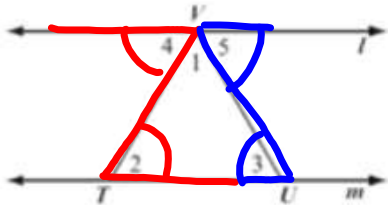


In the given figure, $l \parallel m$. Jesse has listed two steps as shown to begin to prove that

$$m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$$



How can Jesse justify the steps she listed?

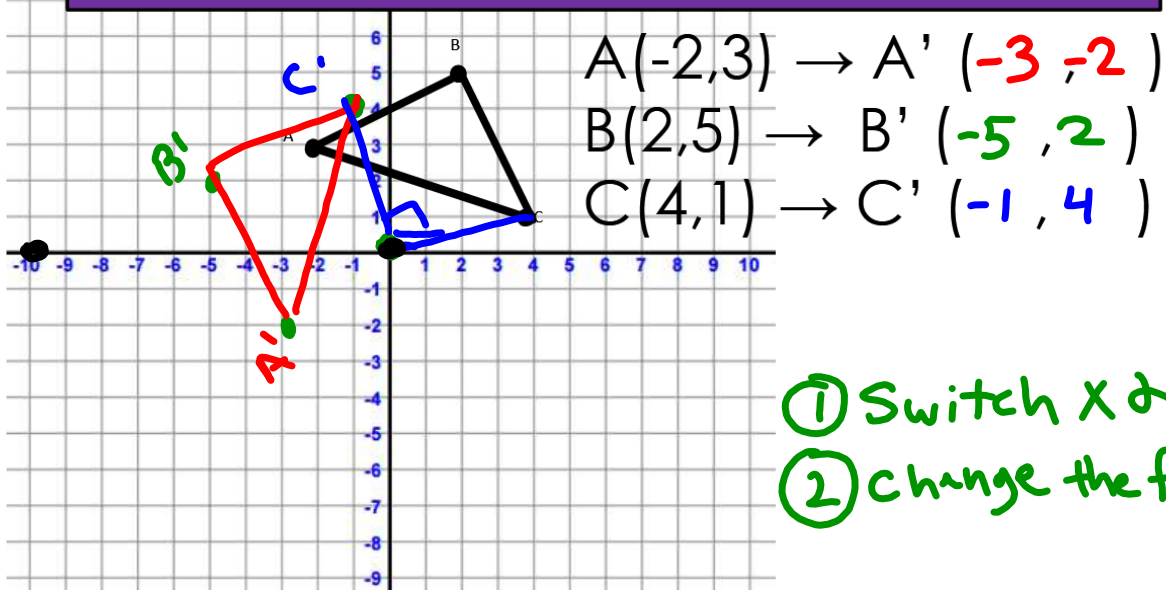
	Step	Justification
1	$\angle 2 \cong \angle 4$?
2	$\angle 3 \cong \angle 5$?

- A. Alternate Interior angles are congruent
- B. Corresponding angles are congruent
- C. Vertical angles are congruent
- D. Alternate Exterior angles are congruent

Rotations

Using patty paper, complete the rotations on page 30 in the packet.

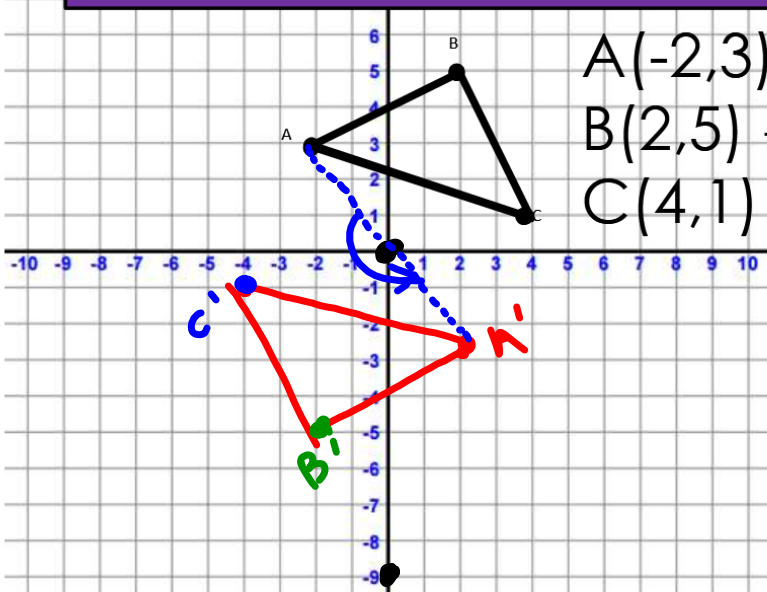
Rotate 90° Counterclockwise about the Origin



- ① Switch x & y
- ② change the first

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

Rotate 180° about the Origin



$$A(-2,3) \rightarrow A' (2, -3)$$

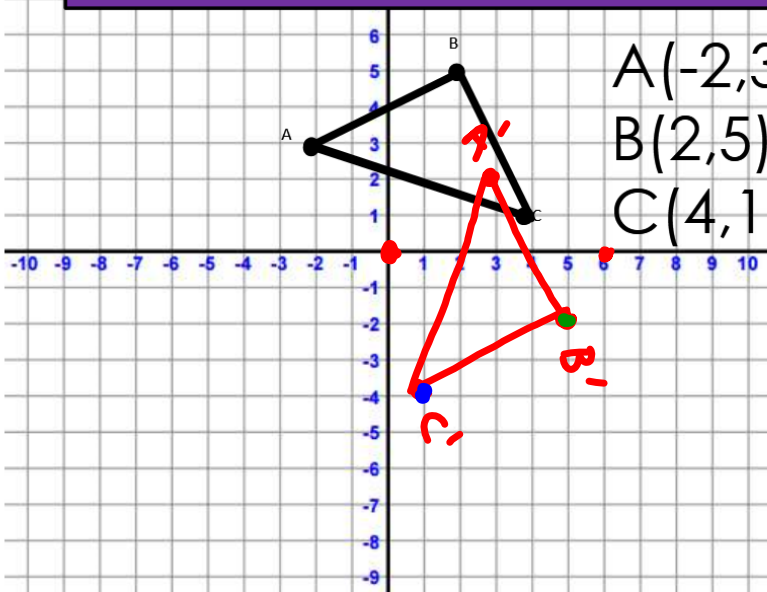
$$B(2,5) \rightarrow B' (-2, -5)$$

$$C(4,1) \rightarrow C' (-4, -1)$$

① Change x & y

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

Rotate 270° Counterclockwise about the Origin



$$A(-2, 3) \rightarrow A' (3, -2)$$

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

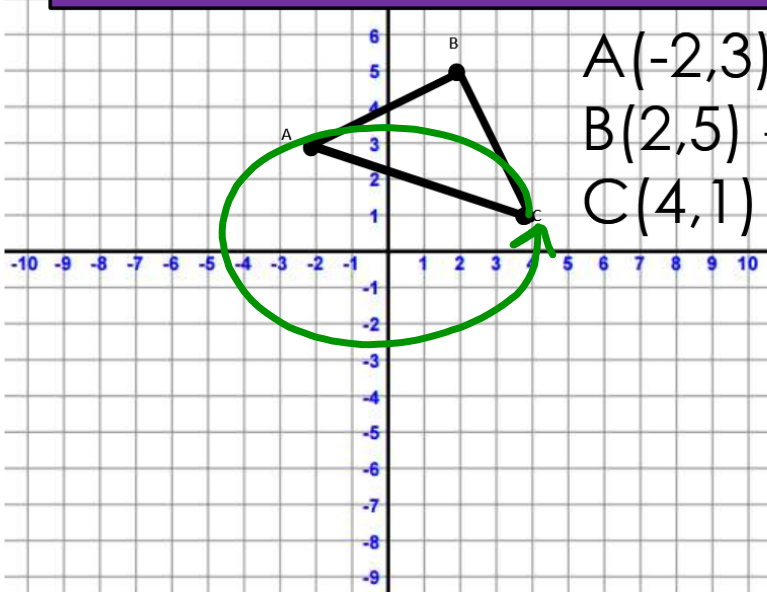
$$C(4, 1) \rightarrow C' (1, -4)$$

① Switch x & y

② Change the last

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

Rotate 360° Counterclockwise about the Origin



$$A(-2, 3) \rightarrow A'(-2, 3)$$

$$B(2, 5) \rightarrow B'(2, 5)$$

$$C(4, 1) \rightarrow C'(4, 1)$$

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

nothing happens!
'maps onto itself.'

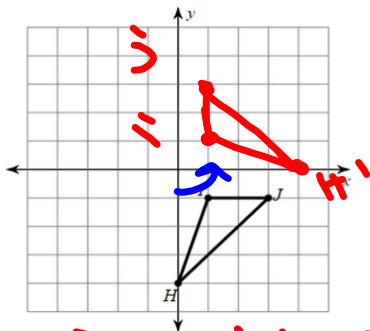
Rules

Counterclockwise (CCW)	(x,y)	Clockwise (CW)
90°	$(-y,x)$	270°
180°	$(-x,-y)$	180°
270°	$(y,-x)$	90°
360°	(x,y)	$0^\circ, 360^\circ$

Practice

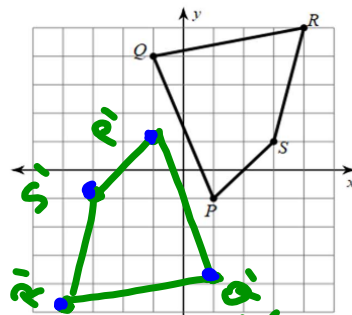
Graph the image of the figure using the transformation given.

1) rotation 90° counterclockwise about the origin



$$\begin{aligned} H(0, -4) &\rightarrow H'(4, 0) \\ I(1, -1) &\rightarrow I'(1, 1) \\ J(3, -1) &\rightarrow J'(1, 3) \end{aligned}$$

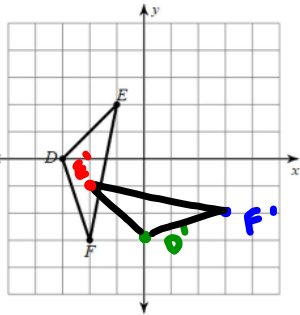
2) rotation 180° about the origin



$$\begin{aligned} P(1, -1) &\rightarrow P'(-1, 1) \\ Q(-1, 4) &\rightarrow Q'(1, -4) \\ R(4, 5) &\rightarrow R'(-4, -5) \\ S(3, 1) &\rightarrow S'(-3, -1) \end{aligned}$$

3) rotation 90° counterclockwise about the origin

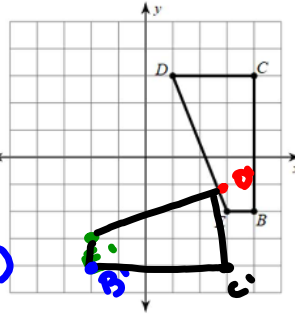
$E(-1, 2)$
 $E'(-2, -1)$
 $D(-3, 0)$
 $D'(0, -3)$
 $F(-2, -3)$
 $F'(4, -2)$



$D(3, 3)$
 $D'(3, -1)$
 $E(3, -2)$
 $E'(-2, -3)$
 $B(4, -2)$
 $B'(-2, -4)$
 $C(4, 3)$
 $C'(3, -4)$

4) rotation 90° clockwise about the origin

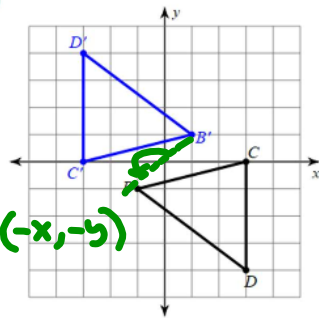
270° CCW



Write a rule to describe each rotation about the origin.

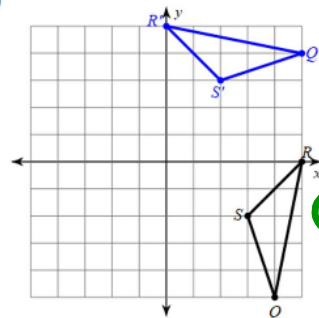
5)

$B(-1, 1)$
 $B'(1, 1)$
 $(x, y) \rightarrow (-x, -y)$
 R_{180}



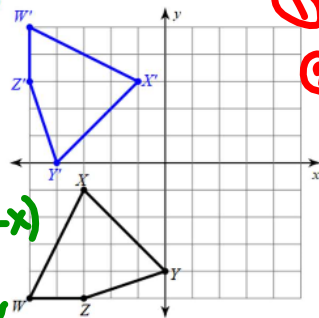
6)

$R(5, 0)$
 $R'(0, 5)$
 $(x, y) \rightarrow (y, x)$
 $R_{90\text{CCW}}$

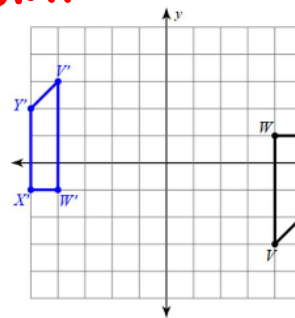


7)

$X(-3, -1)$
 $X'(-1, 3)$
 $(x, y) \rightarrow (y, -x)$
 $R_{270\text{CCW}}$



① Pick a point
 ② Match the rule



$W(4, 1)$
 $W'(-4, -1)$
 $(x, y) \rightarrow (-x, -y)$
 R_{180}

9. Rotate A(12, 23) 90° CW about the origin.

$A'(23, -12)$

10. Rotate A(32, -49) 180° about the origin.

11. Rotate A(-7, 92) 180° about the origin.

12. Rotate D(-10, -14) 90° CCW clockwise about the origin.

$D'(14, -10)$

13. Rotate A(8, -3) 270° counterclockwise about the origin.

14. Rotate C(-4, 7) 90° CCW about the origin.

Practice

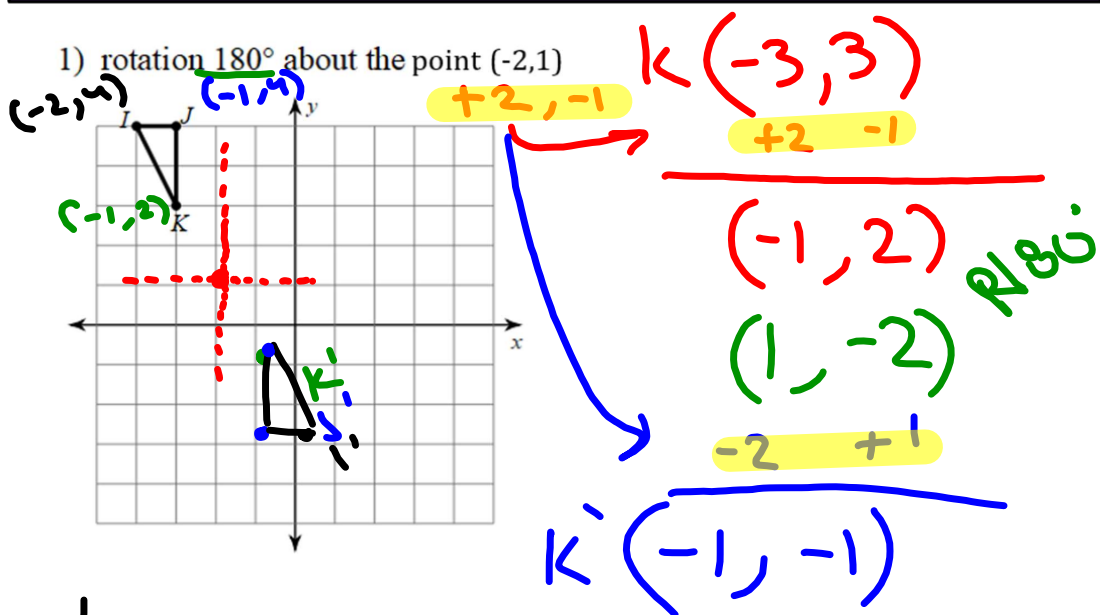
9. Rotate $A(12, 23)$ 90° CW about the origin.

$$A' (23, -12)$$

10. Rotate $A(32, -49)$ 180° about the origin.

$$A' (-32, 49)$$

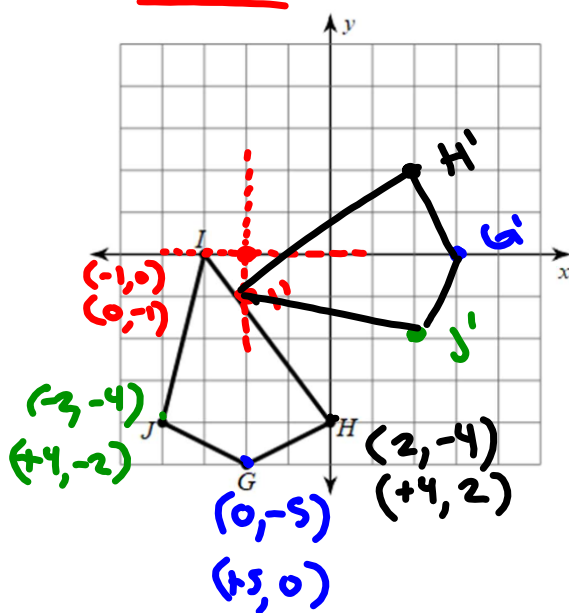
Rotations about a point



$$\begin{array}{l}
 K'(-1, -1) \\
 J'(-1, -3) \\
 I'(0, -3)
 \end{array}$$

Rotations about a point

2) rotation 90° counterclockwise about the point $(-2,0)$ $(x,y) \rightarrow (-y,x)$



$$I'(-2,1)$$

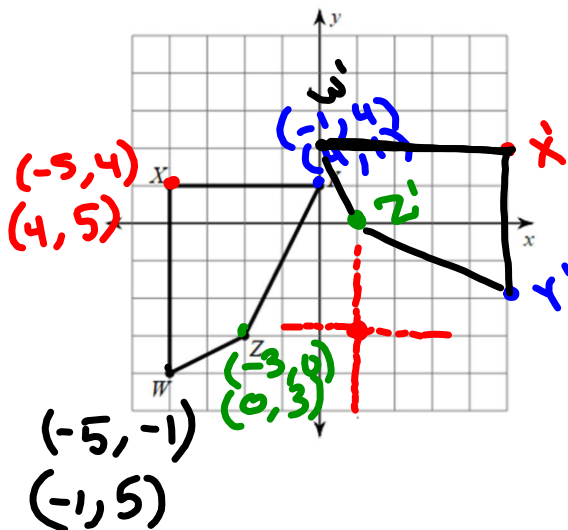
$$J'(2,-2)$$

$$G'(3,0)$$

$$H'(2,2)$$

Rotations about a point

3) rotation 90° clockwise about the point $(1, -3)$ $(x, y) \rightarrow (y, -x)$



$$\begin{aligned} W' & (0, 2) \\ X' & (5, 2) \\ Y' & (5, -2) \\ Z' & (1, 0) \end{aligned}$$

GSE Geometry

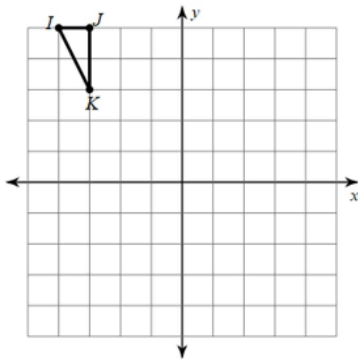
Name _____

Rotations about a point

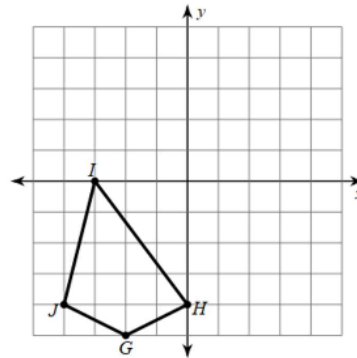
Date _____ Block ____

Graph the image of the figure using the transformation given.

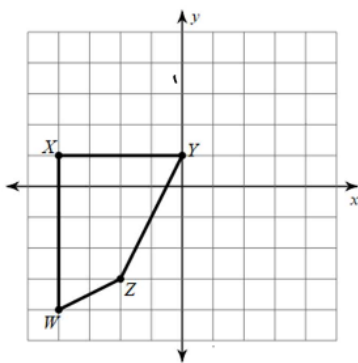
1) rotation 180° about the point $(-2,1)$



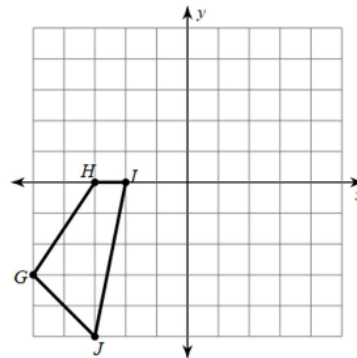
2) rotation 90° counterclockwise about the point $(-2,0)$



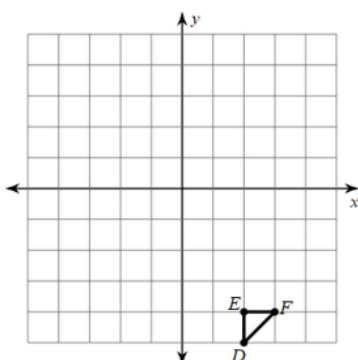
3) rotation 90° clockwise about the point $(1, -3)$



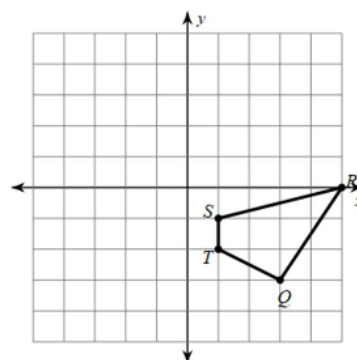
4) rotation 90° counterclockwise about the point $(-3, -2)$



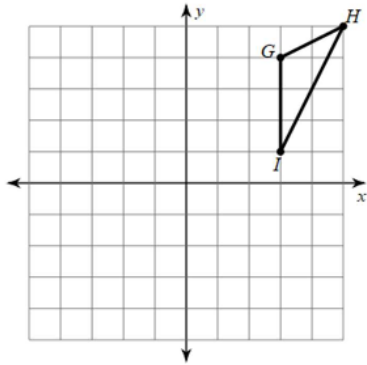
5) rotation 90° counterclockwise about the point $(1,-3)$



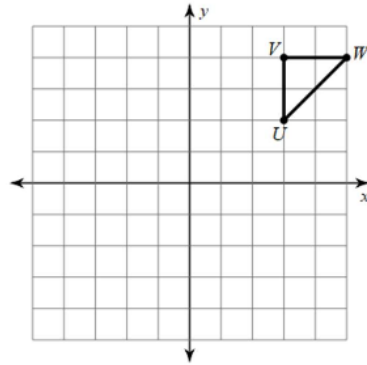
6) rotation 90° clockwise about the point $(3, 1)$



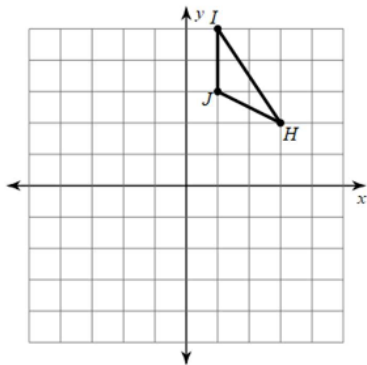
7) rotation 180° about the point $(3, 2)$



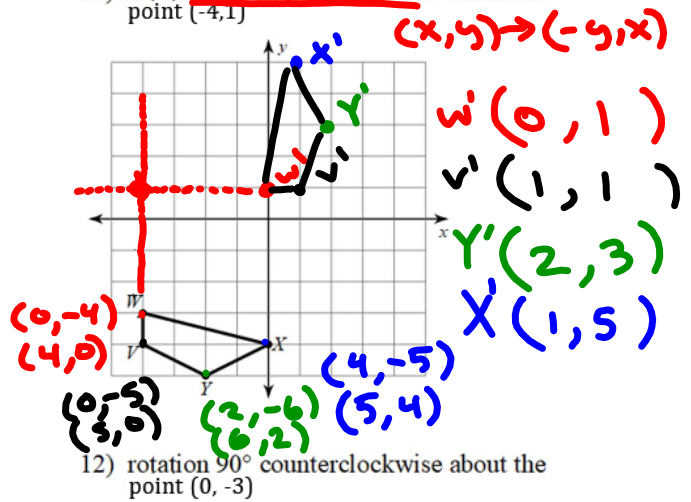
8) rotation 180° about the point $(2, -1)$



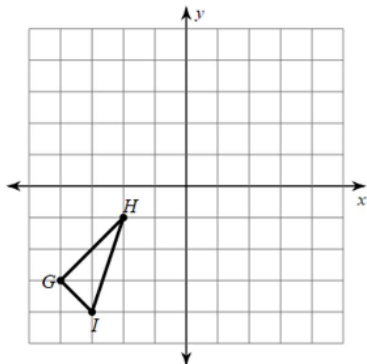
9) rotation 90° clockwise about the point $(-1, 2)$



10) rotation 90° counterclockwise about the point $(-4, 1)$



11) rotation 180° about the point $(-3, -2)$



12) rotation 90° counterclockwise about the point $(0, -3)$

