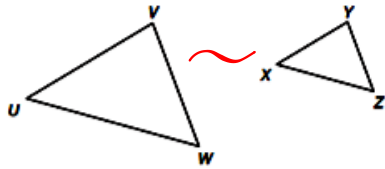


When you say two figures are similar to each other, you use the symbol '~'. In the figure below, $\triangle UVW \sim \triangle XYZ$. The order in which you write the vertices in a similarity statement indicates the corresponding angles and sides (just like congruence statements). Name the corresponding sides and angles.



Practice: Determine if the following transformations preserve similarity or congruency.

a. Reflection over x-axis followed by a translation up 3 units.

b. Dilation by a scale factor of 2 and then rotation of 180 degrees.

c. Dilation by scale factor of 3 and then another dilation by a scale factor of 1/3.

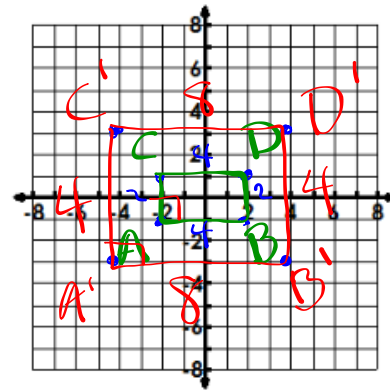
congruent

similar

congruent

Example 1: Use a scale factor of 2. Complete the table below and graph both the original (pre-image) and new (image) rectangle.

Pre-Image	Process	Image
A (-2, -1)	<i>mult. 2</i>	<i>A' (4, -2)</i>
B (2, -1)	<i>mult. 2</i>	<i>B' (4, -2)</i>
C (-2, 1)	<i>mult. 2</i>	<i>C' (4, 2)</i>
D (2, 1)	<i>x 2</i>	<i>D' (4, 2)</i>



How did the following change?

A. Angle Measures:

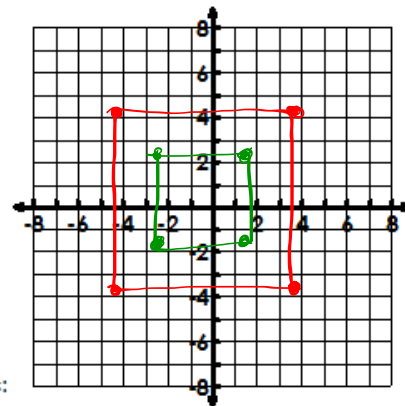
No

B. Length of Sides:

mult by 2

Example 2: Use a scale factor of 1/2. Complete the table below and graph both the original (pre-image) and new (image) rectangle.

Pre-Image	Process	Image
A (-4, 4)	<i>x 1/2 ÷ 2</i>	<i>A' (-2, 2)</i>
B (-4, -4)	<i>x 1/2 ÷ 2</i>	<i>B' (-2, -2)</i>
C (4, 4)	<i>x 1/2 ÷ 2</i>	<i>C' (2, 2)</i>
D (4, -4)	<i>mult. 1/2 ÷ 2</i>	<i>D' (2, -2)</i>



How did the following change?

A. Angle Measures:

No-

B. Length of the sides:

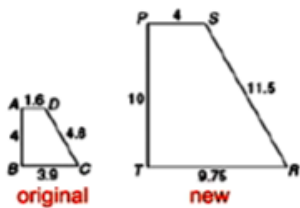
Div. by 2

Finding Scale Factors

To find the scale factor of your new figure (image), you want to compare the ratio of the sides from the new figure to the original figure (pre-image).

$$\frac{\text{image}}{\text{pre-image}} = \frac{\text{new}}{\text{original}}$$

Example 3: Trapezoid PTRS is a dilation of trapezoid ABCD. What is the scale factor of the dilation?

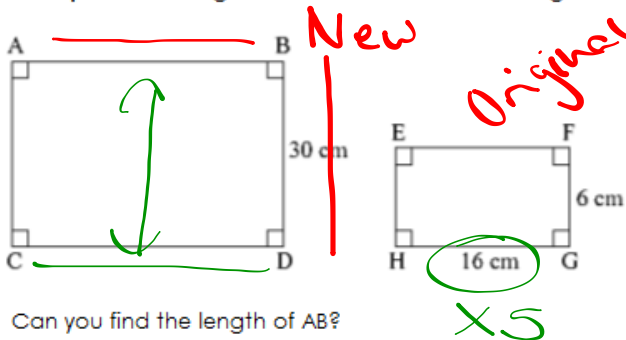


$$\frac{10}{4} = 2.5$$

$$\frac{4}{1.6} = 2.5$$

The scale factor of the dilation is 2.5,

Example 4: Rectangle EFGH is a dilation of Rectangle ABCD. What is the scale factor of the dilation?



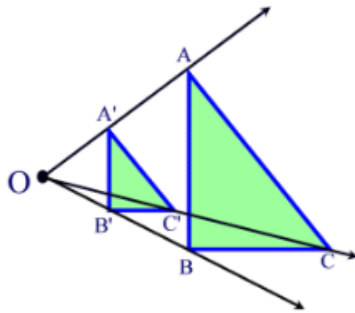
$$\frac{30}{6} = 5$$

Can you find the length of AB?

$$16 \times 5 = 80$$

Finding the Scale Factor with a Center of Dilation at the Origin

The **center of dilation** is a fixed point in the plane about which all points are enlarged or reduced. To find the center of dilation, connect each corresponding vertex from the pre-image to the image. The lines meet at the center of dilation.



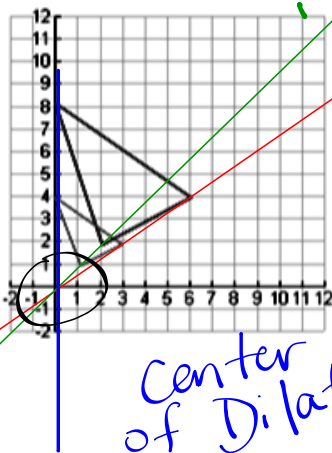
Center of Dilations at the Origin

Multiply every coordinate of the original figure by the scale factor.
OR
Multiply the horizontal and vertical distance between each point on the pre-image and the center of dilation by the scale factor.

Examples

Scale Factor is 3: $(x, y) \rightarrow (3x, 3y)$
Scale Factor is $\frac{1}{4}$: $(x, y) \rightarrow (\frac{1}{4}x, \frac{1}{4}y)$

Example 5: Determine the center of dilation. Then find the scale factor of the dilation. Larger triangle is the original figure.



Smaller line is the original figure.

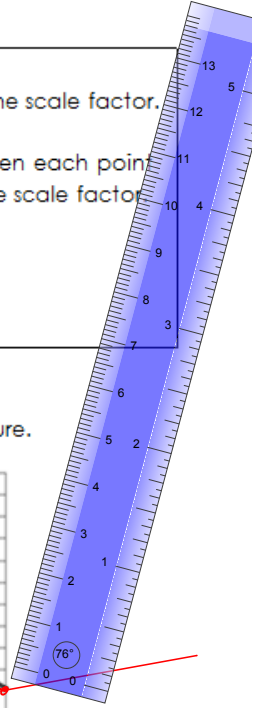


Center of Dilation: $(0,0)$

$(0,0)$

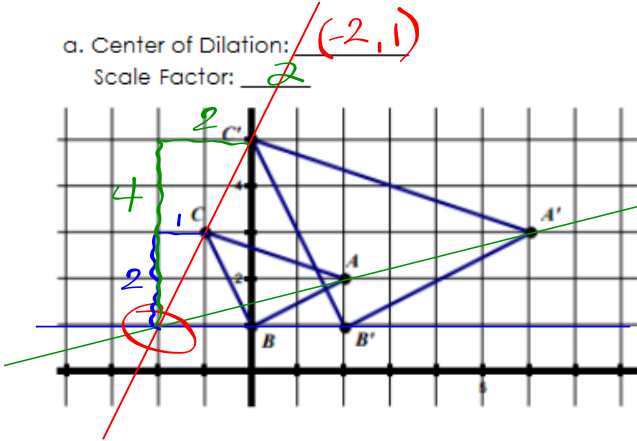
Connect the dots with a straight line

-the point where the lines all connect is the **center of dilation**

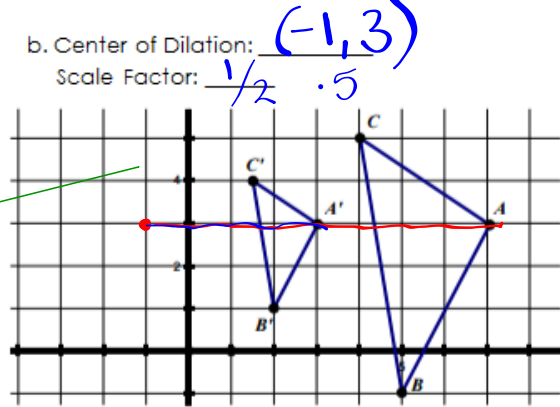


Example 8: Work backwards to find the center of dilation, and also determine the scale factor.

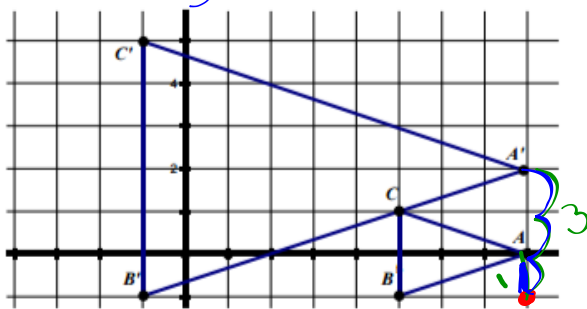
a. Center of Dilation: $(-2, 1)$
 Scale Factor: 2



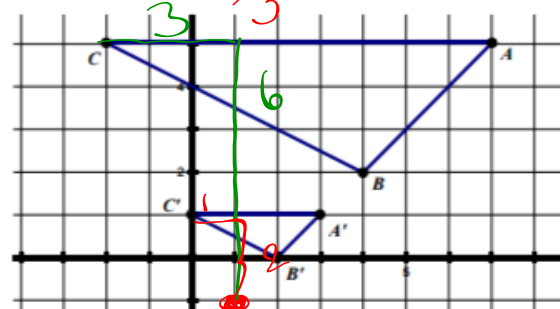
b. Center of Dilation: $(-1, 3)$
 Scale Factor: $1/2$ or $.5$



c. Center of Dilation: $(8, -1)$
 Scale Factor: 3



d. Center of Dilation: $(1, -1)$
 Scale Factor: $1/3$

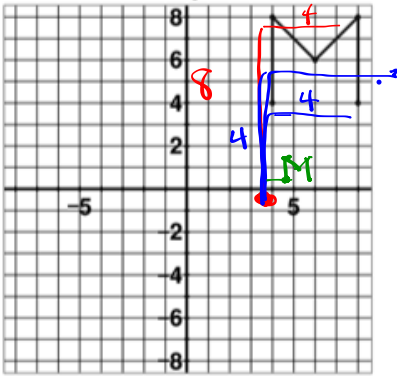


Connect the dots with a straight line

-the point where the lines all connect is the **center of dilation**

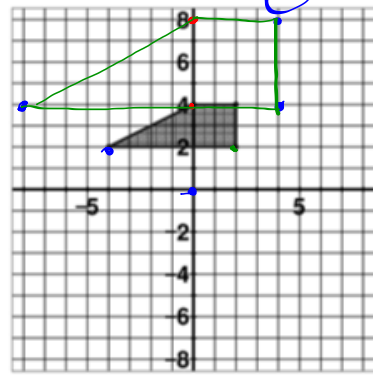
Example 6: Perform the given dilation on each given pre-image with the given center of dilation.

1. Dilate by $c = \frac{1}{4}$, center $(0,0)$



$(2, 2)$
 $(4, 4)$
 $(-4, 2)$
 $(0.5, 0.5)$
 $(1, 1)$
 $(-1, 0.5)$

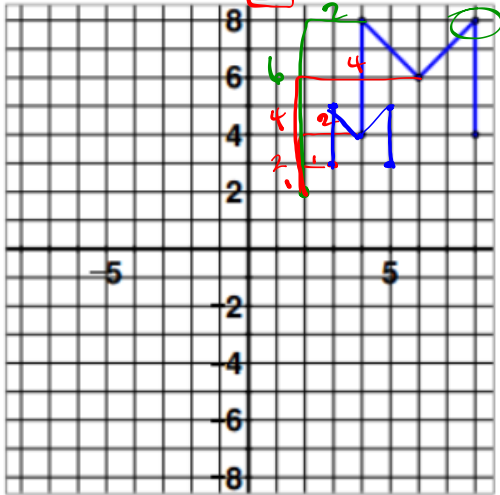
13. Dilate by $c = 2$, center $(0,0)$



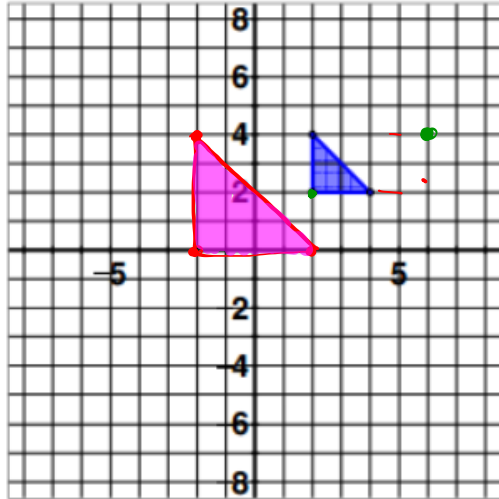
1. Label the center
2. count the distance from the center to each point on the figure
3. apply the scale factor to these distances
4. plot the new points with the new distances

Example 7: Perform the given dilation on each given pre-image with the given center of dilation.

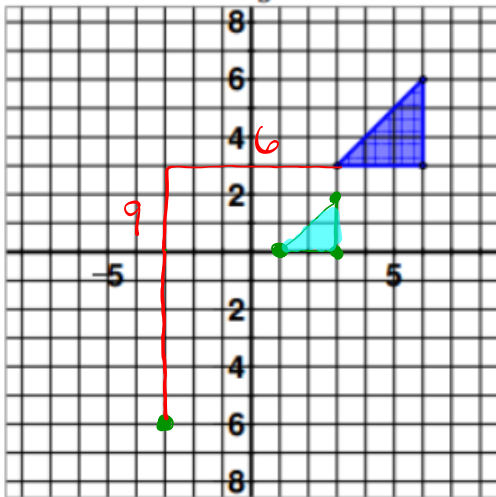
2. Dilate by $c = \frac{1}{2}$, center (2,2)



4. Dilate by $c = 2$, center (6,4)



8. Dilate by $c = \frac{2}{3}$, center (-3, -6)



18. Dilate by $c = \frac{4}{3}$, center (0, -6)

