

Lesson 2.7:

Dilations

Essential Question

How can you enlarge or reduce a figure in the coordinate plane?

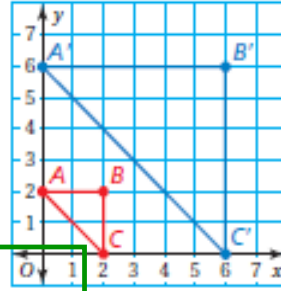
Key Idea

Dilations in the Coordinate Plane

Words To dilate a figure with respect to the origin, multiply the coordinates of each vertex by the scale factor k .

Algebra $(x, y) \rightarrow (kx, ky)$

- When $k > 1$, the dilation is an enlargement.
- When $k > 0$ and $k < 1$, the dilation is a reduction.



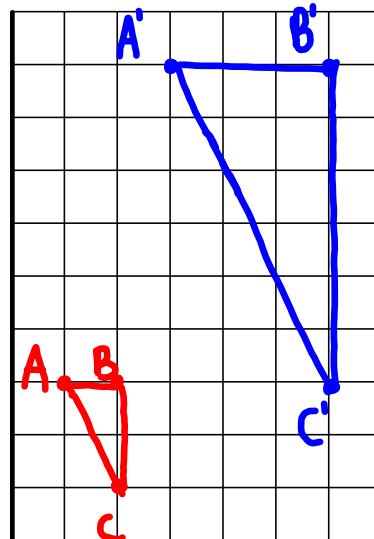
Draw the image of Triangle ABC ($A(1, 3)$, $B(2, 3)$, $C(2, 1)$) after a dilation with a scale factor of 3. Identify the type of dilation.

$$(x, y) \rightarrow (3x, 3y)$$

$$A(1, 3) \rightarrow A'(3, 9)$$

$$B(2, 3) \rightarrow B'(6, 9)$$

$$C(2, 1) \rightarrow C'(6, 3)$$



Enlargement

Draw the image of Rectangle WXYZ ($W(-4, -6)$, $X(-4, 8)$, $Y(4, 8)$, $Z(4, -6)$) after a dilation with a scale factor of 0.5. Identify the type of dilation.

$$(x, y) \rightarrow (0.5x, 0.5y)$$

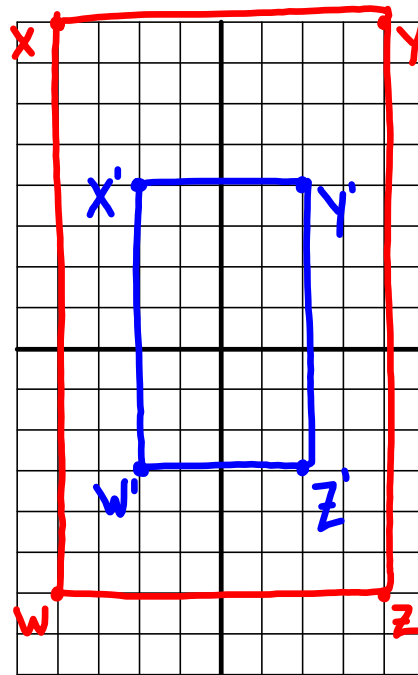
$$W(-4, -6) \rightarrow W'(-2, -3)$$

$$X(-4, 8) \rightarrow X'(-2, 4)$$

$$Y(4, 8) \rightarrow Y'(2, 4)$$

$$Z(4, -6) \rightarrow Z'(2, -3)$$

Reduction



The vertices of a trapezoid are $A(-2, -1)$, $B(-1, 1)$, $C(0, 1)$, and $D(0, -1)$. Dilate the trapezoid with respect to the origin using a scale factor of 2. Then translate it 6 units right and 2 units up. What are the coordinates of the image?

$$(x, y) \rightarrow (2x, 2y) \rightarrow (x'+6, y'+2)$$

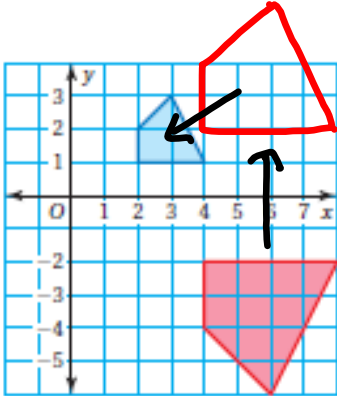
$$A(-2, -1) \rightarrow A'(-4, -2) \rightarrow A''(2, 0)$$

$$B(-1, 1) \rightarrow B'(-2, 2) \rightarrow B''(4, 4)$$

$$C(0, 1) \rightarrow C'(0, 2) \rightarrow C''(6, 4)$$

$$D(0, -1) \rightarrow D'(0, -2) \rightarrow D''(6, 0)$$

The red figure is similar to the blue figure. Describe a sequence of transformations in which the blue figure is the image of the red figure.



Reflection in the x -axis

Dilation where $k = \frac{1}{2}$