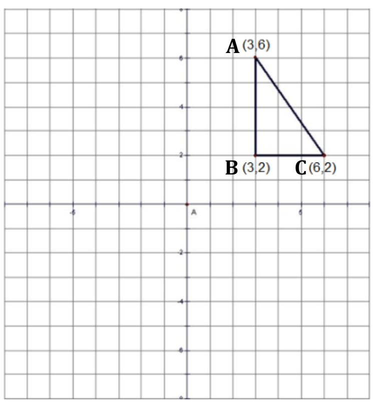
Lesson 4: Rotations

- An image can be rotated about a ____________________________ point.
    - The blades of a fan rotate about a fixed point.

Vocabulary:

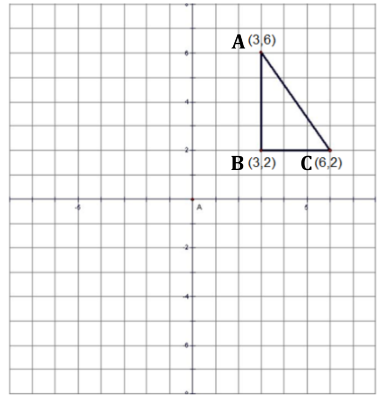
- ______________________________- a point around which a figure is rotated
- ______________________________- which way a figure is rotated.

1. This is a triangle at a **0° or 360°** rotation. We use this as our starting point.



Be sure to watch the change in the signs of the ordered pairs as we move through the other quadrants

2. Notice that with a **90°** rotation (quarter rotation) the image triangle moved to quadrant 2 or quadrant 4. A figure can rotate clockwise or counterclockwise.



Original Coordinates:

A (3, 6)	B (3, 2)	C (6, 2)

90° Clockwise Rotation:

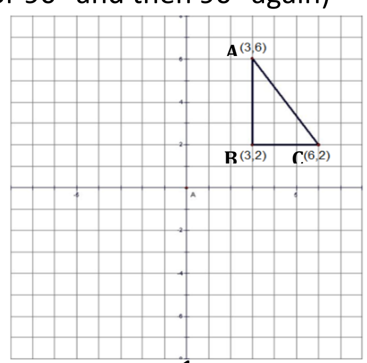
A^I (,)	B^I (,)	C^I (,)

90° Counterclockwise Rotation:

A^I (,)	B^I (,)	C^I (,)

The signs of the y-coordinates did not change but the x-coordinates did. Also, the x & y coordinates switched spots. (Every 90° flip the coordinate and check the sign that should be in the quadrant you are in)

3. Notice that with a **180°** rotation (half rotation) the figure moved the quadrant 3. (or 90° and then 90° again)



Original Coordinates:

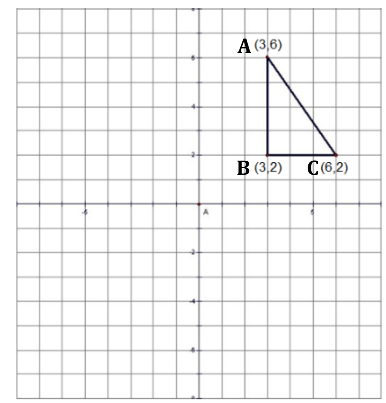
A (3, 6)	B (3, 2)	C (6, 2)

180° Rotation:

A^I (,)	B^I (,)	C^I (,)

The only difference between the original triangle and the image triangle is the sign change on all of the coordinates. The numbers, however, didn't flip-flop but rather stay in their original position.

4. The original triangle has now rotated **270°** (¾ rotation) from its original position. (or 90° counter clockwise)



Original Coordinates:

A (3, 6)	B (3, 2)	C (6, 2)

90° Clockwise Rotation:

A^I (,)	B^I (,)	C^I (,)

90° Counterclockwise Rotation:

A^I (,)	B^I (,)	C^I (,)

The signs on the y coordinates ONLY have changed and the x and y coordinates have flip-flopped.

a. When a figure is rotated 90° counterclockwise about the origin, multiply the y-coordinate by -1 and switch the x- and y- coordinates.

(x, y)→ ________________________

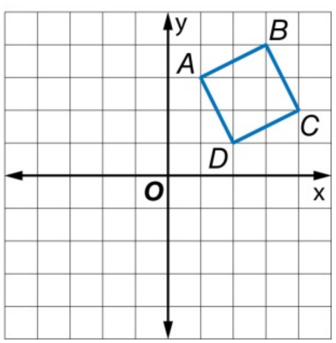
b. When a figure is rotated 180° about the origin, multiply both coordinates by -1.

(x, y)→ ________________________

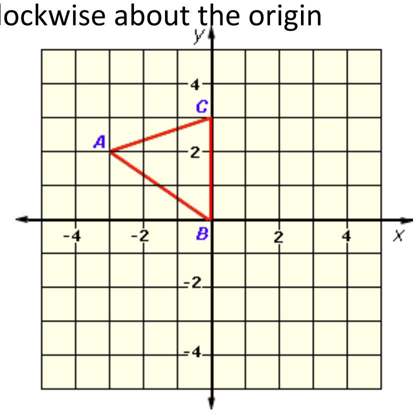
c. When a figure is rotated 270° counterclockwise (90° clockwise) about the origin, multiply the x-coordinate by -1, then switch the x- & y- coordinates.

(x, y)→ ________________________

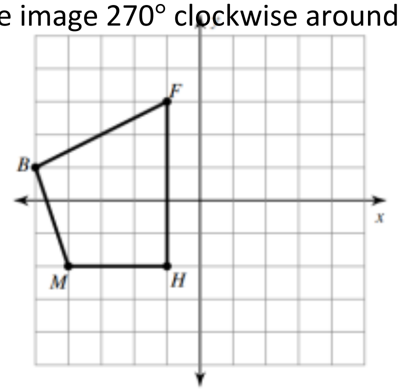
5. Draw the image of *ABCD* under a 180° clockwise rotation about the origin.



6. Rotate the following image 90° clockwise about the origin



7. Rotate the image 270° clockwise around the origin



Find the coordinates of the vertices of each figure given the rotation:

8. Rotation 90° clockwise about the origin

$Z(-1,-5), K(-1,0), C(1,1), N(3,-2)$

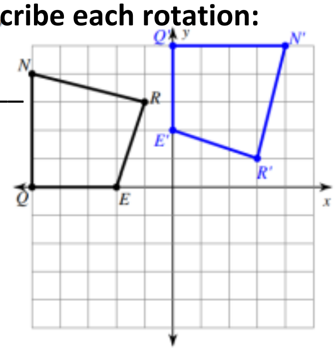
____

9. Rotation 180° about the origin

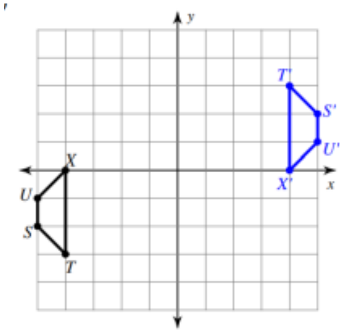
$S(1,-4), W(1,0), J(3,-4)$

Write a rule to describe each rotation:

10. ______________



11. ______________



12. Hexagon *DGJTSR* is shown below. Identify the new coordinates of point T after each of the following rotations:

a. 0° or 360° = ______________

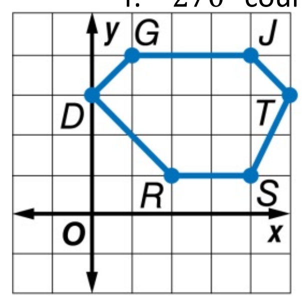
b. 90° clockwise = ____________

c. 90° counterclockwise = _______

d. 180° = ___________________

e. 270° clockwise = ___________

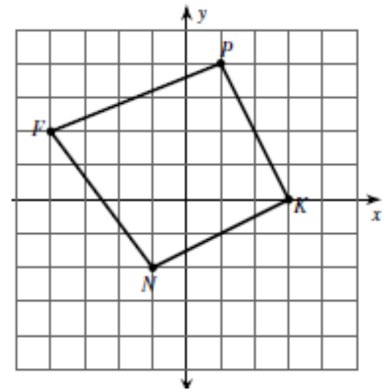
f. 270° counterclockwise = ______



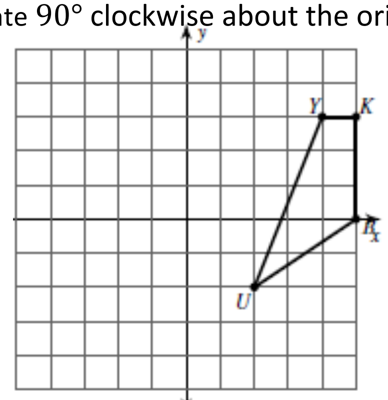
LESSON 4-PRACTICE

Graph the following figure with the information provided.

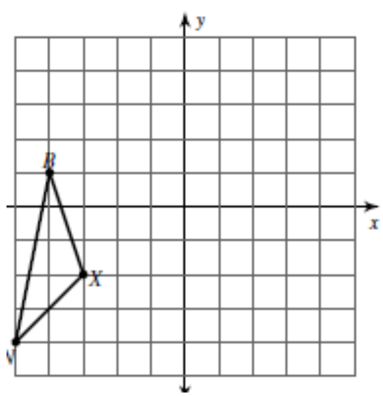
1. Rotate 180° clockwise



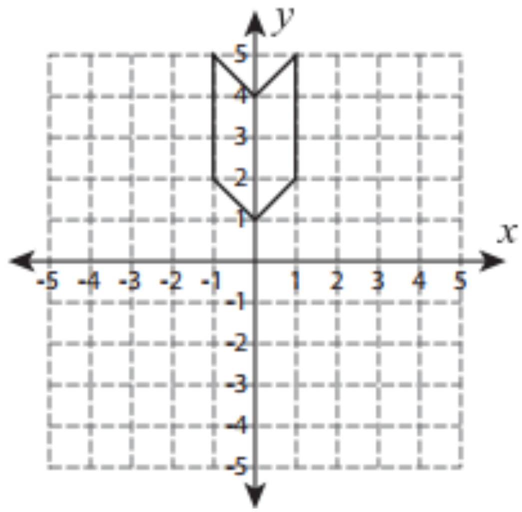
2. Rotate 90° clockwise about the origin



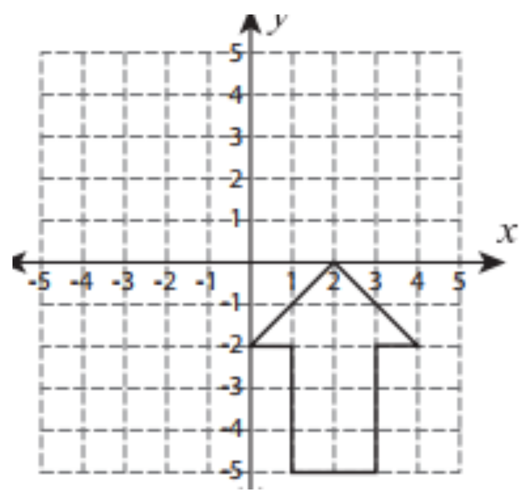
3. Rotate 270° clockwise about the origin



4. Rotate 180° counterclockwise

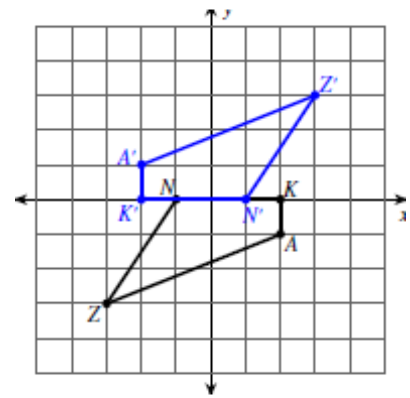


5. Rotate 90° counterclockwise

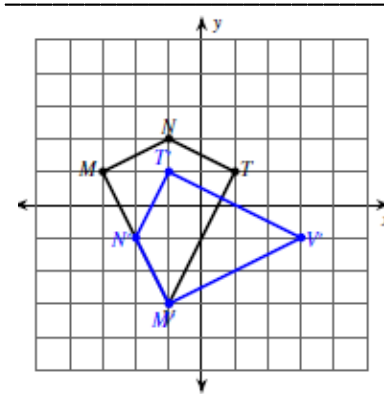


Write the rule for the following transformation

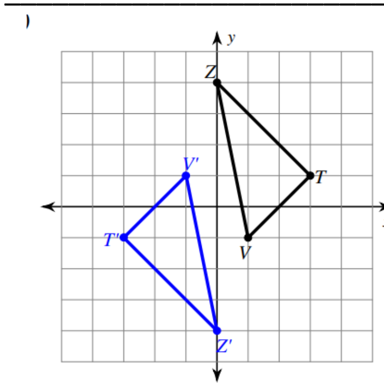
6. ______________________________



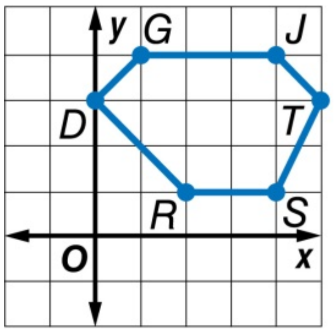
7. ______________________________



8. ______________________________



9. Hexagon *DGJTSR* is shown below. Identify the new coordinates of point R after each of the following rotations:



a. 0° or 360° = ________________

b. 90° clockwise = _____________

c. 90° counterclockwise = _______

d. 180° = ____________________

e. 270° clockwise = ____________

f. 270° counterclockwise = ______

10. Rotation 180° about the origin

$Z(1, -3), K(8, 1), C(0, -6), N(10, -4)$

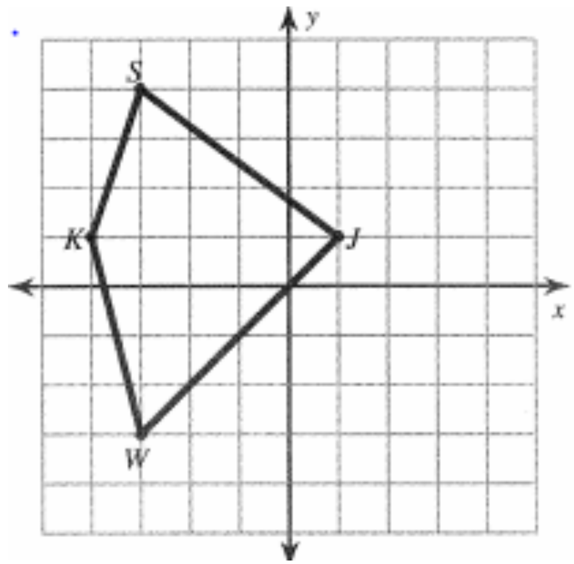
____

11. Rotation 270° counterclockwise

$S(3, -7), W(-6, -1), J(4, 8)$

____

12. Quadrilateral *KSJW* is shown below. Identify the new coordinates of point S after each of the following rotations:



a. 0° or 360° = ________________

b. 90° clockwise = _____________

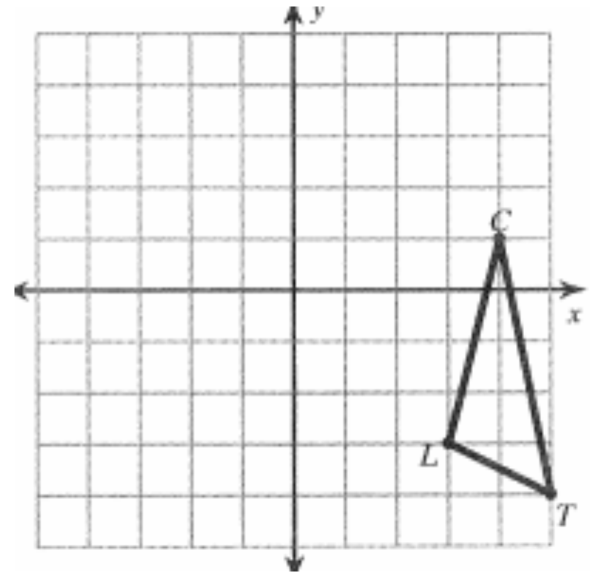
c. 90° counterclockwise = _______

d. 180° = ____________________

e. 270° clockwise = ____________

f. 270° counterclockwise = ______

13. Triangle CLT is shown below. Identify the new coordinates of point T after each of the following rotations:



a. 0° or 360° = ________________

b. 90° clockwise = _____________

c. 90° counterclockwise = _______

d. 180° = ____________________

e. 270° clockwise = ____________

f. 270° counterclockwise = ______