

Geometry 9.3

Draw rotations

Draw rotations in the coordinate plane

center of rotation

angle of rotation

clockwise

counterclockwise

whiteboards

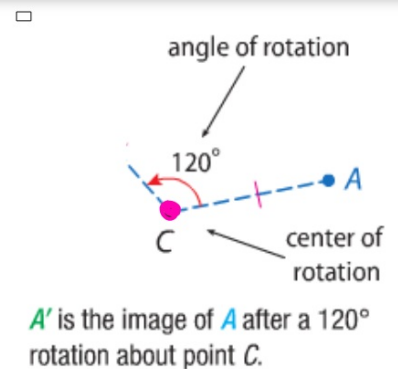


Quiz 9.1-9.2

KeyConcept Rotation

A rotation about a fixed point, called the **center of rotation**, through an angle of x° is a function that maps a point to its image such that

- if the point is the center of rotation, then the image and preimage are the same point, or
- if the point 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 .

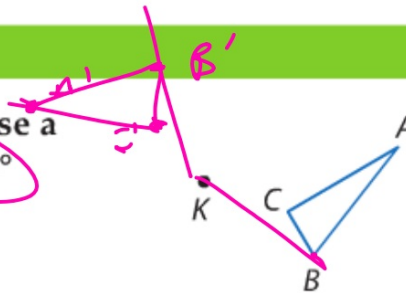


angle CCW



Example 1 Draw a Rotation

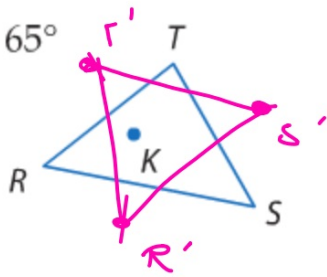
Copy $\triangle ABC$ and point K . Then use a protractor and ruler to draw a 140° rotation of $\triangle ABC$ about point K .



1. connect to center
2. measure angle
3. measure distance
4. repeat for each point on preimage

CCW

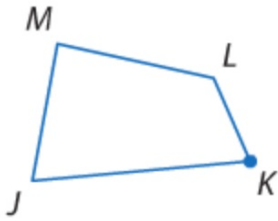
1A. 65°



1. connect to center
2. measure angle
3. measure distance
4. repeat for each point on preimage

CCW

1B. 170°



1. connect to center
2. measure angle
3. measure distance
4. repeat for each point on preimage

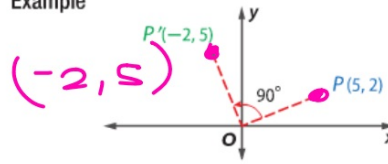
KeyConcept Rotations in the Coordinate Plane

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



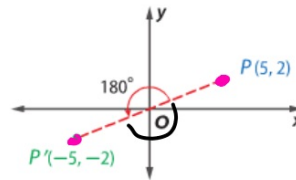
90 = perpendicular
(slopes are always reciprocal & opposite)
coordinates trade places & one becomes negative

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

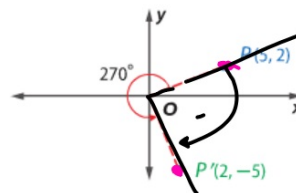


270° Rotation

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



What about -90 etc?
What is 360 degree rotation?

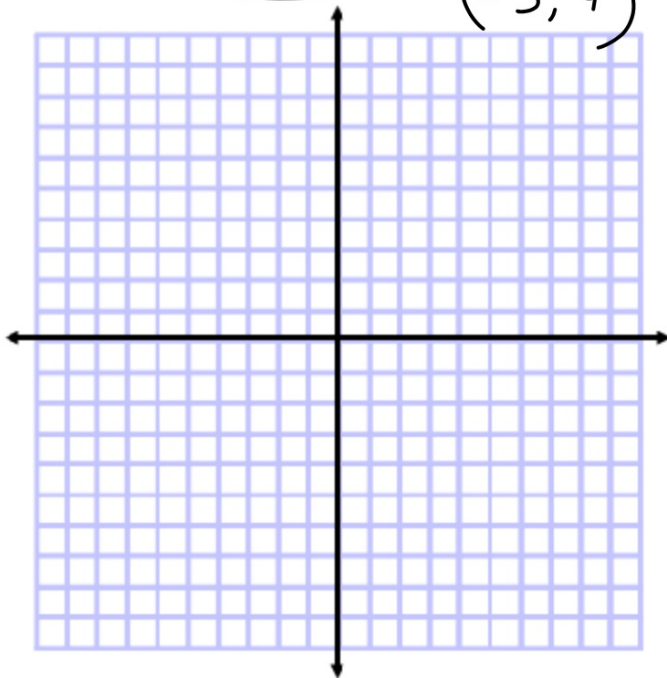


CCW

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

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.



$$(-5, 4) \quad (-1, 5)$$

CCW

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

$(-2, -1) \quad (-7, -1) \quad (-6, 3)$

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.



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

Standardized Test Example 3 Rotations in the Coordinate Plane

Triangle JKL is shown at the right. What is the image of point J after a rotation 270° counterclockwise about the origin?

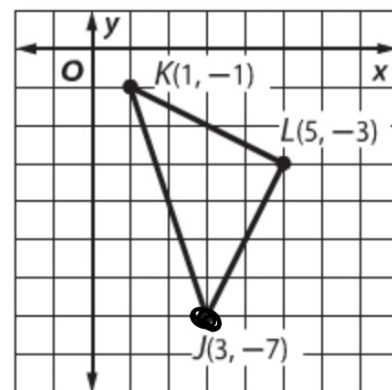
A $(-3, -7)$

B $(-7, 3)$

C $(-7, -3)$

D $(7, -3)$

$(-7, -3)$



WB 9.3