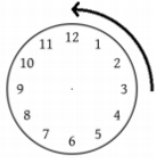
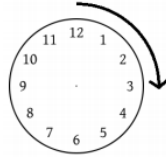


Geometry CC WS 1.19 - Introduction to Rotations

Rotation is a transformation that turns a figure about a fixed point (center of rotation). Rotations can be in a clockwise or counter-clockwise direction.



Counterclockwise

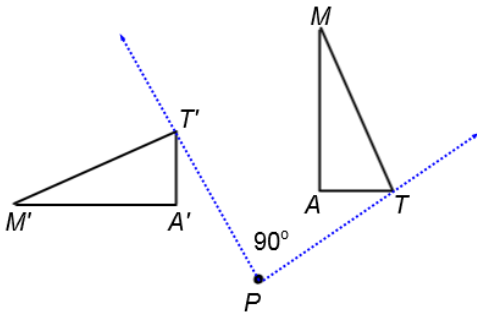


Clockwise

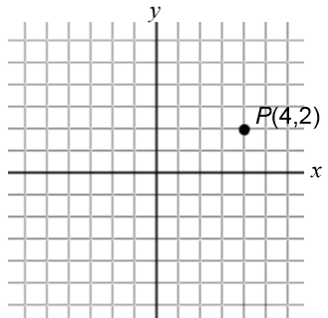
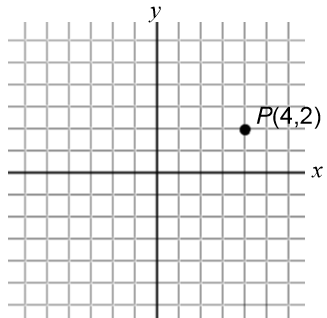
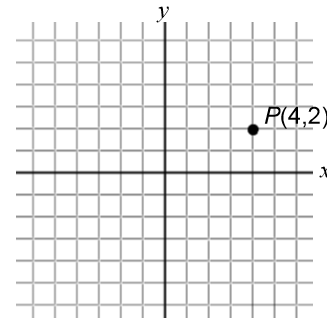
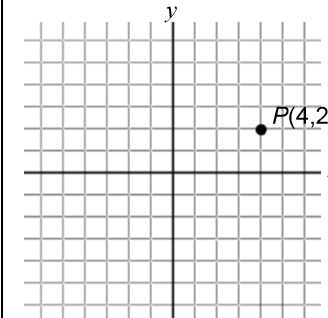
A positive angle of rotation turns the figure in a counterclockwise direction. A negative angle of rotation turns the figure in a clockwise direction.

The angle of rotation is the number of degrees the figure rotates. Rays drawn from the center of rotation to a point and to its corresponding image form the angle of rotation.

In the diagram below T' is the image of point T after a 90° rotation about point P . Points A and M are also rotated 90° .



Opening exercise: Take the point $P(4, 2)$ and rotate it as stated. Plot P' , the image of P , and state its coordinates.

<p>Rotate point P 90° about the origin.</p>  <p>Coordinates of P' _____</p>	<p>Rotate point P 180° about the origin.</p>  <p>Coordinates of P' _____</p>	<p>Rotate point P 270° about the origin.</p>  <p>Coordinates of P' _____</p>	<p>Rotate point P 360° about the origin.</p>  <p>Coordinates of P' _____</p>
---	---	--	---

Based on your findings above, come up with rules for each of the rotations

$$R_{O,90^\circ} : (x, y) \rightarrow (\quad , \quad)$$

$$R_{O,180^\circ} : (x, y) \rightarrow (\quad , \quad)$$

$$R_{O,270^\circ} : (x, y) \rightarrow (\quad , \quad)$$

$$R_{O,360^\circ} : (x, y) \rightarrow (\quad , \quad)$$

Summary of the Rules:

$$R_{O,90^\circ} : (x, y) \rightarrow (-y, x)$$

$$R_{O,180^\circ} : (x, y) \rightarrow (-x, -y)$$

$$R_{O,270^\circ} : (x, y) \rightarrow (y, -x)$$

$$R_{O,360^\circ} : (x, y) \rightarrow (x, y)$$

1. State the image of point $P(-2, 7)$ after each rotation:
 - a. R_{90°
 - b. R_{270°
 - c. R_{-90°
 - d. R_{180°
 - e. R_{360°
 - f. R_{-180°
2. If $R(5, 2)$ is rotated counterclockwise 90° about the origin, its image will be _____.
3. What are the coordinates of M' , the image of $M(2, 4)$, after a counterclockwise rotation of 180° about the origin?
4. What are the coordinates of P' , the image of $P(-3, 5)$, after a counterclockwise rotation of 270° about the origin?
5. The transformation $R_{O,90^\circ}$ maps the point $(5, 3)$ onto a point whose coordinates are
 - 1) $(5, -3)$
 - 2) $(3, -5)$
 - 3) $(3, 5)$
 - 4) $(-3, 5)$
6. What's the image of point $(-3, -6)$ under a clockwise rotation of 90° ($R_{O,-90^\circ}$) about the origin?
7. What are the coordinates of A' , the image of $A(3, -4)$, after a rotation of 180° about the origin.
8. State each rotation as an equivalent *positive* rotation
 - a) -90°
 - b) -180°
 - c) -270°
 - d) clockwise rotation of 90°
