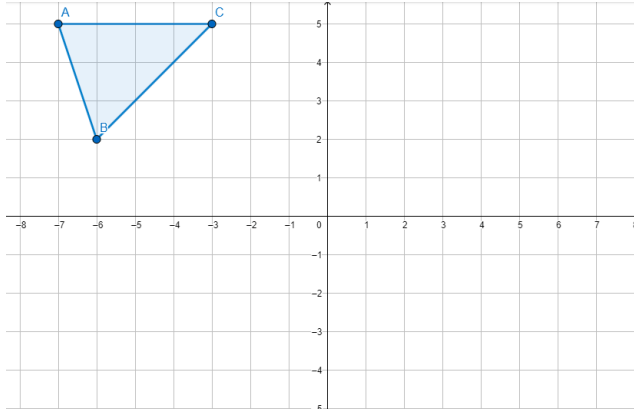


See the ANSWERS below on page 3.

1. Given triangle ABC shown below, find the image that results from the following transformation:  $T_{-2, 4}$  (translation  $(x-2, y+4)$ )  $\circ$   $r_{y\text{-axis}}$  (reflection y-axis)



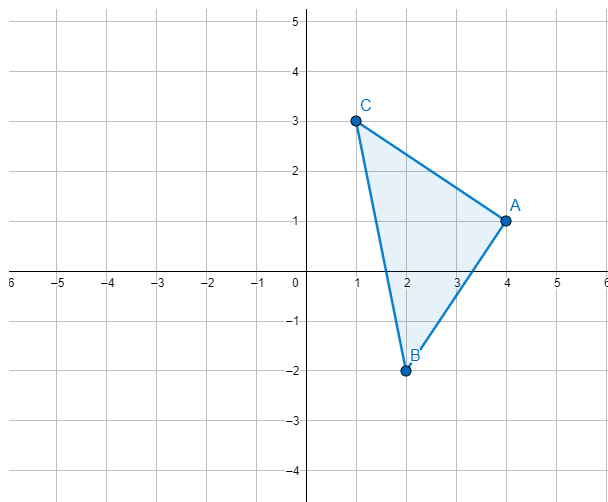
2. The point  $(-3, 5)$  is rotated 90 degrees counterclockwise around the origin and then dilated by a scale factor of 4 at the origin. What are the coordinates of the resulting image?

3. The point  $(7, -1)$  is rotated 270 degrees clockwise around the origin and then dilated by a scale factor of  $1/2$  at the origin. What are the coordinates of the resulting image?

4. Line segment AB, with A  $(-3, 7)$  and B  $(2, 9)$  is reflected over the y-axis and then rotated 180 degrees about the origin. What is the resulting image?

5. Given triangle ABC below, find the image that results from the following transformation:

$R_{90 \text{ degrees}}$   $\circ$   $T_{-3, 1}$ .



For each point given in the table below, (1) plot the point, (2) perform the indicated transformations and (3) give the resulting point:

	$T_{-2, 1} \circ R_{180 \text{ degrees}}$	$r_{x\text{-axis}} \circ T_{3, 5}$	$r_{y\text{-axis}} \circ r_{x\text{-axis}}$	$R_{90 \text{ degrees}} \circ r_{y\text{-axis}}$
6. $(-7, 3)$				
7. $(0, -5)$				
8. $(4, 0)$				
9. $(0, 0)$				
10. $(-7, -9)$				
11. $(4, -6)$				
12. $(2, 12)$				

# Answer Key:

1. Triangle A''B''C'' with A''(5, 9), B''(4, 6), and C''(1, 9)

$$\begin{aligned} A(-7, 5) &\rightarrow A'(7, 5) \rightarrow A''(5, 9) \\ B(-6, 2) &\rightarrow B'(6, 2) \rightarrow B''(4, 6) \\ C(-3, 5) &\rightarrow C'(3, 5) \rightarrow C''(1, 9) \end{aligned}$$

①  $r_{y\text{-axis}} (-x, y)$  ②  $T(-2, 4)$

2. (-20, -12)

$$(-3, 5) \xrightarrow{\text{Rotate } 90^\circ \text{ ccw } (-y, x)} (-5, -3) \xrightarrow{\text{Dilate } 4} (-20, -12)$$

①  $R_{90^\circ \text{ ccw}} (-y, x)$  ②  $D_4 (-4y, 4x)$

3. (1/2, 7/2)

$$(7, -1) \xrightarrow{\text{Rotate } 270^\circ \text{ cw } (-y, x)} (1, 7) \xrightarrow{\text{Dilate } 1/2} \left(\frac{1}{2}, \frac{7}{2}\right)$$

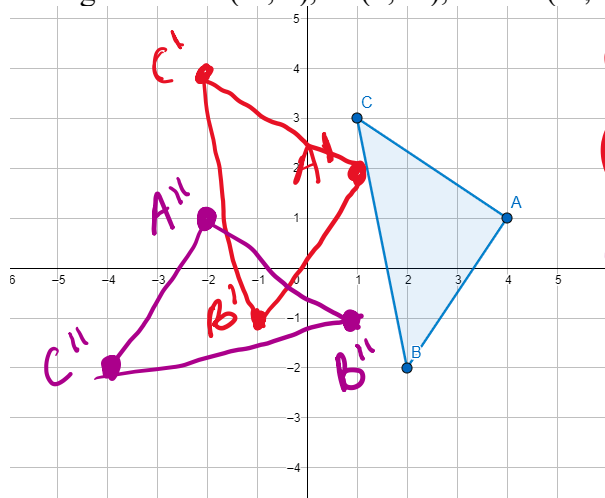
①  $R_{270^\circ \text{ cw}} (-y, x)$  ②  $D_{1/2} (-\frac{1}{2}y, \frac{1}{2}x)$

4. Line segment with A''(-3, -7) and B''(2, -9)

$$\begin{aligned} A(-3, 7) &\xrightarrow{\text{reflect } y\text{-axis } (-x, y)} (3, 7) \xrightarrow{\text{rotate } 180^\circ} A''(-3, -7) \\ B(2, 9) &\xrightarrow{\text{reflect } y\text{-axis } (-x, y)} (-2, 9) \xrightarrow{\text{rotate } 180^\circ} B''(2, -9) \end{aligned}$$

① reflect  $y\text{-axis } (-x, y)$  ② rotate  $180^\circ$

5. Triangle with A''(-2, 1), B''(1, -1), and C''(-4, -2)



①  $T_{-3, 1} (x-3, y+1)$   
②  $R_{90^\circ} (-y, x)$

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

	$T_{-2, 1} \circ R_{180^\circ}$	$r_{x\text{-axis}} \circ T_{3, 5}$	$r_{y\text{-axis}} \circ r_{x\text{-axis}}$	$R_{90^\circ} \circ r_{y\text{-axis}}$
6. (-7, 3)	(5, -2)	(-4, -8)	(7, -3)	(-3, 7)
7. (0, -5)	(-2, 6)	(3, 0)	(0, 5)	(5, 0)
8. (4, 0)	(-6, 1)	(7, -5)	(-4, 0)	(0, -4)
9. (0, 0)	(-2, 1)	(3, -5)	(0, 0)	(0, 0)
10. (-7, -9)	(5, 10)	(-4, 4)	(7, 9)	(9, 7)
11. (4, -6)	(-6, 7)	(7, 1)	(-4, 6)	(6, -4)
12. (2, 12)	(-4, -11)	(5, -17)	(-2, -12)	(-12, -2)

①  $R_{180} (-x, -y)$  ①  $T_{3, 5} (x+3, y+5)$  ①  $r_{x\text{-axis}} (x, -y)$  ①  $r_{y\text{-axis}} (-x, y)$   
②  $T_{-2, 1} (x-2, y+1)$  ②  $r_{x\text{-axis}} (x, -y)$  ②  $r_{y\text{-axis}} (-x, y)$  ②  $R_{90^\circ} (-y, x)$

