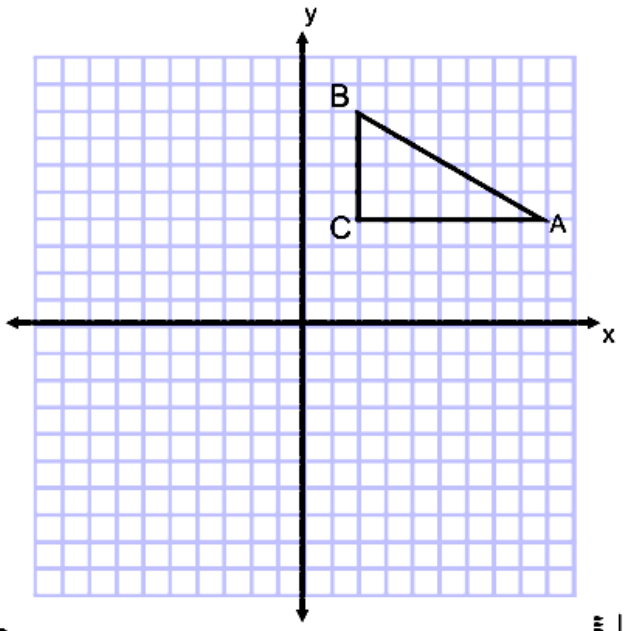
Lesson 2.5 – Moving Shapes Around – Rotations in Coordinate Plane

In Module 2 – Lesson 4 we rotated objects in a plane using a ruler and a protractor. In this lesson we will rotate objects in the Cartesian plane. Typically when we rotate an object in the Cartesian plane, we rotate the object about the origin (,) and use degree measures of 90^0, 180^0, and 270^0 as angles of rotation. There is an advantage to using the Cartesian plane to rotate objects. We can physically turn our paper at a 90^0, 180^0, or 270^0 and record the coordinates as they appear.

Set 1 – Rotate triangle ABC about the origin using 90^0, 180^0, and 270^0 as angles of rotation. Record the coordinates of the new images, plot the new images, and label the new triangles A'B'C'(90^0), A"B"C"(180^0), and A"'B"'C"'(270^0).



Triangle ABC

A (,)

B (,)

C (,)

Triangle A'B'C'

A' (,)

B' (,)

C' (,)

Triangle A"B"C"

A" (,)

B" (,)

C" (,)

Triangle A"'B"'C"'

A"' (,)

B"' (,)

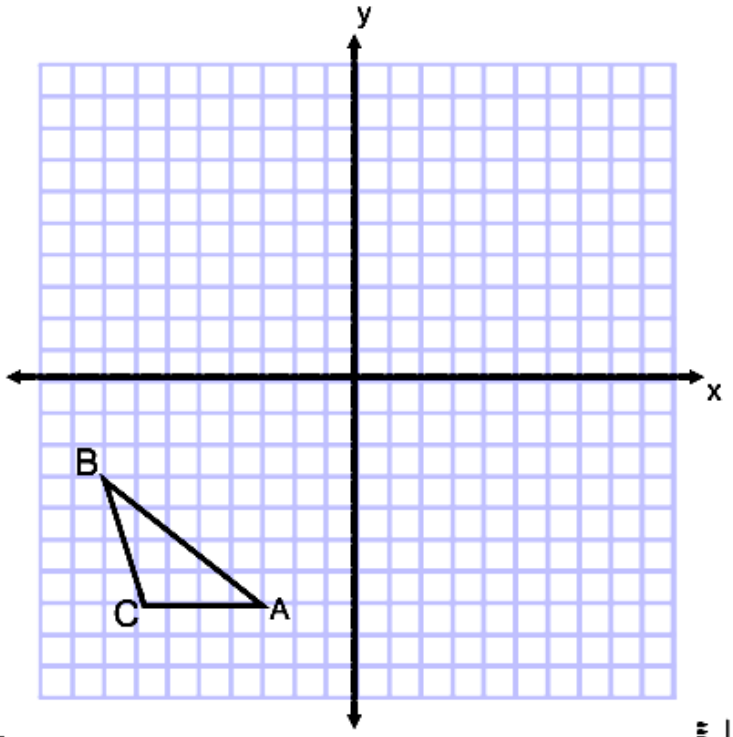
C"' (,)

Relist the coordinates you found above.

Triangle ABC	Triangle A'B'C'	Triangle A"B"C"	Triangle A"'B"'C"'
A ( )	A' ( )	A" ( )	A"' ( )
B ( )	B' ( )	B" ( )	B"' ( )
C ( )	C' ( )	C" ( )	C"' ( )

What was the angle of rotation used on triangle ABC to produce triangle A'B'C'? When you compare the points from triangle ABC with triangle A'B'C', do you see a pattern?

Set 2 – – Rotate triangle ABC about the origin using 90^0, 180^0, and 270^0 as angles of rotation. Record the coordinates of the new images, plot the new images, and label the new triangles A'B'C'(90^0), A"B"C"(180^0), and A"'B"'C"'(270^0).



Triangle ABC

A (,)

B (,)

C (,)

Triangle A'B'C'

A' (,)

B' (,)

C' (,)

Triangle A"B"C"

A" (,)

B" (,)

C" (,)

Triangle A"'B"'C"'

A"' (,)

B"' (,)

C"' (,)

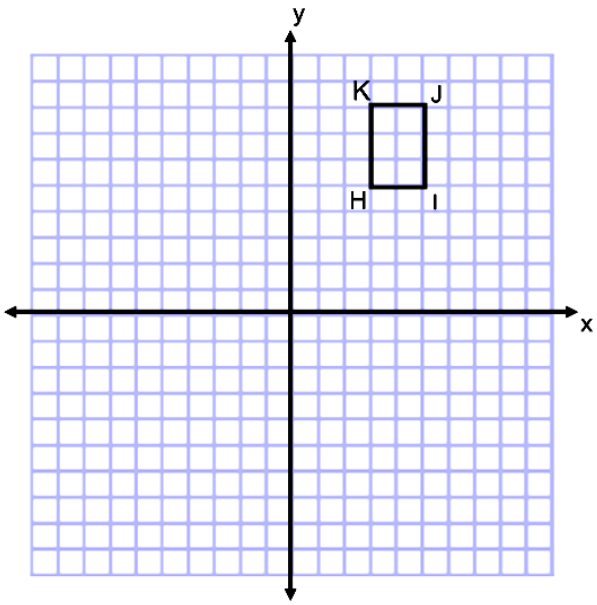
Relist the coordinates you found above.

Triangle ABC	Triangle A'B'C'	Triangle A"B"C"	Triangle A"'B"'C"'
A ( )	A' ( )	A" ( )	A"' ( )
B ( )	B' ( )	B" ( )	B"' ( )
C ( )	C' ( )	C" ( )	C"' ( )

What was the angle of rotation used on triangle ABC to produce triangle A"B"C"? When you compare the points from triangle ABC with triangle A"B"C", do you see a pattern?

<u>Set 3</u> – Follow the instructions below.

A)



Rotate rectangle HIJK about the origin 90^0. State the coordinates of the original image and the new image.

H (,) → H' (,)

I (,) → I' (,)

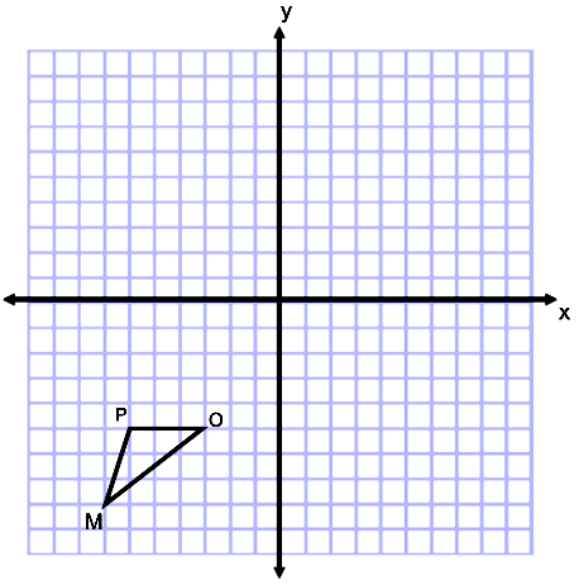
J (,) → J' (,)

K (,) → K' (,)

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

What quadrant did the new image appear in?

B)



Rotate triangle MOP about the origin 90^0. State the coordinates of the original image and the new image.

M (,) → M' (,)

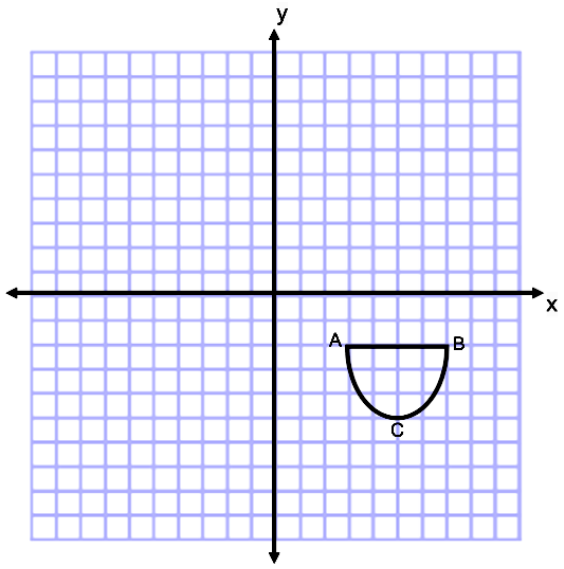
O (,) → O' (,)

P (,) → P' (,)

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

What quadrant did the new image appear in?

C)



Rotate object ABC about the origin 180^0. State the coordinates of the original image and the new image.

A (,) → A' (,)

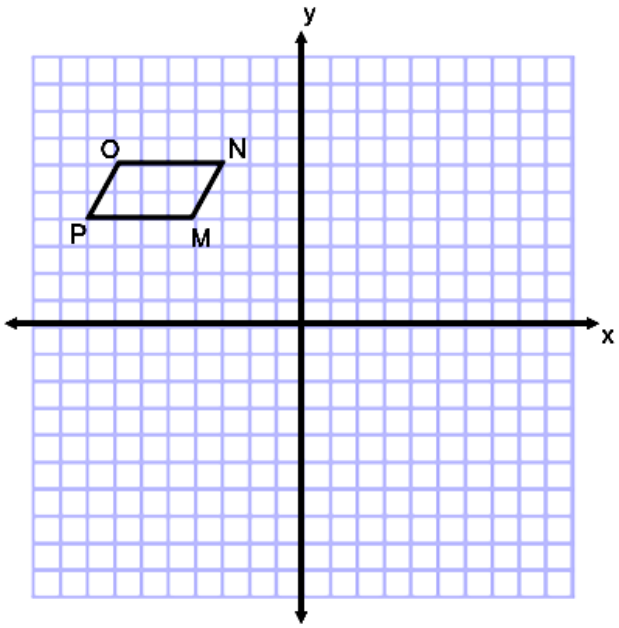
B (,) → B' (,)

C (,) → C' (,)

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

What quadrant did the new image appear in?

D)



Rotate parallelogram MNOP about the origin 180^0. State the coordinates of the original image and the new image.

M (,) → M' (,)

N (,) → N' (,)

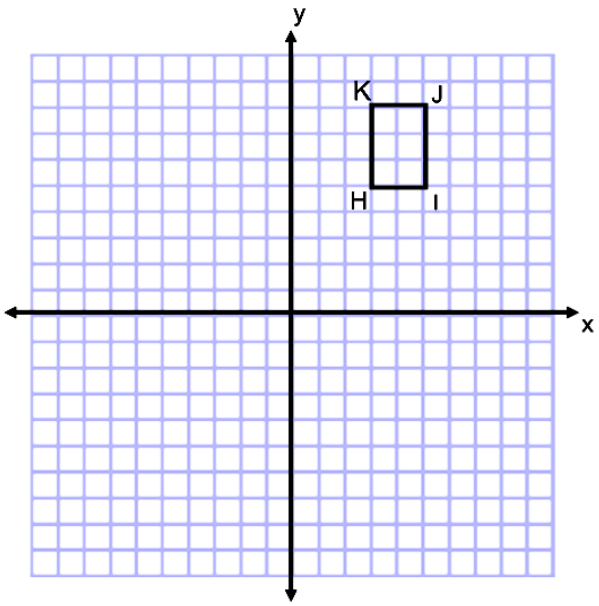
O (,) → O' (,)

P (,) → P' (,)

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

What quadrant did the new image appear in?

E)



Rotate rectangle HIJK about the origin 270^0. State the coordinates of the original image and the new image.

H (,) → H' (,)

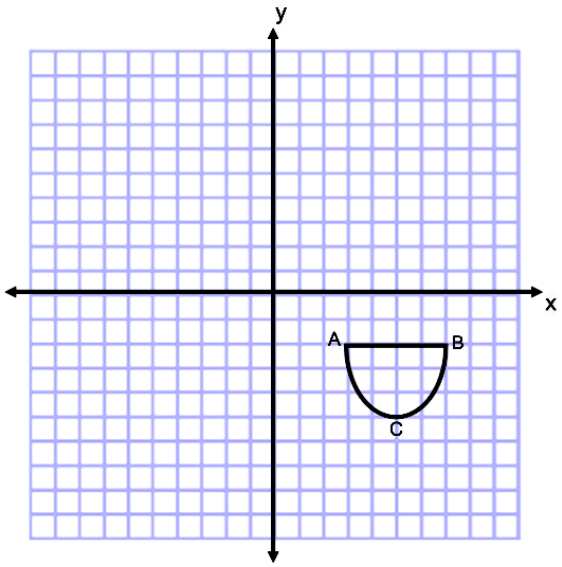
I (,) → I' (,)

J (,) → J' (,)

K (,) → K' (,)

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

F)



Rotate object ABC about the origin 270^0. State the coordinates of the original image and the new image.

A (,) → A' (,)

B (,) → B' (,)

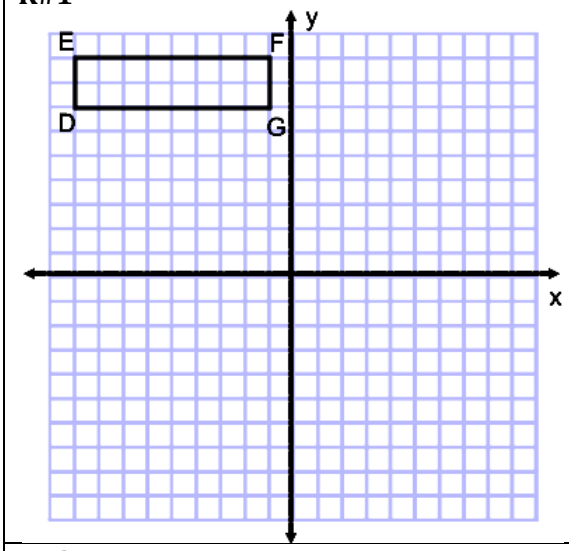
C (,) → C' (,)

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

A rotation of $+270^0$ is equivalent to a rotation of what negative angle measure?

Review – Follow the instructions below.

R#1



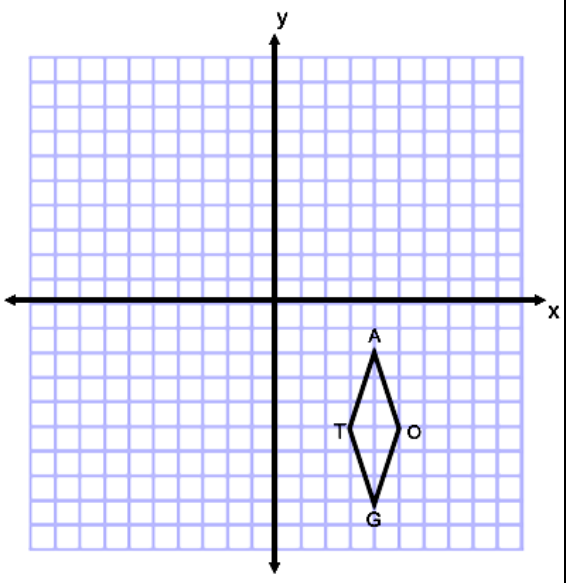
Rotate rectangle DEFG 90^0 about the origin.

Rectangle DEFG rotated from quadrant ____ to quadrant _____.

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

Pick any point and its image that illustrates the pattern.

R#2



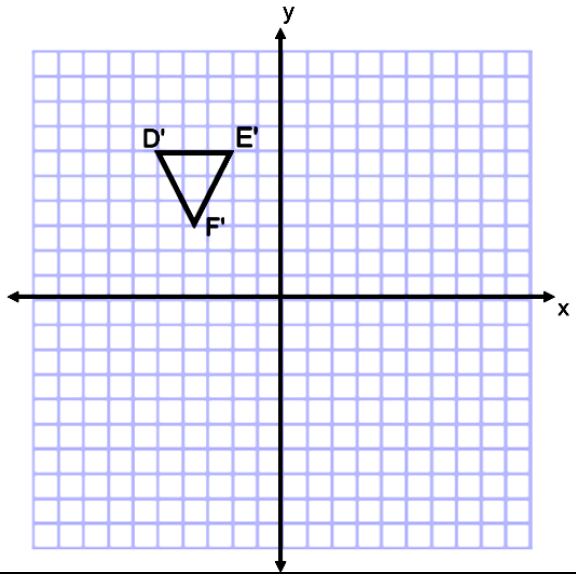
Rotate quadrilateral GOAT 180^0 about the origin.

Quadrilateral DEFG rotated from quadrant ____ to quadrant _____.

Compare the coordinates for two images. Using the coordinate (x, y), describe the pattern that you see.

Pick any point and its image that illustrates the pattern.

R#3



Triangle D'E'F' is the image of triangle DEF after a rotation of 270^0. Determine the coordinates of the original image and plot triangle DEF.

Rotate triangle DEF 180^0 and label the new image D"E"F".

Explain how we could have produced triangle D"E"F by using triangle D'E'F'.