

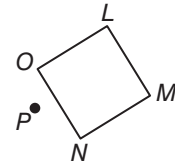
9-3 Study Guide and Intervention

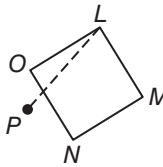
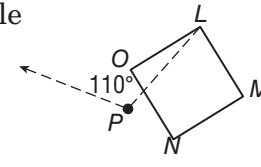
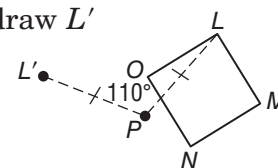
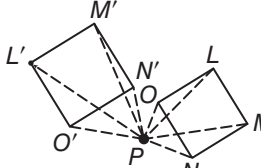
Rotations

Draw Rotations A **rotation** is a transformation that moves every point of the preimage through a specified angle, x° , and direction about a fixed point called the **center of rotation**.

- If the point being rotated is the center of rotation, then the image and preimage are the same point.
- If the point being rotated is not the center of rotation, then the image and preimage are the same distance from the center of rotation and the measure of the angle of rotation formed by the preimage, center of rotation, and image points is x .

Example Use a protractor and ruler to draw a 110° rotation of square $LMNO$ about point P .

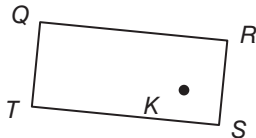


| | |
|---|---|
| <p>Step 1 Draw a segment from vertex L to point P.</p>  | <p>Step 2 Draw a 110° angle using \overline{PL} as one side.</p>  |
| <p>Step 3 Use a ruler to draw L' such that $PL' = PL$.</p>  | <p>Step 4 Repeat steps 1–3 for vertices $M, N,$ and O and draw square $L'M'N'O'$.</p>  |

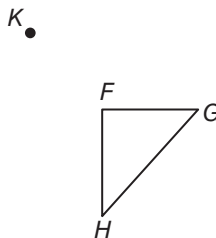
Exercises

Use a protractor and a ruler to draw the specified rotation of each figure about point K .

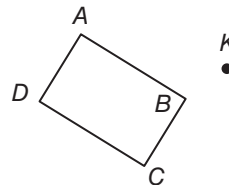
1. 75°



2. 45°



3. 135°



9-3 Study Guide and Intervention *(continued)*

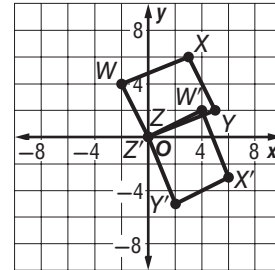
Rotations

Draw Rotations In The Coordinate Plane The following rules can be used to rotate a point 90° , 180° , or 270° counterclockwise about the origin in the coordinate plane.

| To rotate | Procedure |
|-------------|---|
| 90° | Multiply the y -coordinate by -1 and then interchange the x - and y -coordinates. |
| 180° | Multiply the x - and y -coordinates by -1 . |
| 270° | Multiply the x -coordinate by -1 and then interchange the x - and y -coordinates. |

Example

Parallelogram $WXYZ$ has vertices $W(-2, 4)$, $X(3, 6)$, $Y(5, 2)$, and $Z(0, 0)$. Graph parallelogram $WXYZ$ and its image after a rotation of 270° about the origin.



Multiply the x -coordinate by -1 and then interchange the x - and y -coordinates.

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

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

$$X(3, 6) \rightarrow X'(6, -3)$$

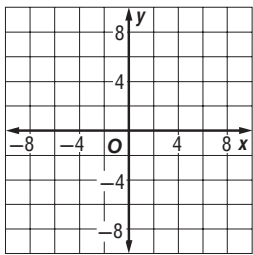
$$Y(5, 2) \rightarrow Y'(2, -5)$$

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

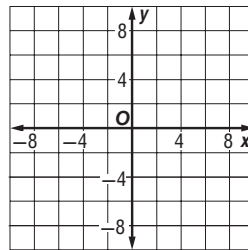
Exercises

Graph each figure and its image after the specified rotation about the origin.

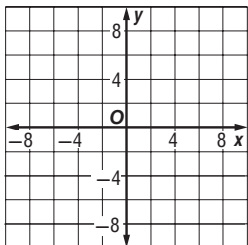
1. trapezoid $FGHI$ has vertices $F(7, 7)$, $G(9, 2)$, $H(3, 2)$, and $I(5, 7)$; 90°



2. $\triangle LMN$ has vertices $L(-1, -1)$, $M(0, -4)$, and $N(-6, -2)$; 90°



3. $\triangle ABC$ has vertices $A(-3, 5)$, $B(0, 2)$, and $C(-5, 1)$; 180°



4. parallelogram $PQRS$ has vertices $P(4, 7)$, $Q(6, 6)$, $R(3, -2)$, and $S(1, -1)$; 270°

