

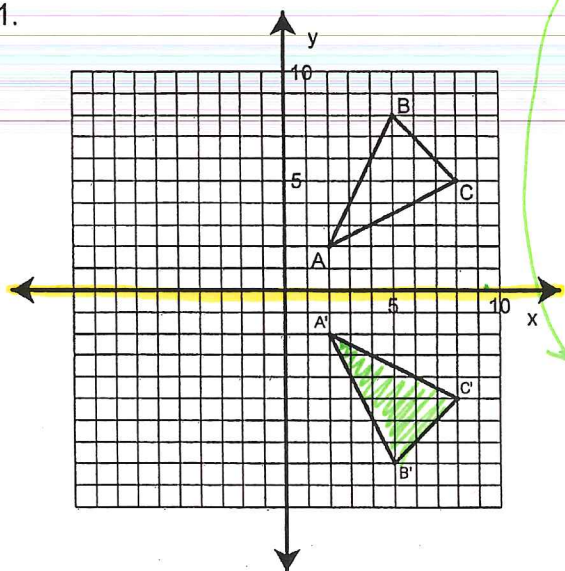
# Geometry

## Composite of Reflections over Two Intersecting Lines

Name Key  
 Hour \_\_\_\_\_

1 - 4 Find the line of reflection and highlight it with a colored pencil. Write the equation of the line of reflection. Find the coordinates of the reflected image and use them to write the image formula that would reflect any point  $(x,y)$  over the given reflection line.

1.



A	(2,2)	B	(5,8)	C	(8,5)
A'	(2,-2)	B'	(5,-8)	C'	(8,-5)

$(x, -y)$

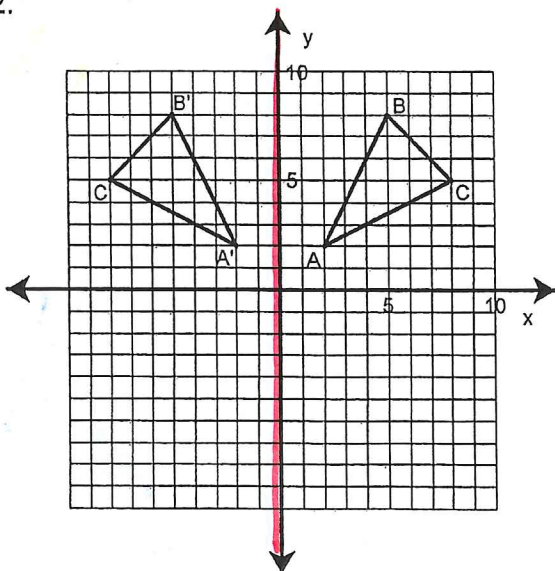
Equation of the line of reflection:

$y = 0$

Image formula for this reflection:

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

2.



A	(2,2)	B	(5,8)	C	(8,5)
A'	(-2,2)	B'	(-5,8)	C'	(-8,5)

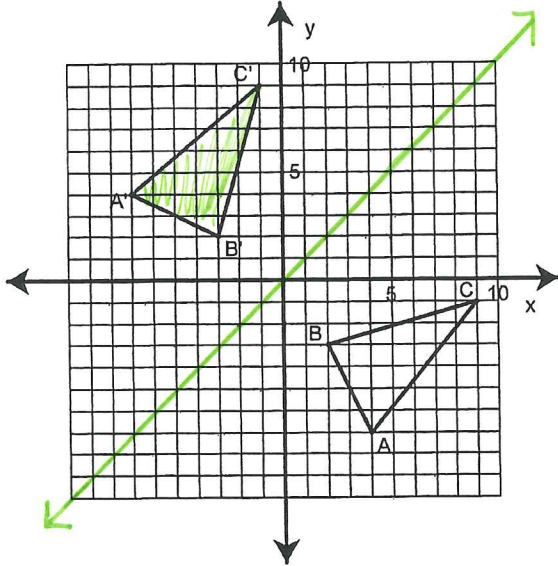
Equation of the line of reflection:

$x = 0$

Image formula for this reflection:

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

3.



A	(4,-7)	B	(2,-3)	C	(9,-1)
A'	(-7,4)	B'	(-3,2)	C'	(-1,9)

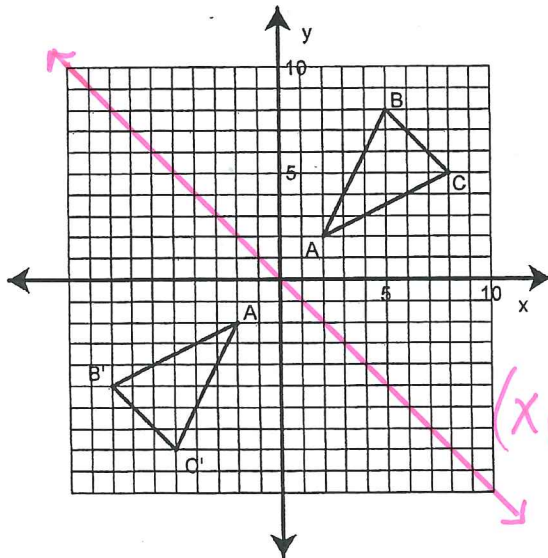
Equation of the line of reflection:

$$x = y$$

Image formula for this reflection:

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

4.



A	(2,2)	B	(5,8)	C	(8,5)
A'	(-2,-2)	B'	(-8,-5)	C'	(-5,-8)

Equation of the line of reflection:

$$y = -x$$

Image formula for this reflection:

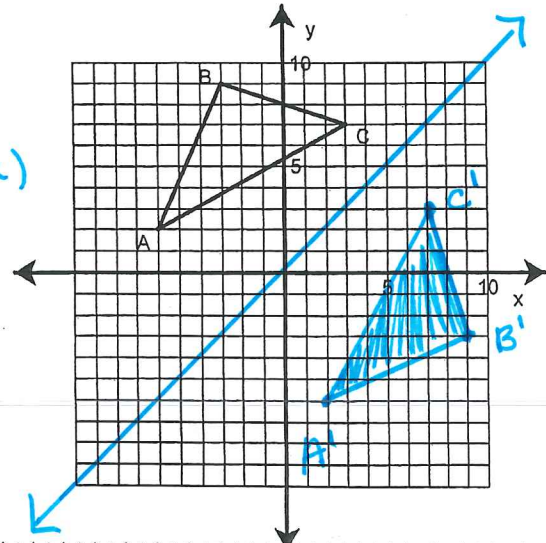
$$(x, y) \rightarrow (-y, -x)$$

5 – 6 Use the image formulas written in numbers 1 – 4 to find the new coordinates of  $\triangle ABC$ . Then graph the new triangle ( $\triangle A'B'C'$ ).

5. Equation of the line of reflection:  $y = x$

Image formula for this reflection:  $(x, y) \rightarrow (y, x)$

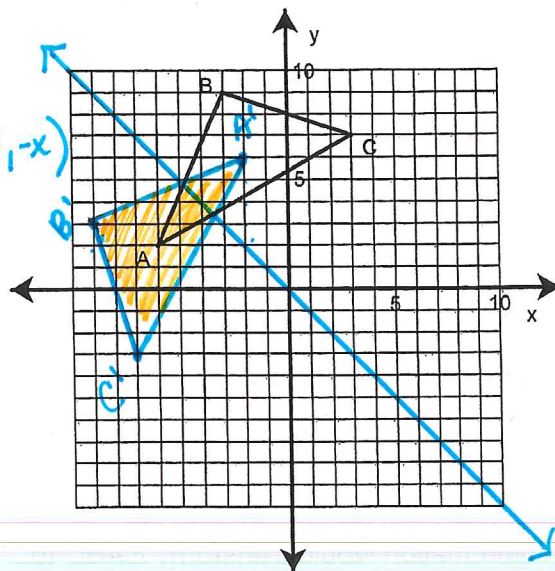
A	(-6,2)	B	(-3,9)	C	(3,7)
A'	(2,-6)	B'	(9,-3)	C'	(7,3)



6. Equation of the line of reflection:  $y = -x$

Image formula for this reflection:  $(x, y) \rightarrow (-y, -x)$

A	(-6, 2)	B	(-3, 9)	C	(3, 7)
A'	(-2, 6)	B'	(-9, 3)	C'	(-7, -3)



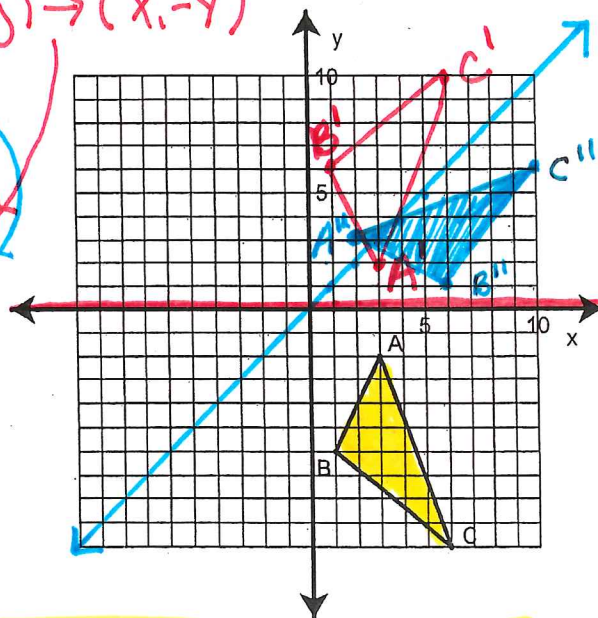
7 – 8 Use the image formulas written in numbers 1 – 4 to first find the coordinates of  $\Delta A'B'C'$  and then to find the coordinates of  $\Delta A''B''C''$  for the given composites. Then graph ONLY  $\Delta A''B''C''$ . Also graph the two lines of reflection.

7. Composite:  $(r_{y=x} \circ r_{y=0})(\Delta ABC) = r_{y=x}(R_{y=0})(\Delta ABC)$

Equation of the first line of reflection:  $y = 0$   $(x, y) \rightarrow (x, -y)$

Equation of the second line of reflection:  $y = x$   $(x, y) \rightarrow (y, x)$

A	(3, -2)	B	(1, -6)	C	(6, -10)
A'	(3, 2)	B'	(1, 6)	C'	(6, 10)
A''	(2, 3)	B''	(6, 1)	C''	(10, 6)



What transformation occurred from this composite? In other words, what transformation would transform  $\Delta ABC$  to  $\Delta A''B''C''$  without using any reflections?

- \* Rotation
- \*  $90^\circ$  counter clockwise
- \* about the origin

Give an image formula for this transformation.

A (3, -2) B (1, -6) C (6, -10)

A'' (2, 3) B'' (6, 1) C'' (10, 6)

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

8. Composite:  $r_{y=0}(r_{y=x}(\triangle ABC))$

Equation of the first line of reflection:  $y = x$   $(x, y) \rightarrow (y, x)$

Equation of the second line of reflection:  $y = 0$   $(x, y) \rightarrow (x, -y)$

A	(3, -2)	B	(1, -6)	C	(6, -10)
A'	(-2, 3)	B'	(-6, 1)	C'	(-10, 6)
A''	(-2, -3)	B''	(-6, -1)	C''	(-10, -6)

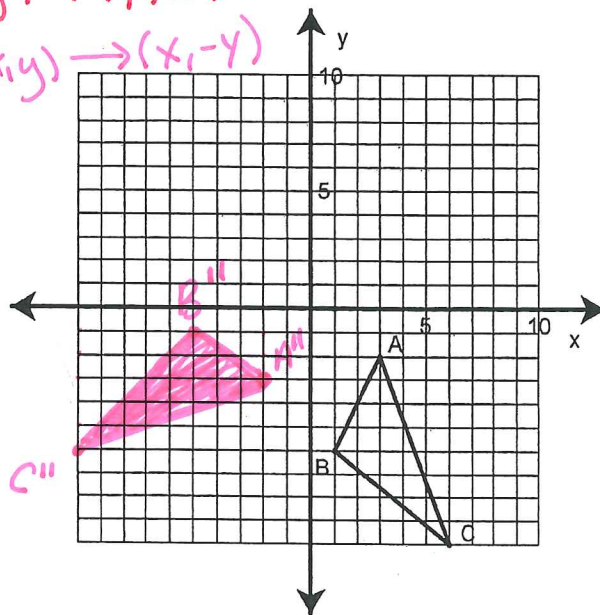
What transformation occurred from this composite? In other words, what transformation would transform  $\triangle ABC$  to  $\triangle A''B''C''$  without using any reflections?

- \* Rotation
- \*  $90^\circ$  clockwise
- \* around origin

Give an image formula for this transformation.

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

Based on  $A(3, -2)$   
 $A''(-2, -3)$



9. Notice in numbers 7 and 8, the same two lines of reflection were used, however the image triangle is located in a different position. Make a conjecture on what you think makes the difference.

Changing the order in which you reflect, changes the direction of the rotation.

10 - 11 Use the image formulas written in numbers 1 - 4 to first find the coordinates of  $\Delta A'B'C'$  and then to find the coordinates of  $\Delta A''B''C''$  for the given composites. Then graph ONLY  $\Delta A''B''C''$ .

10. Composite:  $(r_{y=x} \circ r_{y=-x})(\Delta ABC)$

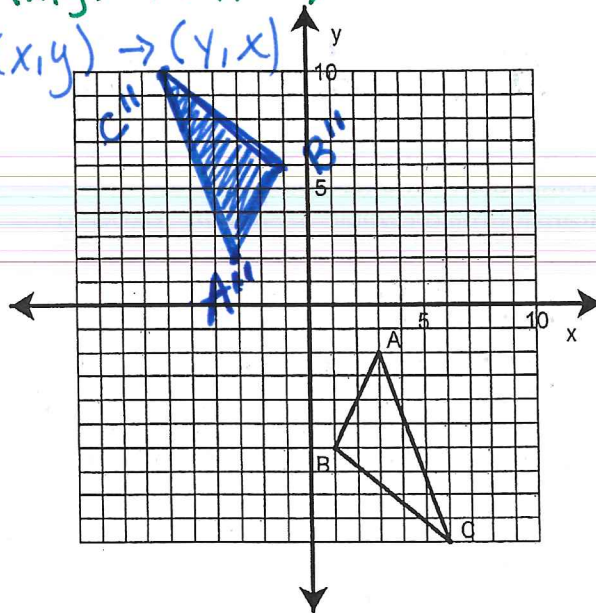
Equation of the first line of reflection:  $y = -x$   $(x, y) \rightarrow (-y, -x)$

Equation of the second line of reflection:  $y = x$   $(x, y) \rightarrow (y, x)$

A	(3, -2)	B	(1, -6)	C	(6, -10)
A'	(2, -3)	B'	(6, -1)	C'	(-10, -6)
A''	(-3, 2)	B''	(-1, 6)	C''	(-6, 10)

What transformation occurred from this composite? In other words, what transformation would transform  $\Delta ABC$  to  $\Delta A''B''C''$  without using any reflections?

180° Rotation around the origin



Give an image formula for this transformation.

$$A(3, -2) \longrightarrow A''(-3, 2)$$

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

11 Composite:  $r_{x=0}(r_{y=0}(\Delta ABC))$

Equation of the first line of reflection:  $y=0$   $(x,y) \rightarrow (x,-y)$

Equation of the second line of reflection:  $x=0$   $(x,y) \rightarrow (-x,y)$

A	(3,-2)	B	(1,-6)	C	(6,-10)
A'	(3,2)	B'	(1,6)	C'	(6,10)
A''	(-3,2)	B''	(-1,6)	C''	(-6,10)

What transformation occurred from this composite? In other words, what transformation would transform  $\Delta ABC$  to  $\Delta A''B''C''$  without using any reflections?

Rotation

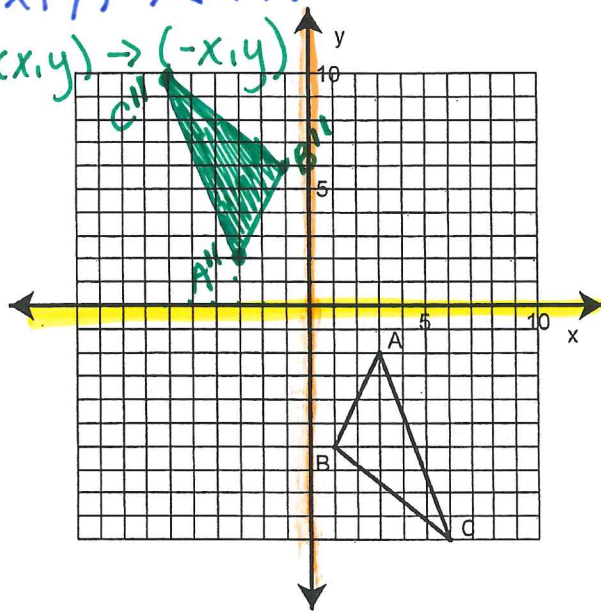
180° clockwise AND  
Counter clockwise

about the origin

Give an image formula for this transformation.

$$A(3,-2) \longrightarrow A''(-3,2)$$

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



12. Notice in numbers 10 and 11, the same transformation occurred but different lines were used. Make a conjecture on what you think must be true about the lines used as lines of reflection.

It is a reflection over 2 lines which are  $\perp$ . It did not matter what order they needed to be.