

Transformations – Rotations

Notes Section 20.3

Name _____

G.CO.A.5

Write your questions here!

Rotations

Rotations

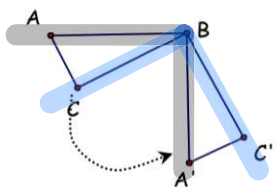
Rotations

Rotations

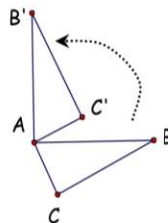
Rotations

Rotations are exactly as you would expect: a transformation that turns an image around a given point. When we are graphing, that point will ~~always~~ be the origin (0,0). *usually*

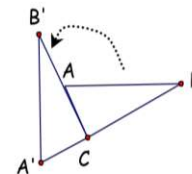
We usually rotate in the same direction that we number the quadrants: Counter clockwise. If you are asked to rotate clockwise, find the equivalent rotation counterclockwise. (More later...)



$\triangle ABC$ is rotated 90° about point B



$\triangle ABC$ is rotated 90° about point A



$\triangle ABC$ is rotated 90° about point C

Rules for rotating _____ about the origin:

$R_{0,90^\circ}$
 $R_{0,180^\circ}$
 $R_{0,270^\circ}$
 $R_{0,360^\circ}$

Rule	Abbreviation	Transformation
Rotation of 90° about the origin	R_{90°	$(x, y) \rightarrow (-y, x)$
Rotation of 180° about the origin	R_{180°	$(x, y) \rightarrow (-x, -y)$
Rotation of 270° about the origin	R_{270°	$(x, y) \rightarrow (y, -x)$
Rotation of 360° about the origin	R_{360°	$(x, y) \rightarrow (x, y)$

(Switch coordinates, change first sign)



Please keep in mind:

A rotation of 270° COUNTERCLOCKWISE is equivalent to a rotation of -90° clockwise!
 A rotation of 360° in either direction maps each preimage onto itself.

Example 1:

Find the coordinates of $\triangle A(2, 1), B(3, -1), C(-4, 0)$ after a rotation of 90° counterclockwise about the origin.

$$90^\circ \text{ ccw} = (x, y) \rightarrow (-y, x)$$

$A(2, 1)$ $A'(-1, 2)$
$B(3, -1)$ $B'(1, 3)$
$C(-4, 0)$ $C'(0, -4)$

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Example 2:

Find the coordinates of $\Delta D(-2, 5)$, $E(0, 4)$, $F(-4, -3)$ after a rotation of 180° counterclockwise about the origin.

(x, y)
 $90^\circ \text{ ccw } (-y, x)$
 $180^\circ \text{ ccw } (-x, -y)$

$D(-2, 5)$	$E(0, 4)$	$F(-4, -3)$
$D'(2, -5)$	$E'(0, -4)$	$F'(4, 3)$

Example 3:

Find the coordinates of $\Delta G(4, -7)$, $H(-2, 4)$, $F(-1, 0)$ after a rotation of 90° clockwise about the origin.

(x, y)
 $90^\circ \text{ cw } (-y, x)$
 $180^\circ \text{ cw } (-x, -y)$
 $270^\circ \text{ cw } (y, -x)$

$G(4, -7)$	$H(-2, 4)$	$F(-1, 0)$
$G'(-7, -4)$	$H'(4, 2)$	$F'(0, 1)$

Example 4:

- Graph trapezoid TRAP where $T(0, 4)$, $R(-2, 1)$, $A(-5, 1)$, and $P(-5, 4)$.
- Graph $T'R'A'P'$, the image of TRAP after R_{270° .
- Graph kite KITE where $K(-3, -3)$, $I(-1, -3)$, $T(-1, -1)$ and $E(-4, 0)$.
- Graph $K'I'T'E'$, the image of KITE after R_{90° .

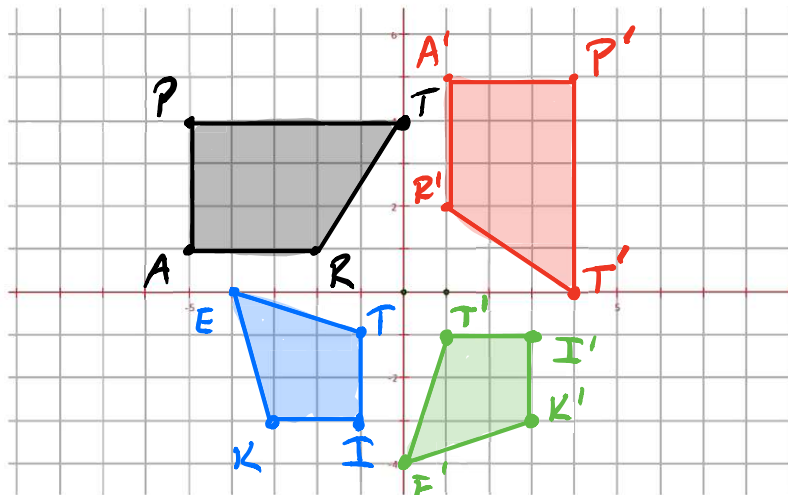


$(x, y) \rightarrow (y, x)$

$T(0, 4)$	$R(-2, 1)$
$T'(4, 0)$	$R'(1, 2)$
$A(-5, 1)$	$P(-5, 4)$
$A'(1, 5)$	$P'(4, 5)$

$(x, y) \rightarrow (-y, x)$

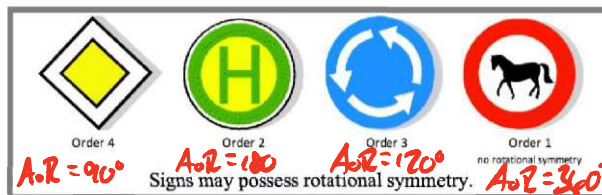
$K(-3, -3)$	$I(-1, -3)$
$K'(3, 3)$	$I'(3, -1)$
$T(-1, -1)$	$E(-4, 0)$
$T'(1, -1)$	$E'(0, -4)$



Symmetry

An object has Rotational symmetry if there is a center point around which the object is rotated a certain number of degrees and the object looks the same.

Examples:



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Which of the following letters have **rotational symmetry**?

H, I, N, O, S, X, Z

Which have **reflectional symmetry**?

A, B, C, D, E, H, I, K, M, O, T, U, V, W, X, Y



Now, summarize your notes here!

Solve each equation for x!	
<p>1. $20 - x > 19.5$</p> <p style="margin-left: 40px;">$-x > -0.5$</p> <p style="margin-left: 40px;">$x < 0.5$</p>	<p>2. $36 - 4x = -x - x$</p> <p style="margin-left: 40px;">$36 - 4x = -2x$</p> <p style="margin-left: 40px;">$36 = 2x$</p> <p style="margin-left: 40px;">$18 = x$</p>
Factor!	Factor!
<p>3. $2x^2 - x - 3$</p> <p style="margin-left: 40px;">$= \frac{(2x-3)(2x+2)}{2}$</p> <p style="margin-left: 40px;">$= (2x-3)(x+1)$</p>	<p>4. $(x^2 - 1)$</p> <p style="margin-left: 40px;">$= (x-1)(x+1)$</p>
<p>5. Graph the equation:</p> <p style="margin-left: 20px;">$3x + 2 = 2 - 2x$</p> <p style="margin-left: 20px;">$5x = 0$</p> <p style="margin-left: 20px;">$x = 0$</p>	<p>6. Graph the equation:</p> <p style="margin-left: 20px;">$-x - 4y = 8$</p> <p style="margin-left: 20px;">$-4y = x + 8$</p> <p style="margin-left: 20px;">$y = -\frac{1}{4}x - 2$</p>

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