

Unit 1

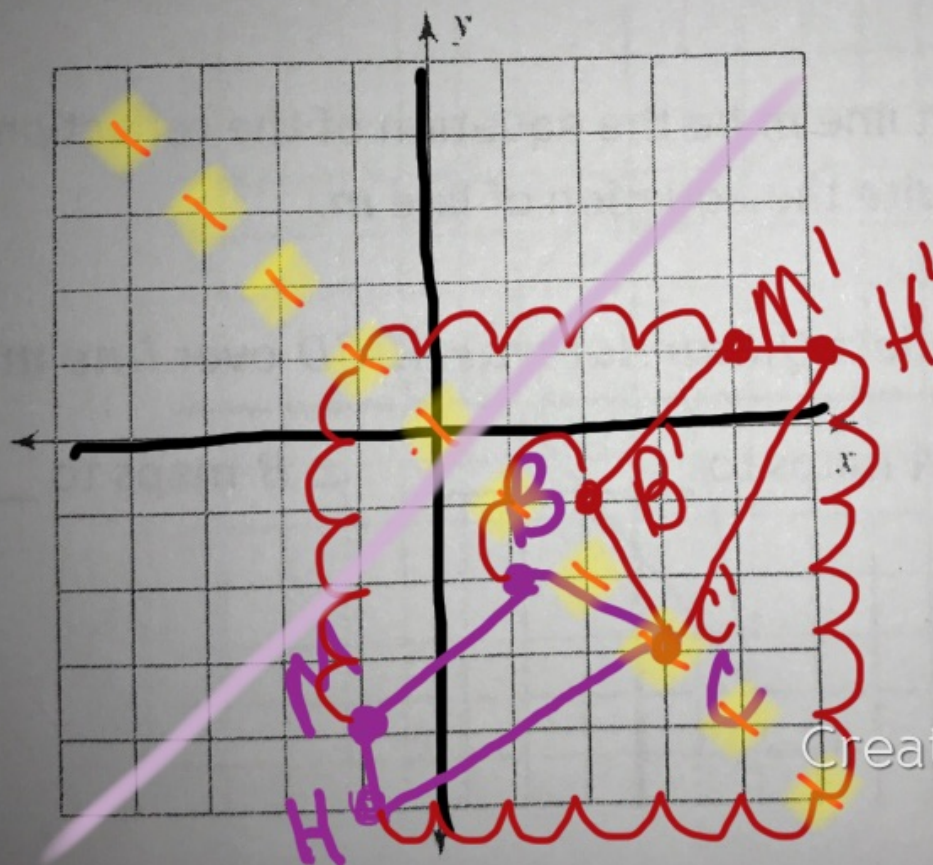
Lesson 3

Rotations with Coordinates

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6) reflection across $y = -x$
 $H(-1, -5), M(-1, -4), B(1, -2), C(3, -3)$



Notation:

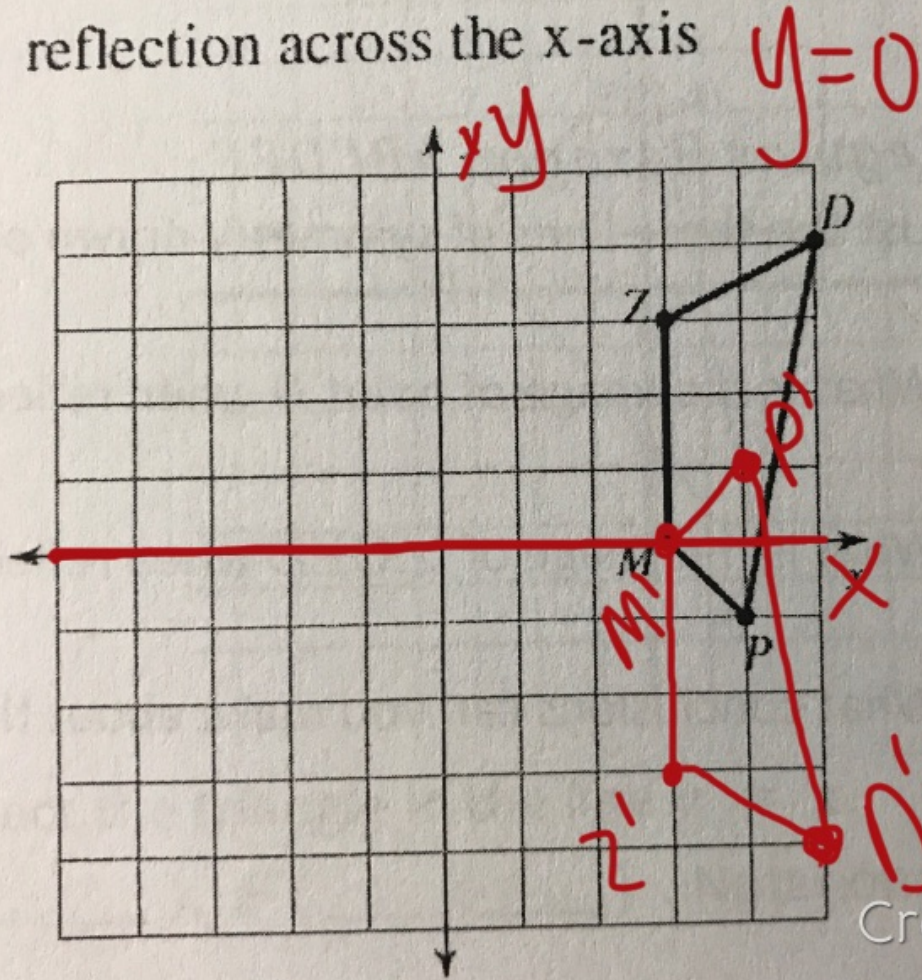
$$R_{y=-x}$$

~~Algebraic Rule.~~

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4) reflection across the x-axis



Notation:

$R_{x\text{-axis}}$

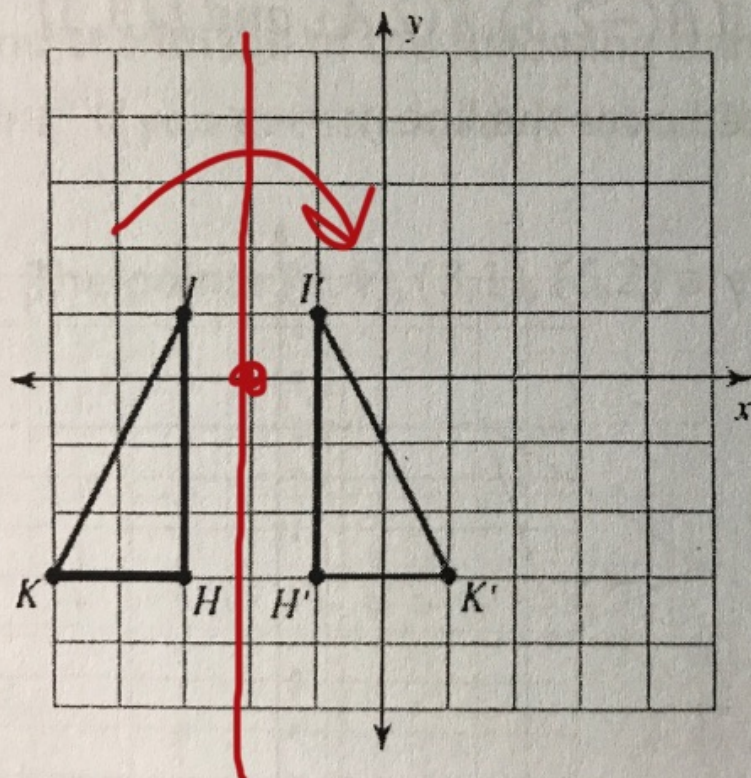
$R_{y=0}$

Algebraic Rule:

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11)



12)

Description:

Reflect over $x = -2$

Notation:

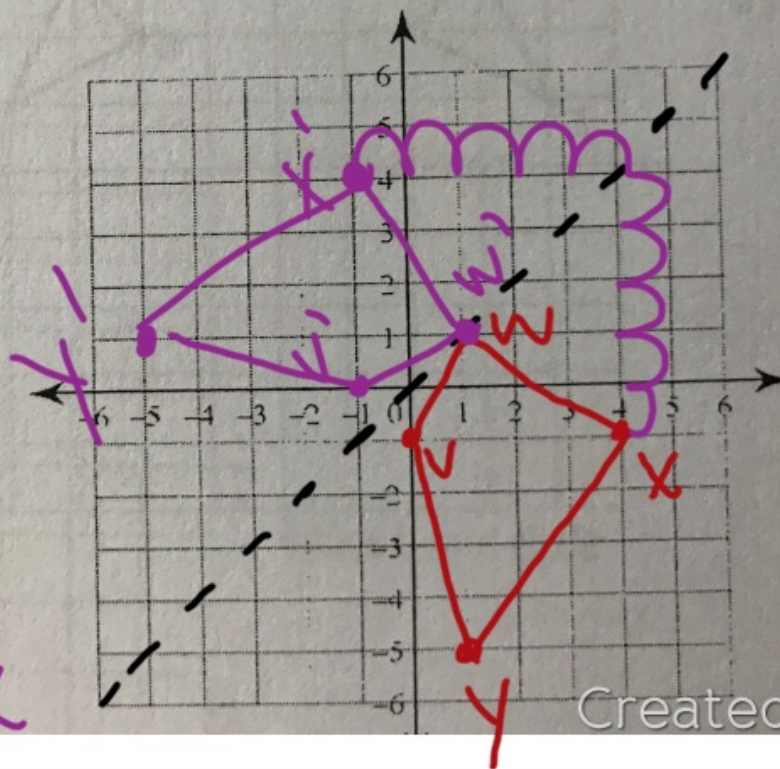
$R_{x = -2}$

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3. Quadrilateral $VWXY$ if $V(0, -1)$, $W(1, 1)$, $X(4, -1)$, and $Y(1, -5)$ reflected over the line $y = x$.

$V'(-1, 0)$
 $W'(1, 1)$
 $X'(-1, 4)$
 $Y'(-5, 1)$



Notation:

$R_{y=x}$

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Math 2
Unit 1 – Geometric Transformations
Lesson 3 – Rotations with Coordinates

Name _____
Date _____ Pd _____

Rotations

Definition:

A rotation is a type of transformation which is a turn in a given direction for a given number of degrees around a fixed point. To rotate an object, you must specify the degree of rotation, the point around which the rotation is to occur, and the direction.

- Rotations can be completed in two directions: counter-clockwise & clockwise

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A'B'C'D'E' is a 90° counterclockwise rotation of ABCDE.

CCW

CW

NOTE: Unless otherwise specified, the standard for rotations is **counterclockwise!**

- Notation for Rotations: \mathcal{R} # degrees
- Examples:

\mathcal{R}_{90°	1 turn	$\mathcal{R}_{270^\circ\text{CW}}$
\mathcal{R}_{180°	2 turns	$\mathcal{R}_{180^\circ\text{CW}}$
\mathcal{R}_{270°	3 turns	$\mathcal{R}_{90^\circ\text{CW}}$

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➤ **Rotations on the Coordinate Plane Exploration:** Triangle ABC has coordinates A(2, 0), B(3, 4), C(6, 4).

Trace the triangle and the x – and y – axes on patty paper.

CCW (origin)

- 1) Rotate *Triangle ABC* 90° , using the axes you traced to help you line it back up. Record the new coordinates.

A' (0 , 2), B' (-4 , 3), C' (-4 , 6)

3 turns CCW origin

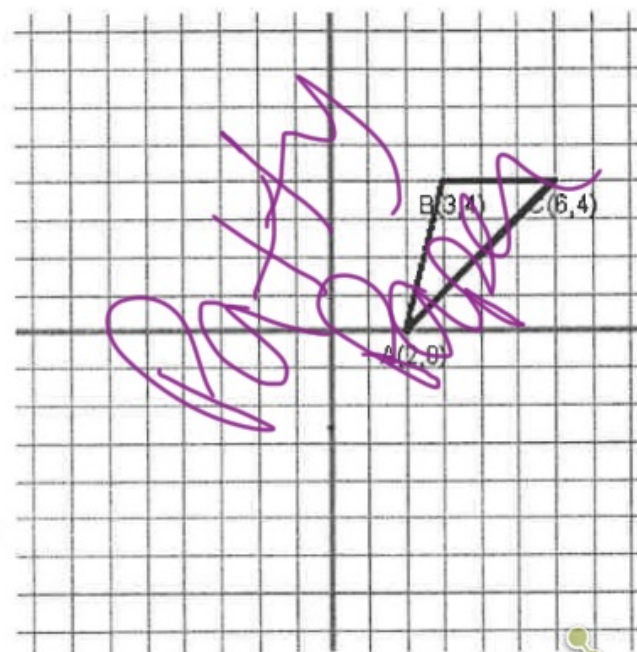
- 2) Rotate *Triangle ABC* 270° , using the axes you traced to help you line it up. Record the new coordinates.

A' (0 , -2), B' (-4 , -3), C' (4 , -6)

2 CCW

- 3) Rotate *Triangle ABC* 180° , using the axes you traced to help you line it back up correctly. Record the new coordinates.

A' (-2 , 0), B' (-3 , -4), C' (-6 , -4)



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➤ **Rotation Algebraic Rules:**

- ✓ Look for patterns in the above examples to help complete the following rotation rules.
- ✓ Then write the rule using proper notation for 1 – 3.

1. A 90° counter-clockwise rotation maps $(x, y) \rightarrow (\underline{-y}, \underline{x})$. Notation: R_{90°
2. A 270° counter-clockwise rotation maps $(x, y) \rightarrow (\underline{y}, \underline{-x})$. Notation: R_{270°
3. A 180° rotation maps $(x, y) \rightarrow (\underline{-x}, \underline{-y})$. Notation: R_{180°

4. A rotation of 270° **clockwise** is equivalent to a rotation of $\underline{90^\circ \text{ CCW}}$.
5. A rotation of 270° **counterclockwise** is equivalent to a rotation of $\underline{90^\circ \text{ CW}}$.
6. A rotation of 180° **counterclockwise** is equivalent to a rotation of $\underline{180^\circ \text{ CW}}$.

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➤ Identify the coordinates of the vertices for each figure after the given transformation. Also, give the algebraic rule and correct notation for each transformation.

7) rotation 180° about the origin

$Z(-1, -5), K(-1, 0), C(1, 1), N(3, -2)$

Vertices:

Algebraic Rule:

Notation:

8) rotation 180° about the origin

$L(1, 3), Z(5, 5), F(4, 2)$

Vertices:

Algebraic Rule:

Notation:

9) rotation 90° about the origin

$S(1, -4), W(1, 0), J(3, -4)$

Vertices:

Algebraic Rule:

Notation:

10) rotation 270° about the origin

$W(-5, -3), A(-3, 1), G(0, -3)$

Vertices:

Algebraic Rule:

Notation:

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HW

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