

Transformations

90° Rotation Around The Origin

90° clockwise or counter-clockwise rotation around the origin.

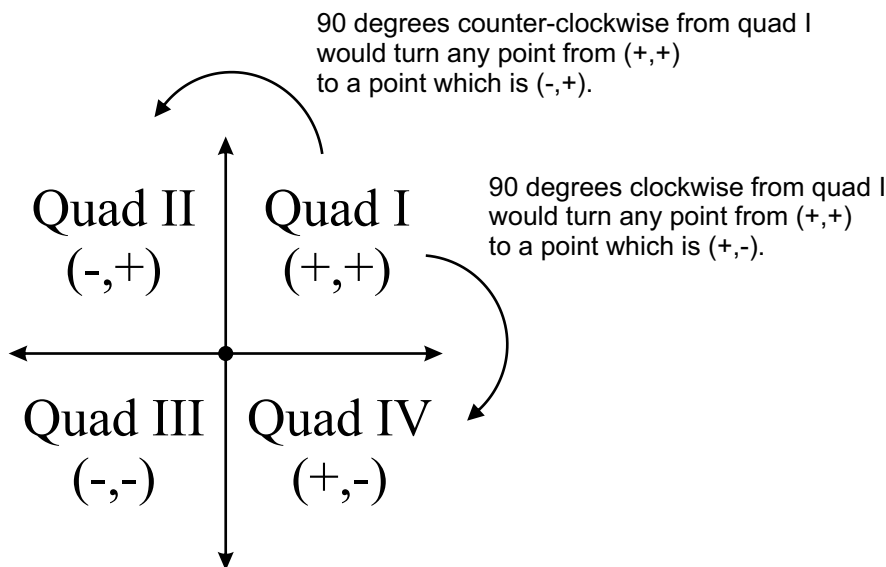
- A. Switch the original x and y-values.
 B. Determine whether each x and y-value is negative or positive. This depends on what quadrant you rotate your point to.

Example: Rotating (3,4) 90° clockwise around the origin will place the point at (4,-3).

(3,4) should be switched to (4,3). After switching x and y take care of the signs.

Because (3,4) is in quadrant I and will end up in quadrant IV with a 90° clockwise rotation, the x-value must be positive and the y-value negative. It is always a good idea to have a 4-quadrant coordinate plane handy for reference. See 4-quadrant grid below.

(3,4) -----> (4,-3) with a 90 degree-clockwise rotation around the origin.



Whether rotating clockwise or counter-clockwise, remember to always switch the x and y-values.

Remember that any 90 degree rotation around the origin will always end up in an adjacent quadrant either before or after the quadrant you started in.

It will NEVER end up "kitty-corner" to where you started. That would be a 180 degree rotation around the origin.

Directions: Write what the new coordinates of each point will be if rotated 90° clockwise around the origin.

1) A (5,-8) → A' _____

6) K (3,-5) → K' _____

2) Z (8,9) → Z' _____

7) X (4,2) → X' _____

3) P (-9,-3) → P' _____

8) R (4,-2) → R' _____

4) M (8,-2) → M' _____

9) U (-3,-2) → U' _____

5) J (-1,0) → J' _____

10) S (2,9) → S' _____

Directions: Below are the same points found on the previous page. Rotate these points 90° **counterclockwise** around the origin.

11) A (5,-8) \longrightarrow A' _____

12) Z (8,9) \longrightarrow Z' _____

13) P (-9,-3) \longrightarrow P' _____

14) M (8,-2) \longrightarrow M' _____

15) J (-1,0) \longrightarrow J' _____

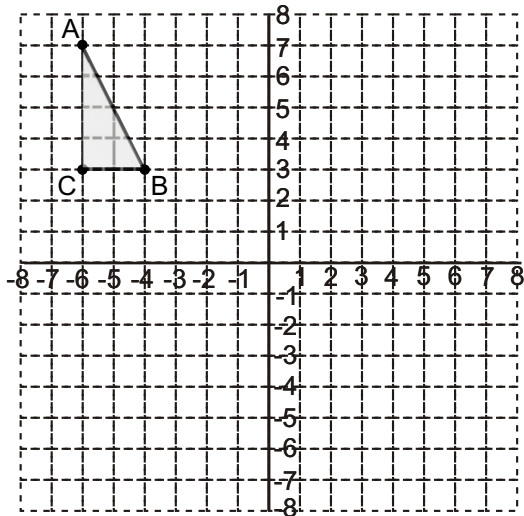
16) K (3,-5) \longrightarrow K' _____

17) X (4,2) \longrightarrow X' _____

18) R (4,-2) \longrightarrow R' _____

19) U (-3,-2) \longrightarrow U' _____

20) S (2,9) \longrightarrow S' _____

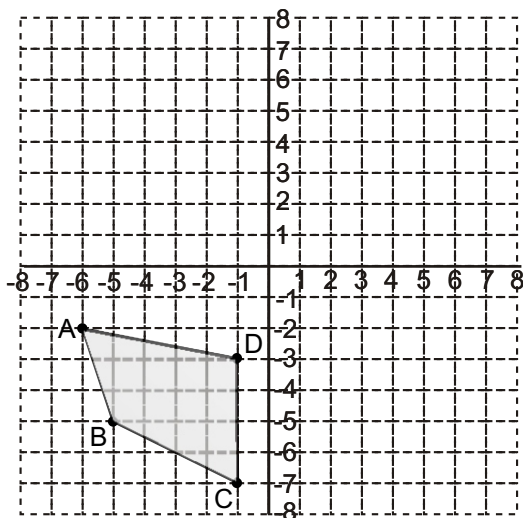


21) Rotate triangle ABC 90° counter-clockwise. Plot the new points and draw the new triangle. Record the rotated points below.

A' _____ B' _____ C' _____

22) Rotate triangle ABC 90° clockwise. Plot the points and draw the triangle. Record the new coordinates below.

A' _____ B' _____ C' _____



23) Rotate quadrilateral ABCD 90° clockwise around the origin. Plot the new points and draw the quadrilateral. Record the coordinates below.

A' _____ B' _____ C' _____ D' _____

24) Rotate quadrilateral ABCD 90° counter-clockwise around the origin. Plot the new points and draw the quadrilateral. Record the coordinates below.

A' _____ B' _____ C' _____ D' _____

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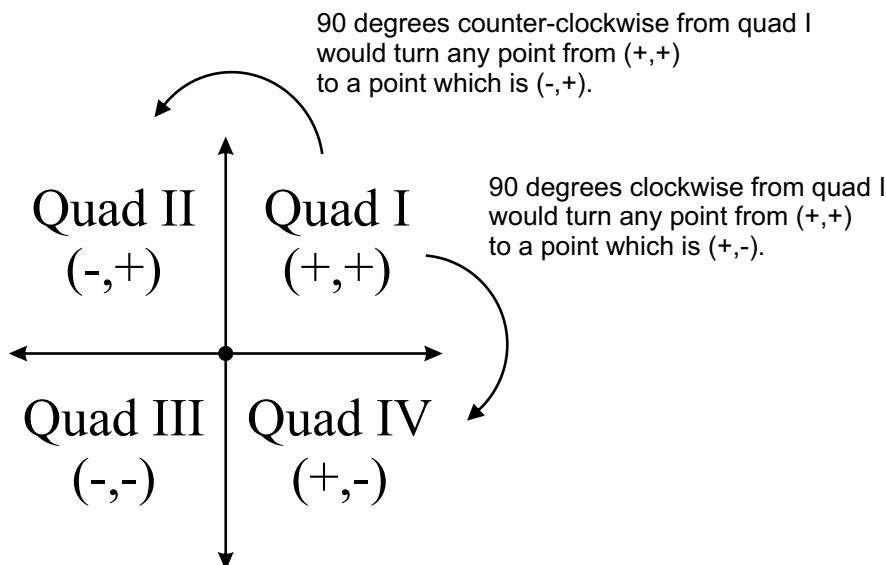
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Example: Rotating (3,4) 90° clockwise around the origin will place the point at (4,-3).

(3,4) should be switched to (4,3). After switching x and y take care of the signs.

Because (3,4) is in quadrant I and will end up in quadrant IV with a 90° clockwise rotation, the x-value must be positive and the y-value negative. It is always a good idea to have a 4-quadrant coordinate plane handy for reference. See 4-quadrant grid below.

(3,4) -----> (4,-3) with a 90 degree-clockwise rotation around the origin.



Whether rotating clockwise or counter-clockwise, remember to always switch the x and y-values.

Remember that any 90 degree rotation around the origin will always end up in an adjacent quadrant either before or after the quadrant you started in.

It will NEVER end up "kitty-corner" to where you started. That would be a 180 degree rotation around the origin.

Directions: Write what the new coordinates of each point will be if rotated 90° clockwise around the origin.

1) A (5,-8) → A' (-8,-5)

6) K (3,-5) → K' (-5,-3)

2) Z (8,9) → Z' (9,-8)

7) X (4,2) → X' (2,-4)

3) P (-9,-3) → P' (-3,9)

8) R (4,-2) → R' (-2,-4)

4) M (8,-2) → M' (-2,-8)

9) U (-3,-2) → U' (-2,3)

5) J (-1,0) → J' (0,1)

10) S (2,9) → S' (9,-2)

Directions: Below are the same points found on the previous page. Rotate these points 90° **counterclockwise** around the origin.

11) A (5,-8) \longrightarrow A' (8,5)

12) Z (8,9) \longrightarrow Z' (-9,8)

13) P (-9,-3) \longrightarrow P' (3,-9)

14) M (8,-2) \longrightarrow M' (2,8)

15) J (-1,0) \longrightarrow J' (0,-1)

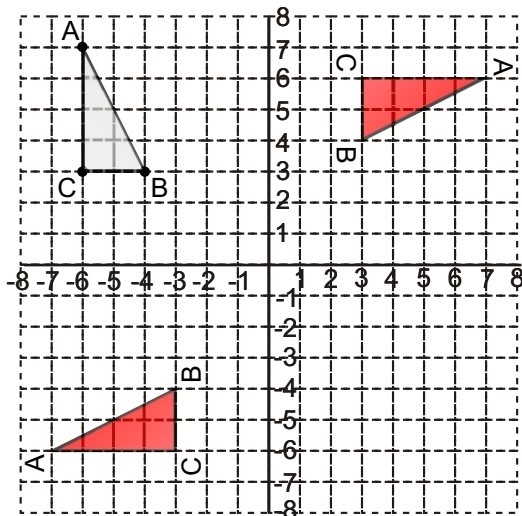
16) K (3,-5) \longrightarrow K' (5,3)

17) X (4,2) \longrightarrow X' (-2,4)

18) R (4,-2) \longrightarrow R' (2,4)

19) U (-3,-2) \longrightarrow U' (2,-3)

20) S (2,9) \longrightarrow S' (-9,2)

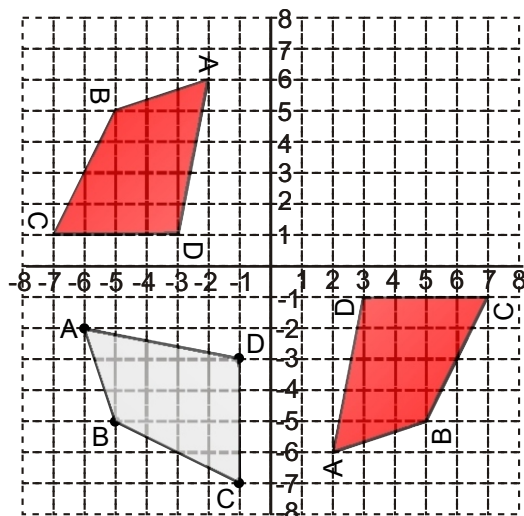


21) Rotate triangle ABC 90° counter-clockwise. Plot the new points and draw the new triangle. Record the rotated points below.

A' (-7,-6) B' (-3,-4) C' (-3,-6)

22) Rotate triangle ABC 90° clockwise. Plot the points and draw the triangle. Record the new coordinates below.

A' (7,6) B' (3,4) C' (3,6)



23) Rotate quadrilateral ABCD 90° clockwise around the origin. Plot the new points and draw the quadrilateral. Record the coordinates below.

A' (-2,6) B' (-5,5) C' (-7,1) D' (-3,1)

24) Rotate quadrilateral ABCD 90° counter-clockwise around the origin. Plot the new points and draw the quadrilateral. Record the coordinates below.

A' (2,-6) B' (5,-5) C' (7,-1) D' (3,-1)

Transformations

180° Rotation Around The Origin

180° rotation around the origin.

To find the new location of any point after it has been rotated 180° around the origin, simply change the signs of both the x and y-values.

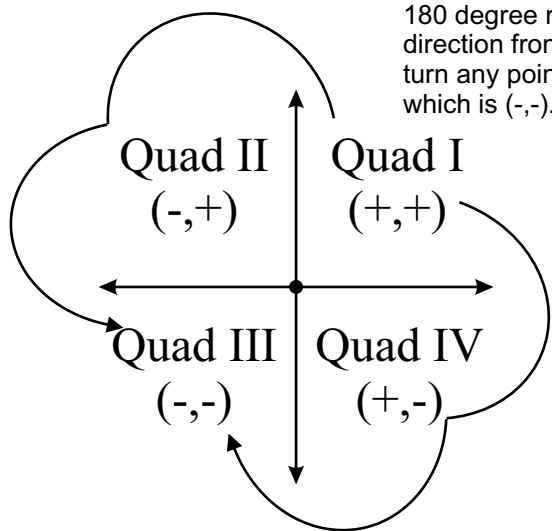
Example: (5,6) rotated 180° becomes (-5,-6)

Notice how the absolute value does not change for the x and the y, only the sign does.

(-3,5) rotated 180° becomes (3,-5)

(6,-7) rotated 180° becomes (-6,7)

Any object rotated 180° will always end up in the quadrant “kitty-corner” to where it started. If you started in quadrant one you will end up in quadrant three.



180 degree rotation in either direction from quad one will turn any point from (+,+) to a point which is (-,-).

With 180° rotations, clockwise or counter-clockwise movement is not important. Either way the object will end up at the same point.

Remember to make each sign opposite when rotating 180°.

point before rotation	→	point after rotation
(-, -)	→	(+, +)
(-, +)	→	(+, -)
(+, -)	→	(-, +)
(+, +)	→	(-, -)

Directions: Write what the new coordinates of each point will be if rotated 180° around the origin.

1) A (5,-8) → A' _____

6) K (3,-5) → K' _____

2) Z (8,9) → Z' _____

7) X (4,2) → X' _____

3) P (-9,-3) → P' _____

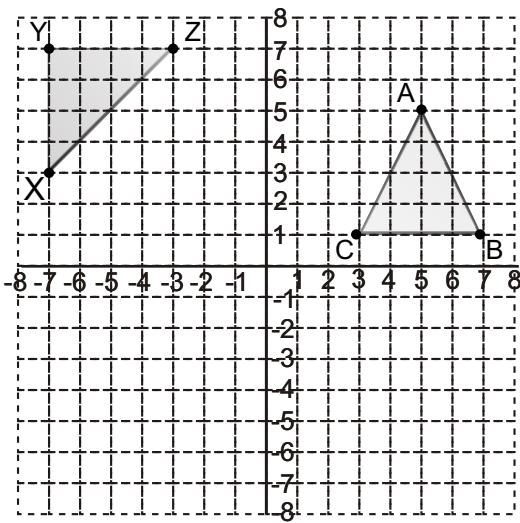
8) R (4,-2) → R' _____

4) M (8,-2) → M' _____

9) U (-3,-2) → U' _____

5) J (-1,0) → J' _____

10) S (2,9) → S' _____

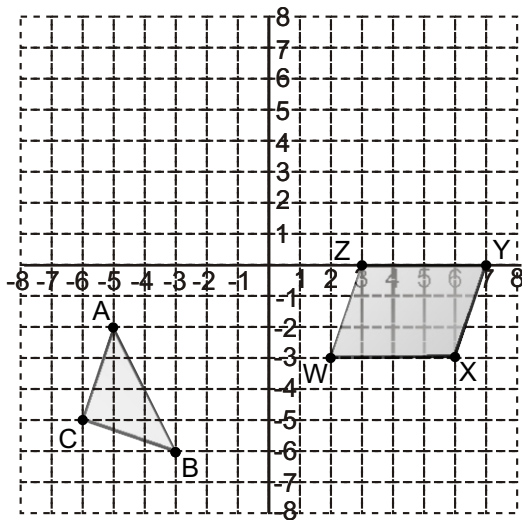


- 11) Rotate triangle ABC 180° around the origin. Plot the new points and draw the new triangle. Record the rotated points below.

A' _____ B' _____ C' _____

- 12) Rotate triangle XYZ 180° around the origin. Plot the points and draw the triangle. Record the new coordinates below.

X' _____ Y' _____ Z' _____

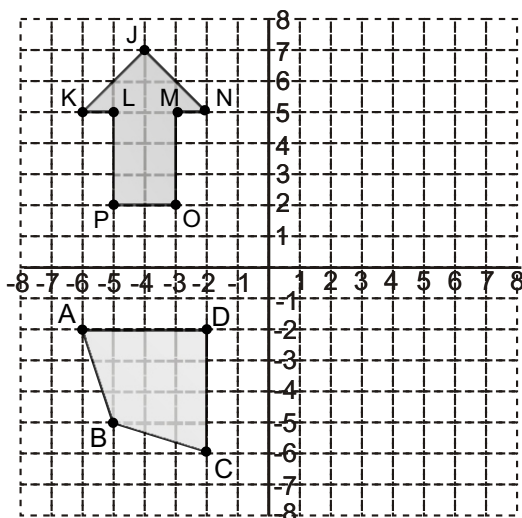


- 13) Rotate triangle ABC 180° around the origin. Plot the new points and draw the new triangle. Record the rotated points below.

A' _____ B' _____ C' _____

- 14) Rotate parallelogram WXYZ 180° around the origin. Plot the points and draw the parallelogram. Record the new coordinates below.

W' _____ X' _____ Y' _____ Z' _____



- 15) Rotate quadrilateral ABCD 180° around the origin. Plot the new points and draw the quadrilateral. Record the coordinates below.

A' _____ B' _____ C' _____ D' _____

- 16) Rotate the arrow 180° around the origin. Record the location of the new points below. Draw the arrow.

J' _____ K' _____ L' _____ M' _____

N' _____ O' _____ P' _____

Transformations

180° Rotation Around The Origin

180° rotation around the origin.

To find the new location of any point after it has been rotated 180° around the origin, simply change the signs of both the x and y-values.

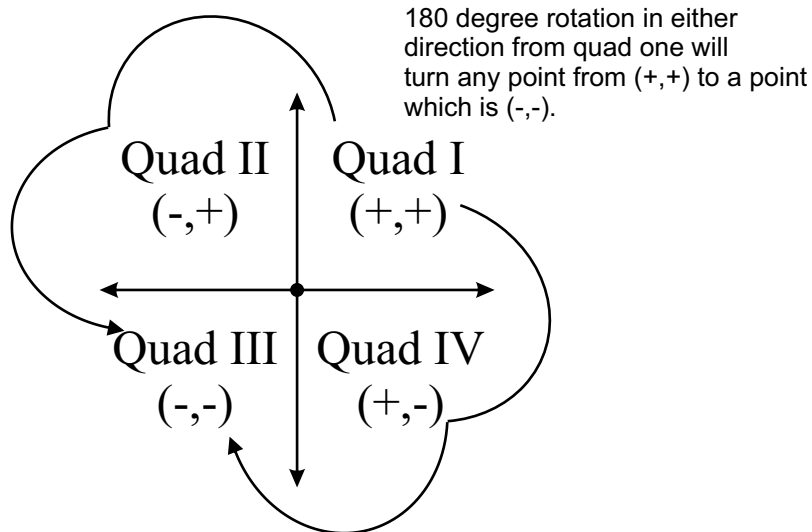
Example: (5,6) rotated 180° becomes (-5,-6)

Notice how the absolute value does not change for the x and the y, only the sign does.

(-3,5) rotated 180° becomes (3,-5)

(6,-7) rotated 180° becomes (-6,7)

Any object rotated 180° will always end up in the quadrant “kitty-corner” to where it started. If you started in quadrant one you will end up in quadrant three.



With 180° rotations, clockwise or counter-clockwise movement is not important. Either way the object will end up at the same point.

Remember to make each sign opposite when rotating 180°.

point before rotation	point after rotation
(-, -)	(+, +)
(-, +)	(+, -)
(+, -)	(-, +)
(+, +)	(-, -)

Directions: Write what the new coordinates of each point will be if rotated 180° around the origin.

1) A (5,-8) → A' (-5,8)

6) K (3,-5) → K' (-3,5)

2) Z (8,9) → Z' (-8,-9)

7) X (4,2) → X' (-4,-2)

3) P (-9,-3) → P' (9,3)

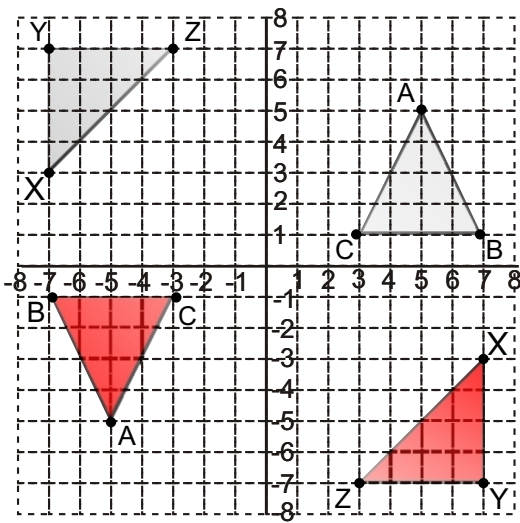
8) R (4,-2) → R' (-4,2)

4) M (8,-2) → M' (-8,2)

9) U (-3,-2) → U' (3,2)

5) J (-1,0) → J' (1,0)

10) S (2,9) → S' (-2,-9)

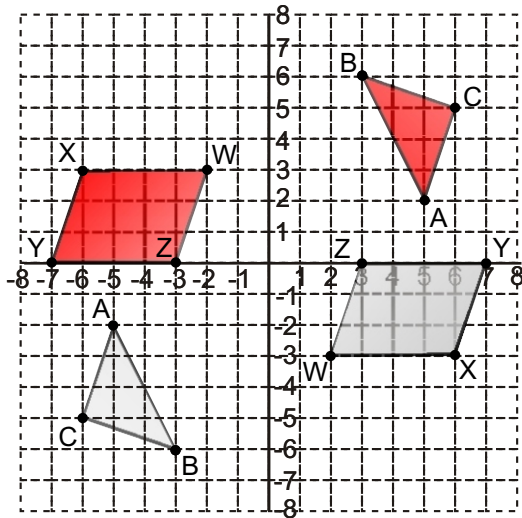


- 11) Rotate triangle ABC 180° around the origin. Plot the new points and draw the new triangle. Record the rotated points below.

A' (-5,-5) B' (-7,-1) C' (-3,-1)

- 12) Rotate triangle XYZ 180° around the origin. Plot the points and draw the triangle. Record the new coordinates below.

X' (7,-3) Y' (7,-7) Z' (3,-7)

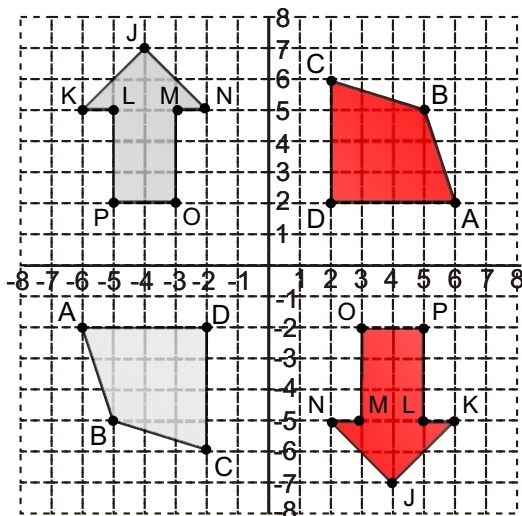


- 13) Rotate triangle ABC 180° around the origin. Plot the new points and draw the new triangle. Record the rotated points below.

A' (5,2) B' (3,6) C' (6,5)

- 14) Rotate parallelogram WXYZ 180° around the origin. Plot the points and draw the parallelogram. Record the new coordinates below.

W' (-2,3) X' (-6,3) Y' (-7,0) Z' (-3,0)



- 15) Rotate quadrilateral ABCD 180° around the origin. Plot the new points and draw the quadrilateral. Record the coordinates below.

A' (6,2) B' (5,5) C' (2,6) D' (2,2)

- 16) Rotate the arrow 180° around the origin. Record the location of the new points below. Draw the arrow.

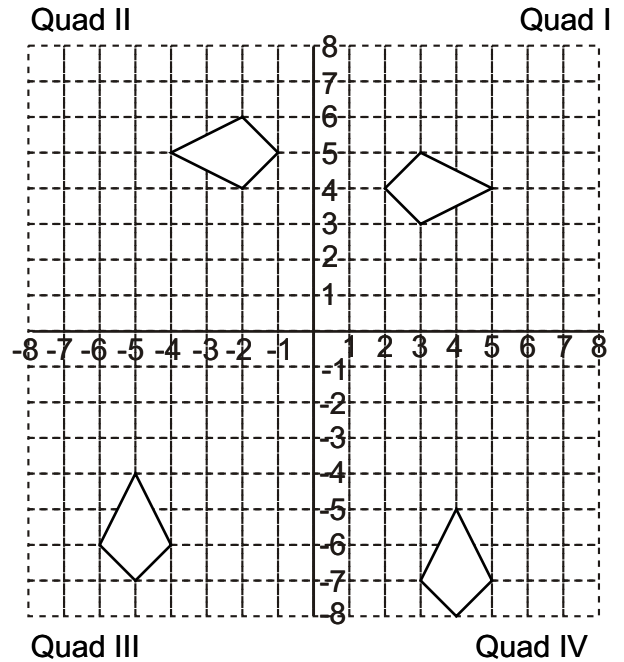
J' (4,-7) K' (6,-5) L' (5,-5) M' (3,-5)

N' (2,-5) O' (3,-2) P' (5,-2)

Rotation Around The Origin

90° and 180° Rotation

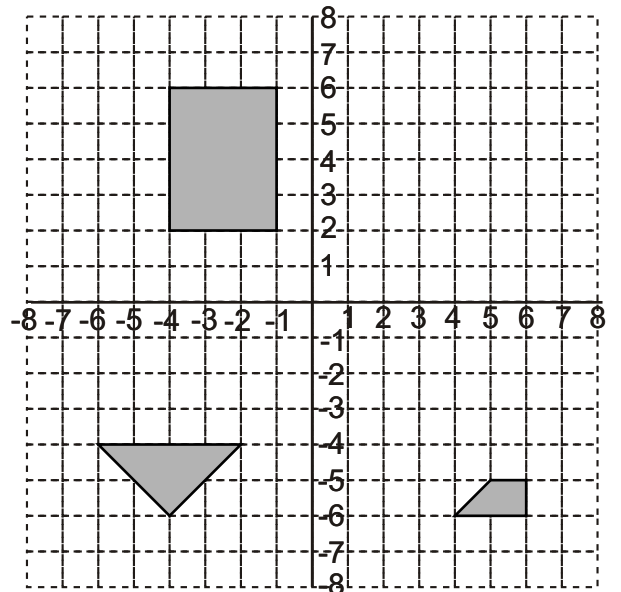
- 1) Rotate the figure in quadrant II, 90° clockwise around the origin. Draw the rotated image on the coordinate plane.
- 2) Rotate the figure in quadrant number III, 180° around the origin. Draw the rotated figure.
- 3) Rotate the figure in quadrant IV, 90° counter-clockwise around the origin. Draw the rotated figure on the coordinate plane.
- 4) After rotating the first figures in problems one, two and three, at what point do all four quadrilaterals intersect?



- 5) Rotate the quadrilateral in quadrant IV 90° counter-clockwise around the origin. Draw the rotated figure on the coordinate plane.

- 6) Rotate the rectangle in quadrant II 90° clockwise around the origin. Draw the rotated figure on the coordinate plane.

- 7) Rotate the triangle in quadrant III 180° around the origin. Draw the rotated figure on the coordinate plane.

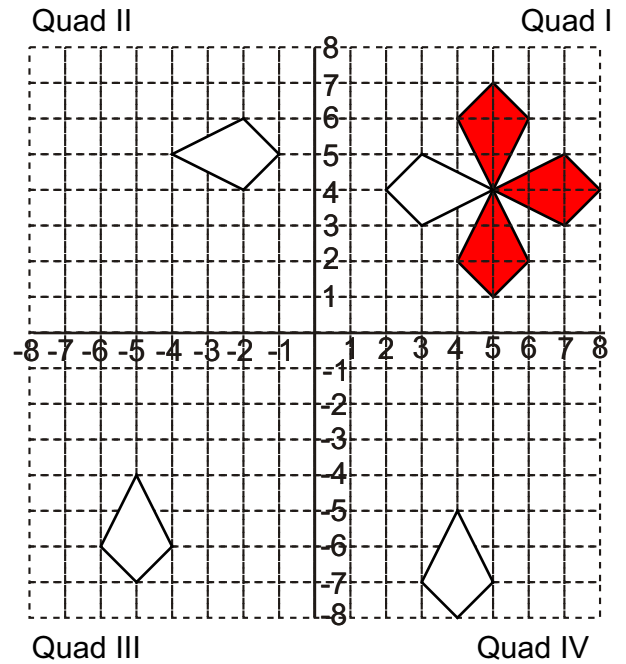


- 8) What picture was created after rotating the images.

Rotation Around The Origin

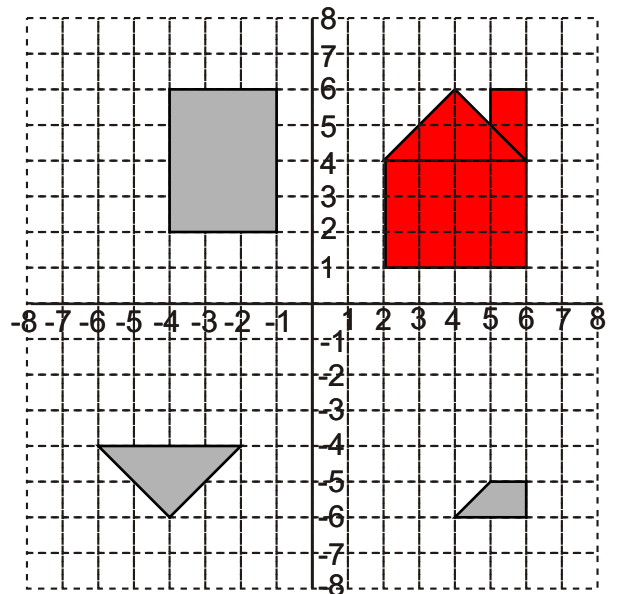
90° and 180° Rotation

- 1) Rotate the figure in quadrant II, 90° clockwise around the origin. Draw the rotated image on the coordinate plane.
- 2) Rotate the figure in quadrant number III, 180° around the origin. Draw the rotated figure.
- 3) Rotate the figure in quadrant IV, 90° counter-clockwise around the origin. Draw the rotated figure on the coordinate plane.
- 4) After rotating the first figures in problems one, two and three, at what point do all four quadrilaterals intersect?



All four quadrilaterals intersect at (5,4).

- 5) Rotate the quadrilateral in quadrant IV 90° counter-clockwise around the origin. Draw the rotated figure on the coordinate plane.
- 6) Rotate the rectangle in quadrant II 90° clockwise around the origin. Draw the rotated figure on the coordinate plane.
- 7) Rotate the triangle in quadrant III 180° around the origin. Draw the rotated figure on the coordinate plane.



- 8) What picture was created after rotating the images.