Unit 5: Transformations Name:_____ Per:__

Transformation Rules

TRANSLATION		
Explanation	**Coordinate Form**	**Vector Form**

REFLECTION					
Explanation	**OVER** $y = x$ **y = -x**	**OVER** y *axis*	**OVER** x *axis*	**LINE** $y =$ *A Number*	**LINE** $x =$ *A Number*
When can't I count?					

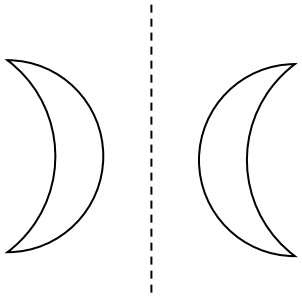
ROTATION			
Explanation	**90 Degrees Counterclockwise**	**180 Degrees Counterclockwise**	**270 Degrees Counterclockwise**
What do I do when I don't rotate around the origin?			

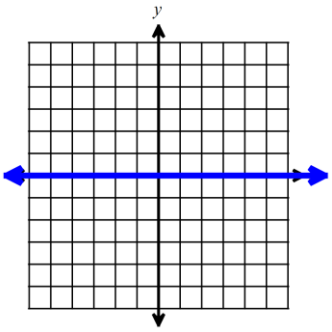
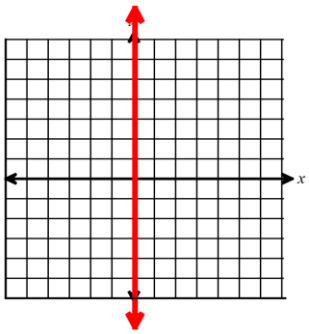
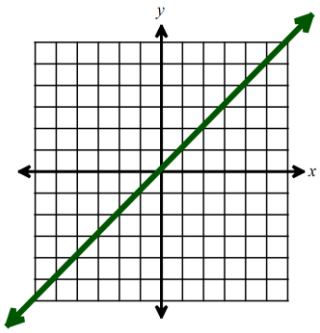
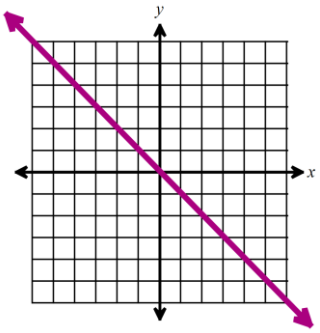
Day 1 – Reflections

Objectives: SWBAT find the reflections of images and points over lines and axis

Reflection

Line of reflection



Reflections in the Coordinate Plane Rules			
Reflected over x axis	**Reflected over y axis**	**Reflected over $y = x$**	**Reflected over $y = -x$**
			

Plot the point's reflection over the x axis, y axis, and $y = x$.

	x axis	y axis	$y = x$	$y = -x$

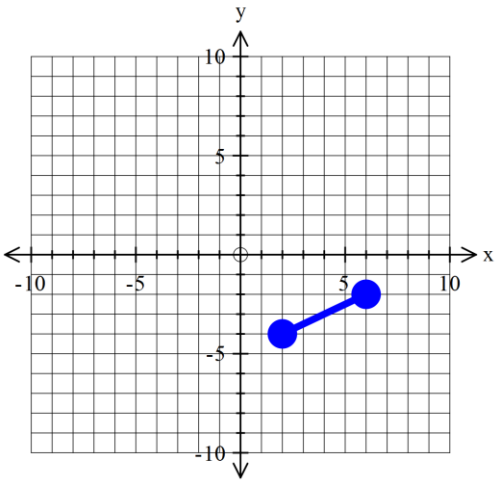
1. A (3, 2)

2. B (5, 0)

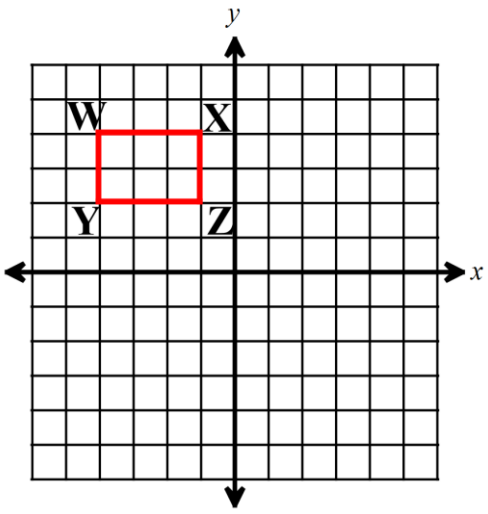
3. C (-3, -1)

Reflect the following over the given line of reflection

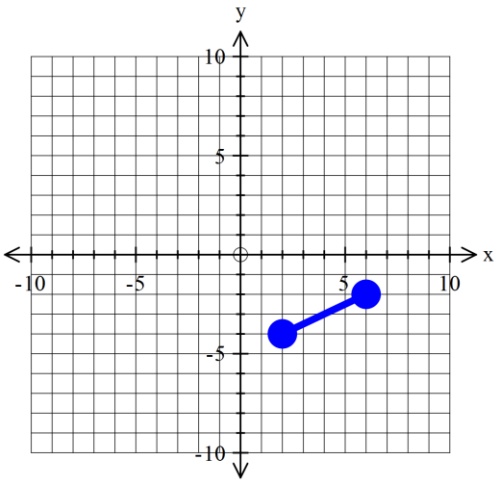
4. Reflect over the $x-axis$



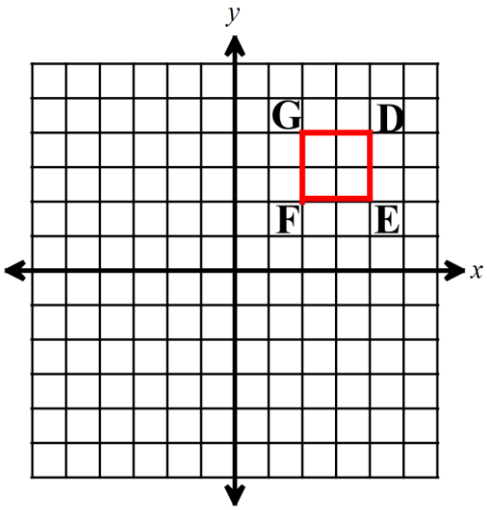
5. Reflect over the $y-axis$



6. Reflect over the $y = x$



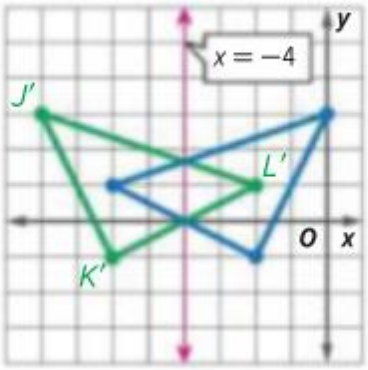
7. Reflect over the $y = -x$



- **Reflection over the line $y = \#$ or $x = \#$**

Triangle JKL has vertices $J(0, 3)$, $K(-2, -1)$, and $L(-6, 1)$. Graph $\triangle JKL$ and its image in the line $x = -4$.

Find a corresponding point for each vertex so that a vertex and its image are equidistant from the line $x = -4$.

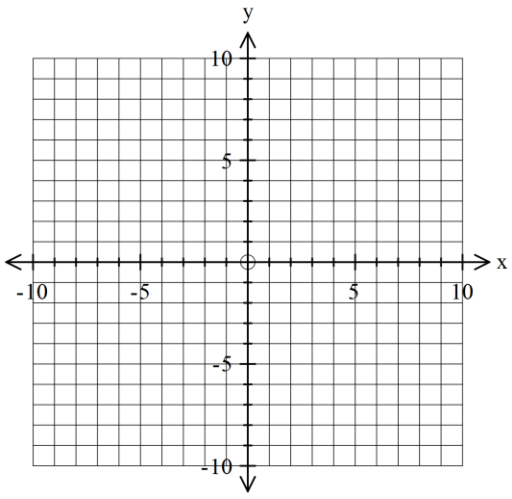


Plot each point, then plot its' reflection in the line $y = 2$. Name the point.

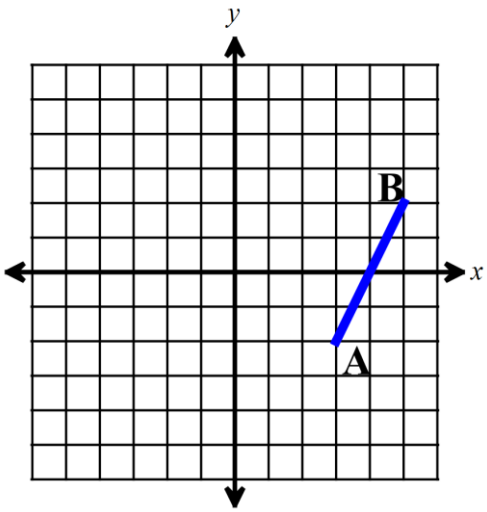
8. M (4, 4)

9. N (-5, 2)

10. P (-2, -4)



11. What are the coordinates of the $\overline{AB}$ after the translation of $(x, y) \rightarrow (x - 6, y + 1)$ and then reflected over the line $y = x$



12.

Given quadrilaterals $J(-3, 1)$, $K(-1, 3)$, $L(1, 3)$, and $M(-3, -1)$ and its image $J'(1, -3)$, $K'(3, -1)$, $L'(3, 1)$, and $M'(-1, -3)$, describe the transformation using coordinate notation.

13. Given J (-4, 1), find J' based on the following scenarios.

a) x = 5

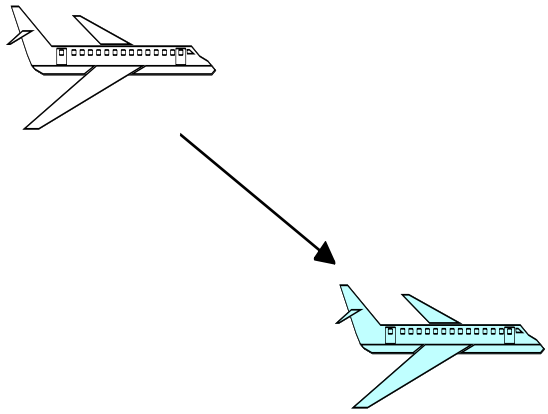
b) y = -2

c) y = x

Day 2 – Translations

Objectives: SWBAT translate point and images on a coordinate plane

Translation



Preimage [A]

Image [A']

Coordinate Notation

Consider the translation that is defined by the coordinate notation

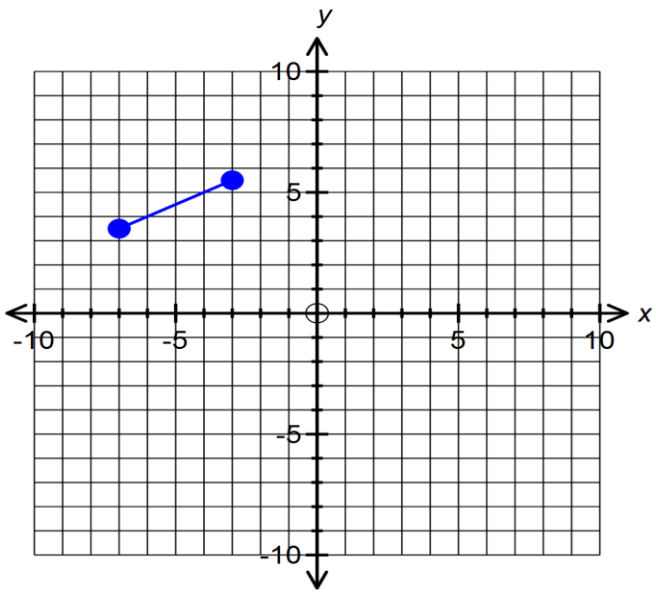
$$(x, y) \rightarrow (x + 2, y - 3)$$

1. What is the image of (3, -4)?

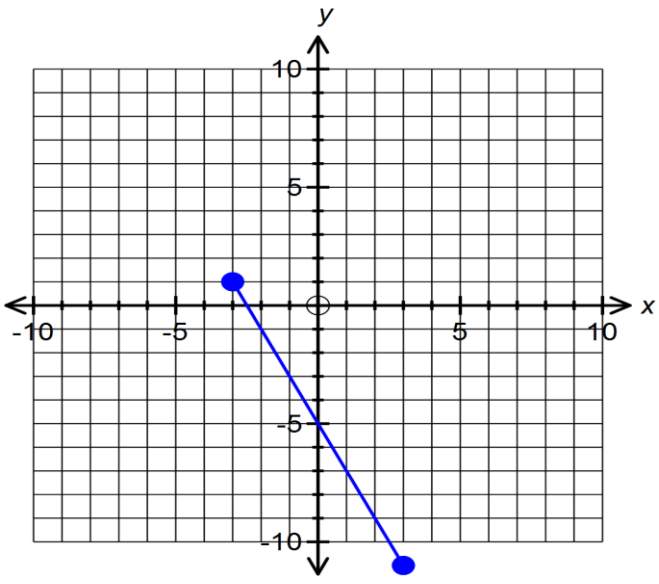
2. What is the pre-image of (5, 8)?

Draw the following segments after the translation.

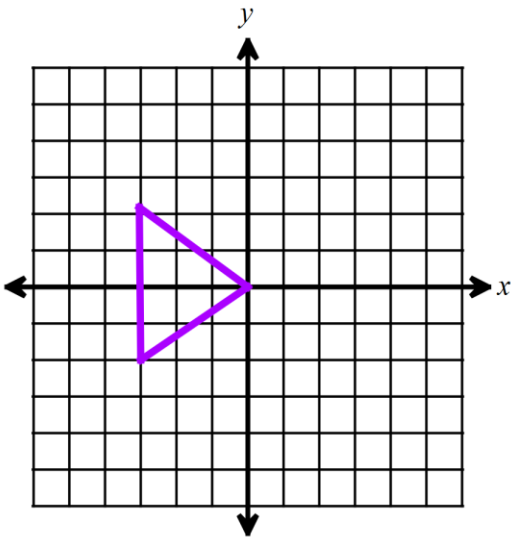
3. (x, y)→(x + 1, y – 5)



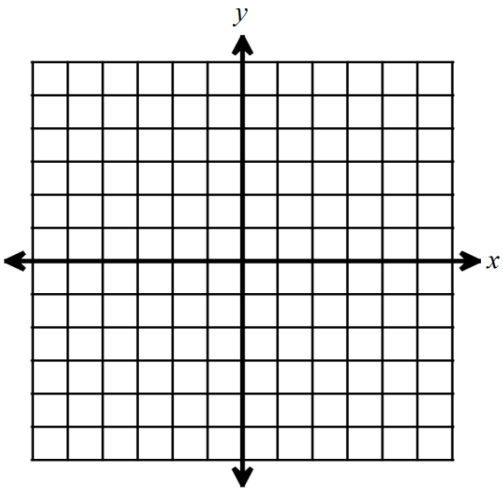
4. (x, y)→(x + 5, y + 3)



5. Graph the image after a translation of $\langle -1, -4 \rangle$

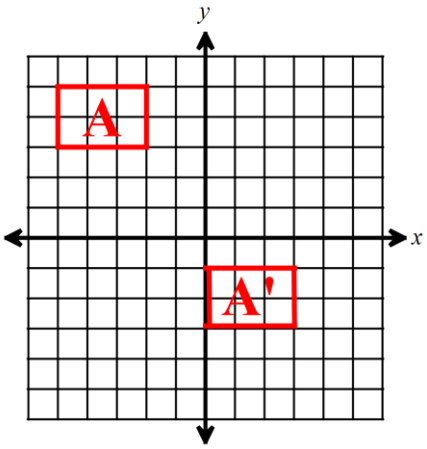


6. Find ΔLMN, where $L'(0,4)$, $M'(2,-1)$, $N'(-2,0)$ with a translation of $(3, 1)$, and then graph the image.

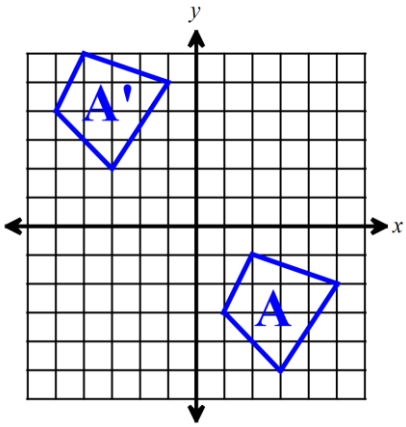


Describe the transformation that map *A* to *A'*.

7.



8.



9. Given the point $A(-3,0)$. A is translated five units up and 6 units to the right. A' is then translated $(x, y) \rightarrow (x, y - 4)$. What is the coordinate of A``?

10.

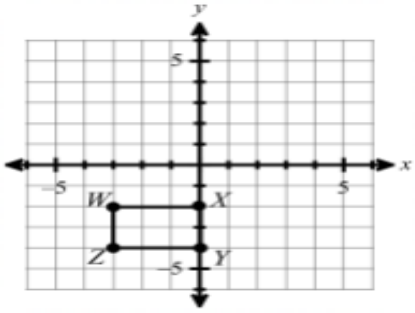
Under which of the following translations does the image of rectangle $WXYZ$ not overlap the preimage?

A. $(x, y) \rightarrow (x + 0, y - 1.5)$

B. $(x, y) \rightarrow (x + 3.5, y + 0)$

C. $(x, y) \rightarrow (x - 1, y + 0)$

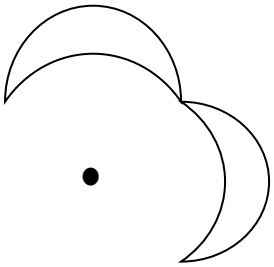
D. $(x, y) \rightarrow (x - 3, y + 2)$



Day 3 – Rotations

Objectives: SWBAT find and rotate images and points over center of rotation at the origin

Rotation



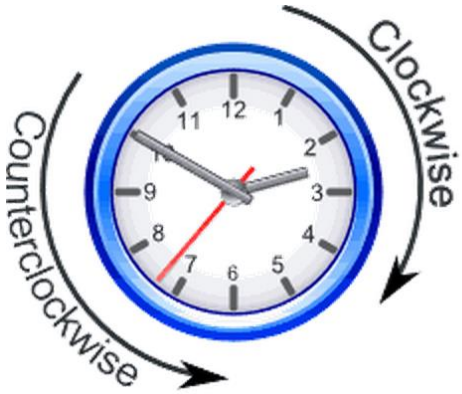
Center of Rotation

Angle of Rotation

Clockwise

Counter Clockwise

Convert the following clockwise measurements to counterclockwise measurements.



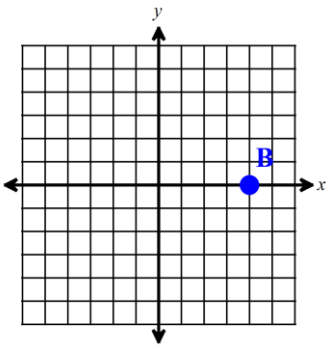
A) 90 degrees is _____ counterclockwise

B) 180 degrees is _____ counterclockwise

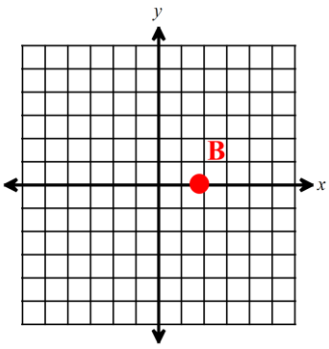
C) 270 degrees is _____ counterclockwise

Rotating when a point is on an axis...

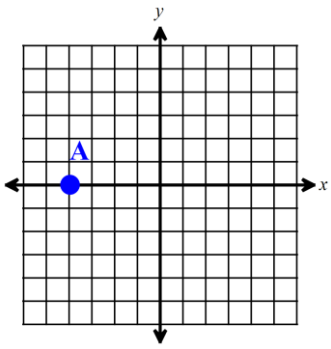
1. Rotate *B* 90° clockwise



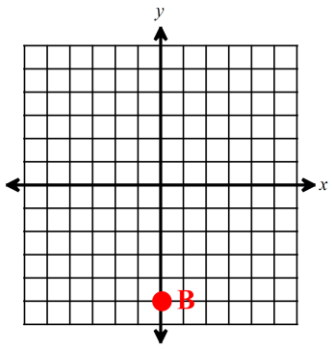
2. Rotate *B* 270° counterclockwise



3. Rotate *A* 270° clockwise



4. 180 degrees counterclockwise



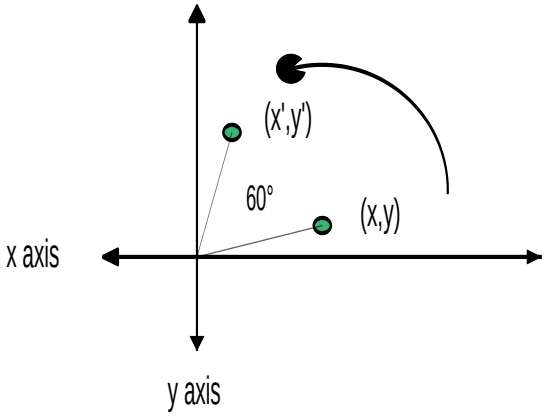
Rotating when a point around the origin

Special Rotation Rules

90°

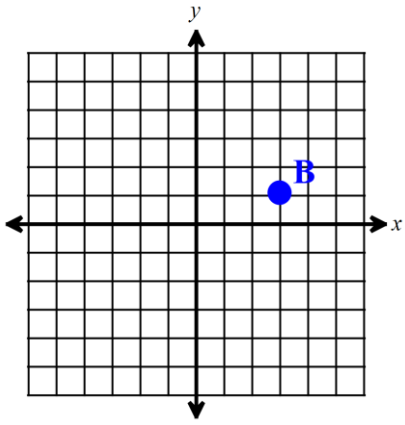
180°

270°

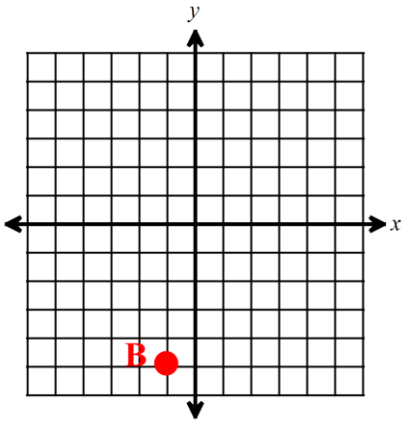


Rotate *B* around the origin the given amount.

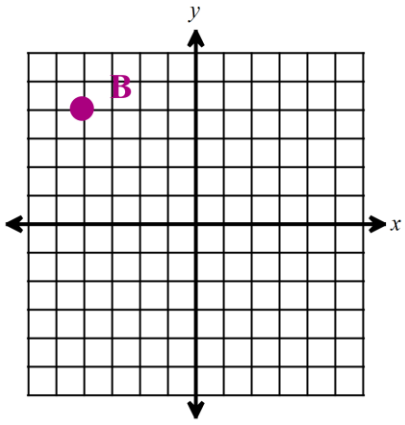
5. 90° counterclockwise



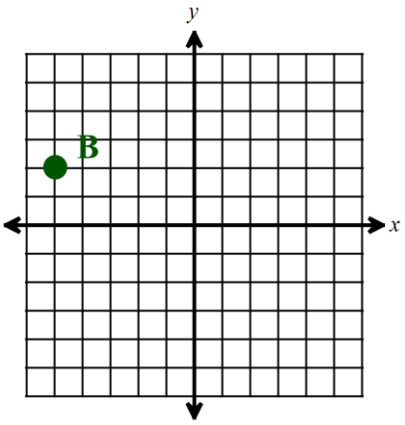
6. 270° counterclockwise



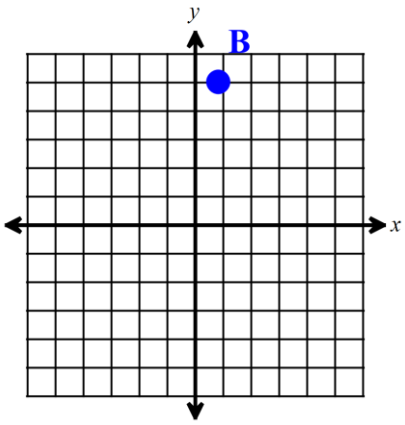
7. 90° clockwise



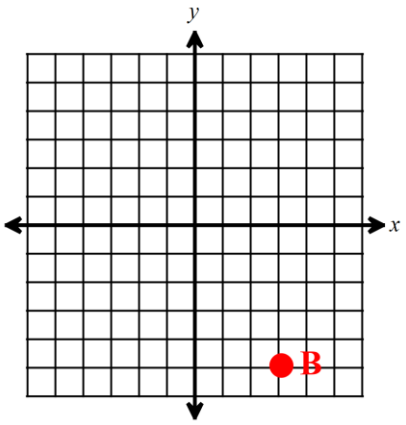
8. 270° clockwise



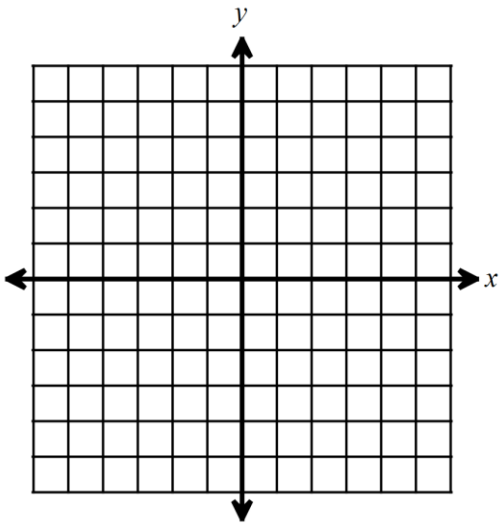
9. 180° clockwise



10. 180° counterclockwise



11. Graph ΔXYZ with vertices $X(2,0)$, Y(7,0), and $Z(2,6)$. Then rotate it 180 degrees around the origin.



12. Rotate ΔABC 90° counterclockwise around the origin. The vertices are $A(0,2), B(3,1)$ and $C(4,3)$.

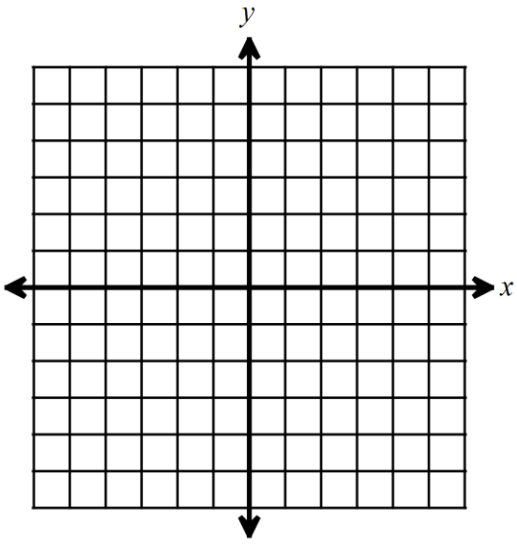
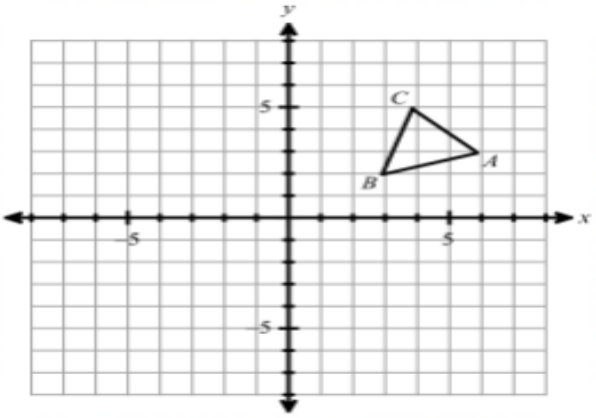


Figure ABC is rotated 90° clockwise about the point (2, 0). What are the coordinates of A' after the rotation?

A. $A'(-1,4)$
B. $A'(3,-6)$
C. $A'(5,-4)$
D. $A'(6,-3)$

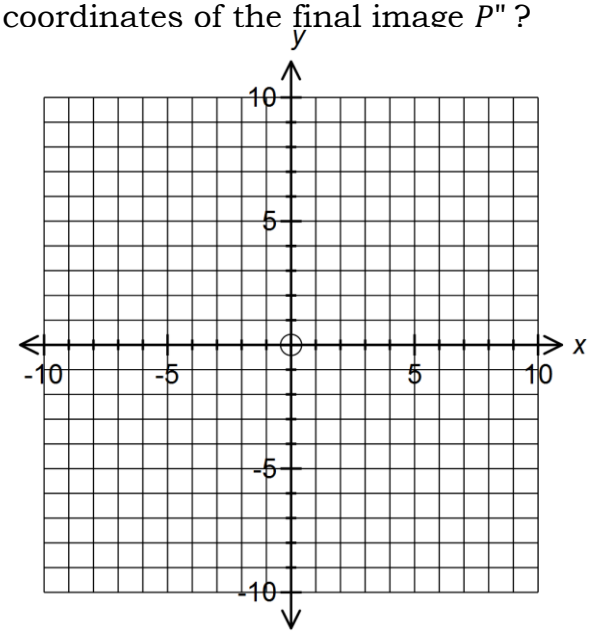


Day 4 – PUTTING IT ALL TOGETHER

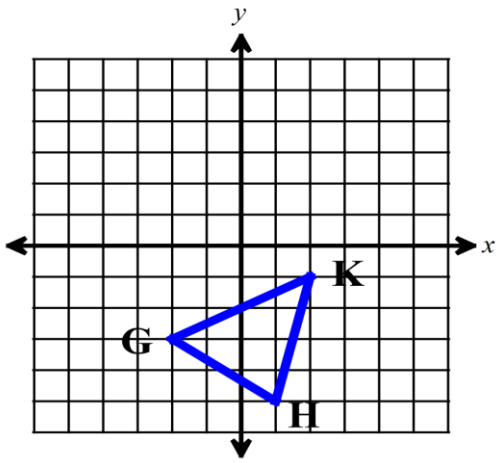
Algebraic Representations of TRANSFORMATIONS

TRANSLATIONS	RIGHT a units: LEFT a units: UP b units: DOWN b units:
REFLECTIONS	Across the x- axis: Across the y-axis:
ROTATIONS	90° clockwise: 90° counterclockwise: 180° :

1. The point $P(-2,-5)$ is rotated 90° counter clockwise about the origin, and then the image is reflected across the line $x = 3$. What are the coordinates of the final image P'' ?



2. What are the coordinates for the image of ΔGHK after a rotation 90° clockwise about the origin and a translation of $(x, y) \rightarrow (x + 3,\ y + 2)$?



For problems 3 -5, Write the rules and find the new coordinate points after the transformation.

3. Reflect across the x-axis Rule

Then, Translate Left 4, Up 7 Rule

Use these transformations for Y (-3 , 6)

4. Translate right 5, Rule

Then rotate 180 clockwise Rule

Use these transformations for B(2, -7)

5. Reflect across y = x Rule

Rotation 90 clockwise Rule

Use these transformations for M (5, 7)

6.

The point $P(-2,-5)$ is rotated 90° counterclockwise about the origin, and then the image is reflected across the line $x = 3$. What are the coordinates of the final image P''?

A. $(1,-2)$

B. $(11,-2)$

C. $(-2,1)$

D. $(2,11)$