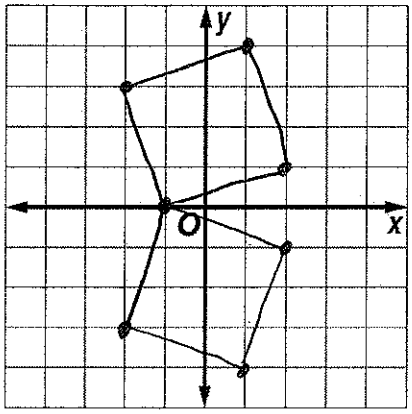
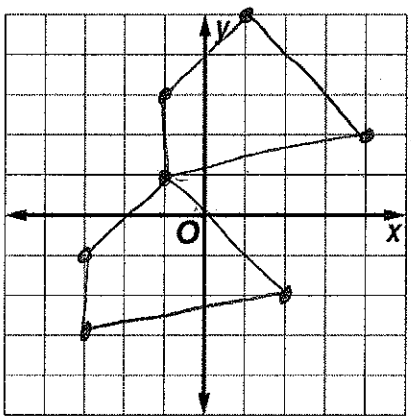
9.3 Warm-Up

1. Square *KLMN* with vertices *K*(–1, 0), *L*(–2, 3), *M*(1, 4), and *N*(2, 1) in the *x*-axis.



K'(-1, 0)
L'(-2, -3)
M'(1, -4)
N'(2, -1)

2. Quadrilateral *TUWX* with vertices T (–1, 1), *U* (4, 2), *W* (1, 5), and *X* (–1, 3);⟨–2, –4⟩.



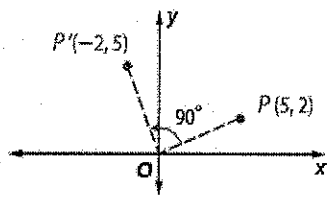
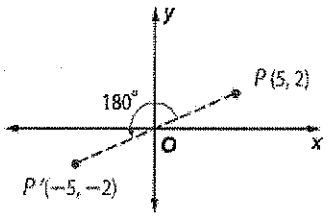
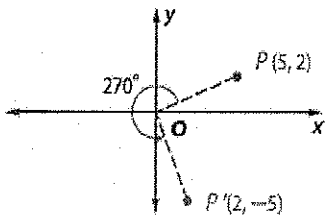
T'(-3, -3)
U'(2, -2)
W'(-1, 1)
X'(-3, -1)

9.3 Rotations

Target: Use properties of the coordinate plane to graph rotations

Center of Rotation- place where rotation starts (0,0)

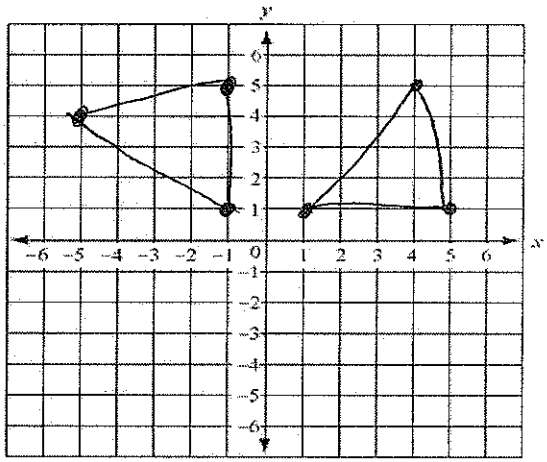
KeyConcept Rotations in the Coordinate Plane

90° Rotation To rotate a point 90° counterclockwise about the origin, multiply the y-coordinate by -1 and then interchange the x- and y-coordinates. **Symbols** $(x, y) \rightarrow (-y, x)$	**Example** 	(3,4) → (-4,3) switch 1st
180° Rotation To rotate a point 180° counterclockwise about the origin, multiply the x- and y-coordinates by -1. **Symbols** $(x, y) \rightarrow (-x, -y)$	**Example** 	(4,5) → (-4,-5) Both
270° Rotation To rotate a point 270° counterclockwise about the origin, multiply the x-coordinate by -1 and then interchange the x- and y-coordinates. **Symbols** $(x, y) \rightarrow (y, -x)$	**Example** 	(6,8) → (8,-6) Switch 2nd

Example 2 Rotations in the Coordinate Plane

Triangle PQR has vertices $P(1, 1)$, $Q(4, 5)$, and $R(5, 1)$. Graph $\triangle PQR$ and its image after a rotation 90° about the origin.

P′(-1, 1)
Q′(-5,4)
R′(-1,5)



Guided Practice

2. Parallelogram $FGHJ$ has vertices $F(2, 1)$, $G(7, 1)$, $H(6, -3)$, and $J(1, -3)$. Graph $FGHJ$ and its image after a rotation 180° about the origin.

F′(-2,-1)
G′(-7,-1)
H′(-6,3)
J′(-1,3)