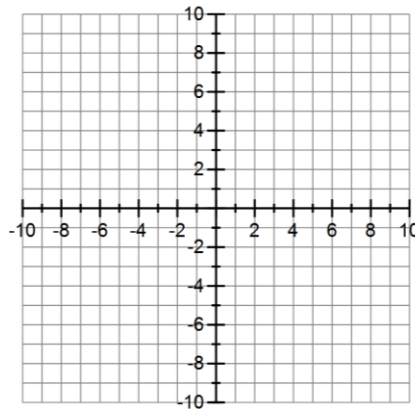
- b) $P(-3, 2)$, $Q(0, 1)$, $R(2, -5)$, $S(-5, -3)$
scale factor = 2



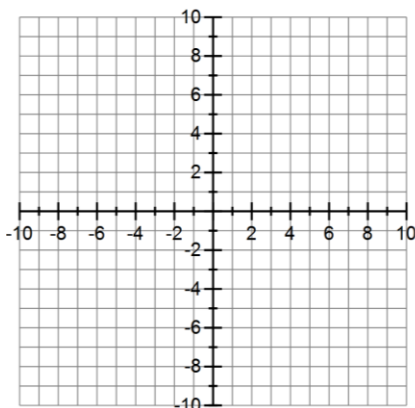
- c) $E(8, 10)$, $F(5, 7)$, $G(6, 0)$
scale factor = $\frac{1}{2}$



- d) $J(-8, 8)$, $K(-4, 4)$, $L(-4, 0)$, $M(-6, -8)$
scale factor = 0.75



- e) $X(2, -4)$, $Y(0, 0)$, $Z(-3, 1)$
scale factor = 1.5



- f) $T(-10, 10)$, $U(5, 5)$, $V(0, -10)$, $W(-5, -5)$
scale factor = $\frac{2}{5}$

