

12/12/07 Objective: TSWBAT draw and find the scale factor of a dilation

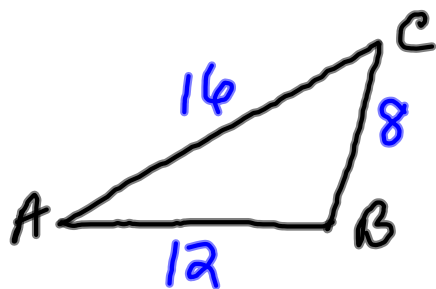
## Vocabulary

① dilation - a transformation in which a figure and its image are similar

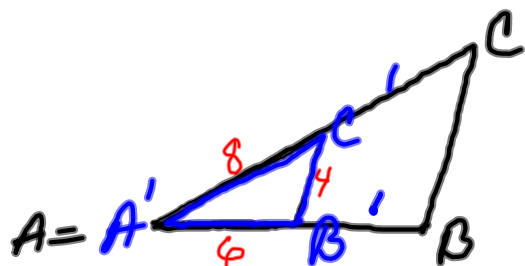
② scale factor - the ratio of the new image to the original figure

③ enlargement - a dilation with a scale factor greater than 1. The image of an enlargement is larger than the original figure

④ reduction - a dilation with a scale factor less than 1. The image of a reduction is smaller than the original figure



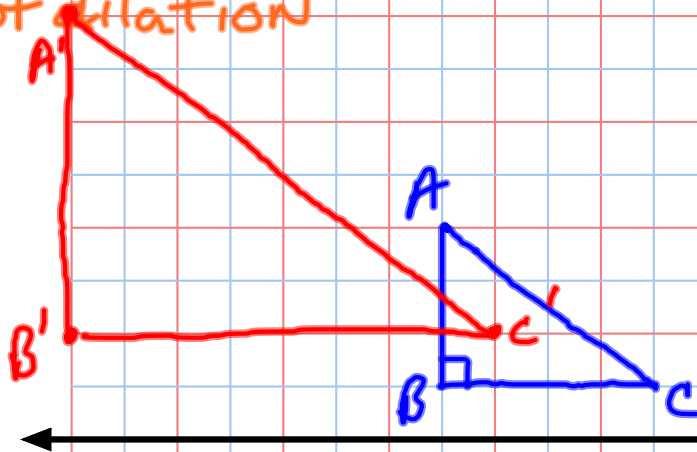
Find the image of  $\triangle ABC$  after a dilation with center  $A$  and a scale factor of  $\frac{1}{2}$



$\triangle A'B'C'$  is the image of  $\triangle ABC$  after a dilation with a scale factor of  $\frac{1}{2}$

$$\triangle ABC \sim \triangle A'B'C'$$

All dilations in a coordinate plane in this text will have  $(0,0)$  as the center of dilation



Draw  $\triangle ABC$  on graph paper. Label the vertices. Find the image of  $\triangle ABC$  after a dilation with a scale factor of 2.

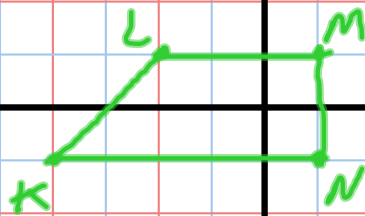
$A(-7, 1)$   $B(-7, 2)$   $C(-3, 2)$

Since the scale factor is 2 multiply each value in the ordered pair by 2

$A'(-14, 2)$   $B'(-14, 4)$   $C'(-6, 4)$

To find the image of a figure in a coordinate plane after a dilation you multiply the x and y coordinates by the scale factor.

Find the coordinates of the image of quadrilateral KLMN after a dilation with a scale factor of  $\frac{3}{2}$



Multiply the x and y coordinate of each point by  $\frac{3}{2}$

$$\begin{aligned} K(-4, -1) &\rightarrow K'(-6, -\frac{3}{2}) \\ L(-2, 1) &\rightarrow L'(-3, \frac{3}{2}) \\ M(1, 1) &\rightarrow M'(\frac{3}{2}, \frac{3}{2}) \\ N(1, -1) &\rightarrow N'(\frac{3}{2}, -\frac{3}{2}) \end{aligned}$$

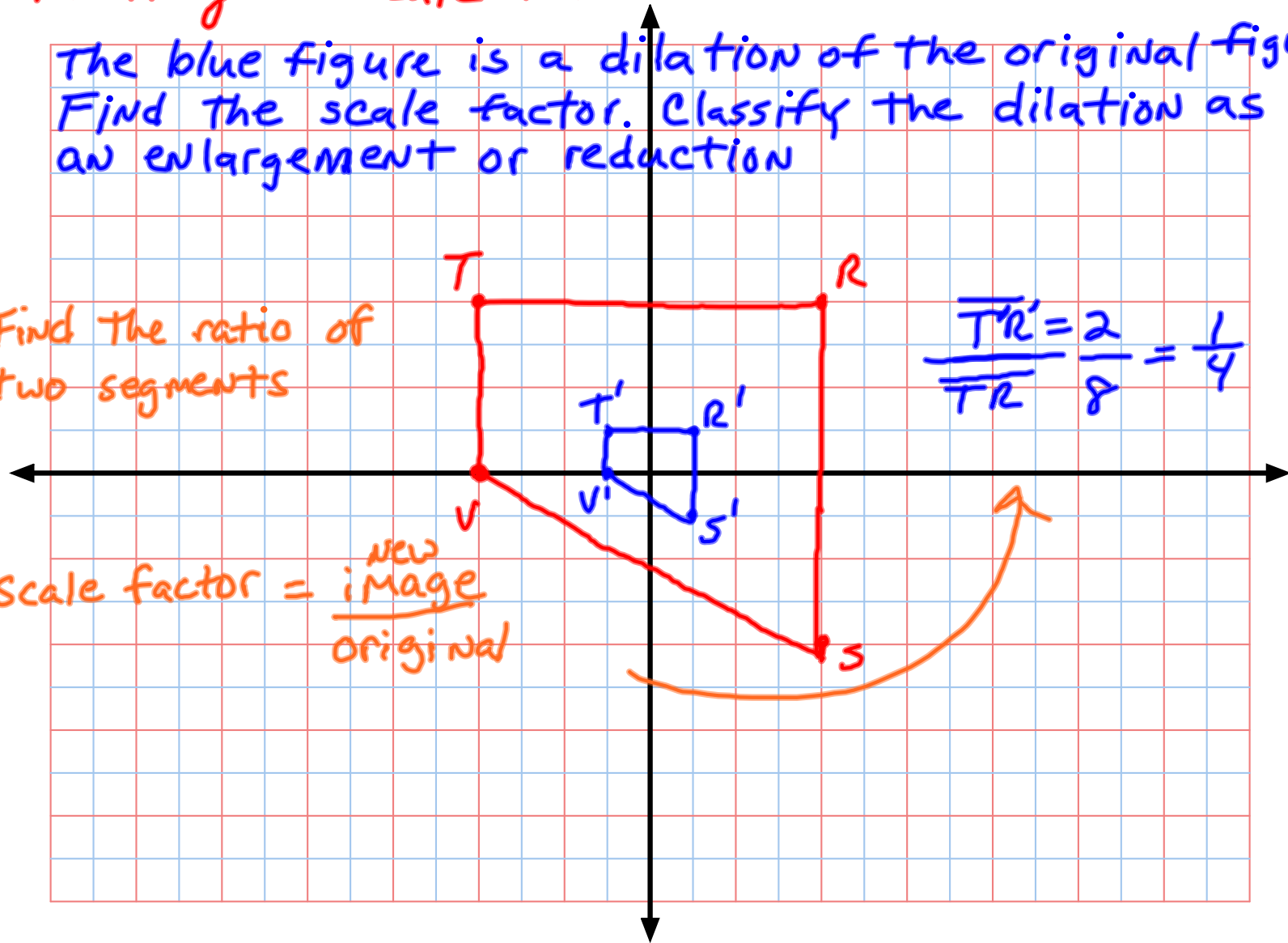
## Finding a Scale Factor

The blue figure is a dilation of the original figure  
Find the scale factor. Classify the dilation as  
an enlargement or reduction

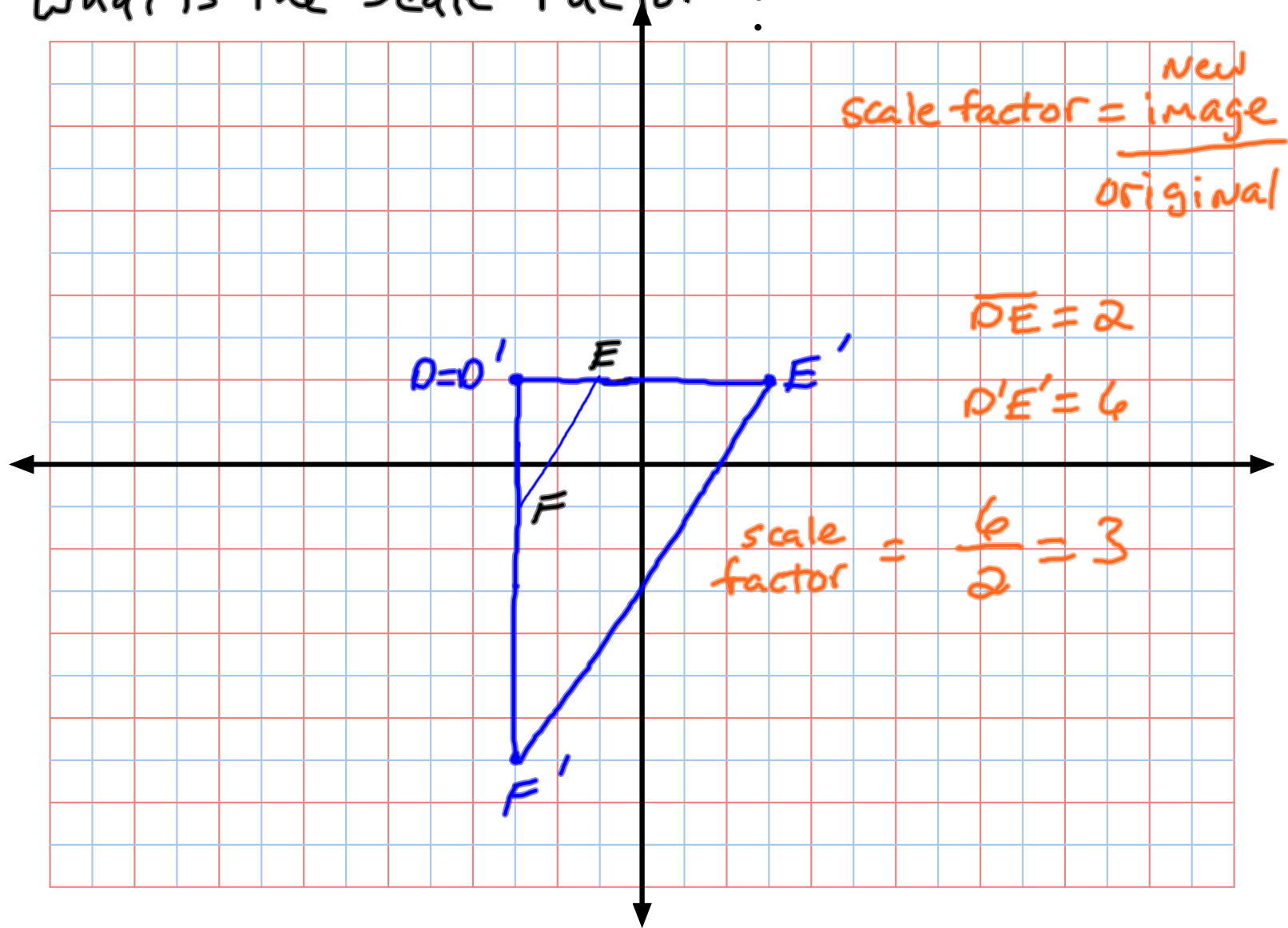
Find the ratio of  
two segments

$$\frac{\overline{T'R'}}{\overline{TR}} = \frac{2}{8} = \frac{1}{4}$$

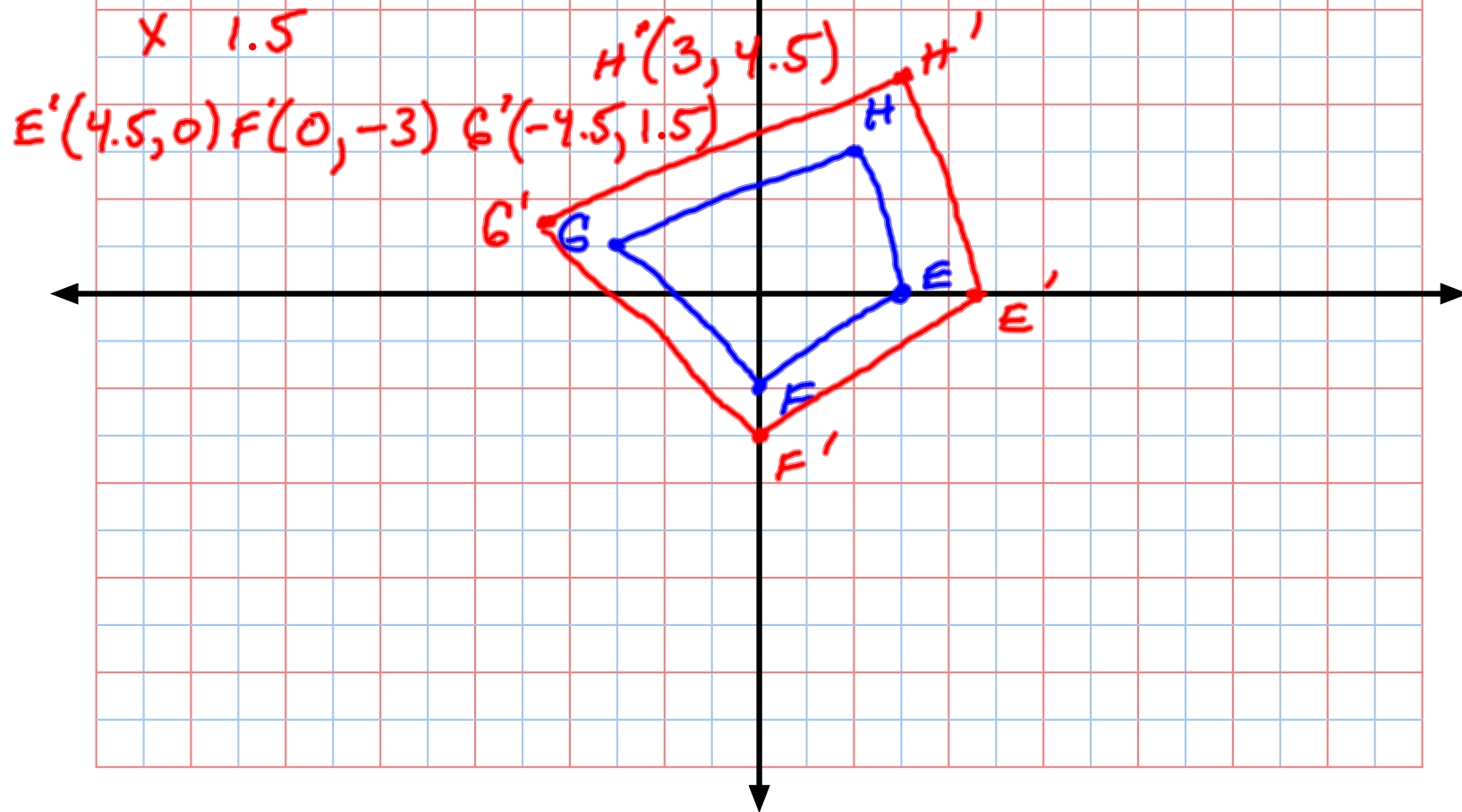
Scale factor =  $\frac{\text{new image}}{\text{original}}$



What is the Scale factor ?



Graph the coordinates of quadrilateral EFBH. Find the coordinates of its image after a dilation with the given scale factor. Graph the image  $E(3,0)$ ,  $F(0,-2)$ ,  $G(-3,1)$ ,  $H(2,3)$  Scale factor of 1.5



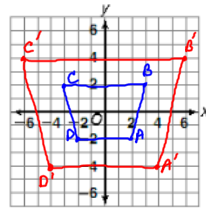
### Practice 5-6

### Similarity Transformations

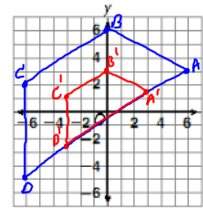
Graph the coordinates of the quadrilateral  $ABCD$ . Find the coordinates of its image  $A'B'C'D'$  after a dilation with the given

scale factor.

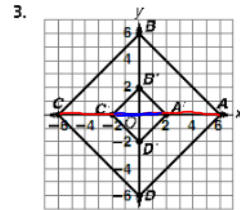
1.  $A(2, -2), B(3, 2), C(-3, 2), D(-2, -2)$ ; scale factor 2  
 *$A'(4, -4), B'(6, 4), C'(-6, 4), D'(-4, -4)$*



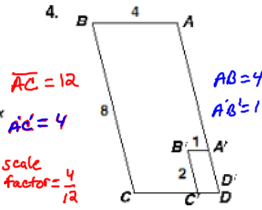
2.  $A(6, 3), B(0, 6), C(-6, 2), D(-6, -5)$ ; scale factor  $\frac{1}{2}$   
 *$A'(3, 1.5), B'(0, 3), C'(-3, 1), D'(-3, -2.5)$*



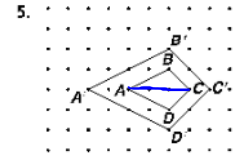
Quadrilateral  $A'B'C'D'$  is a dilation of quadrilateral  $ABCD$ . Find the scale factor. Classify each dilation as an enlargement or a reduction.



$\frac{4}{12} = \frac{1}{3}$



scale factor =  $\frac{1}{4}$

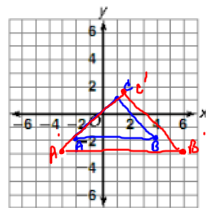


scale factor =  $\frac{6}{3} = 2$

6. A triangle has coordinates  $A(-2, -2), B(4, -2)$ , and  $C(1, 1)$ . Graph its image  $A'B'C'$  after a dilation with scale factor  $\frac{3}{2}$ . Give the coordinates of  $A'B'C'$ , and the ratio of the areas of the figures  $A'B'C'$  and  $ABC$ .

*$A'(-3, -3), B'(6, -3), C'(1.5, 1.5)$*

*Area of  $\triangle ABC = \frac{bh}{2} = \frac{6 \times 3}{2} = 9$  sq units*



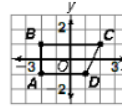
*Area of  $\triangle A'B'C' = \frac{bh}{2} = \frac{9 \times 4.5}{2} = 20.25$  sq units*

*$\frac{20.25}{9} = 2.25$*

## Reteaching 5-6

### Similarity Transformations

Draw the image of quadrilateral  $ABCD$  for the dilation with scale factor 2. Then graph the image.



Example:

- ① Write the coordinates of each point.
- ② Multiply the  $x$ - and  $y$ -coordinates of each point by the scale factor, 2.
- ③ Graph the image  $A'B'C'D'$ .

$$\begin{array}{lcl} A(-2, -1) & \longrightarrow & A'(-4, -2) \\ B(-2, 1) & \longrightarrow & B'(-4, 2) \\ C(2, 1) & \longrightarrow & C'(4, 2) \\ D(1, -1) & \longrightarrow & D'(2, -2) \end{array}$$

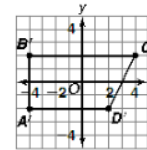
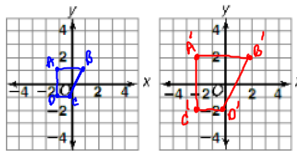


Image  $A'B'C'D'$  is an *enlargement* of  $ABCD$  because the scale factor is greater than 1. If the scale factor had been less than 1, then the dilation of  $ABCD$  would be a *reduction*.

Graph quadrilateral  $ABCD$  and its image  $A'B'C'D'$  after a dilation with the given scale factor. Classify each dilation as an enlargement or a reduction.

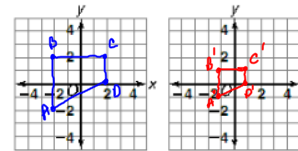
1.  $A(-1, 1), B(1, 1), C(0, -1), D(-1, -1)$ ;  
scale factor 2

$$A'(-2, 2), B'(2, 2), C'(0, -2), D'(-2, -2)$$



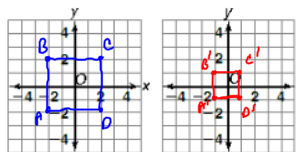
2.  $A(-2, -2), B(-2, 2), C(2, 2), D(2, 0)$ ;  
scale factor  $\frac{1}{2}$

$$A'(-1, -1), B'(-1, 1), C'(1, 1), D'(1, 0)$$



3.  $A(-2, -2), B(-2, 2), C(2, 2), D(2, -2)$ ;  
scale factor  $\frac{1}{2}$

$$A'(-1, -1), B'(-1, 1), C'(1, 1), D'(1, -1)$$



4.  $A(-2, 2), B(2, 0), C(2, -2), D(-2, -2)$ ;  
scale factor 2

$$A'(-4, 4), B'(4, 0), C'(4, -4), D'(-4, -4)$$

