Date: 11/17/20

Lesson 4.3 - Rotations in the Coordinate Plane

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

Success Criteria: *I'll know I'll have it when* I can accuratley graph combinations of transformations, including rotations in the coordinate plane.

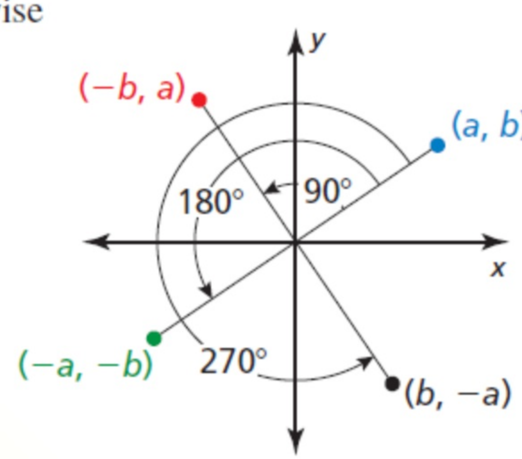
Accountable Team Task: *Therefore, I can* practice using interactive flip charts for notes & invstigations using gizmos to graph transformations including rotations.

Core Concept

Coordinate Rules for Rotations about the Origin

When a point (a, b) is rotated counterclockwise about the origin, the following are true.

- For a rotation of 90°, $(a, b) \rightarrow (-b, a)$.
- For a rotation of 180°, $(a, b) \rightarrow (-a, -b)$.
- For a rotation of 270°, $(a, b) \rightarrow (b, -a)$.



*Rotations are rigid motion

*Always Counter-Clockwise - unless stated

TYPE OF ROTATION	Point on the pre-image	Point on the image (After rotation)
Rotation of 90^0 (clock wise)	(x , y)	(y , - x)
Rotation of 90^0 (counter clock wise)	(x , y)	(- y , x)
Rotation of 180^0 (clock wise & counter clock wise)	(x , y)	(- x , - y)
Rotation of 270^0 (clock wise)	(x , y)	(- y , x)
Rotation of 270^0 (counter clock wise)	(x , y)	(y , - x)

Graph quadrilateral $RSTU$ with vertices $R(3, 1)$, $S(5, 1)$, $T(5, -3)$, and $U(2, -1)$ and its image after a 270° rotation about the origin.

SOLUTION

Use the coordinate rule for a 270° rotation to find the coordinates of the vertices of the image. Then graph quadrilateral $RSTU$ and its image.

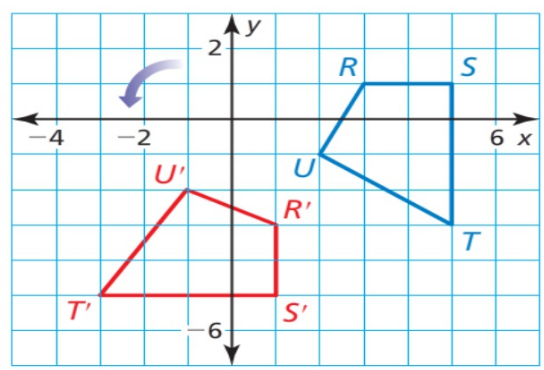
$$(a, b) \rightarrow (b, -a)$$

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

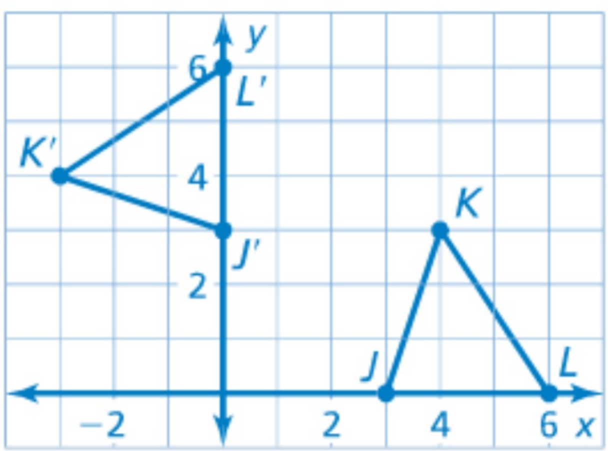
$$S(5, 1) \rightarrow S'(1, -5)$$

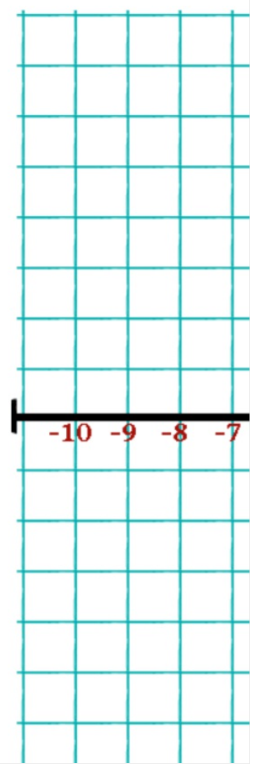
$$T(5, -3) \rightarrow T'(-3, -5)$$

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



2. Graph $\triangle JKL$ with vertices $J(3, 0)$, $K(4, 3)$, and $L(6, 0)$ and its image after a 90° rotation about the origin.





Graph $\overline{RS}$ with endpoints $R(1, -3)$ and $S(2, -6)$ and its image after the composition.

Reflection: in the y-axis

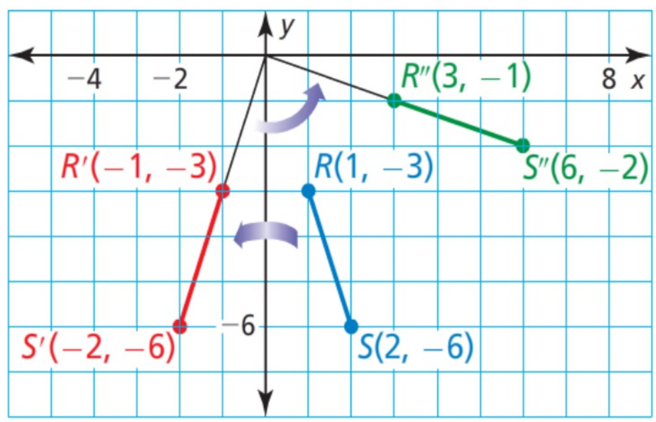
Rotation: 90° about the origin

SOLUTION

Step 1 Graph $\overline{RS}$.

Step 2 Reflect $\overline{RS}$ in the y-axis. $\overline{R'S'}$ has endpoints $R'(-1, -3)$ and $S'(-2, -6)$.

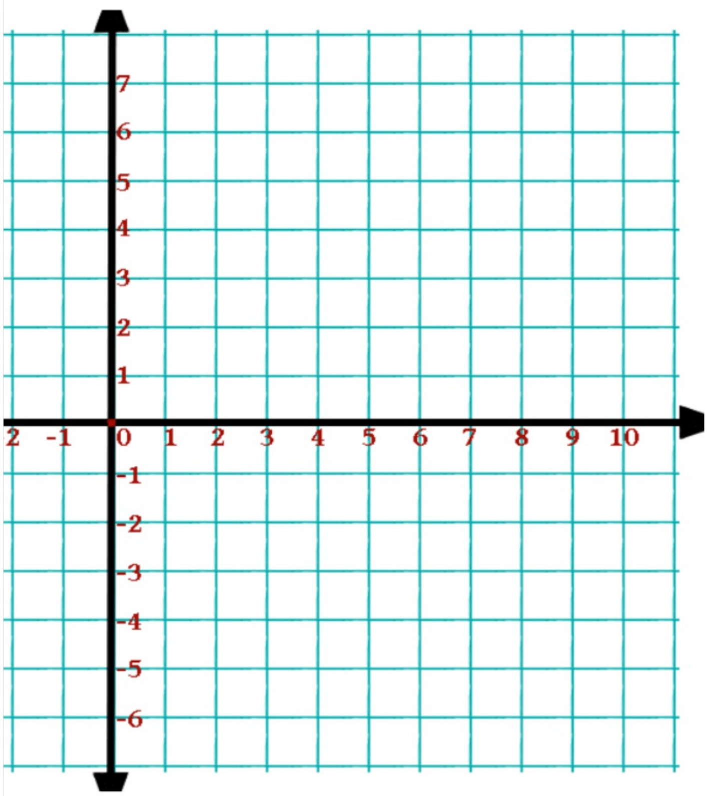
Step 3 Rotate $\overline{R'S'}$ 90° about the origin. $\overline{R''S''}$ has endpoints $R''(3, -1)$ and $S''(6, -2)$.

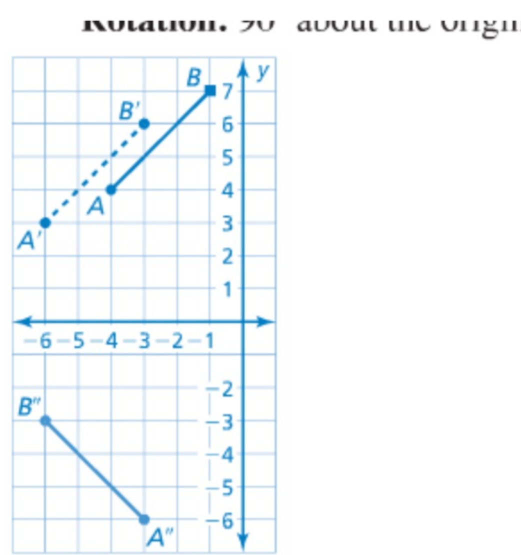


5. Graph $\overline{AB}$ with endpoints $A(-4, 4)$ and $B(-1, 7)$ and its image after the composition.

Translation: $(x, y) \rightarrow (x - 2, y - 1)$

Rotation: 90° about the origin





6. Graph $\triangle TUV$ with vertices $T\,(1, 2)$, $U\,(3, 5)$, and $V\,(6, 3)$ and its image after the composition.

Rotation: 180° about the origin

Reflection: in the x-axis