

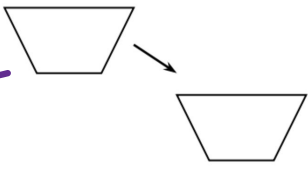
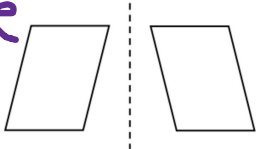
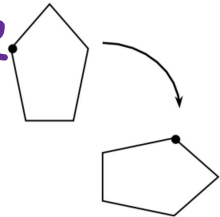
Name: _____ Date: _____ Per: _____

6.1.1-6.1.3 WARM UP

6-23. In the last three lessons, you have investigated rigid transformations: reflections, rotations, and translations.

1. What happens to a shape when you perform a rigid transformation?
2. Do the side lengths or angles in the figure change?
3. Do the relationships between the lines (parallel or perpendicular) change?
4. Why do you think reflections, rotations, and translations are called rigid transformations?

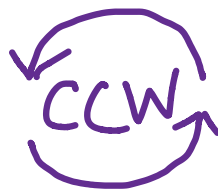
6.1.1-6.1.3 Transformation NOTES

<p>Transformation</p> <p>MOVE</p>	<p>Changing the location and/or the orientation of a figure</p>
<p>Translation</p> <p>SLIDE</p>	<p>Description: Sliding a figure left, right, up, or down.</p>  <p>Notation:</p> $x+7 \quad (x+7, y-3)$ $y-3$
<p>Reflection</p> <p>FLIP</p>	<p>Description: Flipping a figure over a specific line.</p>  <p>Notation:</p> <p>Over x-axis: $(x, y) \rightarrow (\underline{x}, \underline{-y})$</p> <p>Over y-axis: $(x, y) \rightarrow (\underline{-x}, \underline{y})$</p> $(2, 3) \quad (2, -3)$ $(-2, 3)$
<p>Rotation</p> <p>TURN</p>	<p>Description: Turning a figure around a fixed point.</p> 

Clockwise Rotation
vs.
Counterclockwise
Rotation

CW - turn right

CCW - turn left



What happens to a shape when you perform a rigid transformation?

Changes the location or the orientation.

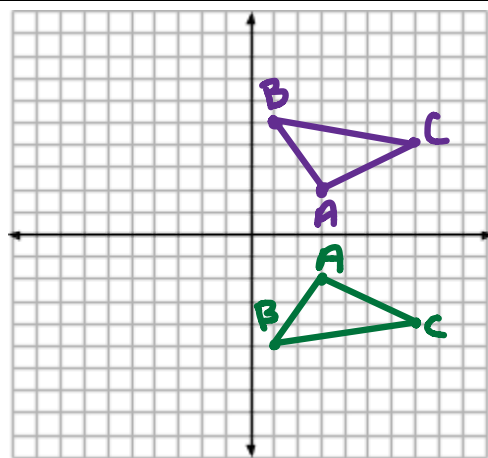
Example 1

A pre-image of a triangle has vertices $A(3, 2)$, $B(1, 5)$, and $C(7, 4)$. Find the coordinates of the reflection over the x axis. Draw the pre-image and the image.

$A(3, -2)$

$B(1, -5)$

$C(7, -4)$



Example 2

State what axis the point is reflected over.

a. $(2, 3)$ to $(-2, 3)$

b. $(-4, 5)$ to $(-4, -5)$

a. y -axis

b. x -axis

Example 3

Reflect (8, 6) over the x-axis then the y-axis.

$$(8, -6) \longrightarrow (-8, -6)$$

Example 4

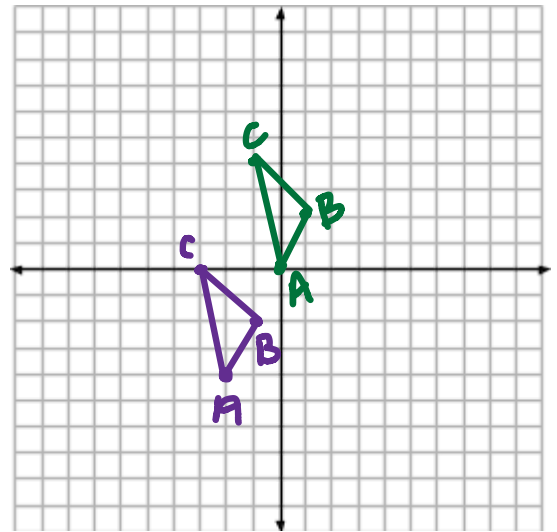
What is the translation of (-2, 5) to (3, 2)?

$$(x+5, y-3)$$

Example 5

A pre-image of a triangle has vertices A(-2, -4), B(-1, -2), and C(-3, 0). The image of (x, y) is translated (x + 2, y + 4). Draw the pre-image and the image.

$$\begin{aligned} A(0, 0) \\ B(1, 2) \\ C(-1, 4) \end{aligned}$$



Example 6

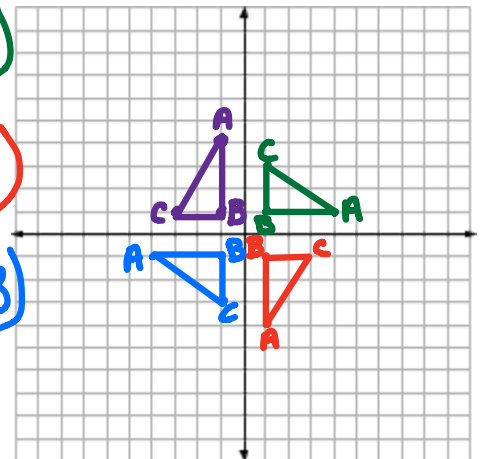
Find the coordinates of the given points rotated 90° counterclockwise about the origin. A(1, -1), B(4, -2), C(3, -4)

$$\begin{aligned} A(1, -1) & \quad A(-1, -1) \\ B(2, 4) & \quad B(-2, -4) \\ C(4, 3) & \quad C(-4, -3) \end{aligned}$$

Example 7

A figure has vertices A(-1, 4), B(-1, 1), and C(-3, 1). Find the new vertices after a 180° rotation about the origin. Graph the pre-image and image.

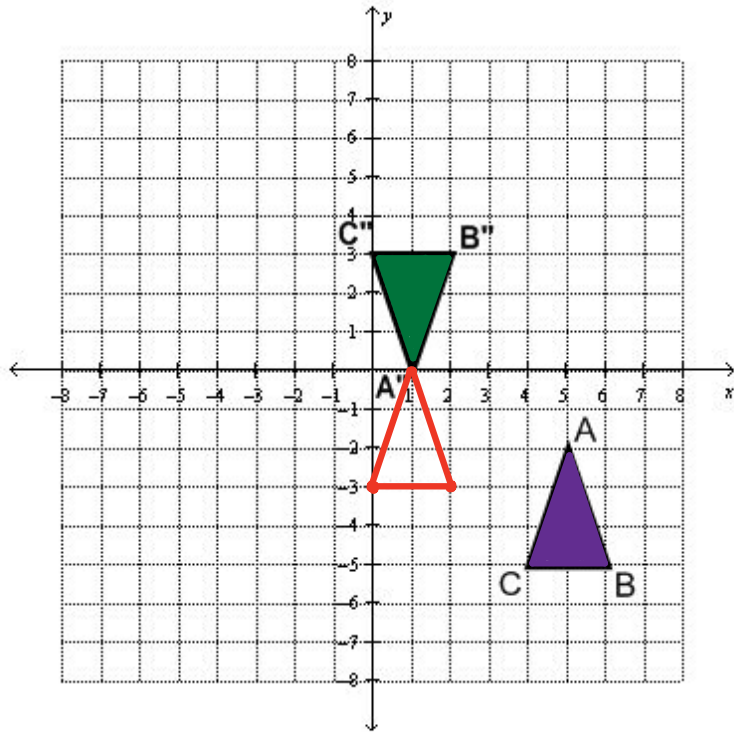
$$\begin{aligned} A(4, 1) \quad B(1, 1) \quad C(1, 3) \\ A(1, -4) \quad B(1, -1) \quad C(3, -1) \\ A(-4, -1) \quad B(-1, -1) \quad C(-1, -3) \end{aligned}$$



Example 8

Describe how you could move the $\triangle ABC$ to exactly match $\triangle A''B''C''$ using a series of two transformations.

$(x-4, y+2)$
Reflect over the x-axis



Example 9

A triangle ABC with vertices at A(2, -2), B(2, 3), C(-4, -2) is reflected over the x-axis, rotated 90° clockwise about the origin, and then translated 2 units left and 3 units down

List the coordinates of the new vertices after each transformation.

Reflection over the x-axis

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

Rotation 90° clockwise about the origin (use coordinates from the primes)

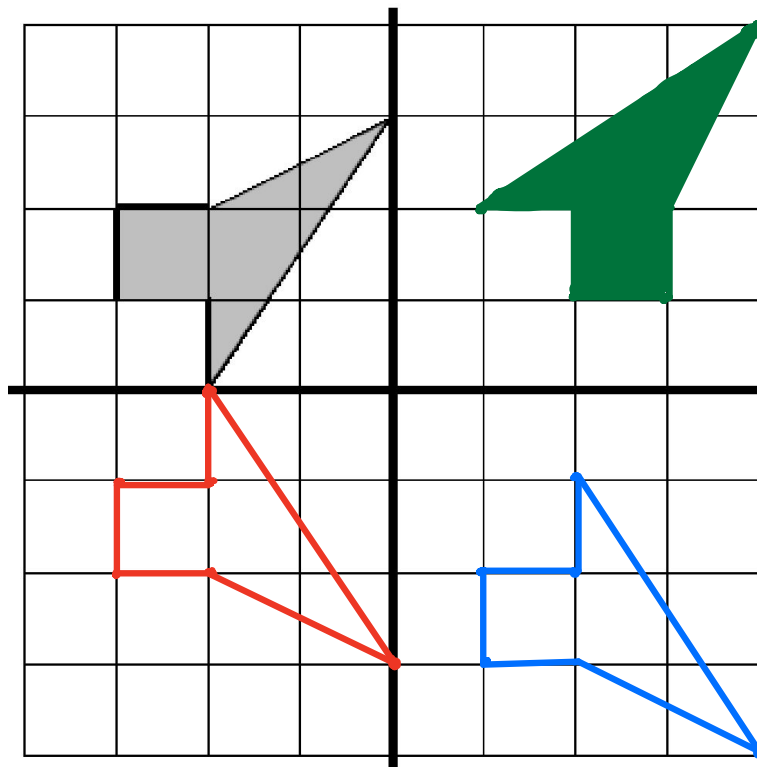
A'' $(2, -2)$ B'' $(-3, -2)$ C'' $(2, 4)$

Translation: $(x, y) \rightarrow (x - 2, y - 3)$ (use coordinates from the double primes)

A''' $(0, -5)$ B''' $(-5, -5)$ C''' $(0, 1)$
 $(x-2, y-3)$ $(x-2, y-3)$ $(x-2, y-3)$
 $(2-2, -2-3)$ $(-3-2, -2-3)$ $(2-2, 4-3)$

Example 10

Complete the following transformations in order. Reflect the shape over the x-axis. Translate $(x+4, y-1)$. Rotate 90° counterclockwise. (Hint: label your coordinates ABCDEF to help keep track of transformations).



YOU TRY PRACTICE

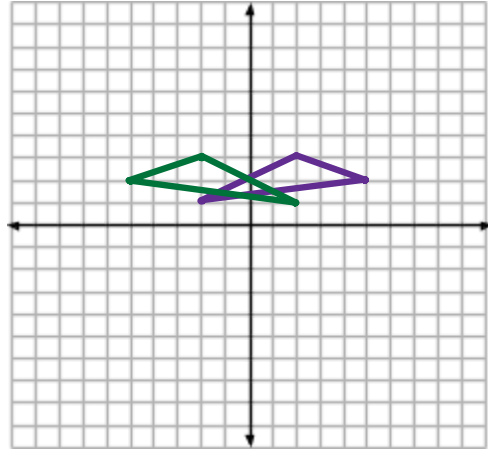
1 (You Try)

A pre-image of a triangle has vertices $D(-2, 1)$, $E(2, 3)$, and $F(5, 2)$. Find the coordinates of the reflection over the y axis. Draw the pre-image and the image.

$$D(2, 1)$$

$$E(-2, 3)$$

$$F(-5, 2)$$



2 (You Try)

State what axis the point is reflected over.

a. $(-3, 7)$ to $(-3, -7)$

b. $(-1, 5)$ to $(1, 5)$

a. x -axis

b. y -axis

3 (You Try)

Reflect $(-9, 4)$ over the y -axis then the x -axis.

$$(-9, 4) \rightarrow (9, 4) \rightarrow (9, -4)$$

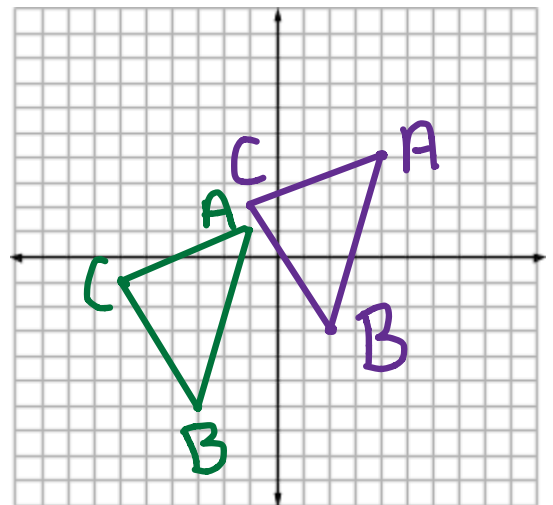
4 (You Try)

A pre-image of a triangle has vertices $A(4, 4)$, $B(2, -3)$, and $C(-1, 2)$. The image of (x, y) is translated $(x - 5, y - 3)$. Draw the pre-image and the image.

$$A'(-1, 1)$$

$$B'(-3, -6)$$

$$C'(-6, -1)$$



5 (You Try)

What is the translation of $(2, -2)$ to $(-1, 3)$?

$$(x-3, y+5)$$

6 (You Try)

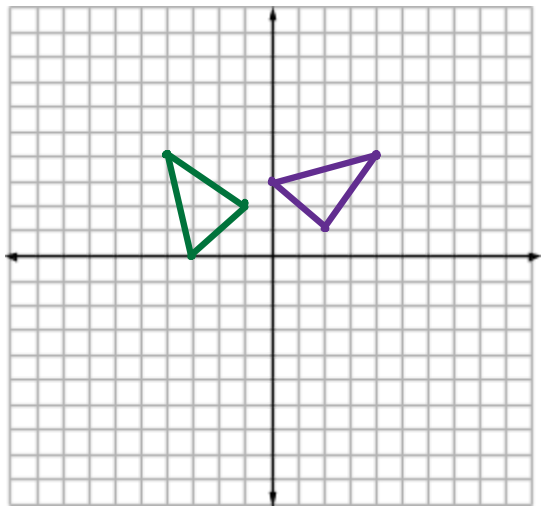
Find the coordinates of the given points rotated 270° clockwise about the origin.

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

$$(-4, 4)$$

$$(-1, 2)$$

$$(-3, 0)$$



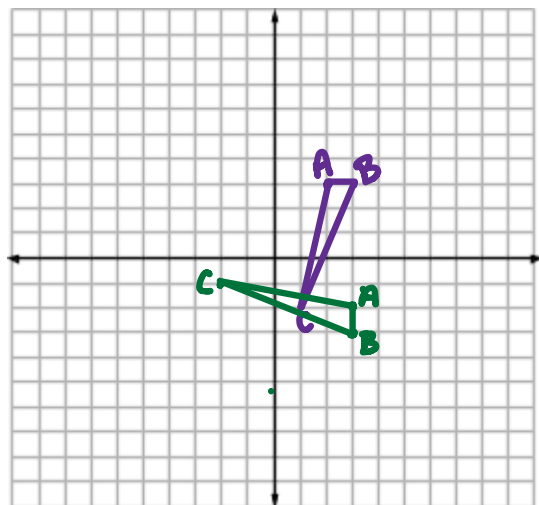
7 (You Try)

A figure has vertices $A(2, 3)$, $B(3, 3)$, and $C(1, -2)$. Find the new vertices after a 270° counterclockwise rotation about the origin. Graph the pre-image and image.

$$A(3, -2)$$

$$B(3, -3)$$

$$C(-2, -1)$$



8 (YOU TRY)

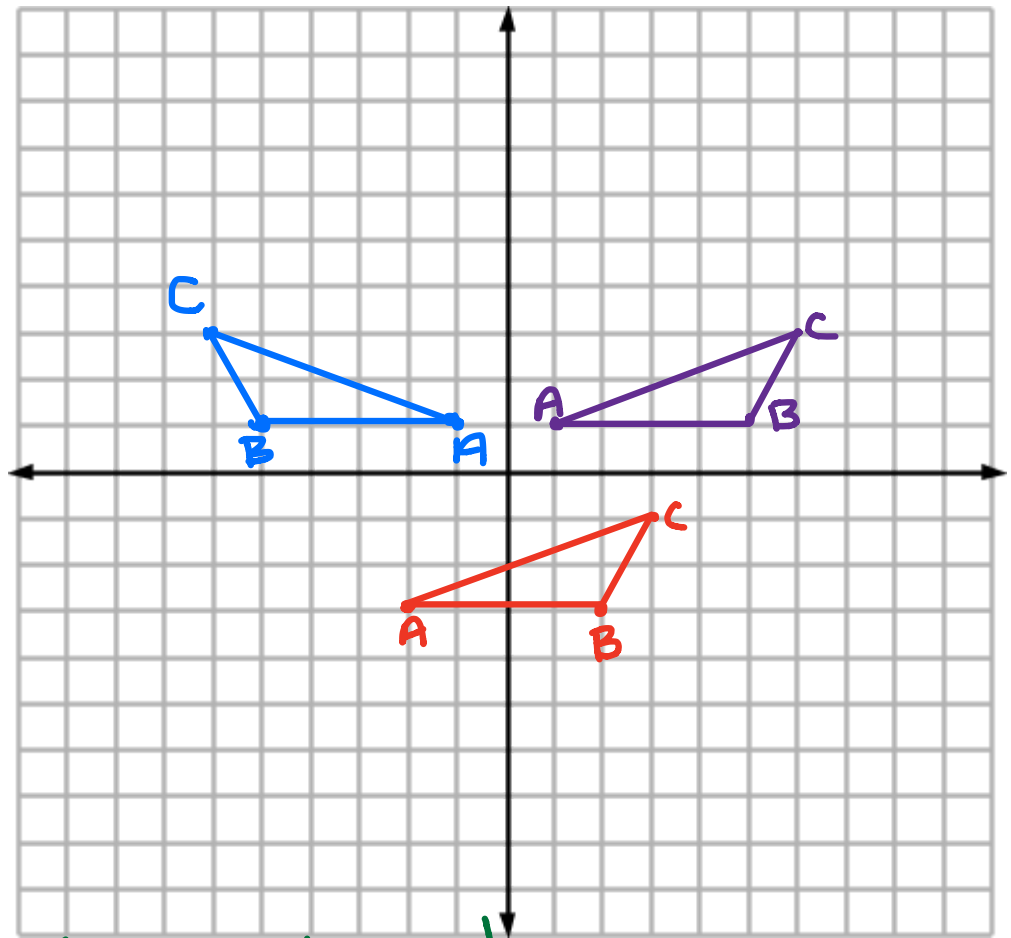
CPM 6-28.

Draw a triangle with vertices at $(1,1)$, $(5,1)$ and $(6,3)$. Label this triangle T.

a. Translate (slide) the triangle left 3 units and down 4 units. Label this triangle A and list the vertices.

b. Reflect triangle T across the y-axis. Label this triangle B and list the vertices.

c. Are triangles T, A, and B congruent (that is, do they have the same shape and size)? Explain.



The triangles are congruent because the shape and size stayed the same.

$A(1,1)$ $B(5,1)$ $C(6,3)$
 $A(-2,-3)$ $B(2,-3)$ $C(3,-1)$
 $A(-1,1)$ $B(-5,1)$ $C(-6,3)$

