Name: ______________________________ 4-5-Dilations and Similarity Transformations

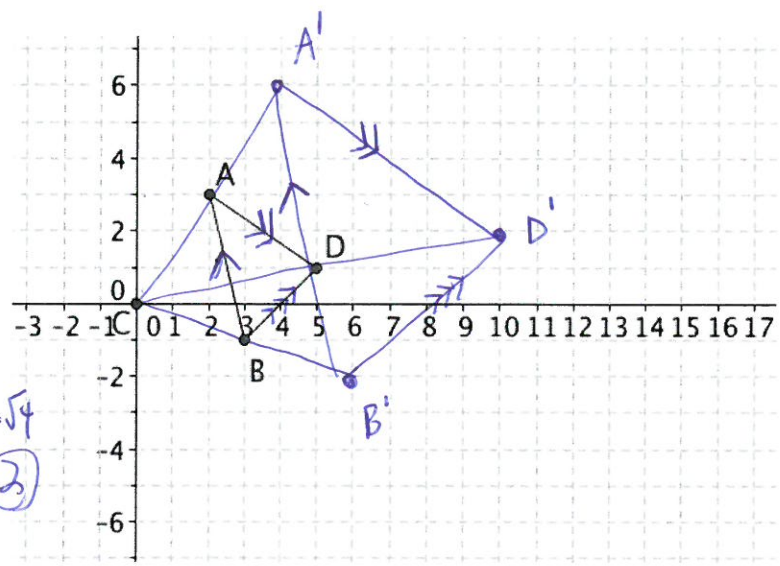
- Multiply the coordinates of ABD by 2 and plot the points, labeling them as A'B'D'
- Connect a segment from C to A', B', and C'

CA' → Distance from C to A'

- Write the ratio of $\frac{CA'}{CA}$, $\frac{CD'}{CD}$, and $\frac{CB'}{CB}$

$\frac{CA'}{CA} = \frac{\sqrt{52}}{\sqrt{13}} = \sqrt{4} = 2$ | $\frac{CD'}{CD} = \frac{\sqrt{104}}{\sqrt{26}} = \sqrt{4} = 2$ | $\frac{CB'}{CB} = \frac{\sqrt{40}}{\sqrt{10}} = \sqrt{4} = 2$

- Put tick marks on the figure to identify which segments are parallel



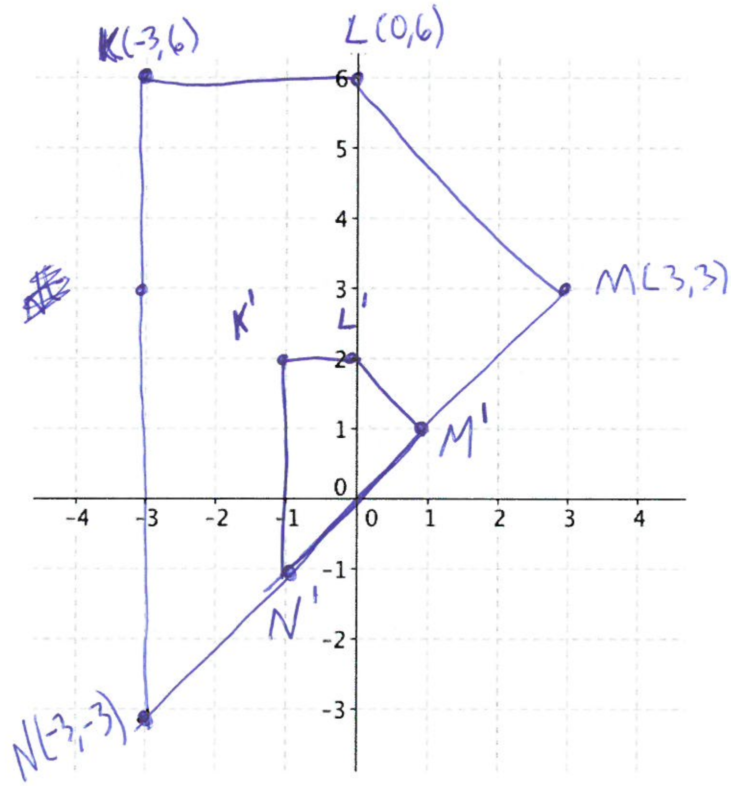
By multiplying the coordinates by a number, you performed a **dilation**.

A **dilation** is a transformation in which a figure is enlarged or reduced with respect to a fixed point called the **center of dilation** (in our case, point *C*), and a scale factor (in our example, 2).

The scale factor is the ratio of the distance from the center of dilation to a point on the image, over the distance from the center of dilation to the corresponding point on the preimage.

When the scale factor is greater than 1, the dilation is an enlargement. When the scale factor is between 0 and 1, the dilation is a reduction.

Example: Graph quadrilateral *KLMN* with vertices *K(-3, 6), L(0, 6), M(3, 3)* and *N(-3, -3)* and its image after a dilation with a scale factor of 1/3.



- What is true about the measures of the angles of *KLMN* compared to *K'L'M'N'*?

  Same Measures

- What is true about the lengths of the sides of *KLMN* compared to *K'L'M'N'*?

  KLMN has side lengths X3 size of K'L'M'N'

- Is a dilation a rigid motion?

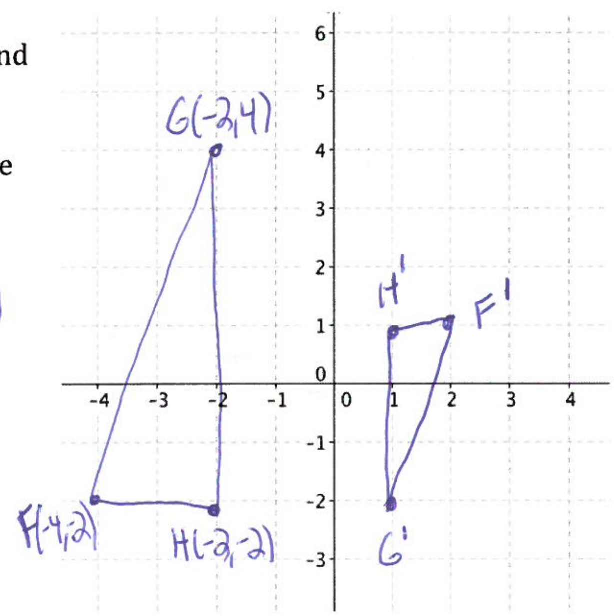
  No

$F'(2,1)$ $G'(1,-2)$ $H'(1,1)$

Graph ΔFGH with vertices $F(-4, -2)$, $G(-2, 4)$ and $H(-2, -2)$ and its image after a dilation with a scale factor of $-\frac{1}{2}$.

- Describe what happens to the dilation when the scale factor is a negative number.

Rotated 180°
because the rule is $(x,y) \rightarrow (-x,-y)$

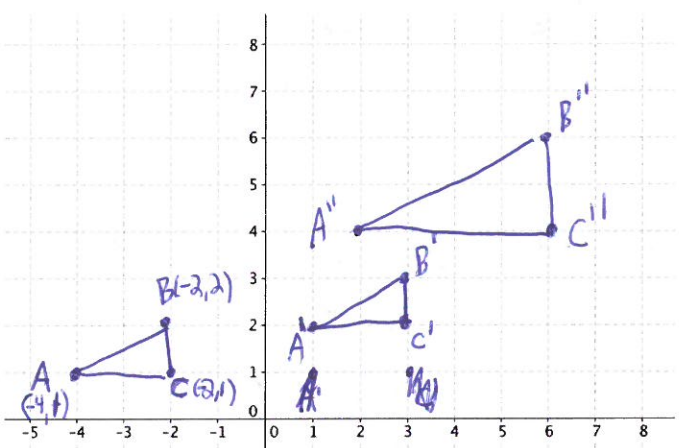


Dilation is an example of a **similarity transformation. Similar figures** are the result of similarity transformations that map one figure onto the other. Similar figures have the same shape but not necessarily the same size. Similarity transformations preserve angle measure only.

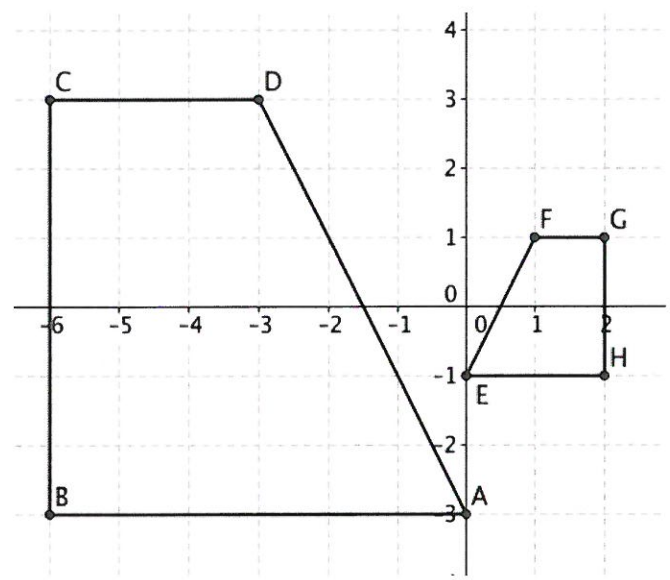
Graph ΔABC with vertices $A(-4, 1)$, $B(-2, 2)$, and $C(-2, 1)$ and its image after the similarity transformation:

Translation: $(x,y) \rightarrow (x+5, y+1)$

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



Describe the similarity transformation that maps trapezoid *ABCD* to trapezoid *EFGH*.



Dilation w/ scale factor 1/3 then reflect over y-axis.

Write Definition/Notes For: ① Dilation, ② Center of Dilation, ③ ~~Similarity Transformation~~ Similar Figures