KEY CONCEPT

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A rotation is a transformation that turns a figure about a fixed point called the center of rotation. The angle of rotation is the number of degrees the figure is rotated. The x- and y-coordinates change in predictable ways when rotated.

Counterclockwise Rotations about the Origin

Angle of Rotation	Transformation
90°	$(x, y) \rightarrow (-y, x)$
180°	$(x, y) \rightarrow (-x, -y)$
270°	$(x, y) \rightarrow (y, -x)$

Do You Understand?

1. **Essential Question** How does a rotation affect the properties of a two-dimensional figure?

2. **Reasoning** If a preimage is rotated 360 degrees about the origin how can you describe its image?

3. **Construct Arguments** In Example 3, side AB is parallel to side DC. How are side $A'B'$ and side $D'C'$ related? Explain.

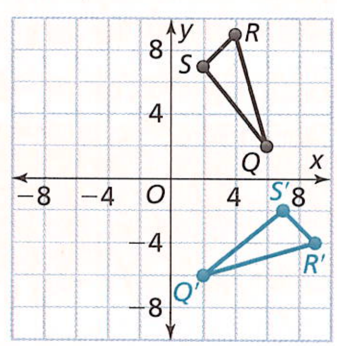
Do You Know How?

4. The coordinates of the vertices of rectangle $ABCD$ are $A(3, -2)$, $B(3, 2)$, $C(-3, 2)$, and $D(-3, -2)$.

   a. Rectangle $ABCD$ is rotated 90° about the origin. What are the coordinates of the vertices of rectangle $A'B'C'D'$?

   b. What are the measures of the angles of $A'B'C'D'$?

5. Describe the counterclockwise rotation that maps $\triangle QRS$ to $\triangle Q'R'S'$.



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PRACTICE TUTORIAL

Practice & Problem Solving

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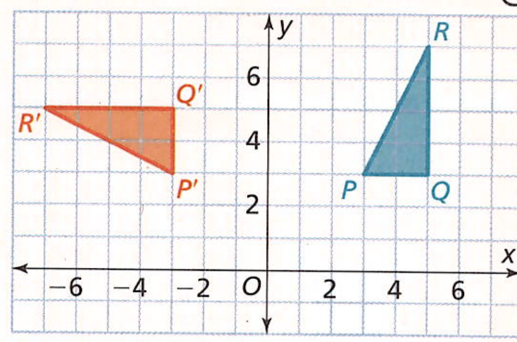
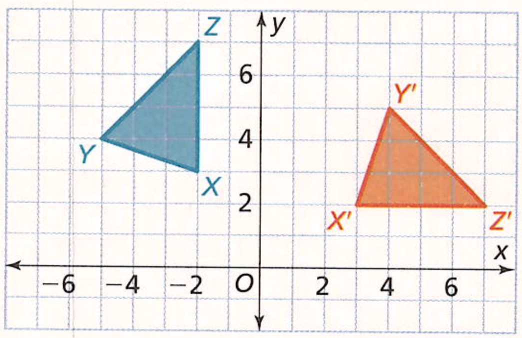
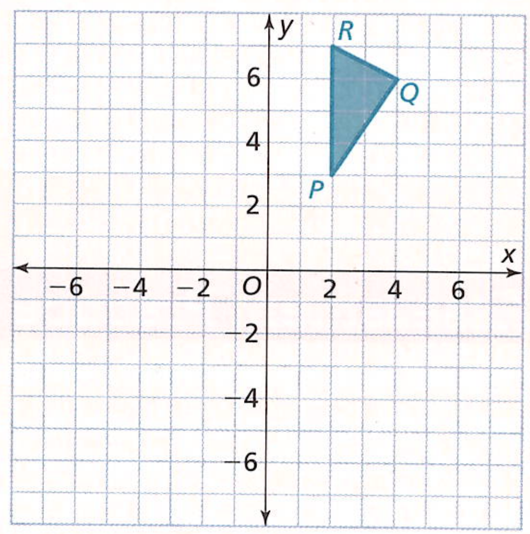
6. What is the angle of rotation about the origin that maps $\triangle PQR$ to $\triangle P'Q'R'$?



7. Is $\triangle X'Y'Z'$ a rotation of $\triangle XYZ$? Explain.



8. $\triangle PQR$ is rotated 270° about the origin. Graph and label the coordinates of P', Q', and R'.



9. Is $\triangle P'Q'R'$ a 270° rotation of $\triangle PQR$ about the origin? Explain.