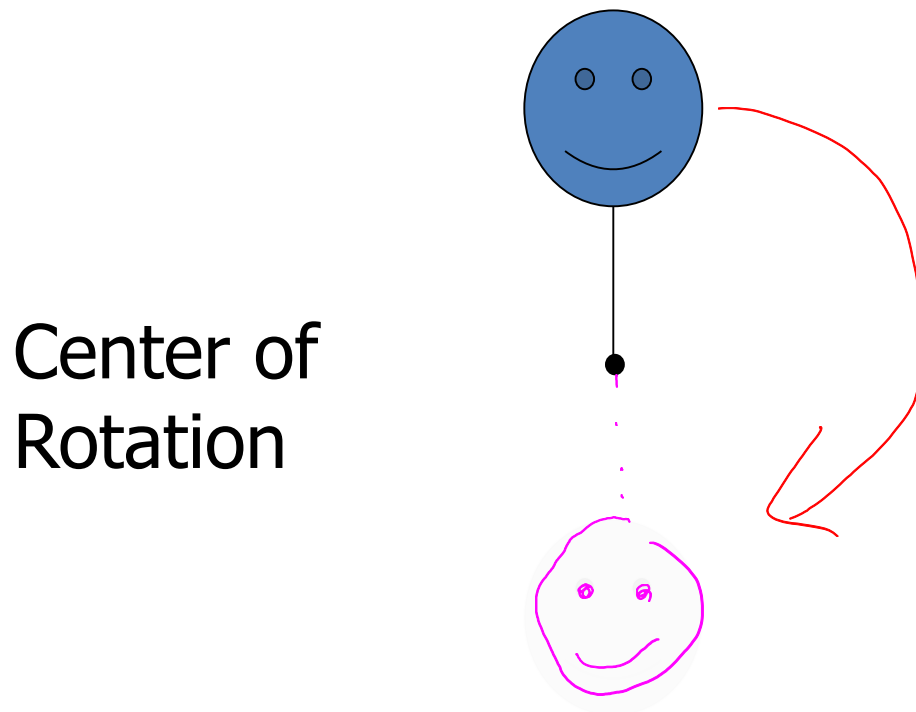


# Rotation

- A transformation in which a figure is turned about a fixed point, called the center of rotation.



# A Rotation is an Isometry

- **Segment lengths are preserved.**
- **Angle measures are preserved.**
- **Parallel lines remain parallel.**
- **Orientation is unchanged.**

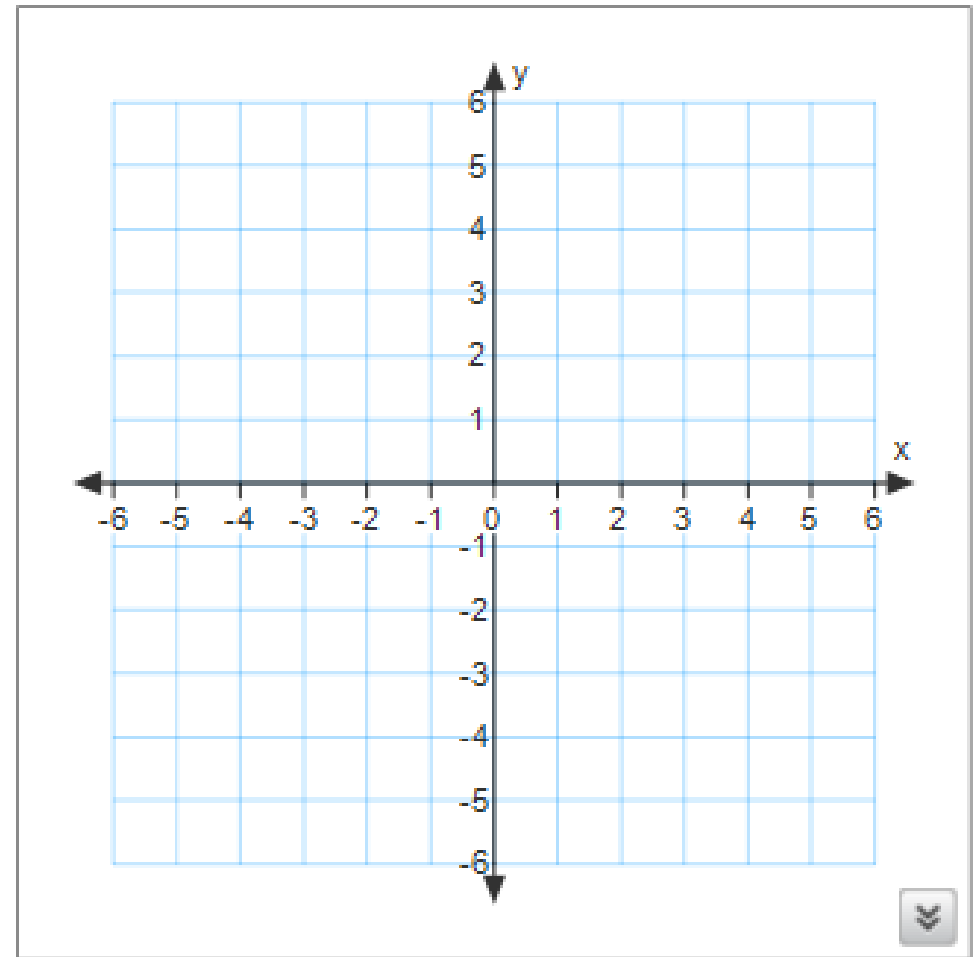
# Day 4 - Rotations

Rotations are always

COUNTERCLOCKWISE

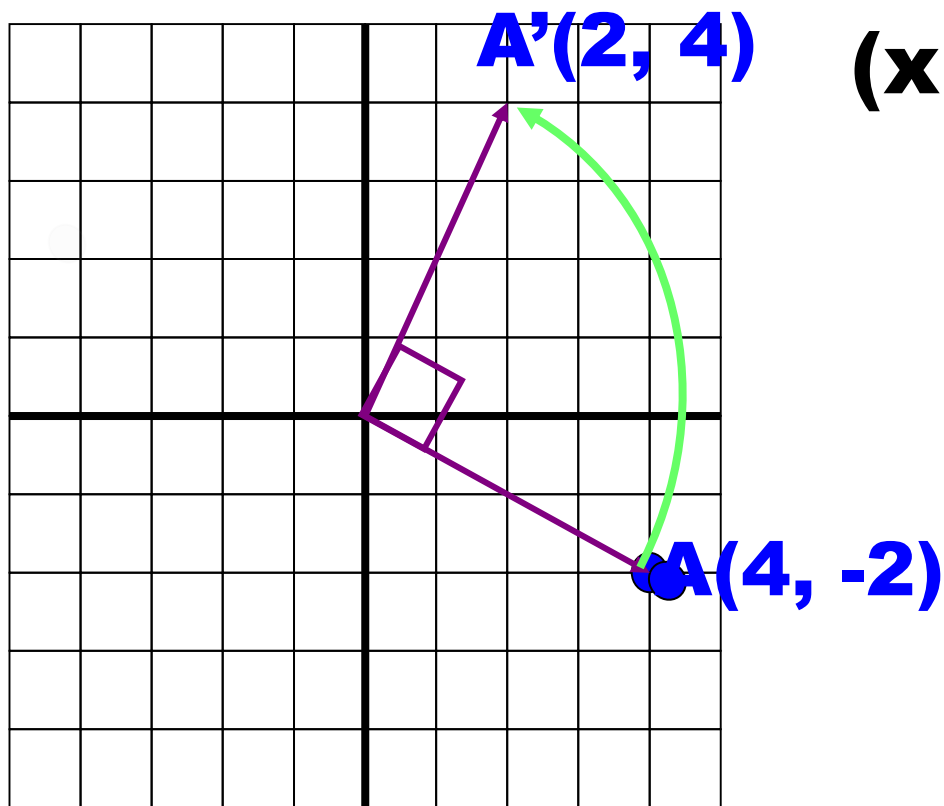


Quadrants - Quad means \_\_\_\_\_



**Discovery  
Investigation!**

# 90° counter-clockwise rotation



## Formula

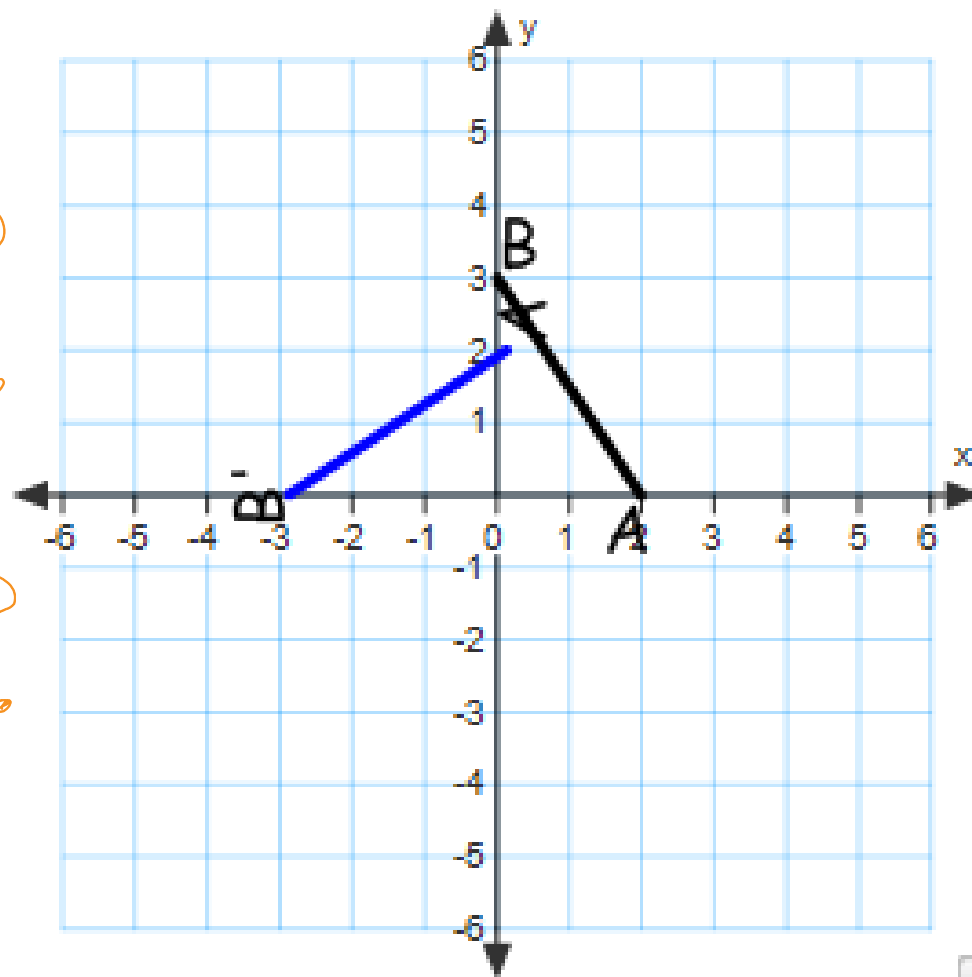
$$(x, y) \rightarrow (y, -x)$$

90°

# 90° Rotation:

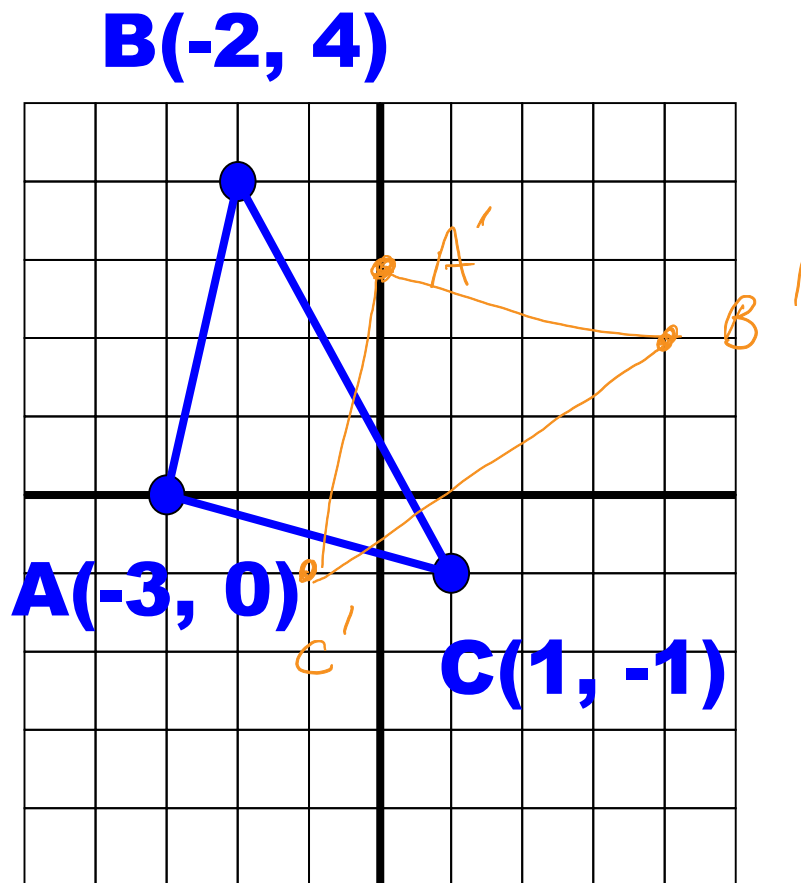
$A(2,0) \rightarrow ( \quad )$

$B(0,3) \rightarrow ( \quad )$



# Rotation Example

**Draw a coordinate grid and graph:**



$$\mathbf{A(-3, 0)} \rightarrow (0, 3) = \mathbf{A'}$$

$$\mathbf{B(-2, 4)} \rightarrow (4, 2) = \mathbf{B'}$$

$$\mathbf{C(1, -1)} \rightarrow (-1, 1) = \mathbf{C'}$$

**Draw  $\triangle ABC$**

**Rotate  $\triangle ABC$   $90^\circ$   
clockwise.**

**Formula**

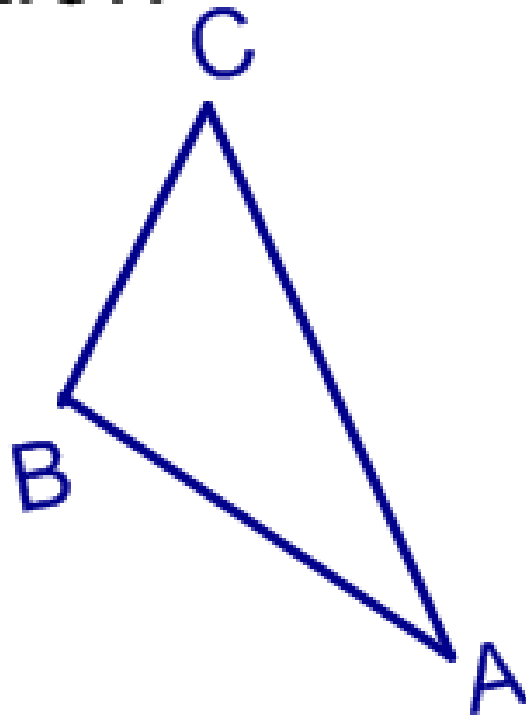
$$\mathbf{(x, y) \rightarrow (y, -x)}$$

# 90° Rotation

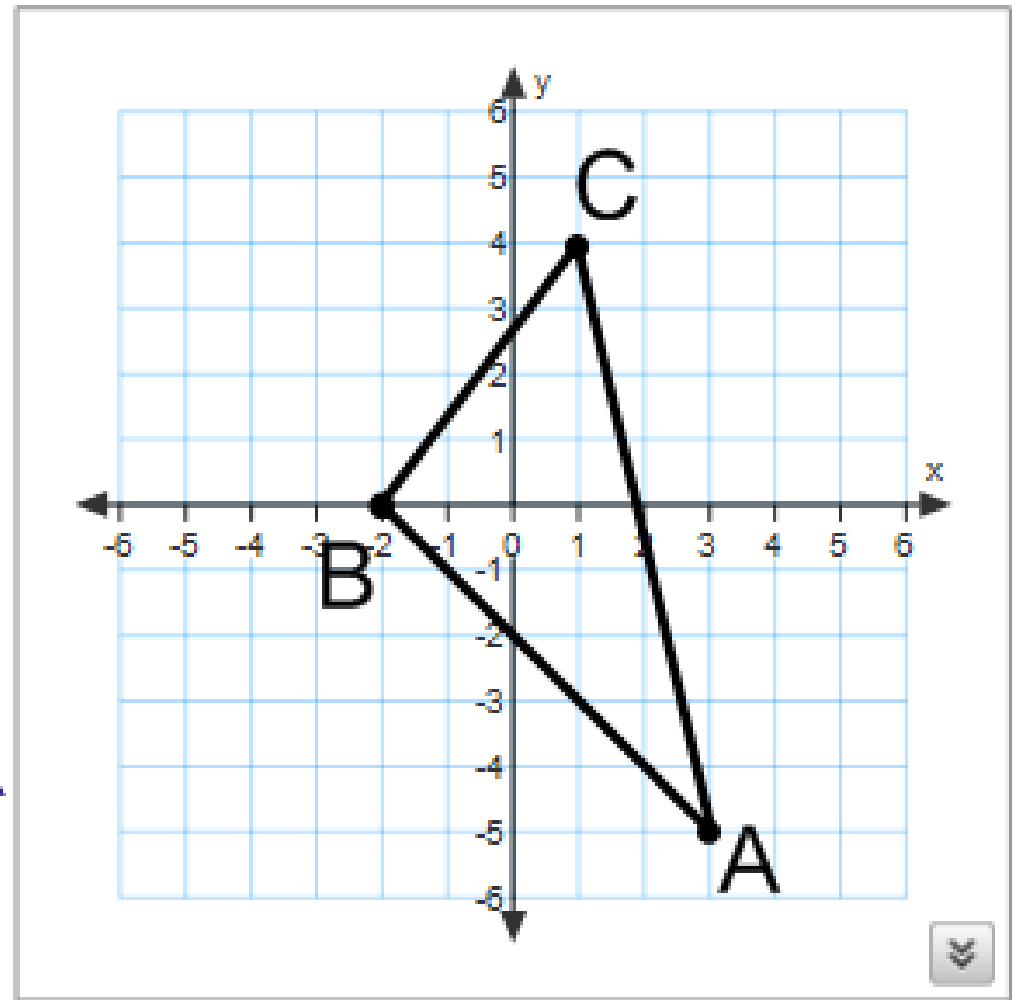
A(3,-5)

B(-2,0)

C(1,4)



Rule: \_\_\_\_\_



Do it!

# 180° Counterclockwise rotation

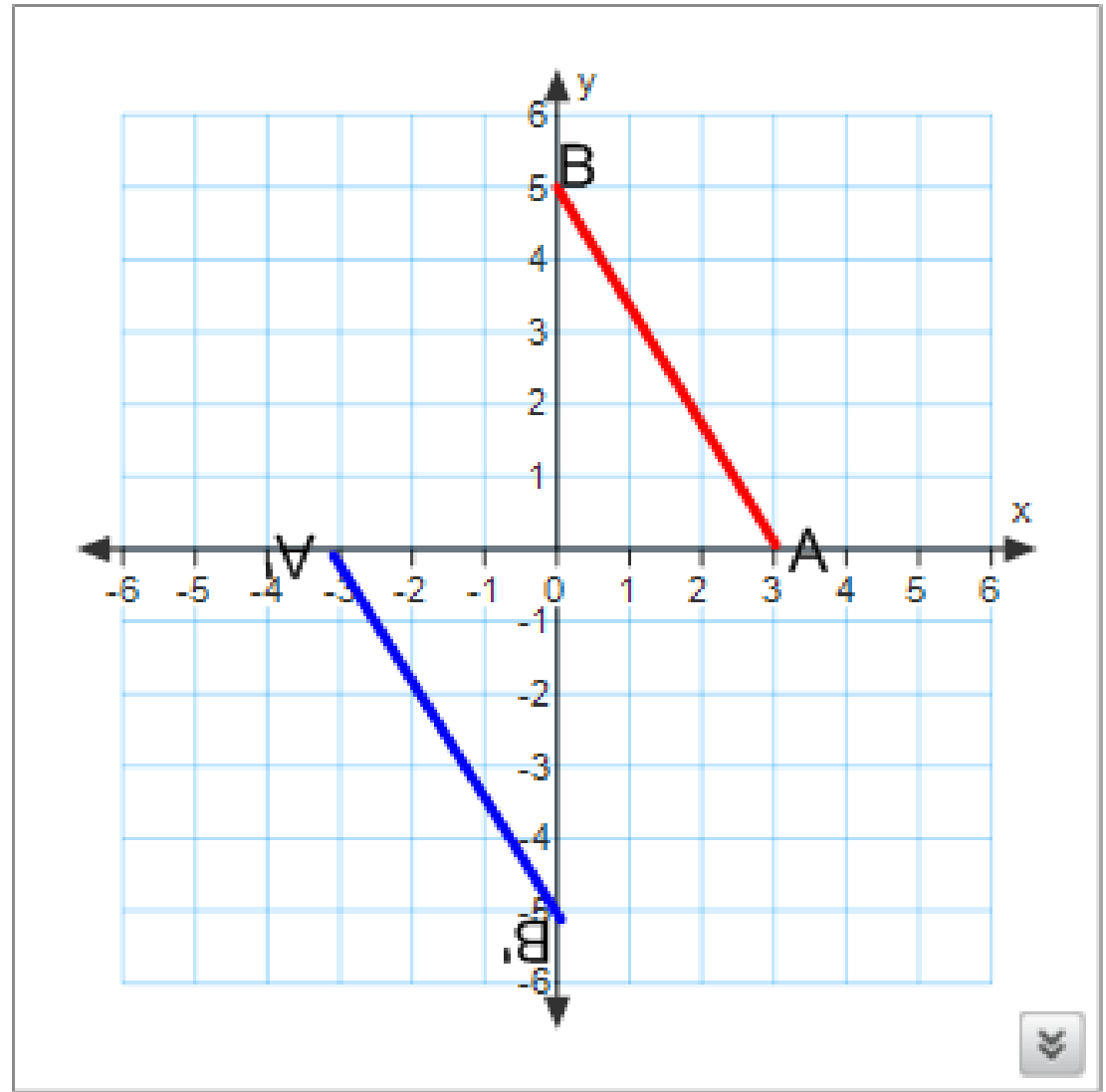
$$A(3,0) \quad A' = (-3,0)$$

$$B(0,5) \quad B' = (0,-5)$$

RULE

180° rotation  $\rightarrow$

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



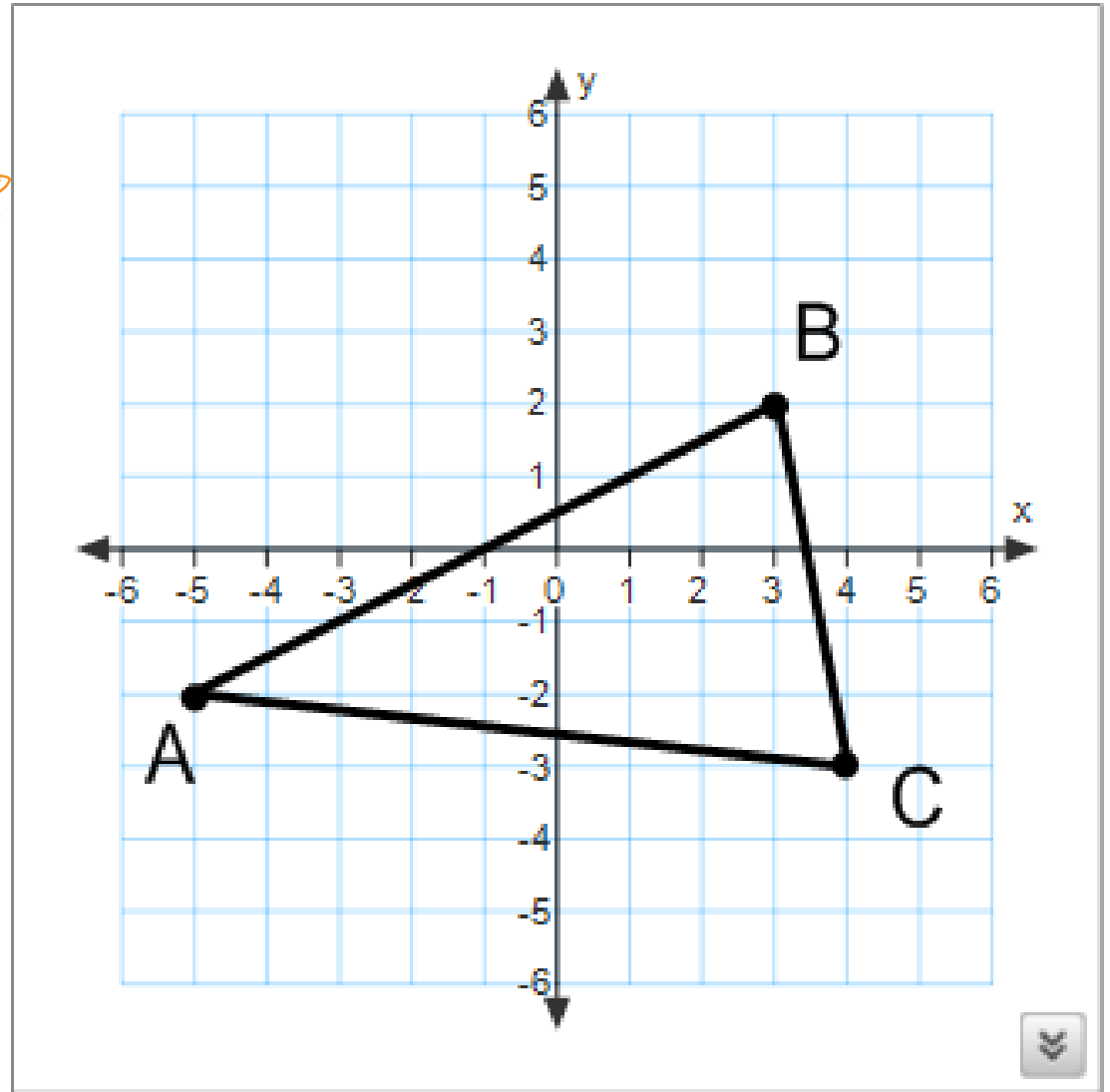


# 180° Counterclockwise rotation

A(-5, -2)

B(3, 2) → (-3, -2) = B'

C(4, -3)



Graph

# Let's Talk about Notation Again

## Rotations

$$90^{\circ}: R_{90^{\circ}}(x, y) = (y, -x)$$

$$180^{\circ}: R_{180^{\circ}}(x, y) = (-x, -y)$$

$$270^{\circ}: R_{270^{\circ}}(x, y) = (-y, x)$$

$$\text{Translation } T\left(\begin{matrix} a \\ b \end{matrix}\right) = (x+a, y+b)$$

## Line Reflections

$$\text{x-axis: } P(x, y) \longrightarrow P'(\quad) \text{ OR } r_{\text{x-axis}}(x, y) = (x, -y)$$

$$\text{y-axis: } P(x, y) \longrightarrow P'(\quad) \text{ OR } r_{\text{y-axis}}(x, y) = (-x, y)$$

$$\text{y=x: } P(x, y) \longrightarrow P'(\quad) \text{ OR } r_{\text{y=x}}(x, y) = (y, x)$$

$D(4, -3)$

$R_{90^\circ}$

$R_{180^\circ}$

$r_{x\text{-axis}}$

$T(x+4, y-2)$

$R_{270^\circ}$

$r_{y\text{-axis}}$

$r_{y=x}$

$G(-3, -4)$

$R_{90^\circ}$

$R_{180^\circ}$

$r_{x\text{-axis}}$

$T(x+4, y-2)$

$R_{270^\circ}$

$r_{y\text{-axis}}$

$r_{y=x}$