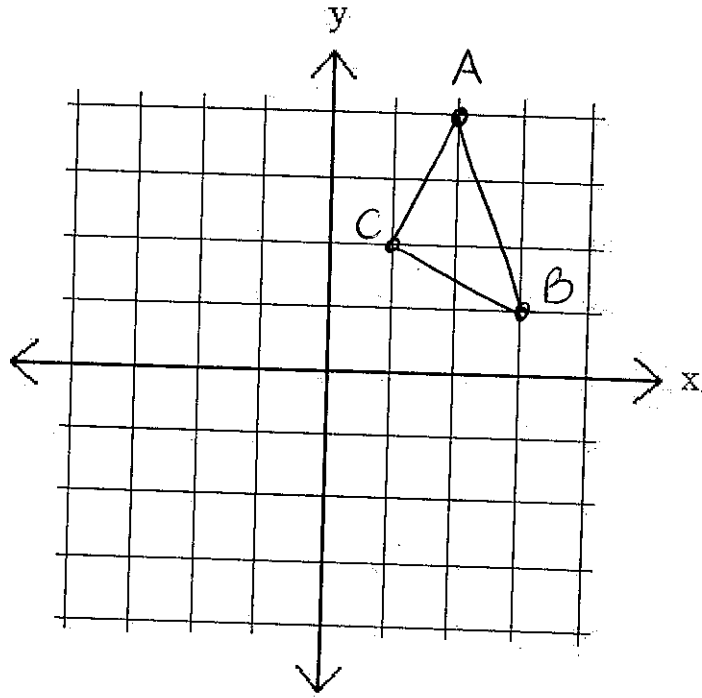


Line Reflections

Do Now:

Given point A(2,4), B(3,1), and C(1,2), draw triangle ABC on the graph provided.



Reflection: a transformation that uses a line like a mirror to reflect a figure over that line

- You can reflect a figure in any line. That mean horizontal, vertical, diagonal or over any line in a coordinate plane (x -axis, y -axis, $y = x$, $y = -x$, etc.)
- A reflection in a line m maps every point P in the plane, to a point P' , so that each of the following properties is true
 - if point P is on line m , then $P = P'$
 - if point P is not on line m , then line m is the perpendicular bisector

Line Reflections in the Coordinate Plane

Transformation	Example	General Rule
Reflection in x-axis		$(x, y) \rightarrow (x, -y)$ *change the sign of y
Reflection in y-axis		$(x, y) \rightarrow (-x, y)$ *change the sign of x
Reflection in $y = x$		$(x, y) \rightarrow (y, x)$ *switch the order
Reflection in $y = -x$		$(x, y) \rightarrow (-y, -x)$ *switch the order <u>AND</u> change both signs

Let's go back to our Do Now and reflect triangle ABC in both the x-axis and y-axis.

Practice Problems:

Determine the image of the pre-image after each reflection.

1.

$$r_{x\text{-axis}}(1, -2) \rightarrow (1, 2)$$

$$r_{y\text{-axis}}(-3, 4) \rightarrow (3, 4)$$

$$r_{y=x}(4, -2) \rightarrow (-2, 4)$$

$$r_{y=-x}(1, -3) \rightarrow (3, -1)$$

2.

$$r_{x\text{-axis}}(5, -3) \rightarrow (5, 3)$$

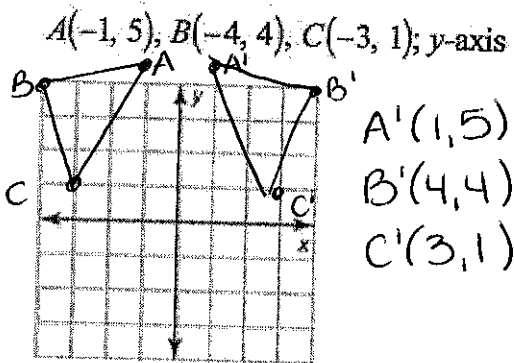
$$r_{y\text{-axis}}(1, 6) \rightarrow (-1, 6)$$

$$r_{y=x}(3, -4) \rightarrow (-4, 3)$$

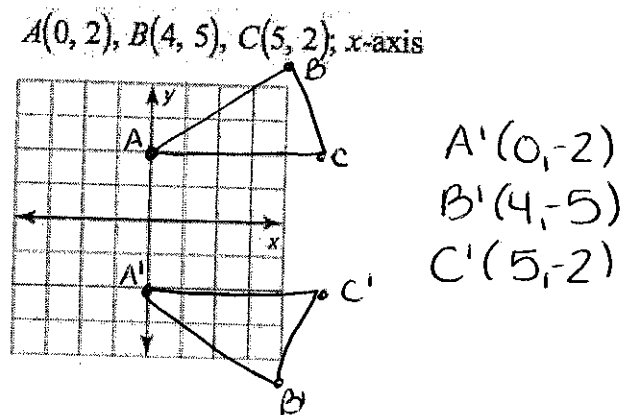
$$r_{y=-x}(-2, 2) \rightarrow (-2, 2)$$

For each of the following, graph the image of the figure after each reflection.

3.



4.

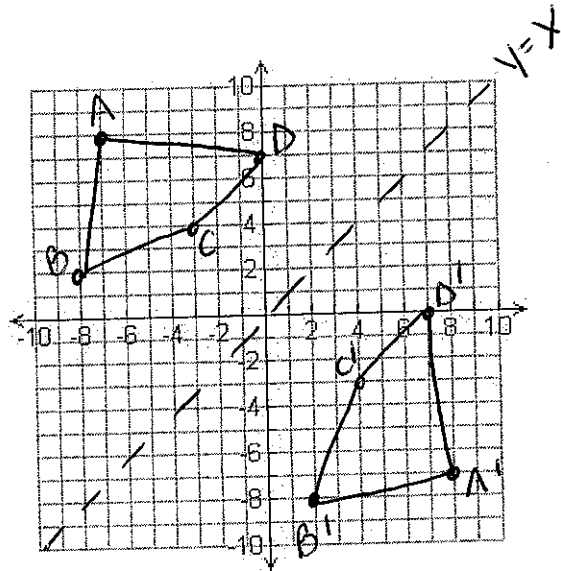


Line Reflections (cont.)

Do Now:

On the accompanying set of axes, draw the reflection of ABCD with A(-7, 8), B(-8, 2), C(-3, 4), D(0, 7) in the line $y = x$. Label and state the coordinates of the reflected figure.

- $A'(8, -7)$
- $B'(2, -8)$
- $C'(4, -3)$
- $D'(7, 0)$



Reflection over any line – count the boxes

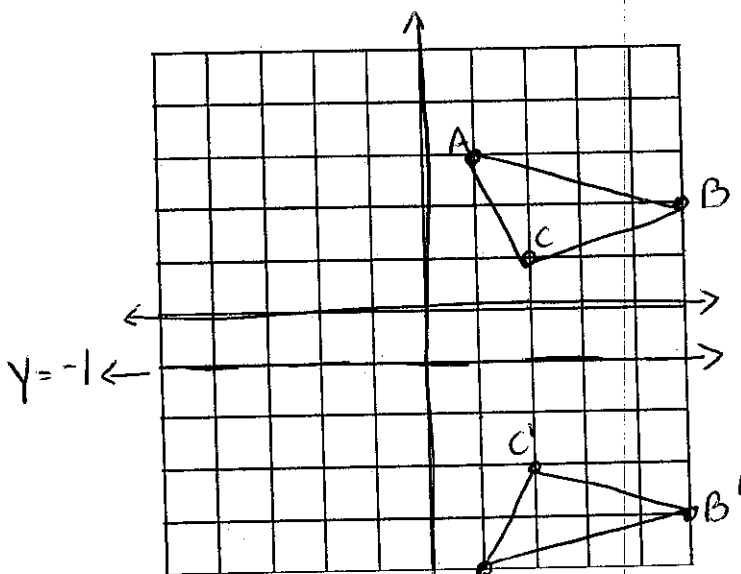
Example 1:

Graph triangle ABC with vertices A(1, 3), B(5, 2), and C(2, 1) and its image after the reflection described.

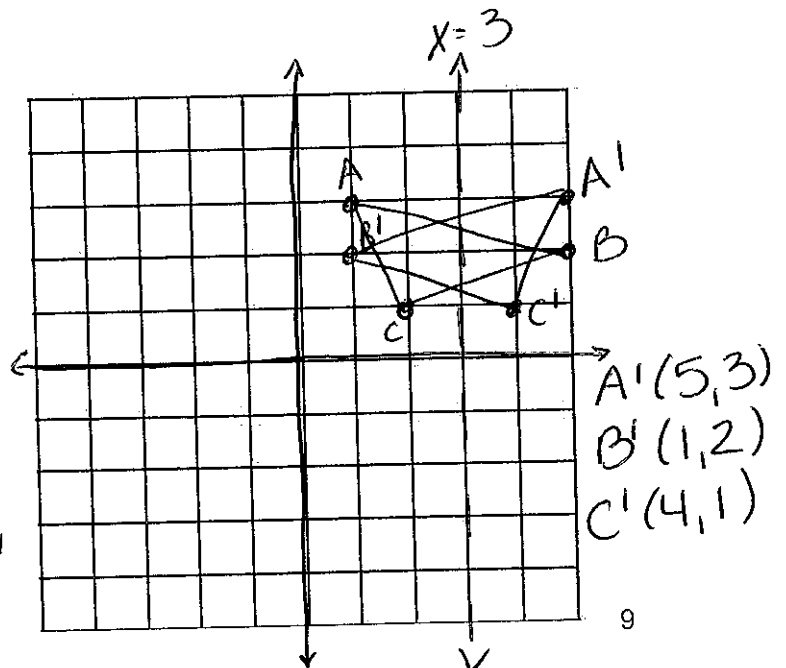
a. In the line $n: y = -1$
horizontal line

b. In the line $m: x = 3$
vertical line

Example 2:



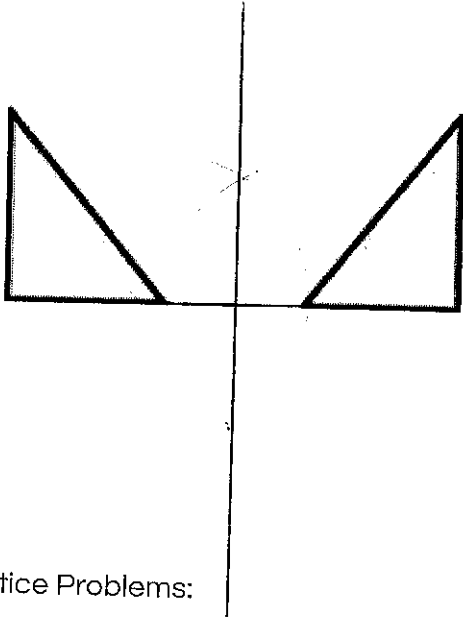
- $A'(1, -5)$
- $B'(5, -4)$
- $C'(2, -3)$



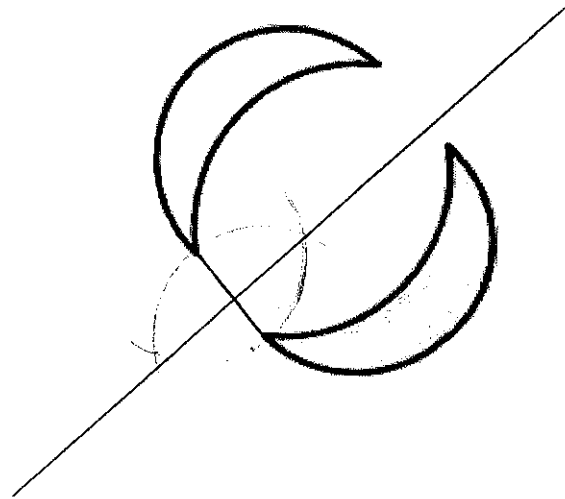
- $A'(5, 3)$
- $B'(1, 2)$
- $C'(4, 1)$

Construct the line of reflection for the following reflections.

a.

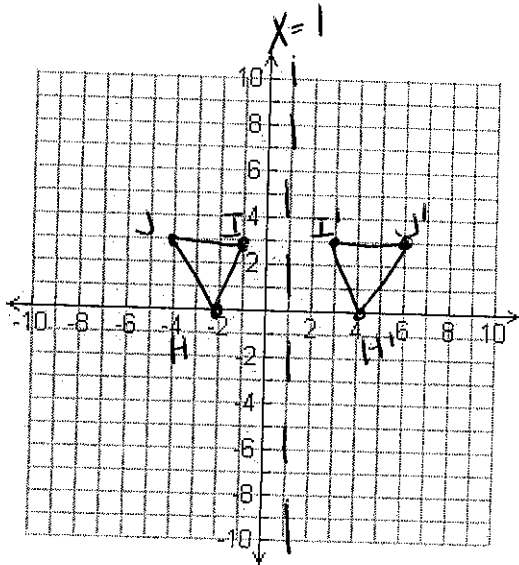


b.



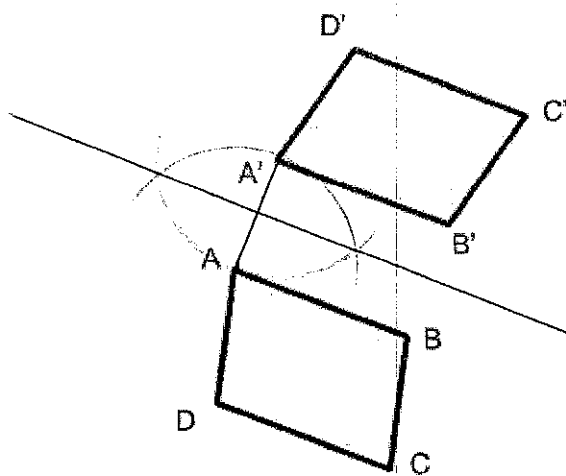
Practice Problems:

- Triangle HIJ with $H(-2, 0)$, $I(-1, 3)$, and $J(-4, 3)$, is reflected over the line $x = 1$. Show the reflection on the graph below and state the coordinates of triangle $H'I'J'$, the image of triangle HIJ.

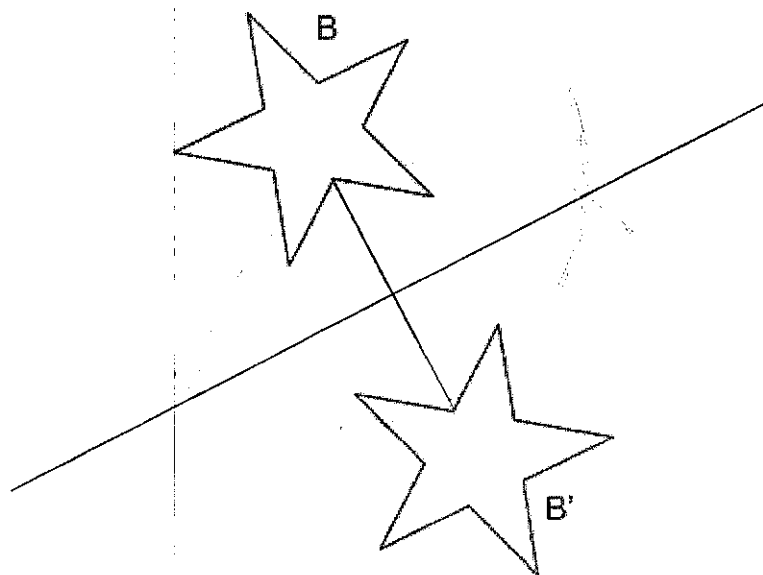


$H'(4, 0)$
 $I'(3, 3)$
 $J'(6, 3)$

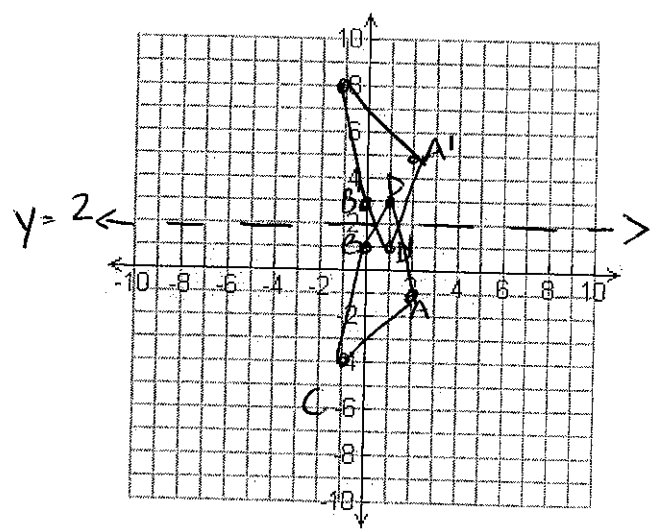
2. Construct the line of reflection for image $A'B'C'D'$ and the pre-image $ABCD$.



3. Construct the line of reflection for image B' and its pre-image B .



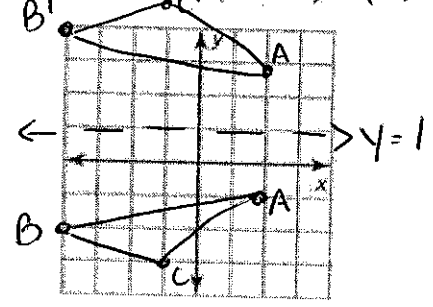
4. Quadrilateral ABCD with A(2, -1), B(0, 1), C(-1, -4), and D(1, -3), is reflected over the line $y = 2$. Show the reflection on the graph below and state the coordinates of its image, A'B'C'D.



- $A'(2, 5)$
- $B'(0, 3)$
- $C'(-1, 8)$
- $D'(1, 1)$

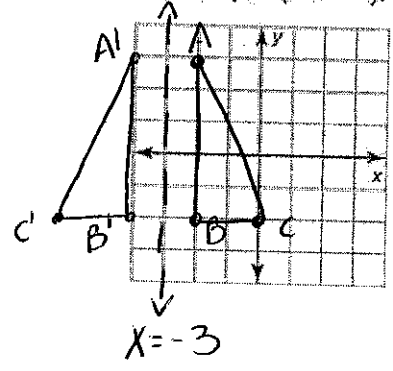
For 5 & 6, sketch a graph of each triangle and graph its image after the reflection described.

5. $A(2, -1), B(-4, -2), C(-1, -3); y = 1$



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

6. $A(-2, 3), B(-2, -2), C(0, -2); x = -3$



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

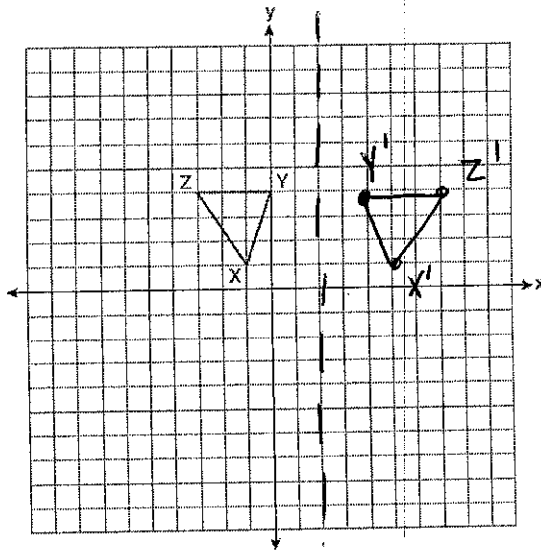
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LINE REFLECTIONS

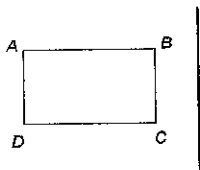
Transformation	Example	General Rule
Reflection in x-axis		
Reflection in y-axis		
Reflection in $y = x$		
Reflection in $y = -x$		

1. Triangle XYZ , shown in the diagram below, is reflected over the line $x = 2$. State the coordinates of $\triangle X'Y'Z'$, the image of $\triangle XYZ$.

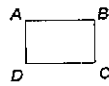


$$\begin{aligned} X' & (5, 1) \\ Y' & (4, 4) \\ Z' & (7, 4) \end{aligned}$$

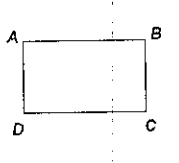
2. Which image represents a reflection of square $ABCD$ over the y -axis?



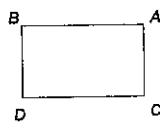
(1)



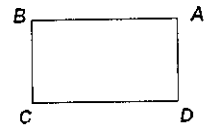
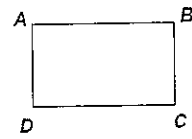
(2)



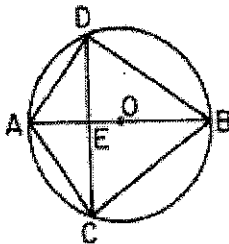
(2)



pay attention to
correspondence

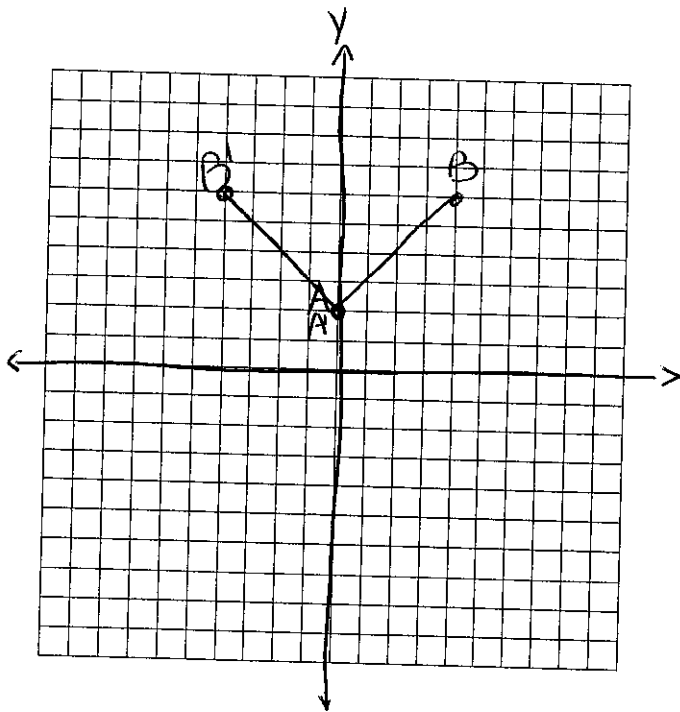


3. In the accompanying diagram of circle O , diameter \overline{AB} is perpendicular to chord \overline{CD} at point E . What is the image of \overline{AC} in \overline{AB} ?



\overline{AD}

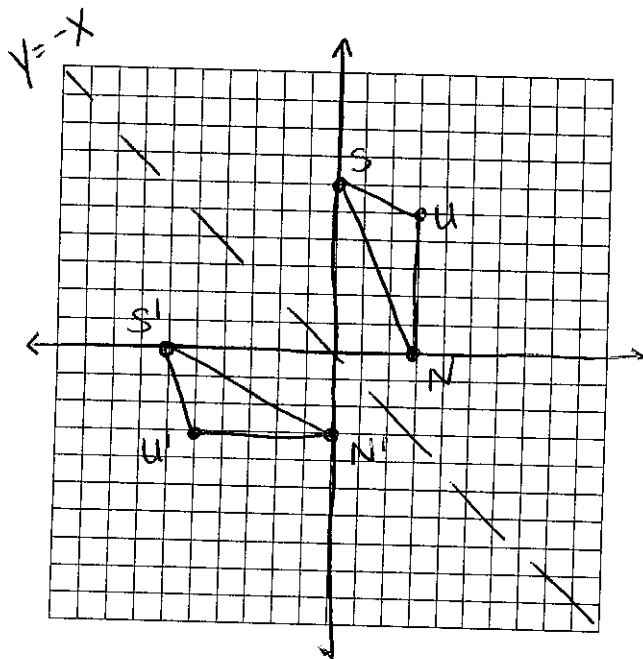
4. The coordinates of the endpoints of \overline{AB} are $A(0,2)$ and $B(4,6)$. Graph and state the coordinates of A' and B' , the images of A and B after \overline{AB} is reflected in the y -axis.



$$A'(0, 2)$$

$$B'(-4, 6)$$

5. Triangle SUN has coordinates $S(0,6)$, $U(3,5)$, and $N(3,0)$. On the accompanying grid, draw and label $\triangle SUN$. Then, graph and state the coordinates of $\triangle S'U'N'$, the image of $\triangle SUN$ after a reflection in the $y = -x$.

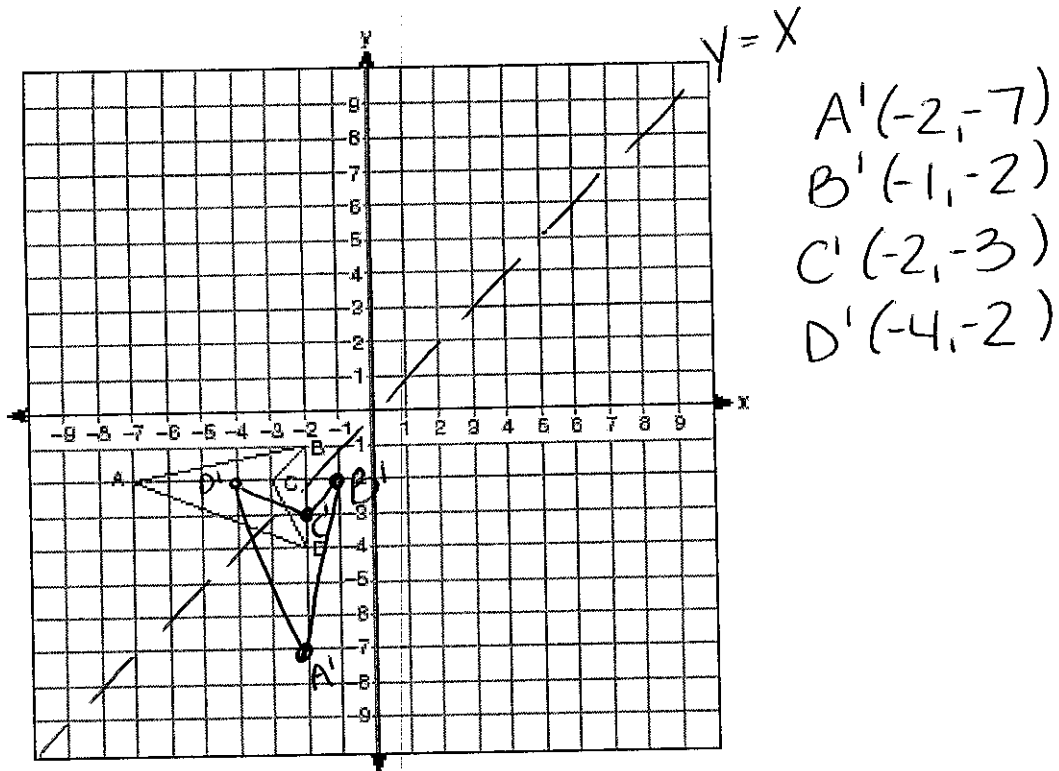


$$S'(-6, 0)$$

$$U'(-5, -3)$$

$$N'(0, -3)$$

6. On the accompanying set of axes, draw the reflection of $ABCD$ in the line $y = x$. Label and state the coordinates of the reflected figure.



7. Triangle ABC has vertices $A(-2, 2)$, $B(-1, -3)$, and $C(4, 0)$. Find the coordinates of the vertices of $\triangle A'B'C'$, the image of $\triangle ABC$ after the transformation $r_{x\text{-axis}}$. [The use of the grid is optional.]

