Name: ___________________________________ # ___________

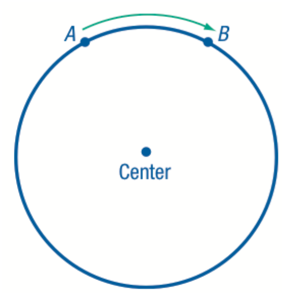
Geometry: Period _____________
Ms. Pierre
Date: ______________

Rotations

Today's Objective

KWBAT represent a rotation as a function of coordinate pairs and rotate a figure in the plane following a rule described in words or as a function.

A **circle** is the set of all points that are the same distance from a point called the center. Visualize turning the circle shown on the right so that point A moves onto point B. If you did that, the points would remain the same distance from the center, but they would be in a different location.

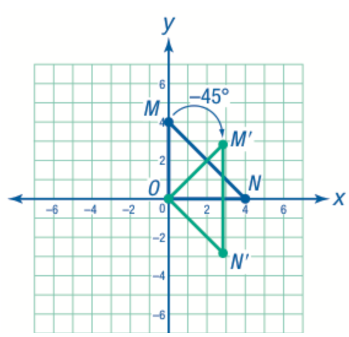


A **rotation** is a transformation that turns a figure around a point, called the

____________________ _____ ____________________.

Just as with points on a circle, when you rotate a point around a center of rotation, it remains the same distance from the center of rotation. You can rotate a figure any number of degrees.

Counterclockwise is considered the positive direction, so the rotation shown below would be described as $-45°$ rotation around the origin. The same image could be obtained, however, by rotating the figure $315°$ clockwise, since $360 - 45 = 315$. So, this rotation could also be called a $315°$ rotation around the origin.



You can represent a rotation as a function for which the input is a coordinate pair. The output of that function is the image produced by the rotation.

A 90° rotation is equivalent to a __________ rotation and has the function:

$$R_{90°}(x, y) = \_\_\_\_\_\_\_\_\_\_$$

A 180° rotation is equivalent to a __________ rotation and has the function:

$$R_{180°}(x, y) = \_\_\_\_\_\_\_\_\_\_$$

A 270° rotation is equivalent to a __________ rotation and has the function:

$$R_{270°}(x, y) = \_\_\_\_\_\_\_\_\_\_$$

Write true or false for each statement. If false, rewrite the statement to make it true.

1. A circle is the set of all points that are equidistant from a point called the center.

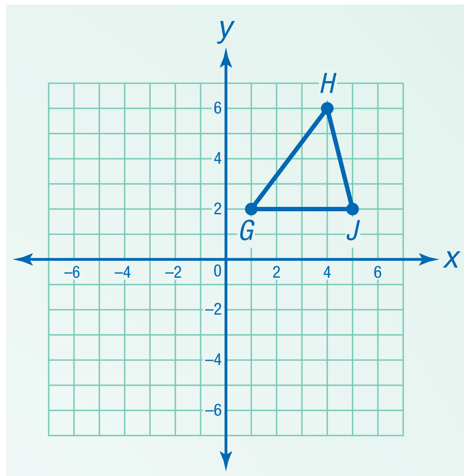
____

2. A quarter-turn in the counterclockwise direction is equivalent to a $-90°$ rotation.

____

Example 1

Triangle GHJ is graphed on the coordinate plane. Draw the image of this triangle after counterclockwise rotations of 90°, 180°, and 270° about the origin.



Step 1: Identify the coordinates of the vertices of ΔGHJ.

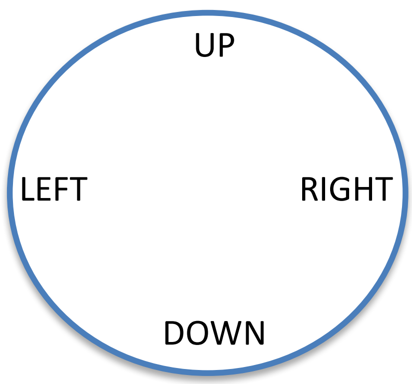
The vertices are G (1 , 2) , H (_______ , _______) , and J (_______ , _______).

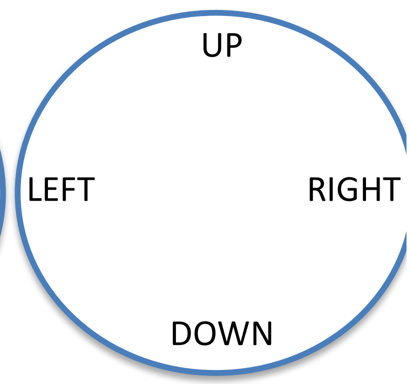
Step 2: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

$R_{90°}(1, 2) = (\_\_\_\_\_, \_\_\_\_\_)$

$R_{90°}(\_\_\_\_\_, \_\_\_\_\_) = (\_\_\_\_\_, \_\_\_\_\_)$

$R_{90°}(\_\_\_\_\_, \_\_\_\_\_) = (\_\_\_\_\_, \_\_\_\_\_)$



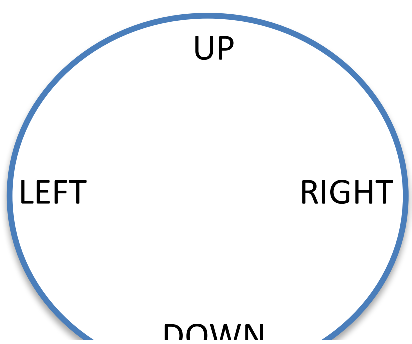


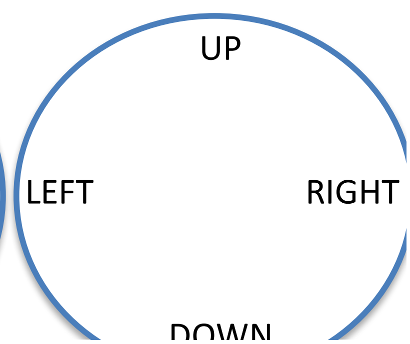
Step 3: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

$R_{180°}(1, 2) = (\_\_\_\_\_, \_\_\_\_\_)$

$R_{180°}(\_\_\_\_\_, \_\_\_\_\_) = (\_\_\_\_\_, \_\_\_\_\_)$

$R_{180°}(\_\_\_\_\_, \_\_\_\_\_) = (\_\_\_\_\_, \_\_\_\_\_)$



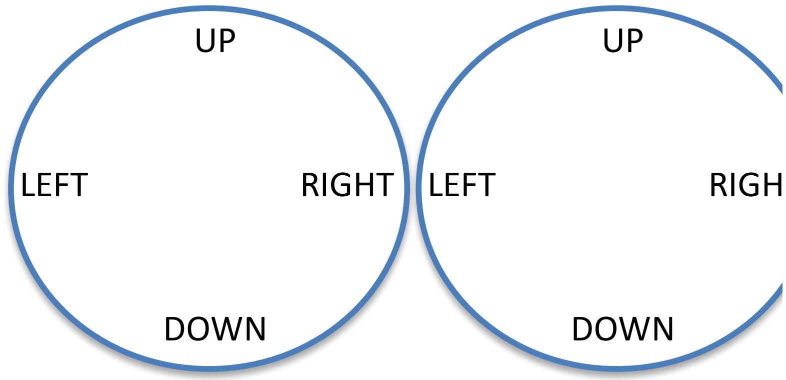


Step 4: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

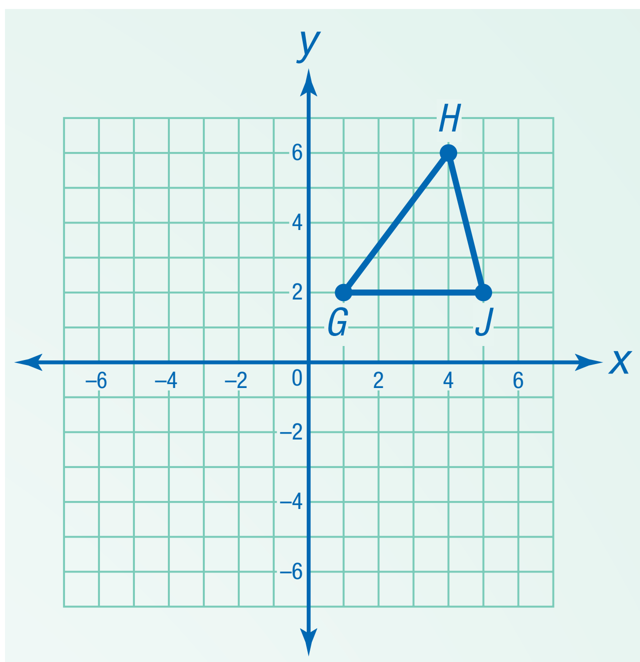
$R_{270^\circ}(1, 2)$ = (_____ , _____)

R_{270°(_____ , _____) = (_____ , _____)

R_{270°(_____ , _____) = (_____ , _____)

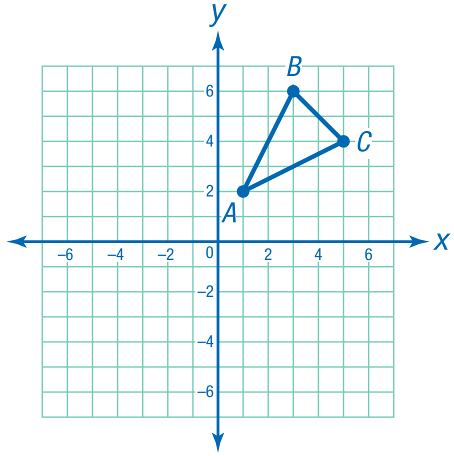


Step 5: Graph and label each image.



☑ Check for Understanding

Triangle ABC is graphed on the coordinate plane. Draw the image of this triangle after counterclockwise rotations of 90°, 180°, and 270° about the origin.



Step 1: Identify the coordinates of the vertices of ΔABC.

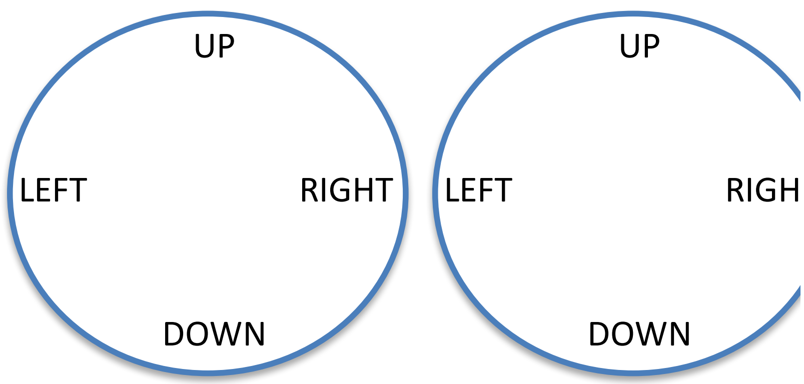
The vertices are A (_______ , _______) , B (_______ , _______) , and C (_______ , _______).

Step 2: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

R_{90°(_____ , _____) = (_____ , _____)

R_{90°(_____ , _____) = (_____ , _____)

R_{90°(_____ , _____) = (_____ , _____)

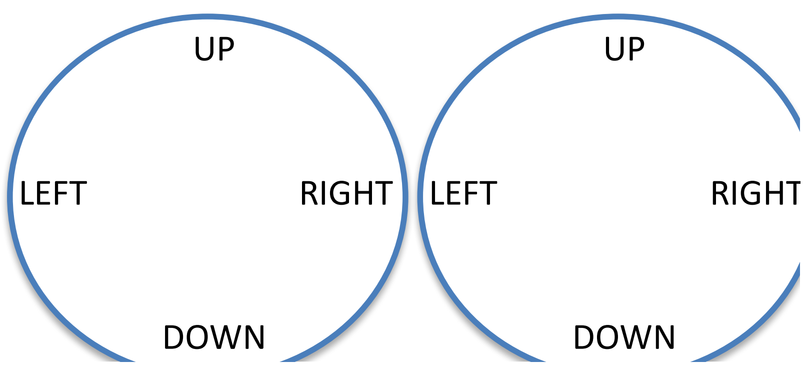


Step 3: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

R_{180°(_____ , _____) = (_____ , _____)

R_{180°(_____ , _____) = (_____ , _____)

R_{180°(_____ , _____) = (_____ , _____)

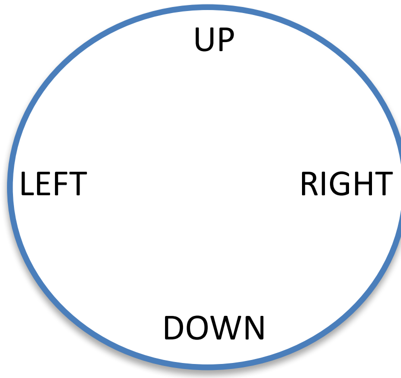


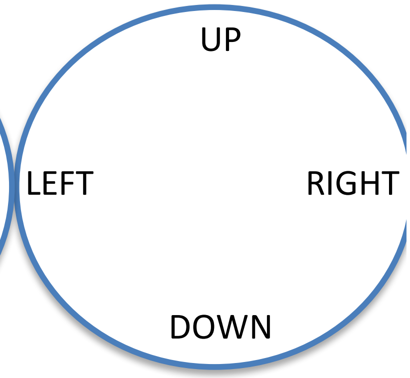
Step 4: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

$R_{270^\circ}(1,2) \quad = (\_\_\_\_\_, \_\_\_\_\_)$

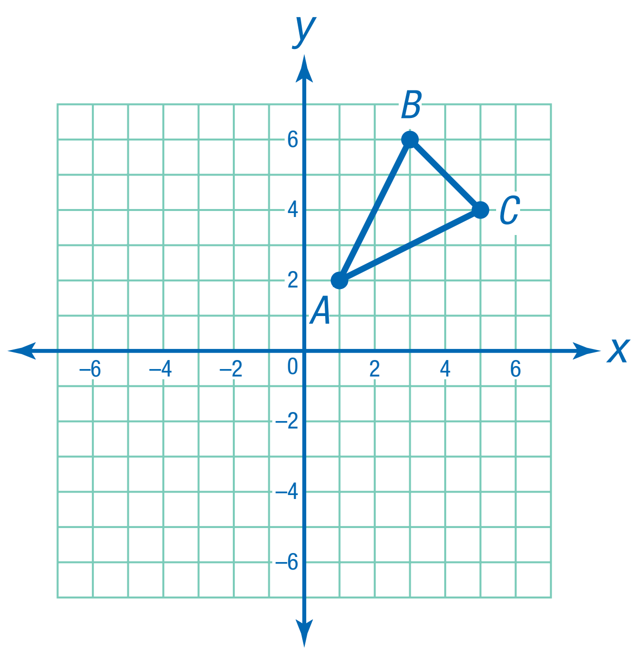
$R_{270^\circ}(\_\_\_\_\_, \_\_\_\_\_) = (\_\_\_\_\_, \_\_\_\_\_)$

$R_{270^\circ}(\_\_\_\_\_, \_\_\_\_\_) = (\_\_\_\_\_, \_\_\_\_\_)$



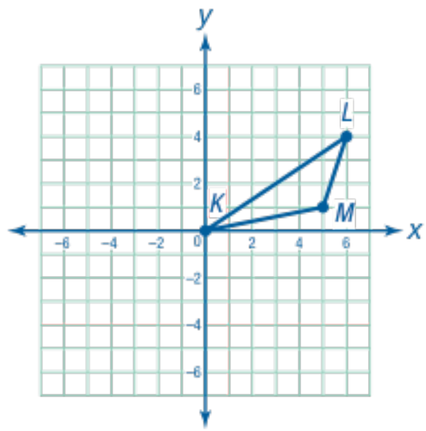


Step 5: Graph and label each image.



Independent Practice

1.) Triangle KLM is graphed on the coordinate plane. Draw the image of this triangle after counterclockwise rotations of 270° about the origin.



Step 1: Identify the coordinates of the vertices of ΔABC.

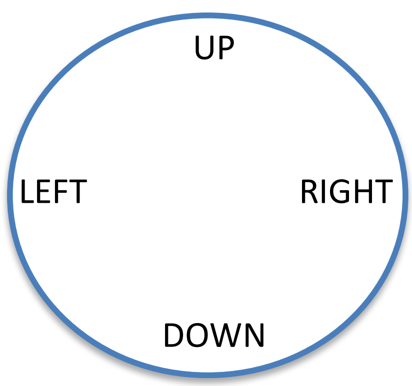
The vertices are K (_______ , _______) , L (_______ , _______) , and M (_______ , _______).

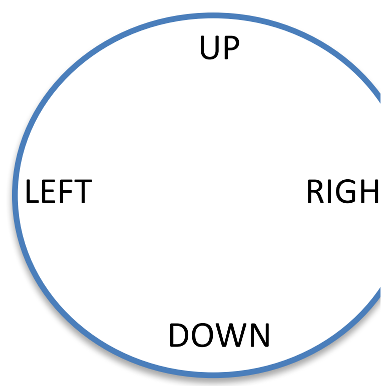
Step 2: Use the "circle technique" to determine the new vertices after the counterclockwise rotation.

$R_{270°}(\underline{\quad\quad},\underline{\quad\quad}) = (\underline{\quad\quad},\underline{\quad\quad})$

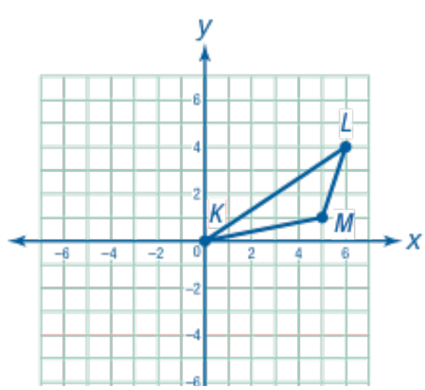
$R_{270°}(\underline{\quad\quad},\underline{\quad\quad}) = (\underline{\quad\quad},\underline{\quad\quad})$

$R_{270°}(\underline{\quad\quad},\underline{\quad\quad}) = (\underline{\quad\quad},\underline{\quad\quad})$





Step 5: Graph and label the image.

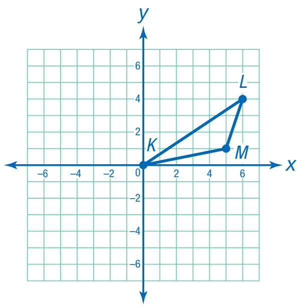


REMEMBER A −90° rotation is equal to a 270° rotation.

Homework

Use the given function to rotate △*KLM* to form △*K′L′M′*. Identify the coordinates of the vertices of the image. Then identify the degree measure of the rotation.

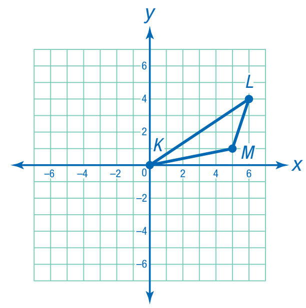
1. $R_\theta(x, y) = (-x, -y)$



$K'(\_\_\_, \_\_\_)$ $L'(\_\_\_, \_\_\_)$ $M'(\_\_\_, \_\_\_)$

____

2. $R_\theta(x, y) = (-y, x)$



$K'(\_\_\_, \_\_\_)$ $L'(\_\_\_, \_\_\_)$ $M'(\_\_\_, \_\_\_)$

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