Date: 11/17/21

Lesson 4.5/4.6 - Dilations with Mutliple Transformations

Learning Intent (Target): *Today I will* be able to graph polygons in the coordinate plane using multiple transformations, including dilations.

Success Criteria: *I'll know I'll have it when* I can accuratley graph multiple transformations with dilations that include translations, reflections, and rotations.

Accountable Team Task: *Therefore, I can* practice using interactive flip charts for notes & invstigations using gizmos to graph multiple transformations.

Graph $\triangle ABC$ with vertices $A(2, 1)$, $B(4, 1)$, and $C(4, -1)$ and its image after a dilation with a scale factor of 2.

SOLUTION

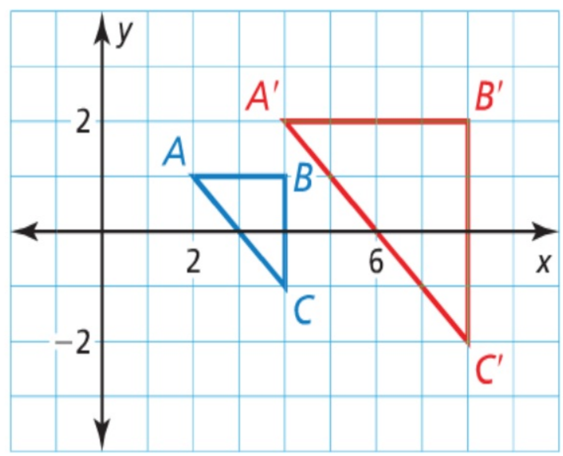
Use the coordinate rule for a dilation with $k = 2$ to find the coordinates of the vertices of the image. Then graph $\triangle ABC$ and its image.

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

$$A(2, 1) \rightarrow A'(4, 2)$$

$$B(4, 1) \rightarrow B'(8, 2)$$

$$C(4, -1) \rightarrow C'(8, -2)$$



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 $\frac{1}{3}$.

SOLUTION

Use the coordinate rule for a dilation with $k = \frac{1}{3}$ to find the coordinates of the vertices of the image. Then graph quadrilateral *KLMN* and its image.

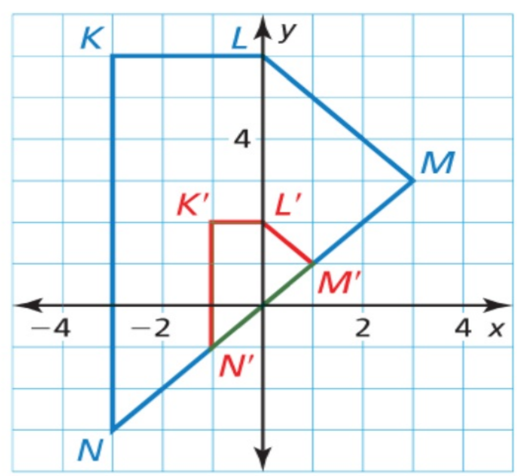
$$(x, y) \rightarrow \left(\tfrac{1}{3}x, \tfrac{1}{3}y\right)$$

$$K(-3, 6) \rightarrow K'(-1, 2)$$

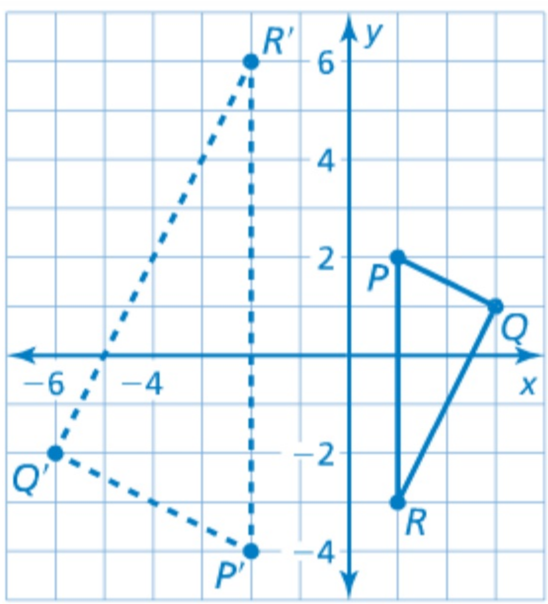
$$L(0, 6) \rightarrow L'(0, 2)$$

$$M(3, 3) \rightarrow M'(1, 1)$$

$$N(-3, -3) \rightarrow N'(-1, -1)$$



4. Graph $\triangle PQR$ with vertices $P(1, 2)$, $Q(3, 1)$, and $R(1, -3)$ and its image after a dilation with a scale factor of -2.



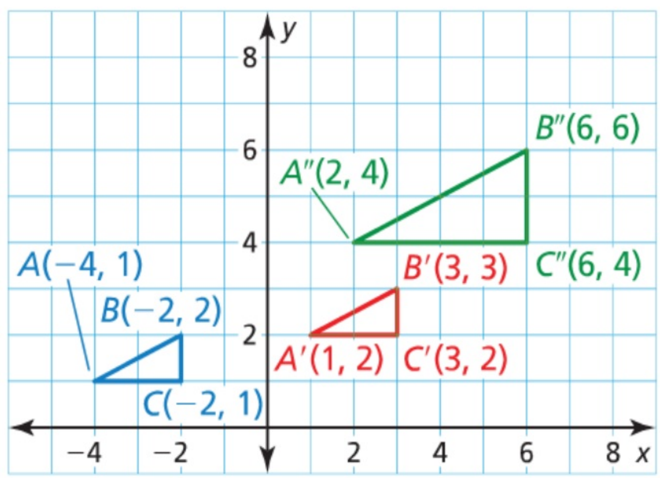
Graph $\triangle ABC$ with vertices $A(-4, 1)$, $B(-2, 2)$, and $C(-2, 1)$ and its image after the similarity transformation.

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

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

SOLUTION

Step 1 Graph $\triangle ABC$.



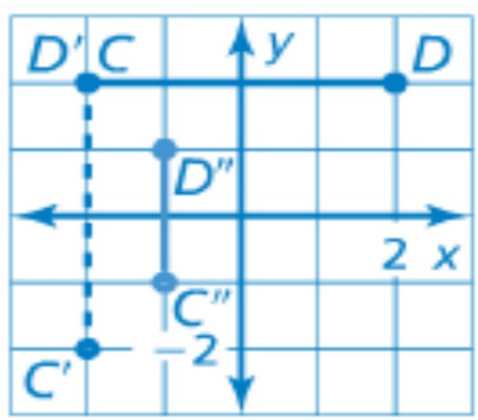
Step 2 Translate $\triangle ABC$ 5 units right and 1 unit up. $\triangle A'B'C'$ has vertices $A'(1, 2)$, $B'(3, 3)$, and $C'(3, 2)$.

Step 3 Dilate $\triangle A'B'C'$ using a scale factor of 2. $\triangle A''B''C''$ has endpoints $A''(2, 4)$, $B''(6, 6)$, and $C''(6, 4)$.

1. Graph $\overline{CD}$ with endpoints *C*(−2, 2) and *D*(2, 2) and its image after the similarity transformation.

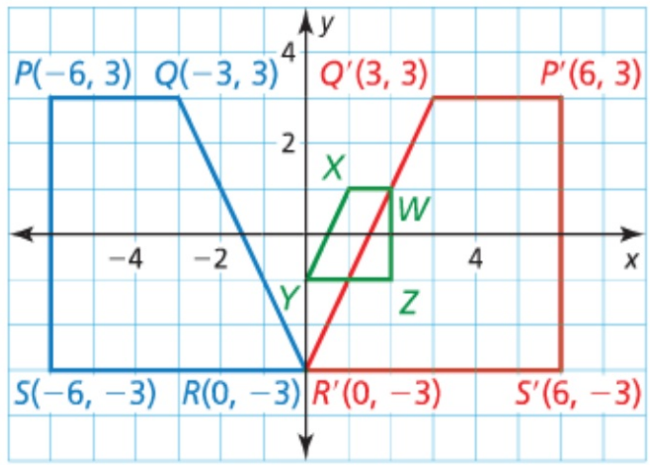
Rotation 90° about the origin

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



SOLUTION

$\overline{QR}$ falls from left to right, and $\overline{XY}$ rises from left to right. If you reflect trapezoid *PQRS* in the *y*-axis as shown, then the image, trapezoid $P'Q'R'S'$, will have the same orientation as trapezoid *WXYZ*.



Trapezoid *WXYZ* appears to be about one-third as large as trapezoid $P'Q'R'S'$. Dilate trapezoid $P'Q'R'S'$ using a scale factor of $\frac{1}{3}$.

$$(x, y) \rightarrow \left(\frac{1}{3}x, \frac{1}{3}y\right)$$

$$P'(6, 3) \rightarrow P''(2, 1)$$

$$Q'(3, 3) \rightarrow Q''(1, 1)$$

$$R'(0, -3) \rightarrow R''(0, -1)$$

$$S'(6, -3) \rightarrow S''(2, -1)$$