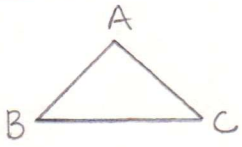
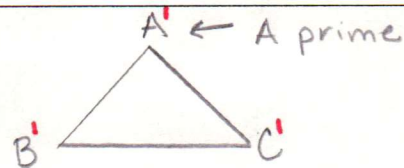
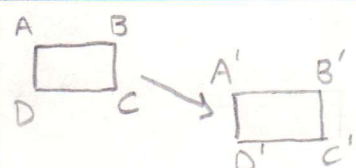
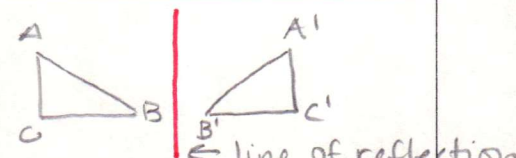
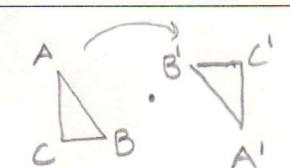
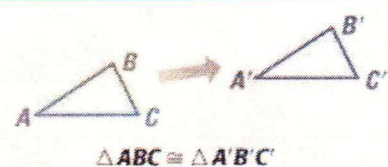
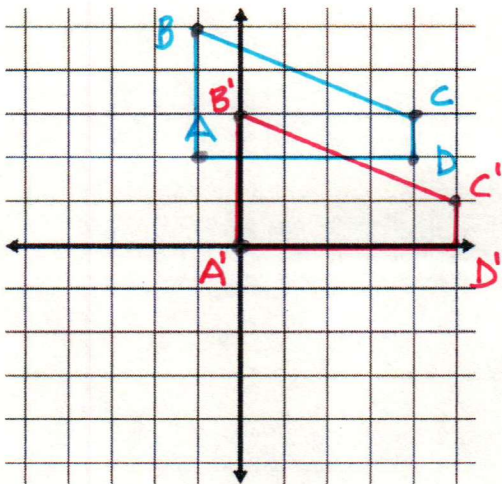


Notes 7.1 – Geometric Transformations

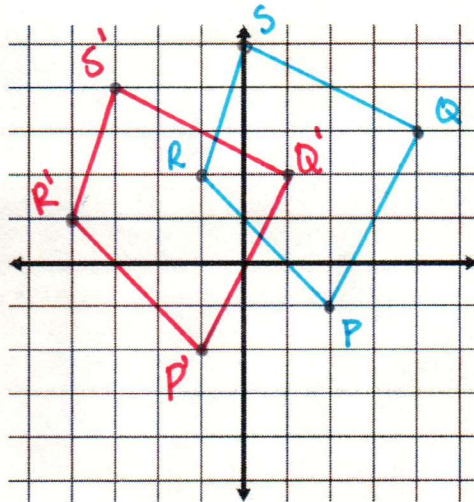
Word	Meaning/Notation	Example
Transformation	a general term for ways to manipulate a geometric figure	
Pre-image	a geometric figure before it is transformed	
Image	a geometric figure after it is transformed	
Translation ( $x+a, y+b$ )	a geometric figure slides to a new location same size, shape, orientation	
Reflection (eqn of line)	the mirror image of a geometric figure	
Rotation ( $x, y$ )	a geometric figure is rotated around a specific point	
Congruent $\cong$	two geometric figures that are the exact same size and shape.	

## Translations

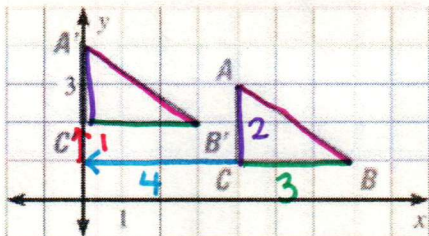
1. Graph the quadrilateral ABCD with vertices  $A(-1,2)$ ,  $B(-1,5)$ ,  $C(4,3)$ , and  $D(4,2)$ . Find the image of each vertex after the translation  $(x,y) \rightarrow (x+1, y-2)$ .  $\uparrow \rightarrow 1 \downarrow 2$   
Then graph the image using prime notation.



2. Graph the quadrilateral PQSR with vertices  $P(2,-1)$ ,  $Q(4,3)$ ,  $S(0,5)$ ,  $R(-1,2)$ . Find the image of each vertex after the translation  $(x,y) \rightarrow (x-3, y-1)$ .  $\leftarrow 3 \downarrow 1$   
Then graph the image using prime notation.

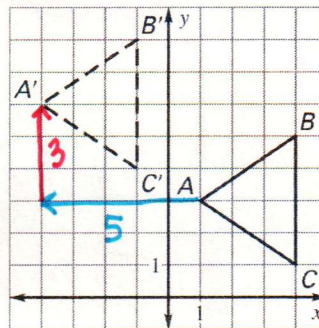


3. Write a rule for the translation of  $\triangle ABC$  to  $\triangle A'B'C'$ , then verify that the translation is an isometry.



$$(x-4, y+1)$$

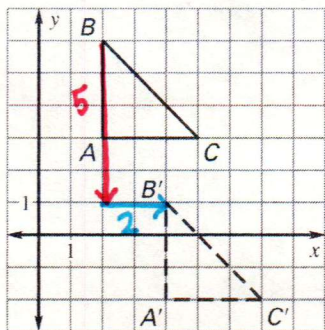
4. Write a rule for the translation of  $\triangle ABC$  to  $\triangle A'B'C'$ , then verify that the translation is an isometry.



$(x-5, y+3)$   
all sides  
are the same  
as the pre-image

5. Write a rule for the translation of  $\triangle ABC$  to  $\triangle A'B'C'$ , then verify that the translation is an isometry.

$$(x+2, y-5)$$



6. Use the translation  $(x, y) \rightarrow (x+6, y-3)$ .

- a. What is the image of  $A(3,2)$ ?

$$A(3+6, 2-3)$$

$$A(9, -1)$$

- b. What is the pre-image of  $D'(-3,-2)$ ?

$$D(x+6=-3, y-3=-2)$$

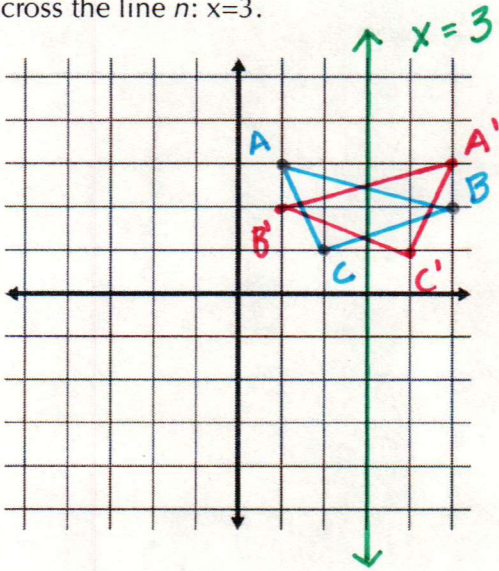
$$D(-9, 1)$$



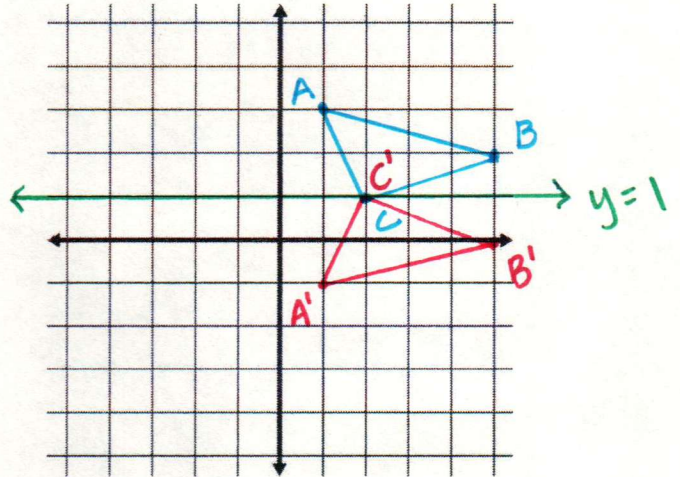
## Reflections

Line of Reflection:

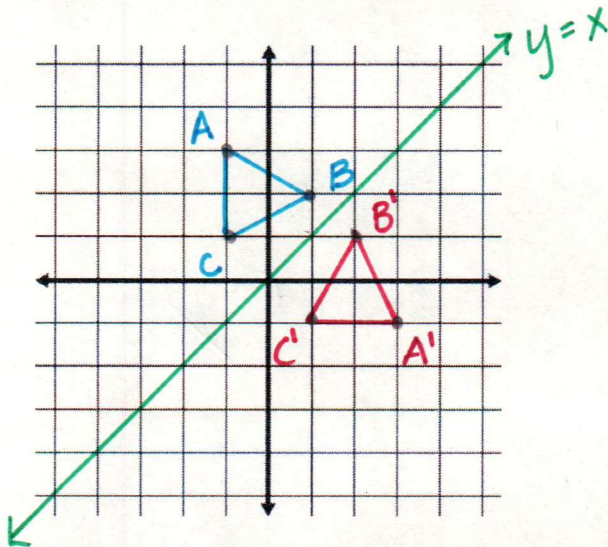
7. The vertices of  $\triangle ABC$  are  $A(1,3)$ ,  $B(5,2)$ , and  $C(2,1)$ . Graph the reflection of  $\triangle ABC$  across the line  $n: x=3$ .



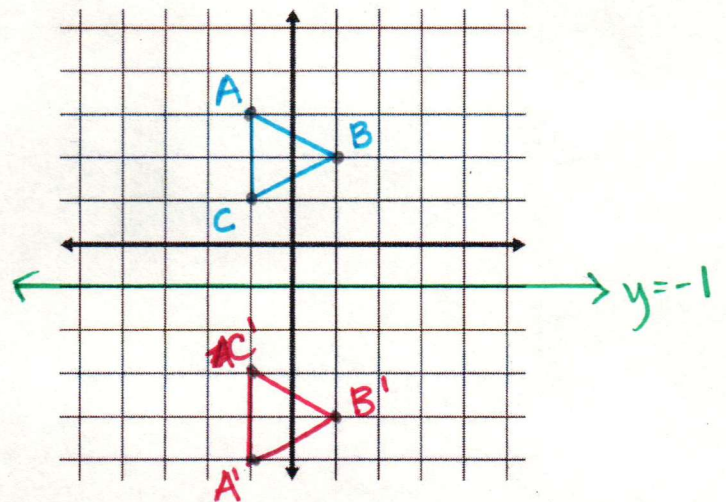
8. The vertices of  $\triangle ABC$  are  $A(1,3)$ ,  $B(5,2)$ , and  $C(2,1)$ . Graph the reflection of  $\triangle ABC$  across the line  $n: y=1$ .



9. The vertices of  $\triangle ABC$  are  $A(-1,3)$ ,  $B(1,2)$ , and  $C(-1,1)$ . Reflect the triangle across the line  $y=x$ . Graph the triangle and its image.



10. The vertices of  $\triangle ABC$  are  $A(-1,3)$ ,  $B(1,2)$ , and  $C(-1,1)$ . Reflect the triangle across the line  $y=-1$ . Graph the triangle and its image.



### Coordinate Rules for Reflections

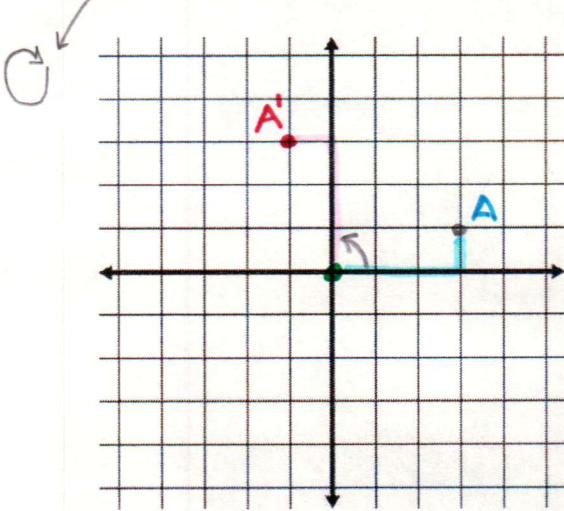
- If  $(a, b)$  is reflected in the  $x$ -axis, its image is the point  $(a, -b)$ .
- If  $(a, b)$  is reflected in the  $y$ -axis, its image is the point  $(-a, b)$ .
- If  $(a, b)$  is reflected in the line  $y = x$ , its image is the point  $(b, a)$ .
- If  $(a, b)$  is reflected in the line  $y = -x$ , its image is the point  $(-b, -a)$ .



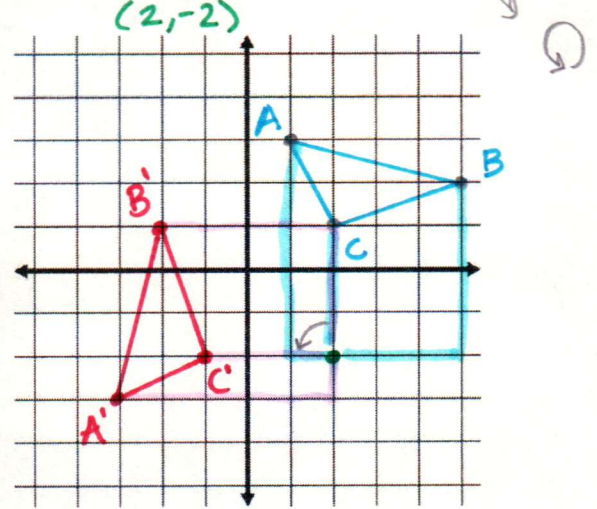
## Rotations

A rotation can be around any point, but frequently it will be about the origin.

11. Graph the point  $A(3, 1)$ , then graph the point rotated around the origin  $90^\circ$  clockwise and label it  $A'$ .



12. Graph the vertices of  $\triangle ABC$  are  $A(1,3)$ ,  $B(5,2)$ , and  $C(2,1)$ . Rotate  $\triangle ABC$   $90^\circ$  around ~~the origin~~ counter-clockwise.



13. Graph the quadrilateral  $PQSR$  with vertices  $P(2,-1)$ ,  $Q(4, 3)$ ,  $S(0,5)$ ,  $R(-1,2)$ . Find the image of each vertex around the origin  $180^\circ$ . Then label the image using prime notation.

