

## 9.3A Notes

Rotations preserve distance, angle, and orientation of figures.

take note

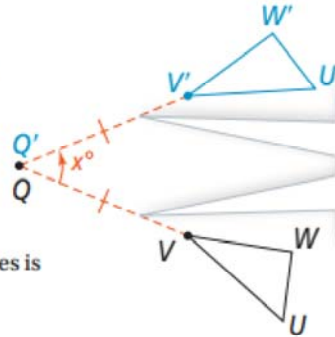
### Key Concept Rotation About a Point

A **rotation** of  $x^\circ$  about a point  $Q$ , called the **center of rotation**, is a transformation with these two properties:

- The image of  $Q$  is itself (that is,  $Q' = Q$ ).
- For any other point  $V$ ,  $QV' = QV$  and  $m\angle VQV' = x$ .

The positive number of degrees a figure rotates is the **angle of rotation**.

A rotation about a point is a rigid motion. You write the  $x^\circ$  rotation of  $\triangle UVW$  about point  $Q$  as  $r_{(x^\circ, Q)}(\triangle UVW) = \triangle U'V'W'$ .



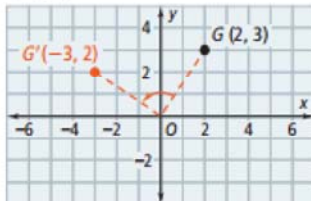
The preimage  $V$  and its image  $V'$  are equidistant from the center of rotation.

When a figure is rotated  $90^\circ$ ,  $180^\circ$ , or  $270^\circ$  about the origin  $O$  in a coordinate plane, you can use the following rules.

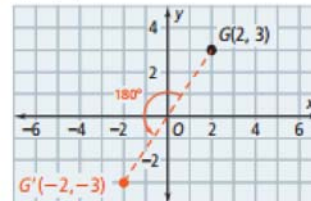
take note

### Key Concept Rotation in the Coordinate Plane

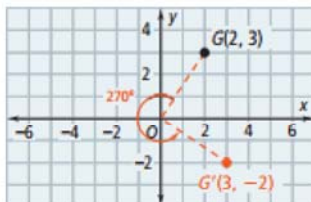
$r_{(90^\circ, O)}(x, y)$



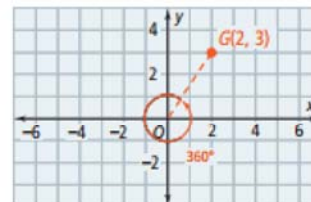
$r_{(180^\circ, O)}(x, y)$



$r_{(270^\circ, O)}(x, y)$

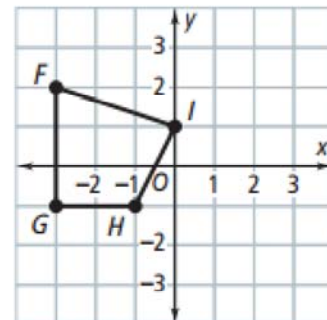


$r_{(360^\circ, O)}(x, y)$



### Problem Drawing Rotations in a Coordinate Plane

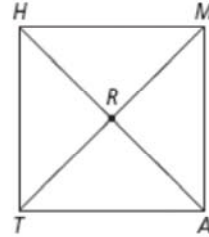
**Got It?** Graph  $r_{(270^\circ, O)}(FGHI)$ .



### 9.3B Homework

Point  $R$  is the center of regular quadrilateral  $MATH$ . Find the image of the given point or segment for the given rotation.

1.  $r_{(90^\circ, R)}(H)$
2.  $r_{(180^\circ, R)}(M)$
3.  $r_{(270^\circ, R)}(\overline{AT})$
4.  $r_{(360^\circ, R)}(\overline{HM})$



For Exercises 5–7,  $ABCD$  has vertices  $A(1, 1)$ ,  $B(1, 3)$ ,  $C(4, 3)$ , and  $D(4, 1)$ .

5. Graph  $r_{(90^\circ, O)}(ABCD)$ .

To start, graph  $ABCD$ .

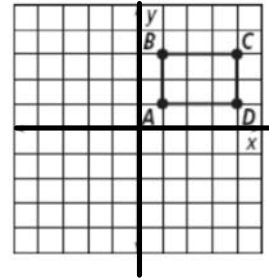
$$A' = r_{(90^\circ, O)}(A) = (-1, \square)$$

$$B' = r_{(90^\circ, O)}(B) = (-3, \square)$$

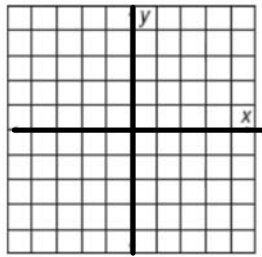
$$C' = r_{(90^\circ, O)}(C) = (\square, 4)$$

$$D' = r_{(90^\circ, O)}(D) = (\square, 4)$$

Then graph  $A'$ ,  $B'$ ,  $C'$ , and  $D'$ .



6. Graph  $r_{(180^\circ, O)}(ABCD)$ .



7. Graph  $r_{(270^\circ, O)}(ABCD)$ .

