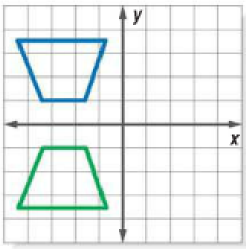
# Starter

The figure shown was transformed from Quadrant II to Quadrant III.




This transformation best represents which of the following?

(F) translation 2 units up

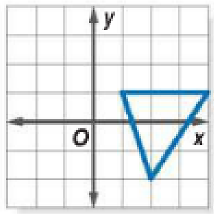
(G) translation 2 units down

(H) reflection over the *x*-axis

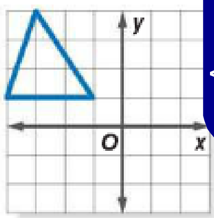
(I) reflection over the *y*-axis

Which of the following is the reflection of $\triangle ABC$ with vertices $A(1, -1)$, $B(4, -1)$, and $C(2, -4)$ over the *x*-axis?

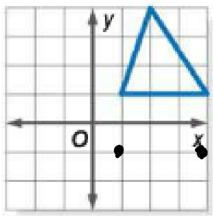
(A)



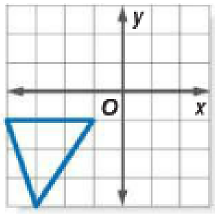

(C)




(B)




(D)




Answers

Feb 15-7:51 AM

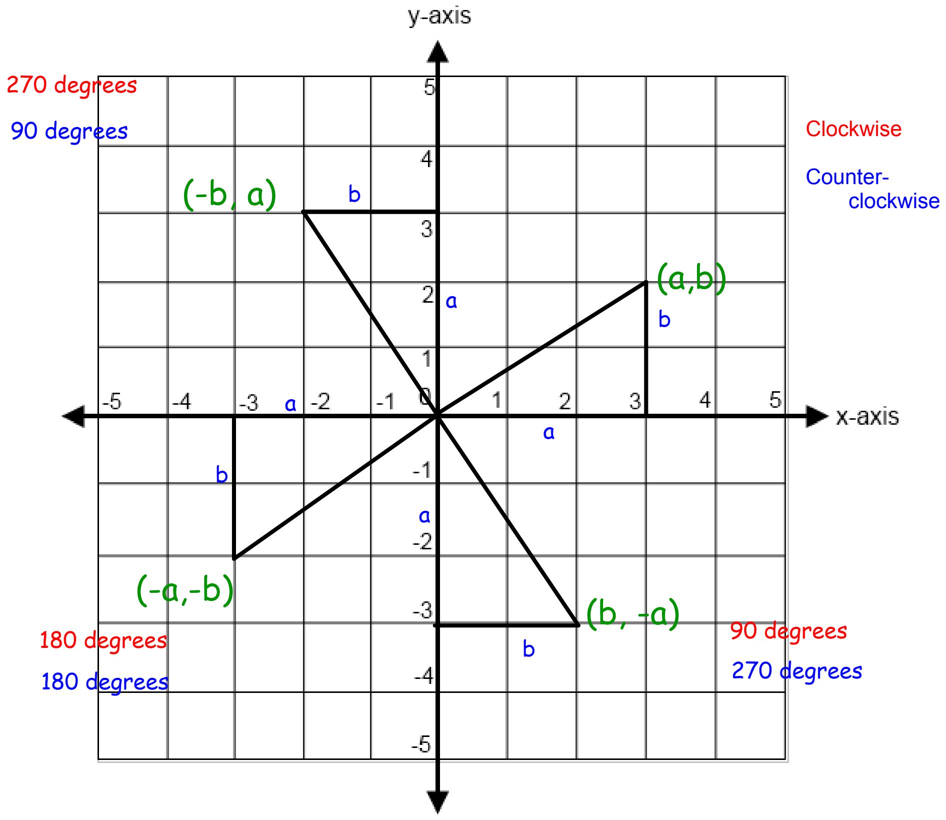
## Todays Goal

Unit 4 Day 3 Rotations

I can ...

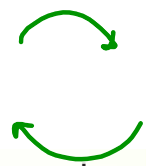
Find the image of a figure by a rotation in the coordinate plane.

Aug 27-2:49 PM




Dec 2-1:02 PM

# Rotation



A spin can be *clockwise* or *counterclockwise*. Define these two words in your own words.

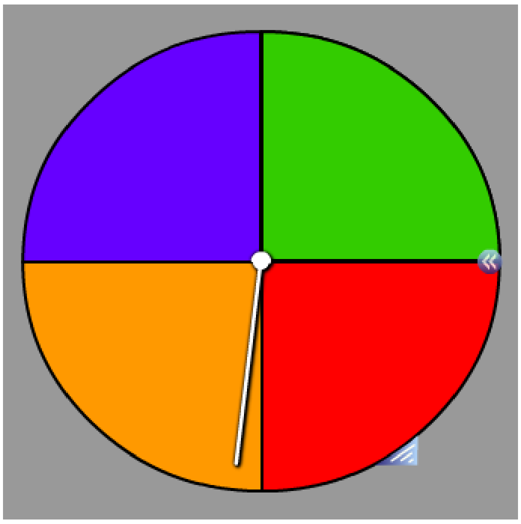
clockwise the way the hands go on a clock.
to the right.

counterclockwise spins to the left from the top.
the way the earth spins.
the opposite way clockwise goes.

Feb 15-6:55 AM

Does the distance from the center to the edge change as it spins? Explain.

Rotations create congruent figures.

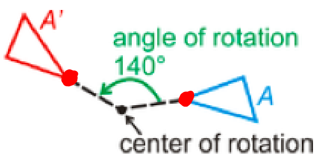


Feb 15-7:28 AM

Definition

Rotation: a transformation where a figure is turned around a fixed point to create an image.

The lines drawn from the preimage to the center of rotation, and from the center of rotation to the image form the angle of rotation.




Oct 25-8:55 PM

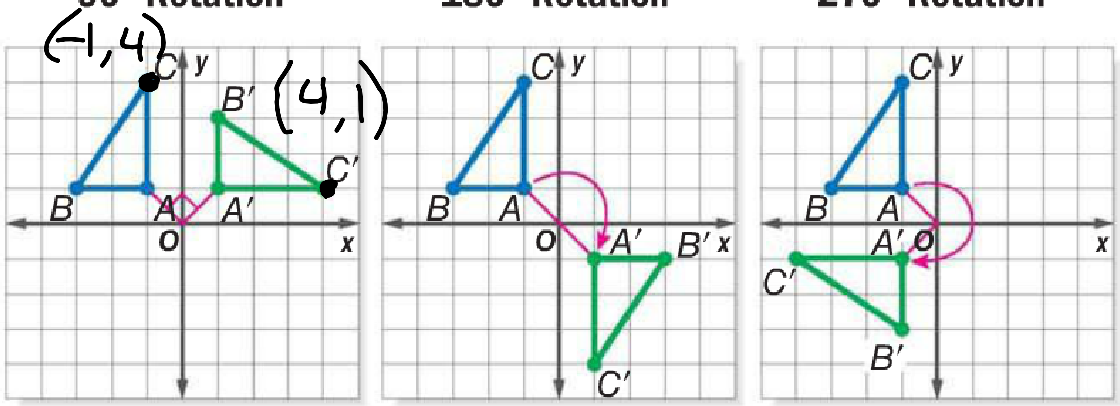
**Know What?** The international symbol for recycling is to the right. It is three arrows rotated around a point. Let's assume that the arrow on the top is the pre-image and the other two are its images. Find the center of rotation and the angle of rotation for each image.

Oct 25-8:54 PM

# Rotate About the Origin (clockwise)

$(a,b) \rightarrow (b,-a)$

90° Rotation 180° Rotation 270° Rotation

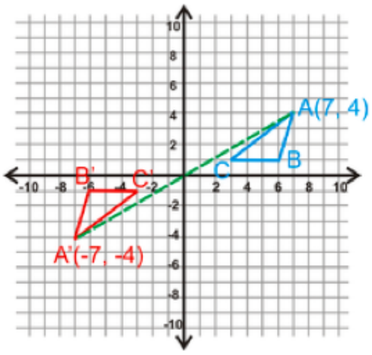



Feb 15-7:37 AM

$180^{\circ}$ **Rotation**

To rotate a figure $180^{\circ}$, in the x-y plane, we ***use the origin as the center of the rotation***. A $180^{\circ}$ angle is called a straight angle. So, an image rotated over the origin $180^{\circ}$ will be on the same line and the same distance away from the origin as the preimage, but on the other side.

**Example 4:** Rotate $\triangle ABC$, with vertices $A(7,4), B(6,1)$, and $C(3,1)$, $180^{\circ}$. Find the coordinates of $\Delta A'B'C'$?.

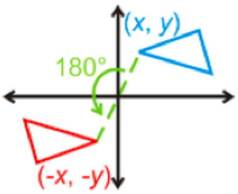



Mar 13-8:54 AM

**Solution:** You can either use Investigation 12-1 or the hint given above to find $\triangle ABC$. First, graph the triangle. If $A$ is (7, 4), that means it is 7 units to the ***right*** of the origin and 4 units ***up***. $A$ would then be 7 units to the ***left*** of the origin and 4 units ***down***.

$A(7,4) \rightarrow A(-7,-4)$
$B(6,1) \rightarrow B(-6,-1)$
$C(3,1) \rightarrow C(-3,-1)$

**Rotation of** $180^{\circ}$**:** $(x,y) \rightarrow (-x,-y)$



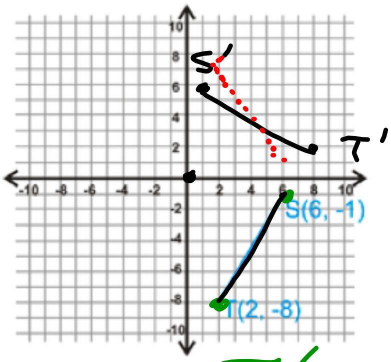

Recall from the second section that ***a rotation is an isometry***. This means that $\Delta ABC \cong \Delta A'B'C'$. You can use the distance formula to show this.

Aug 27-3:11 PM

## $90^\circ$ Rotation (counterclockwise)

Similar to the $180^\circ$ rotation, the image of a $90^\circ$ will be the same distance away from the origin as its preimage, but rotated $90^\circ$.

**Example 5:** Rotate $\overline{ST}$ $90^\circ$.




$(a, b) \to (-b, a)$

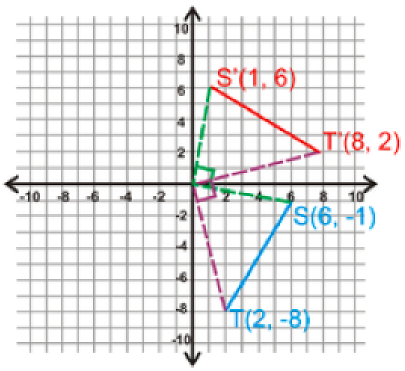
$(b, -a) \to (a, b)$

$S(6, -1) \to S'(1, 6)$

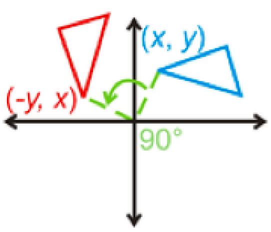
$T(2, -8) \to T'(8, 2)$

Mar 13-8:55 AM

**Solution:** When rotating something $90^\circ$, see if there is a pattern.




**Rotation of $90^\circ$:** $(x, y) \to (-y, x)$

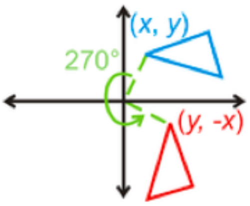



Mar 13-8:56 AM

**Rotation of** $270^\circ$ (counterclockwise)

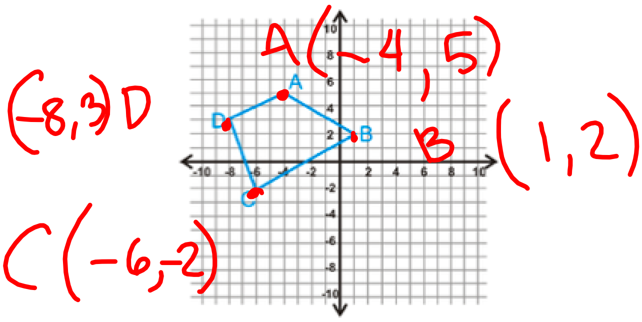
A rotation of $270^\circ$ counterclockwise would be the same as a rotation of $90^\circ$ *plus* a rotation of $180^\circ$. So, if the values of a $90^\circ$ rotation are $(-y, x)$, then a $270^\circ$ rotation would be the opposite sign of each, or $(y, -x)$.

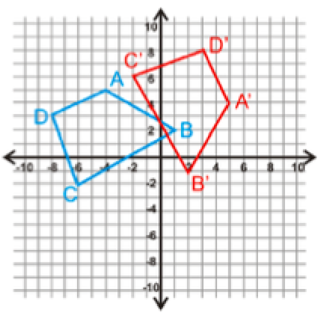
**Rotation of** $270^\circ$**:** $(x, y) \rightarrow (y, -x)$




Mar 13-8:57 AM

**Example 6:** Find the coordinates of $ABCD$ after a $270^\circ$ rotation. counterclockwise



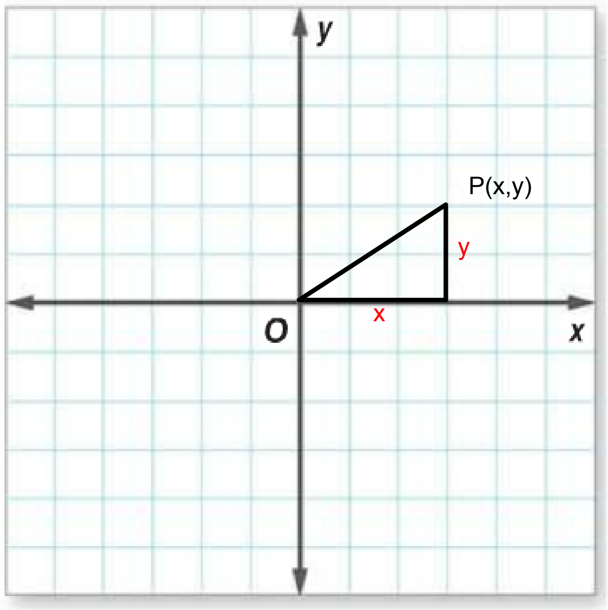




**Solution:** Using the rule, we have:

$$(x, y) \rightarrow (y, -x)$$
$$A(-4, 5) \rightarrow A(5, 4)$$
$$B(1, 2) \rightarrow B(2, -1)$$
$$C(-6, -2) \rightarrow C(-2, 6)$$
$$D(-8, 3) \rightarrow D(3, 8)$$

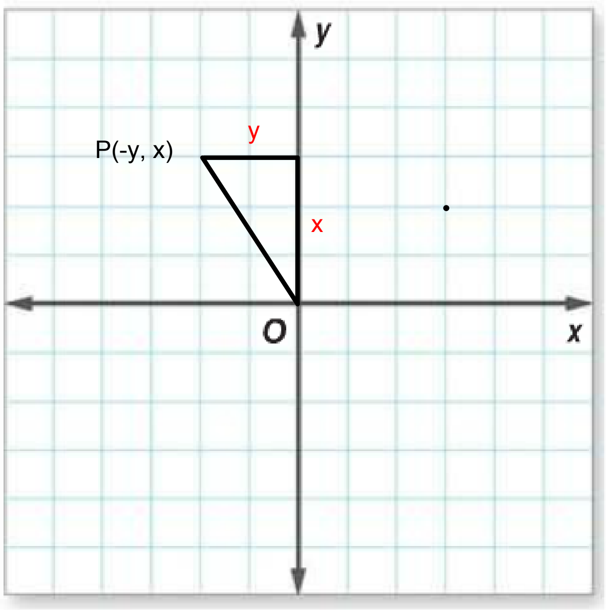
Mar 13-8:58 AM

If you have trouble remembering the formulas for 90, 180 and 270 degree rotations:



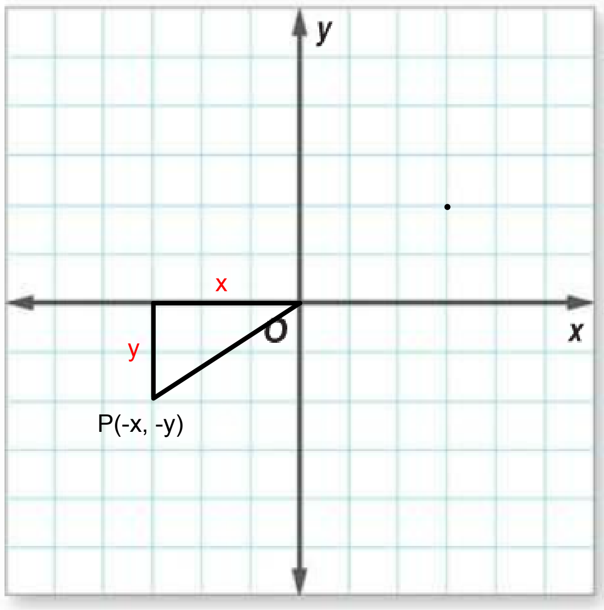

Nov 29-12:59 PM

90 degree rotations:



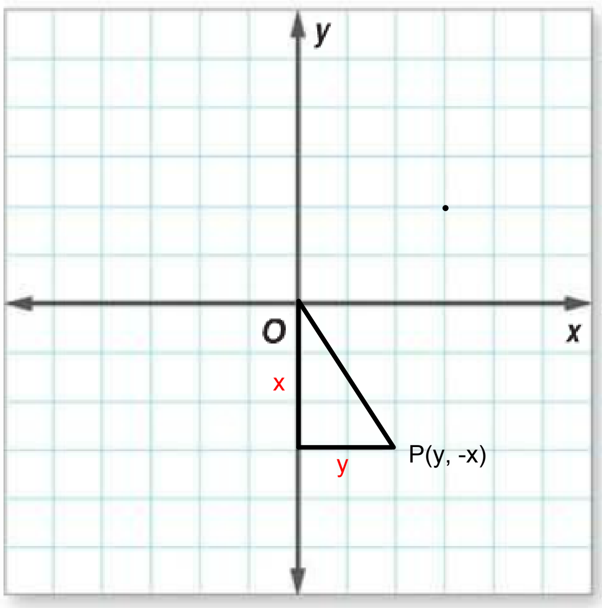

Nov 29-12:59 PM

## 180 degree rotations:



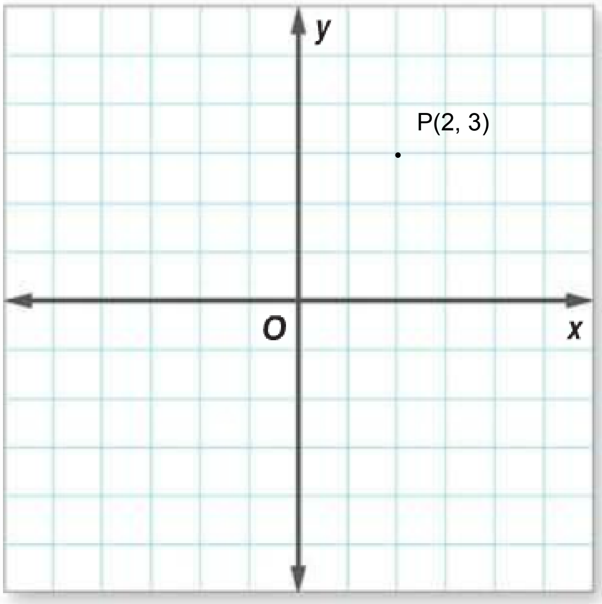

Nov 29-12:59 PM

## 270 degree rotations:



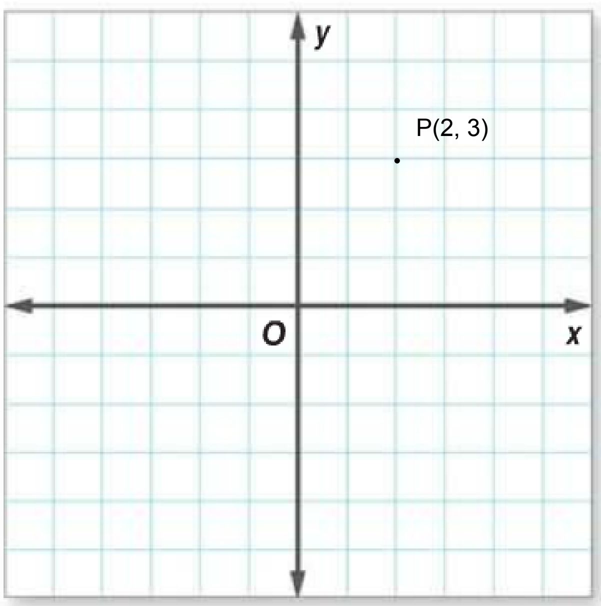

Nov 29-12:59 PM

## 90 degree rotations



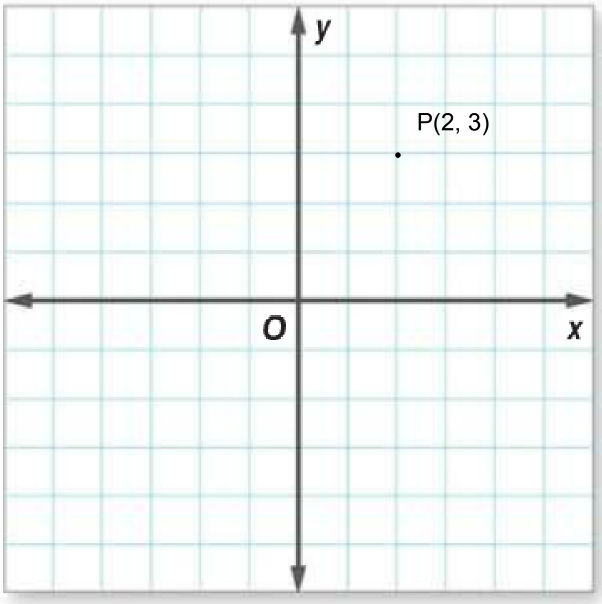

Nov 29-12:59 PM

## 180 degree rotations



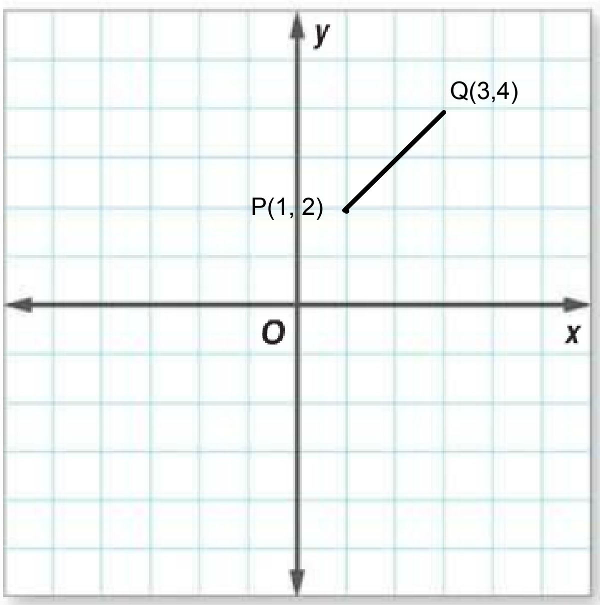

Nov 29-12:59 PM

270 degree rotations




Nov 29-12:59 PM

90 degree rotations




Nov 29-12:59 PM

# Homework:

Triangle MNP has vertices M(1,4), N(3,1), and P(5,3).
Find M'N'P'after each rotation about the origin. Show your work.

1. 90° clockwise

2. 180° clockwise

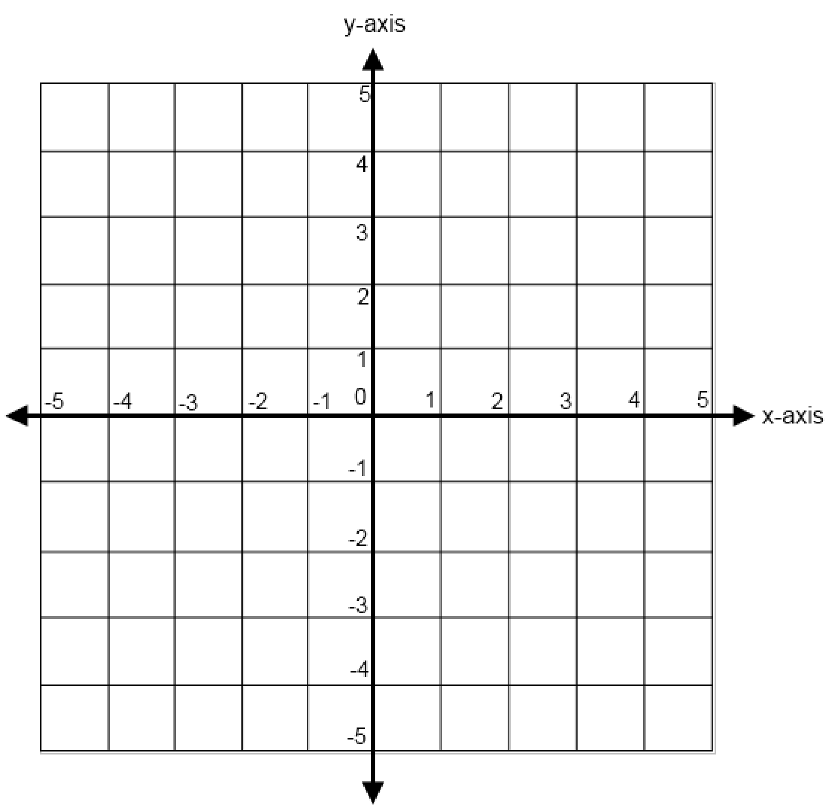
3. 90° counterclockwise

Triangle ABC has vertices A(-2,-1), B(-1,3), and C(3,-2).
Find A'B'C'after each rotation about the origin. Show your work.

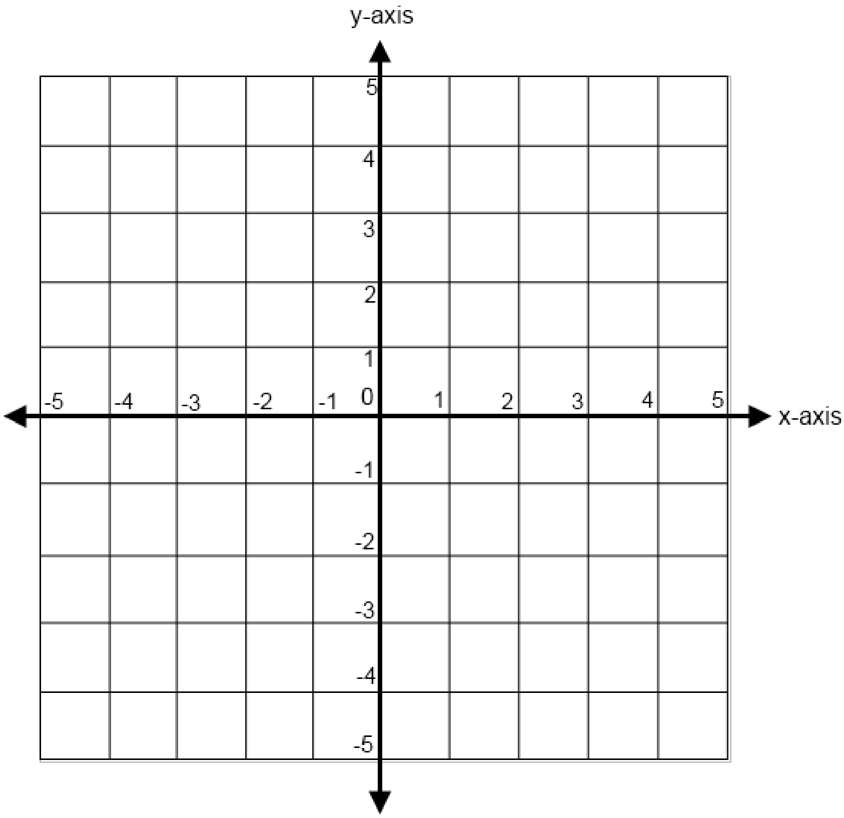
4. 90° counterclockwise

5. 90° clockwise

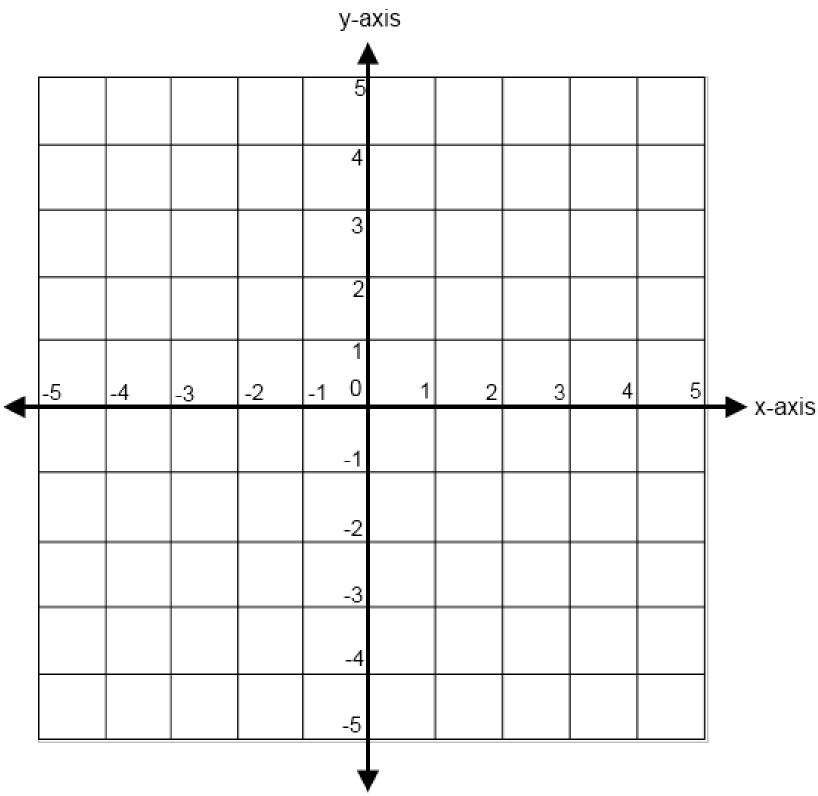
Feb 16-8:54 AM




Nov 29-12:44 PM




Dec 2-7:04 AM




Dec 2-7:05 AM