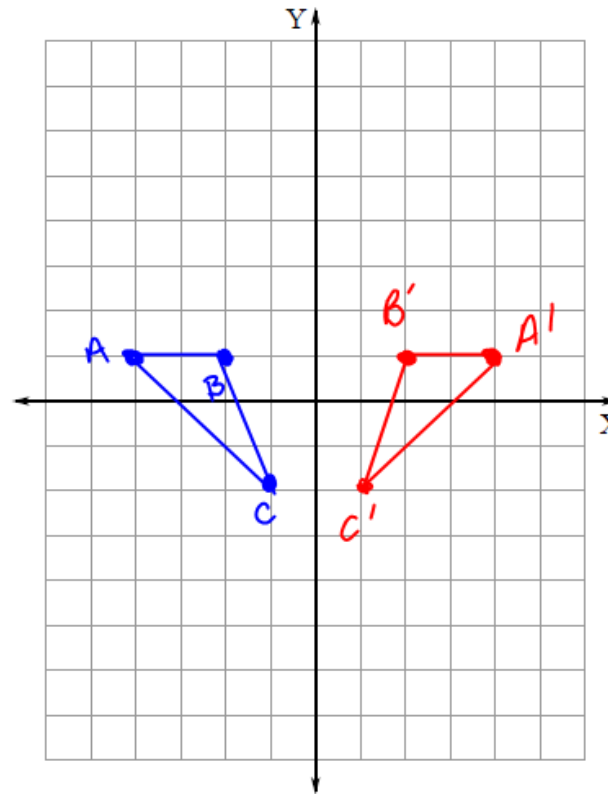


Graph triangle ABC with vertices $A(-4, 1)$, $B(-2, 1)$, and $C(-1, -2)$ on a coordinate grid.

- Graph the image of triangle ABC after a reflection across the y -axis.
- Which side of the image is congruent to side \overline{AB} ? $\overline{A'B'}$
- Which angle in the image is congruent to angle B ? $\angle B'$
- If a point M , 5 units from the x -axis, is reflected across the x -axis, how far is the image of the point, M' , from the x -axis? 5 units
- Angle G in trapezoid $FGHJ$ measures 135° . Jasmine reflects the trapezoid over the x -axis. What is the measure of the image of angle G ? 135°



9.3 Properties of Rotations

Common Core Standard

8.G.1

Verify experimentally the properties of rotations, reflections, and translations

8.G.3

Describe the effect of dilations, translations rotations, and reflections on two-dimensional figures using coordinates

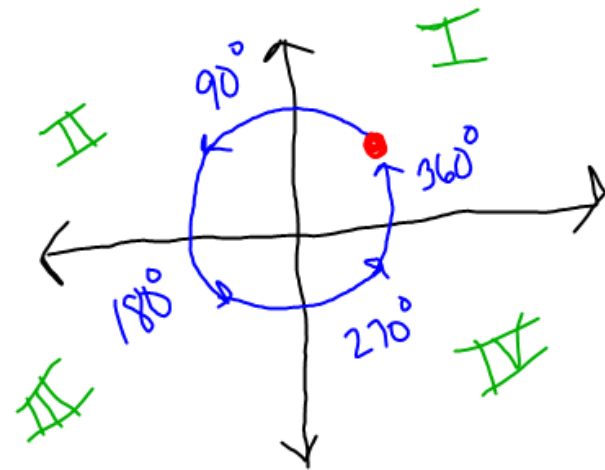
Vocabulary

Rotations - a transformation that turns a figure around a given point

Center of Rotation - the point the figure rotates about



1 turn = 90°
 2 turns = 180°
 3 turns = 270°
 4 turns = 360°



EXPLORE ACTIVITY 1

The triangle shown on the grid is the preimage. You will use the origin as the center of rotation.

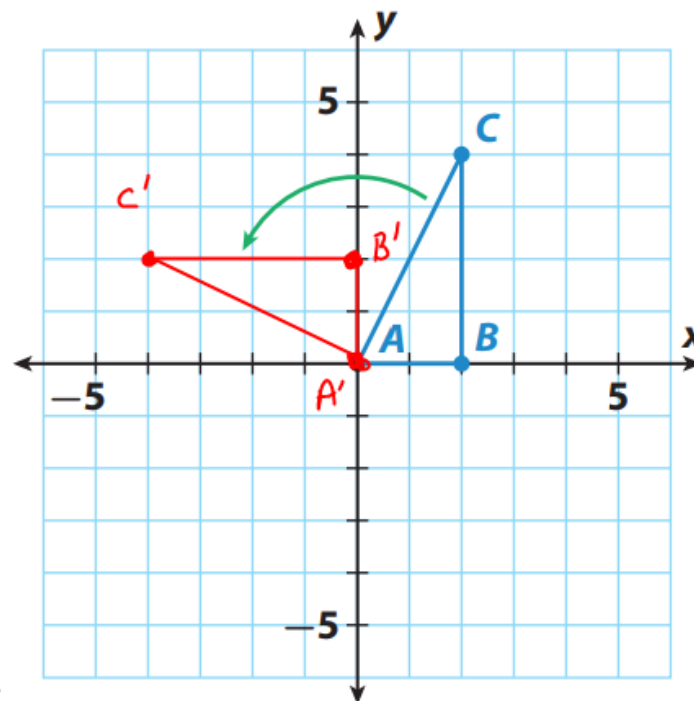
A Follow Directions

B Follow Directions

C Follow Directions

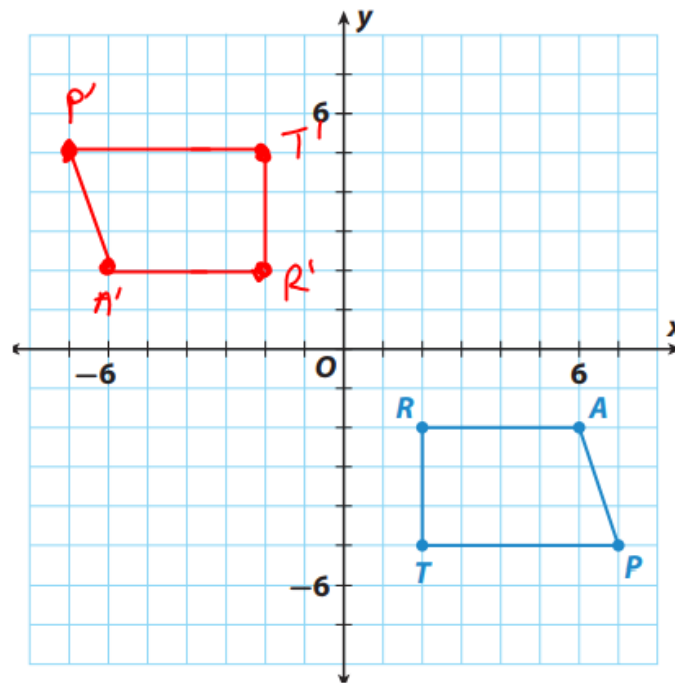
Describe the motion modeled by the rotation.

D Rotate 90° degrees C.C. about the origin.



EXPLORE ACTIVITY 2

- A** Trace the trapezoid onto a piece of paper. Include the portion of the x - and y -axes bordering the third quadrant. Cut out your tracing.
- B** Place your trapezoid and axes on top of those in the figure. Then use the axes to help rotate your trapezoid 180° counterclockwise about the origin. Sketch the image of the rotation of your trapezoid in this new location. Label the vertices of the image T' , R' , A' , and P' .

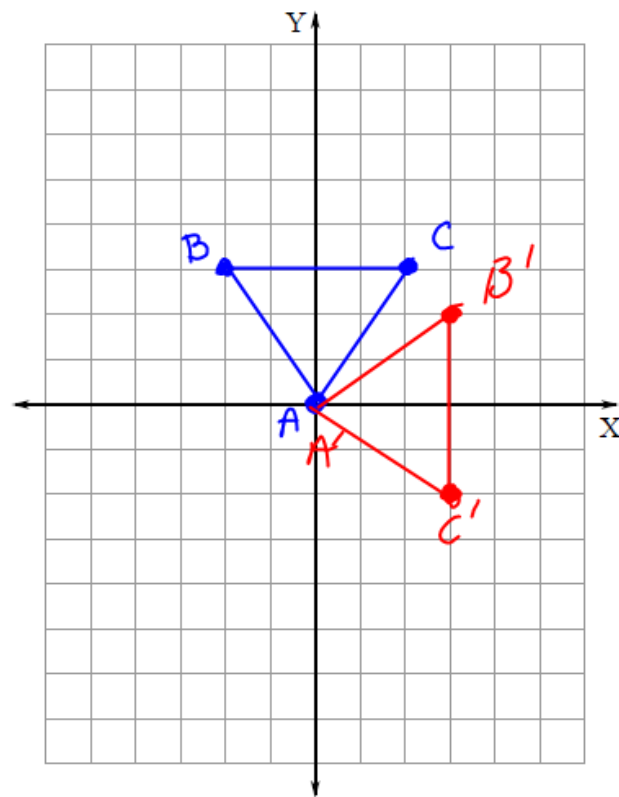


Graphing Rotations

To rotate a figure in a coordinate plane, rotate each of its vertices.

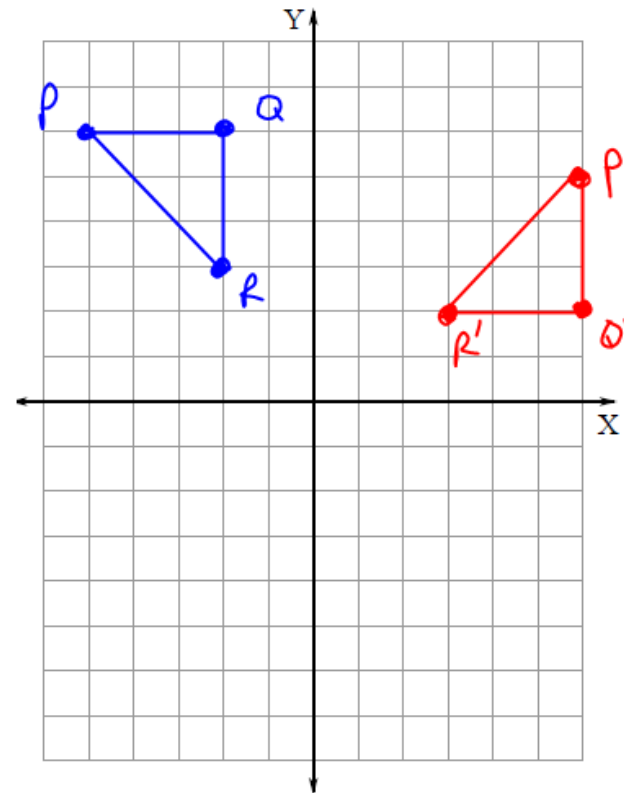
EXAMPLE 1

The figure shows triangle ABC . Graph the image of triangle ABC after a rotation of 90° clockwise.



ADDITIONAL EXAMPLE 1

The figure shows triangle PQR . Graph the image of the triangle after a clockwise rotation of 90° about the origin.

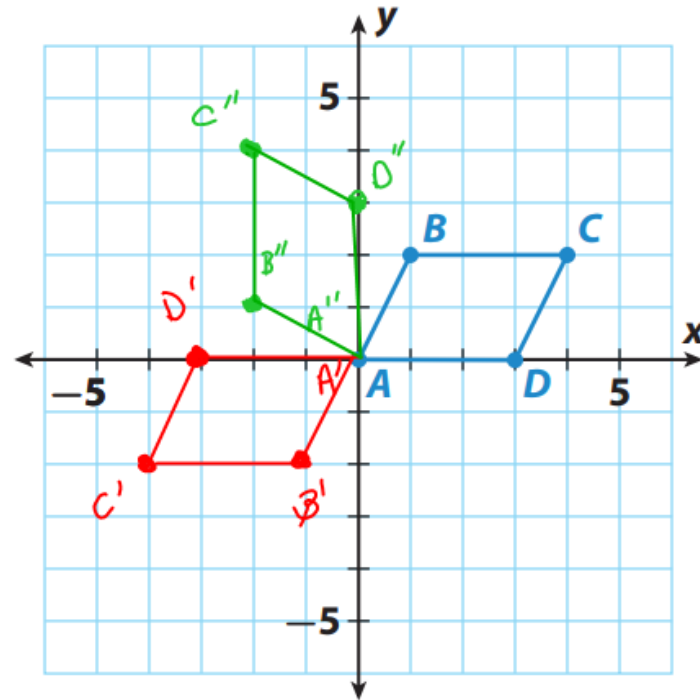


YOUR TURN

Graph the image of quadrilateral $ABCD$ after each rotation.

6. 180° 🍷
7. 270° clockwise 🍷
8. Find the coordinates of Point C after a 90° counterclockwise rotation followed by a 180° rotation.

$(2, -4)$



Rotation Calculation

90°
Clockwise

Opposite x, then switch the x and y
coordinates $(x, y) \rightarrow (y, -x)$

90°
Counterclockwise

Opposite y, then switch the x and y
coordinates $(x, y) \rightarrow (-y, x)$

180°

Opposite x and Opposite y
 $(x, y) \rightarrow (-x, -y)$

EXAMPLE 3

Quadrilateral $ABCD$ has vertices at $A(-4, 2)$, $B(-3, 4)$, $C(2, 3)$, and $D(0, 0)$. Find the vertices of quadrilateral $A'B'C'D'$ after a 90° clockwise rotation. Then graph the quadrilateral and its image.

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

$$B(-3, 4) \rightarrow B'(4, 3)$$

$$C(2, 3) \rightarrow C'(3, -2)$$

$$D(0, 0) \rightarrow D'(0, 0)$$

* opposite x, then
switch

ADDITIONAL EXAMPLE 3

Triangle PQR has vertices $P(3, 3)$, $Q(5, -1)$, and $R(1, -3)$. Find the vertices of triangle $P'Q'R'$ after a 90° counter-clockwise rotation about the origin. Then graph the triangle and its image.

$$\begin{aligned} P(3, 3) &\rightarrow P'(-3, 3) \\ Q(5, -1) &\rightarrow Q'(1, 5) \\ R(1, -3) &\rightarrow R'(3, 1) \end{aligned}$$

** opposite y
then switch*

P300

YOUR TURN

4. A triangle has vertices at $J(-2, -4)$, $K(1, 5)$, and $L(2, 2)$. What are the coordinates of the vertices of the image after the triangle is rotated 90° counterclockwise?
-

$$\begin{aligned} J(-2, -4) &\rightarrow J'(-4, 2) \\ K(1, 5) &\rightarrow K'(5, -1) \\ L(2, 2) &\rightarrow L'(2, -2) \end{aligned}$$

* graph to
check

