Inspiring Greatness

INDEPENDENCE SCHOOL DISTRICT

Math Virtual Learning

Math 8

Rotations of two dimensional figures

(Day 1-Find the coordinates of a rotation)

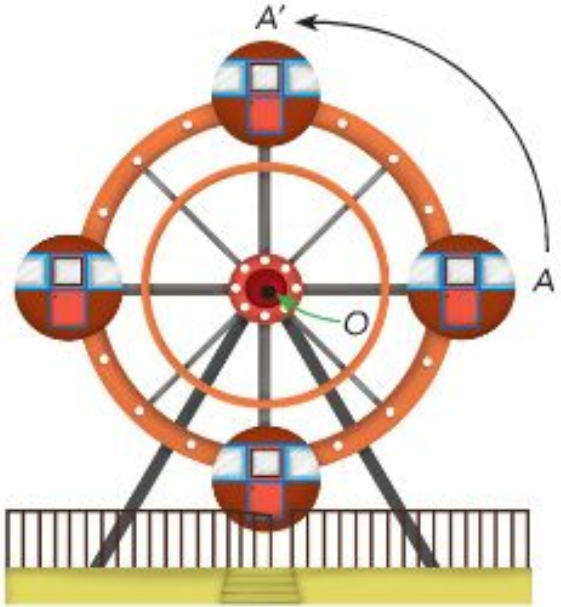
April 20, 2020

Lesson: April 20th, 2020

Objective/Learning Target:
Students will describe the effect of rotations of two-dimensional figures using coordinates.

Warm-Up

You are riding on a Ferris wheel. You start at A and are at A' 3 minutes later. The Ferris wheel is rotating about the center, O.



Rotations are turns! Each car (point) is the same distance from the center (origin).

A rotation maps a point about the center of rotation through a given angle either clockwise (CW) or counter-clockwise (CCW).

Guided Practice: Rotation about the Origin

Clockwise (CW)	Counter-Clockwise (CCW)
90° (x,y) ---> (y,-x)	90° (x,y) ---> (-y,x)
180° (x,y) ---> (-x,-y)	180° (x,y) ---> (-x,-y)
270° (x,y) ---> (-y,x)	270° (x,y) ---> (y,-x)
360° (x,y) ---> (x,y)	360° (x,y) ---> (x,y)

Notice how clockwise and counterclockwise rules are repeated. If an image is rotated 180° in either direction the rule is the same. The rule for rotating 360° in either direction is the same because the image is mapped back onto itself, the coordinate points do not change.

Be sure to pay close attention to the direction of the rotation.

Guided Practice: Rotation 90° CW & 270° CCW

(x,y) ---> (y,-x)

Point Q given Q(2,7) ---> Q'(7,-2)

Line JK given J(9,-4) and K(5,-4) ---> J'(-4,-9) and K'(-4,-5)

Figure XYZ given X(-3,-6) Y(-4,1) and Z(-5,-5) ---> X'(-6,3) Y'(1,4) and Z'(-5,5)

Figure ABCD given A(1,3) B(-4,6) C(-5,-7) and D(2,-1) --->

A'(3,-1) B'(6,4) C'(-7,5) and D'(-1,-2)

Guided Practice: Rotation 180° CW & CCW

(x,y) ---> (-x,-y)

Point Q given Q(2,7) ---> Q'(-2,-7)

Line JK given J(9,-4) and K(5,-4) ---> J'(-9,4) and K'(-5,4)

Figure XYZ given X(-3,-6) Y(-4,1) and Z(-5,-5) ---> X'(3,6) Y'(4,-1) and Z'(5,5)

Figure ABCD given A(1,3) B(-4,6) C(-5,-7) and D(2,-1) --->

A'(-1,-3) B'(4,-6) C'(5,7) and D'(-2,1)

Guided Practice: Rotation 270° CW & 90° CCW

(x,y) ---> (-y,x)

Point Q given Q(2,7) ---> Q'(-7,2)

Line JK given J(9,-4) and K(5,-4) ---> J'(4,9) and K'(4,5)

Figure XYZ given X(-3,-6) Y(-4,1) and Z(-5,-5) ---> X'(6,-3) Y'(-1,-4) and Z'(5,-5)

Figure ABCD given A(1,3) B(-4,6) C(-5,-7) and D(2,-1) --->

A'(-3,1) B'(-6,-4) C'(7,-5) and D'(1,2)

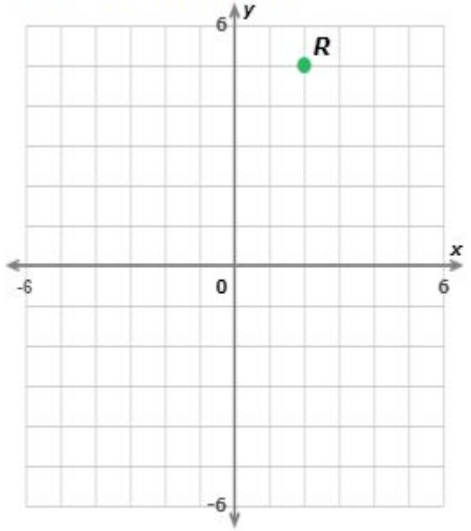
Practice:

Click the link below for additional practice on:

IXL Practice: Rotations-Find the Coordinates

1. Apply what you have learned about rotations to complete the given practice problems.
2. Write your answer as an ordered pair.
3. Once you have typed your answer, press submit to check your understanding.

The point $R(2, 5)$ is rotated 270° counterclockwise around the origin. What are the coordinates of the resulting point, R'?



$R' = (\square, \square)$

Submit

Press here to check your work

Independent Practice: Problems 1 & 2

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

1. Rotate 180°

Original Point	Is Mapped Onto
L (1, 3)	
Z (5, 5)	
F (4, 2)	

2. Rotate 180°

Original Point	Is Mapped Onto
Z (-1, -5)	
K (-1, 0)	
C (1, 1)	
N (3, -2)	

Independent Practice Answer Key: Problems 1 & 2

Once you have completed problems 1 and 2, check your answers here before going on to the next practice problems.

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

1. Rotate 180°

Original Point	Is Mapped Onto
L (1, 3)	L' (-1, -3)
Z (5, 5)	Z' (-5, -5)
F (4, 2)	F' (-4, -2)

2. Rotate 180°

Original Point	Is Mapped Onto
Z (-1, -5)	Z' (1, 5)
K (-1, 0)	K' (1, 0)
C (1, 1)	C' (-1, -1)
N (3, -2)	N' (-3, 2)

Independent Practice: Problems 3 & 4

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

3. Rotate 90° clockwise

Original Point	Is Mapped Onto
S (1, -4)	
W (1, 0)	
J (3, -4)	

4. Rotate 90° counterclockwise

Original Point	Is Mapped Onto
U (1, -3)	
D (3, -1)	
S (4, -2)	

Independent Practice Answer Key: Problems 3 & 4

Once you have completed problems 3 and 4, check your answers here before going on to the next practice problems.

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

3. Rotate 90° clockwise

Original Point	Is Mapped Onto
S (1, -4)	S' (-4, -1)
W (1, 0)	W' (0, -1)
J (3, -4)	J' (-4, -3)

4. Rotate 90° counterclockwise

Original Point	Is Mapped Onto
U (1, -3)	U' (3, 1)
D (3, -1)	D' (1, 3)
S (4, -2)	S' (2, 4)

Independent Practice: Problems 5 & 6

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

5. Rotate 90° counterclockwise

Original Point	Is Mapped Onto
K (1, 0)	
L (4, 1)	
M (1, 4)	
N (-2, 3)	

6. Rotate 180°

Original Point	Is Mapped Onto
E (-8, -8)	
F (-6, -10)	
G (-2, -8)	
H (-6, -6)	

Independent Practice Answer Key: Problems 5 & 6

Once you have completed problems 5 and 6, check your answers here before going on to the next practice problems.

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

5.Rotate 90° counterclockwise

Original Point	Is Mapped Onto
K (1, 0)	K' (0, 1)
L (4, 1)	L' (-1, 4)
M (1, 4)	M' (-4, 1)
N (-2, 3)	N' (-3, -2)

6. Rotate 180°

Original Point	Is Mapped Onto
E (-8, -8)	E' (8, 8)
F (-6, -10)	F' (6, 10)
G (-2, -8)	G' (2, 8)
H (-6, -6)	H' (6, 6)

Independent Practice: Problems 7 & 8

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

7. Rotate 90° clockwise

Original Point	Is Mapped Onto
P (5, 2)	
W (8, 2)	
R (8, 5)	
S (5, 5)	

8. Rotate 90° counterclockwise

Original Point	Is Mapped Onto
A (0, -2)	
B (5, -2)	
C (5, 1)	

Independent Practice Answer Key: Problems 7 & 8

Once you have completed problems 7 and 8, check your answers here before going on to the next practice problems.

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

7. Rotate 90° clockwise

Original Point	Is Mapped Onto
P (5, 2)	P' (2, -5)
W (8, 2)	W' (2, -8)
R (8, 5)	R' (5, -8)
S (5, 5)	S' (5, -5)

8. Rotate 90° counterclockwise

Original Point	Is Mapped Onto
A (0, -2)	A' (2, 0)
B (5, -2)	B' (2, 5)
C (5, 1)	C' (-1, 5)

Independent Practice: Problems 9 & 10

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

9. Rotate 180°

Original Point	Is Mapped Onto
H (-4, -1)	
B (0, 0)	
A (-1, -4)	

10. Rotate 270° clockwise

Original Point	Is Mapped Onto
A (0, 2)	
B (-10, 1)	
C (-9, 6)	

Independent Practice Answer Key: Problems 9 & 10

Once you have completed problems 9 and 10, check your answers here before going on to the next practice problems.

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

9. Rotate 180°

Original Point	Is Mapped Onto
H (-4, -1)	H' (4, 1)
B (0, 0)	B' (0, 0)
A (-1, -4)	A' (1, 4)

10. Rotate 270° clockwise

Original Point	Is Mapped Onto
A (0, 2)	A' (-2, 0)
B (-10, 1)	B' (-1, -10)
C (-9, 6)	C' (-6, -9)

Independent Practice: Problems 11 & 12

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

11. Rotate 270° counterclockwise

Original Point	Is Mapped Onto
P (2, 2)	
Q (6, 1)	
R (10, 9)	

12. Rotate 270° clockwise

Original Point	Is Mapped Onto
E (3, 0)	
F (0, -6)	
G (10, -7)	
H (9, -3)	

Independent Practice Answer Key: Problems 11 & 12

Once you have completed problems 11 and 12, check your answers here before going on to the next practice problems.

Complete the table to find the coordinates of the vertices of each figure after the given rotation **about the origin**. *Read each rotation carefully!*

11. Rotate 270° counterclockwise

Original Point	Is Mapped Onto
P (2, 2)	P' (2, -2)
Q (6, 1)	Q' (1, -6)
R (10, 9)	R' (9, -10)

12. Rotate 270° clockwise

Original Point	Is Mapped Onto
E (0, -3)	E' (3, 0)
F (-6, 0)	F' (0, -6)
G (-7, -10)	G' (10, -7)
H (-3, -9)	H' (9, -3)

Independent Practice: Problems 13 & 14

Work through the following examples on a seperate piece of paper.

(Answer key on next slide.)

A triangular flag attached to a rod rotates about the origin, O. Find the coordinates of the points after each rotation.

13. Rotate 180°

Original Point	Is Mapped Onto
O (0, 0)	
A (4, -4)	
B (6, -6)	
C (8, -4)	
(x, y)	

14. Rotate 270° counterclockwise

Original Point	Is Mapped Onto
O (0, 0)	
A (4, -4)	
B (6, -6)	
C (8, -4)	

Independent Practice Answer Key: Problems 13 & 14

Once you have completed problems 13 and 14, check your answers here before going on to the next practice problems.

A triangular flag attached to a rod rotates about the origin, O. Find the coordinates of the points after each rotation.

13. Rotate 180°

Original Point	Is Mapped Onto
O (0, 0)	O' (0, 0)
A (4, -4)	A' (-4, 4)
B (6, -6)	B' (-6, 6)
C (8, -4)	C' (-8, 4)
(x, y)	(-x, -y)

14. Rotate 270° counterclockwise

Original Point	Is Mapped Onto
O (0, 0)	O' (0, 0)
A (4, -4)	A' (-4, -4)
B (6, -6)	B' (-6, -6)
C (8, -4)	C' (-4, -8)

Independent Practice: Problem 15

Work through the following example on a seperate piece of paper.

(Answer key on next slide.)

15. A heart-shaped figure is rotated 90° counterclockwise about the origin, O. Five points are marked on the figure: D (-2, 1), E (0, 3), F (-1, 4), G (-3, 4), and H (-4, 3). Find the coordinates of the rotated image.

Original Point	Is Mapped Onto
D (-2, 1)	
E (0, 3)	
F (-1, 4)	
G (-3, 4)	
H (-4, 3)	

Independent Practice Answer Key: Problem 15

Once you have completed problem 15, check your answers here before going on to the next practice problems.

15. A heart-shaped figure is rotated 90° counterclockwise about the origin, O. Five points are marked on the figure: D (-2, 1), E (0, 3), F (-1, 4), G (-3, 4), and H (-4, 3). Find the coordinates of the rotated image.

Original Point	Is Mapped Onto
D (-2, 1)	D' (-1, -2)
E (0, 3)	E' (-3, 0)
F (-1, 4)	F' (-4, -1)
G (-3, 4)	G' (-4, -3)
H (-4, 3)	H' (-3, -4)

Additional Practice:

Choose from the links below for additional practice and to check your understanding!

Khan Academy-Rotations Video and Practice

MathGames.com-Find the Coordinates of the Rotation

Quizizz-Rotations Solo Game (follow link then press "play

Math Playground- Reflection and Rotation Practice

Mash-Up Math Rotations Video