Dilations & Similarity

Today's Objective
SWBAT apply the properties of a dilation in order to determine new coordinates, the scale factor k, and the ratio of side lengths.

A _____ is a transformation that moves the points of a line, line segment, or figure either toward or away from a point called the _____ ____ _____. The center of dilation can be any point _____ the figure, ____ the figure, or _____ the figure. Dilations produce _____ figures. Like rigid motions, dilations preserve _____ _____. Unlike rigid motions, dilations do not preserve the _____ of line segments. Instead, they produce a figure with sides that are _____ to the sides of the preimage.

To dilate, _____ the coordinates of the pre-image by a _____ _____ to obtain the coordinates of the image.
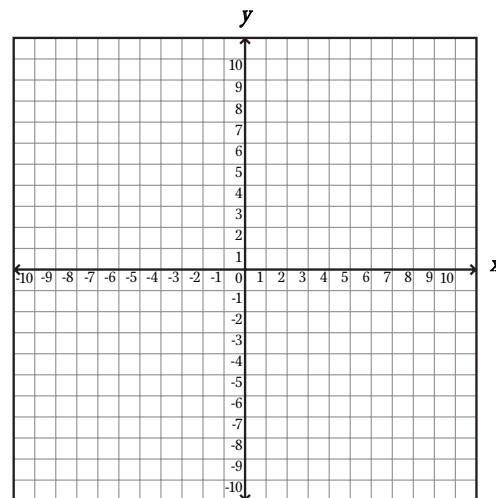
$$\text{Scale Factor} = \frac{\text{Image}}{\text{Preimage}}$$

If the scale factor is greater than 1, then it is an _____.

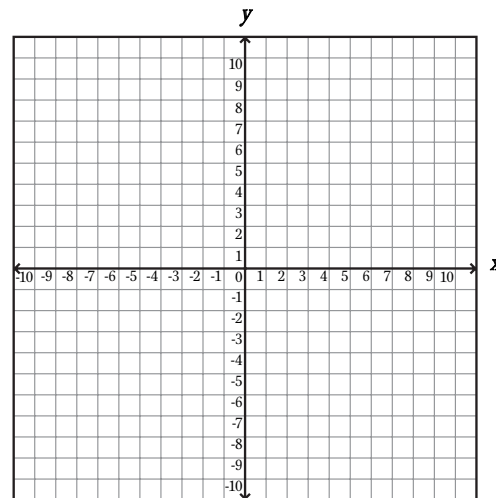If the scale factor is less than 1, then it is a _____.

Example 1

Given the pre-image $A(-4, 2)$, $B(6, 8)$, and the image $A'(-2, 1)$, $B'(3, 4)$ what is the scale factor and center of dilation?
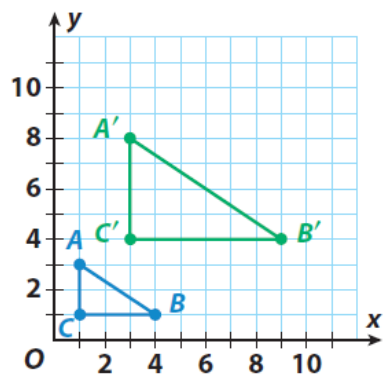
Check for Understanding

Given the pre-image $A(-5, -1)$, $B(1, -2)$ and image $A'(-10, -2)$, $B'(2, -4)$ What is the scale factor and center of dilation?
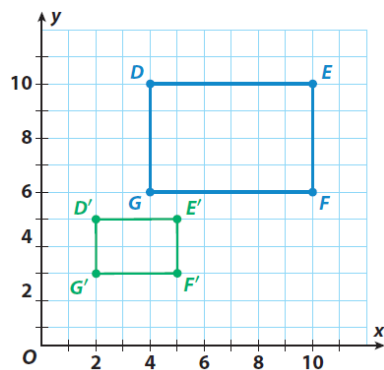
Example 2

Find the center of dilation and scale factor of the drawing below.

Check for Understanding

Find the center of dilation and scale factor of the drawing below.

Example 3

What are the coordinates of point $(1, 5)$ after a translation to the left 3 units and up 2 units, followed by a dilation by a factor of 2 about $(0, 0)$?

Check for Understanding

What are the coordinates of point $(-7, -9)$ after a translation to the right 3 units and up 1 unit, followed by a dilation by a factor of 0.5 about $(0, 0)$?
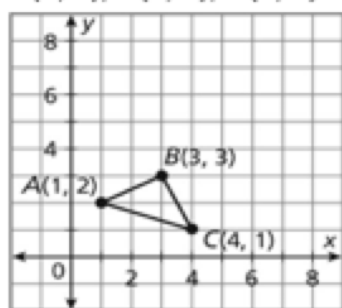
Guided Practice

Apply the dilation D to the polygon with the given vertices. Describe the dilation as an enlargement or a reduction.

1.

$D: (x, y) \rightarrow (2x, 2y)$

$A(1, 2), B(3, 3), C(4, 1)$

A'_____

B'_____

C'_____

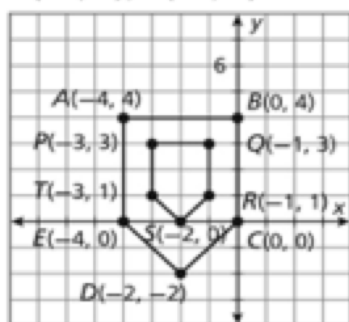Determine whether the polygons with the given vertices are similar. **(Hint: Find the ratio of the corresponding sides.)**

2.

$A(-4, 4), B(0, 4), C(0, 0), D(-2, -2),$
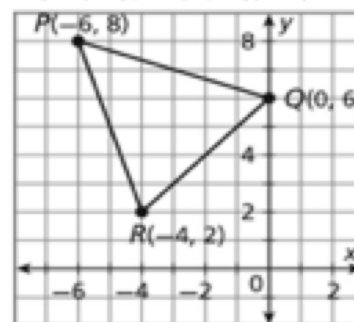$E(-4, 0); P(-3, 3), Q(-1, 3), R(-1, 1),$
$S(-2, 0), T(-3, 1)$

Independent Practice

Apply the dilation D to the polygon with the given vertices. Describe the dilation as an enlargement or a reduction.

1.

$D: (x, y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$

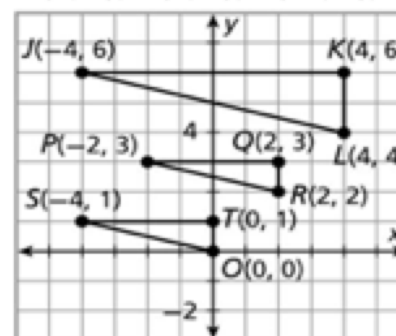$P(-6, 8), Q(0, 6), R(-4, 2)$

P'_____

Q'_____

R'_____

Determine whether the polygons with the given vertices are similar. **(Hint: Find the ratio of the corresponding sides.)**
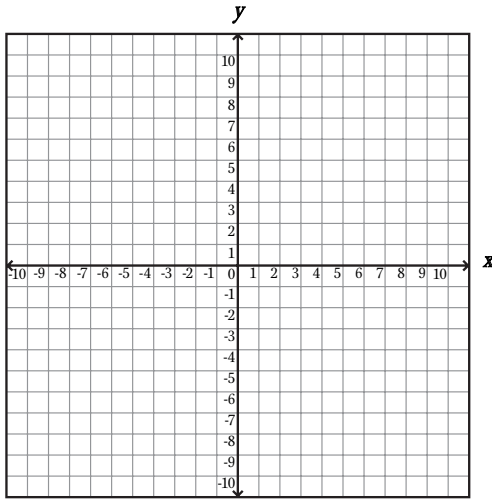
2.

$J(-4, 6), K(4, 6), L(4, 4); P(-2, 3),$
$Q(2, 3), R(2, 2); S(-4, 1), T(0, 1), O(0, 0)$

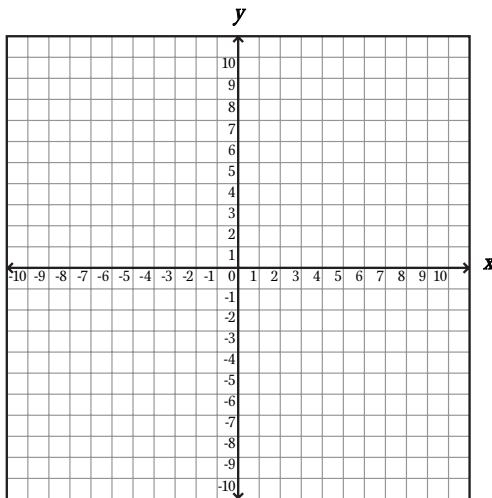# Homework

1. Given the pre-image $A(-5,-4)$, $B(-5,-7)$, $C(-2,-7)$ and image $A'(-7.5,-6)$, $B'(-7.5,-10.5)$, $C'(-3,-10.5)$ What is the scale factor and center of dilation?
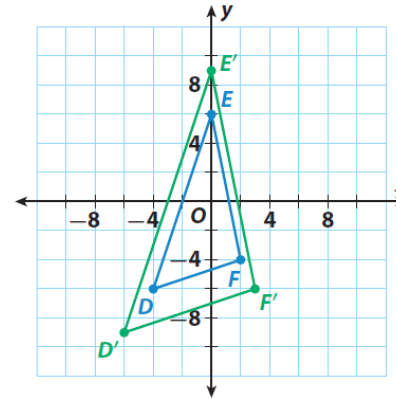

2. Given the pre-image $A(-2,4)$, $B(6,2)$ and image $A'(-3,-1)$, $B'(1,-2)$ What is the scale factor and center of dilation?

Homework

3. Find the center of dilation and scale factor of the drawing below.

4. Find the center of dilation and scale factor of the drawing below.