Name _____ Date _____ Period 6

Similarity and Transformations

Lesson Objective I WBAT identify similar figures and perform similarity transformations.

A dilation is a transformation that preserves shape but NOT size.
- ➔ So, a dilation is a nonrigid motion.

A similarity transformation is a dilation OR a composition of rigid motions and dilations.

Similar Figures Two geometric figures are similar figures if and only if there is a similarity transformation that maps one of the figures onto the other.
- ➔ Similar figures ALWAYS have the same shape, but *not necessarily the same size.*

Congruence transformations preserve length and angle measure.

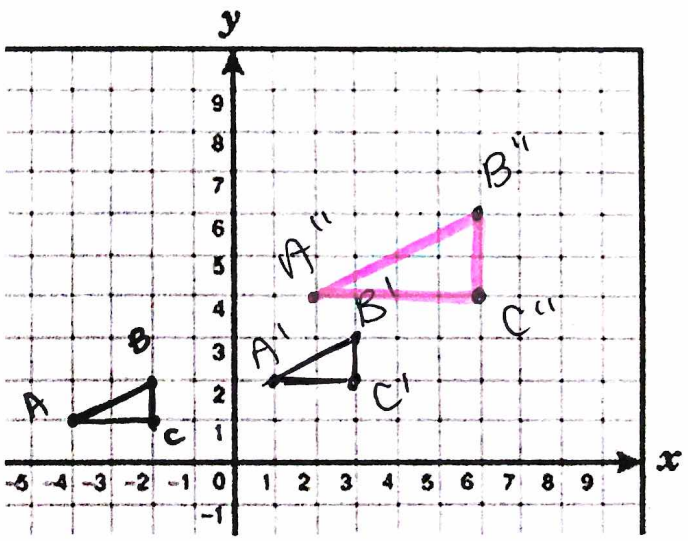
Think About It... If a dilation has a scale factor, k, what are the value(s) for k so that the dilation is ALSO a congruence transformation?

$k = 1$ OR $k = -1$

- ➔ So, when the scale factor of the dilation(s) is NOT equal to 1 or -1, similarity transformations preserve angle measure ONLY.

Examples

1. 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: $(x, y) \rightarrow (2x, 2y)$

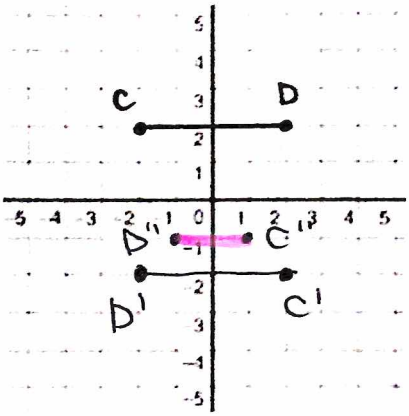


C'(3, 2) → C''(6, 4)

A'(1, 2) → A''(2, 4)

B'(3, 3) → B''(6, 6)

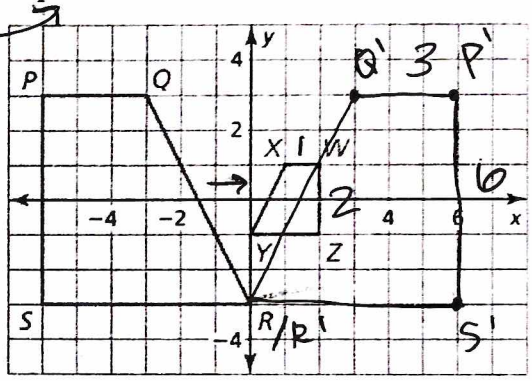
2. Graph $\overline{CD}$ with vertices C(-2, 2) and D(2, 2) and its image after the similarity transformation:
Rotation: 180° about the origin
Dilation: $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$



$C'(2,-2) \rightarrow C''(1,-1)$

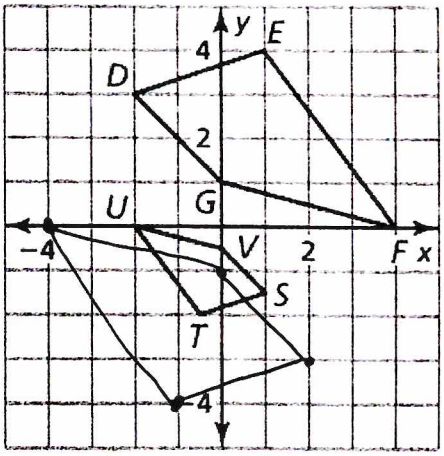
$D'(-2,-2) \rightarrow D''(-1,-1)$

3. Describe a similarity transformation that maps trapezoid PQRS to trapezoid WXYZ.



① reflection in y-axis
② dilate $(x, y) \rightarrow \left(\frac{1}{3}x, \frac{1}{3}y\right)$

4. Describe a similarity transformation that maps quadrilateral DEFG to quadrilateral STUV.

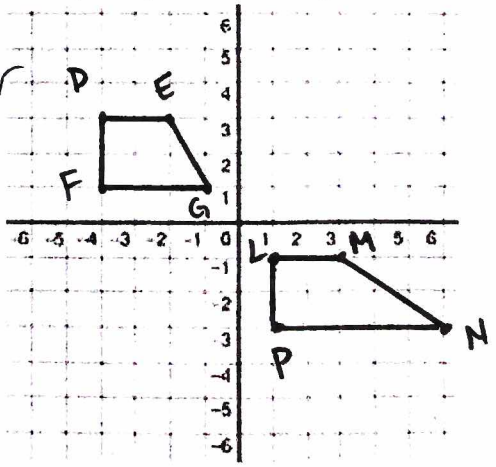


① rotation 180° about (0,0)
② dilate $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

OR

dilate $(x, y) \rightarrow \left(-\frac{1}{2}x, -\frac{1}{2}y\right)$

5. Determine whether the polygons are similar. Use transformations to explain your reasoning.



$\frac{DE}{LM} = \frac{2}{2} = 1$

$\frac{FG}{PN} = \frac{3}{5} \neq 1$

Not similar because scale factor is not same throughout figures