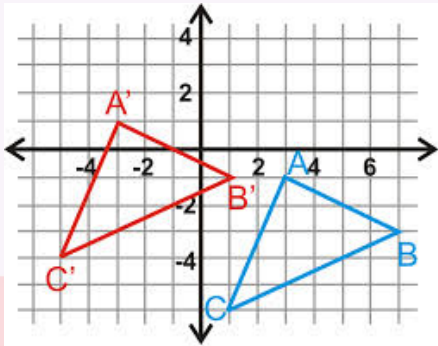


## 9.5 Translations and Glide Reflections

A translation is a transformation that moves points the **same distance** and in the **same direction**.

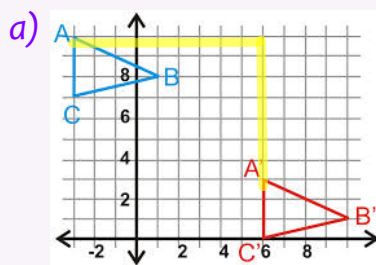


$\triangle ABC$  has been translated 6 units to the left and 2 units up.

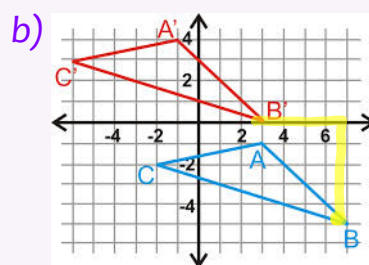
Rule:  $(x, y) \rightarrow (x - 6, y + 2)$

### Example 1

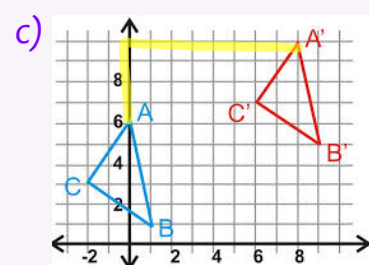
Write a rule for each picture below that will translate  $\triangle ABC$  to  $\triangle A'B'C'$ .



$$(x, y) \rightarrow (x + 9, y - 7)$$



$$(x, y) \rightarrow (x - 4, y + 5)$$

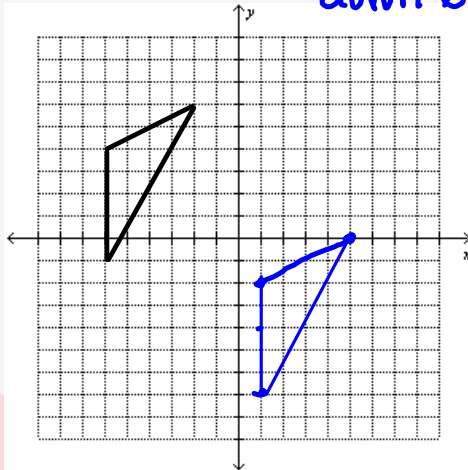


$$(x, y) \rightarrow (x + 8, y + 4)$$

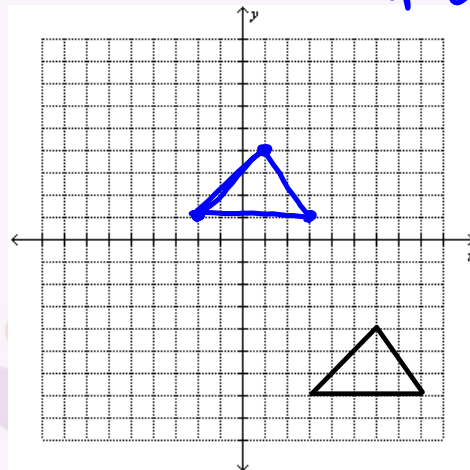
### Example 2

Graph the image of the figure using the translation rule given.

a)  $(x, y) \rightarrow (x + 7, y - 6)$   
*right 7*  
*down 6*

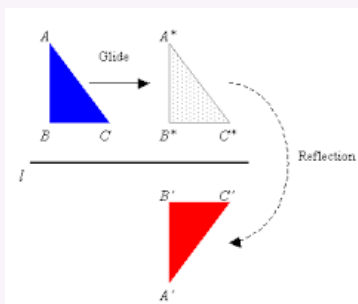


b)  $(x, y) \rightarrow (x - 5, y + 8)$   
*left 5*  
*up 8*



## Glide Reflections & Compositions

A glide reflection is a transformation that combines a **translation** and a **reflection**.



$\triangle ABC$  has been **translated to the right** and **reflected over the axis**.

A composition occurs when **two or more transformations** are combined to produce a **single transformation**.

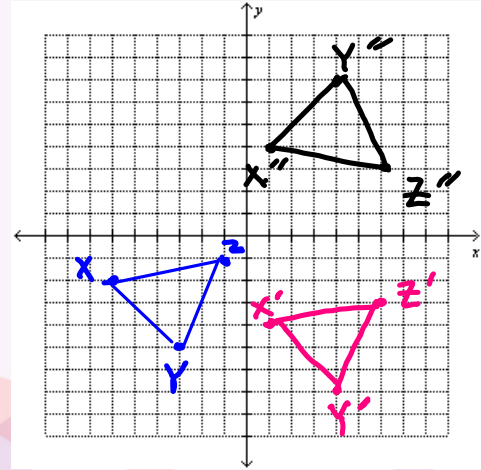
**Example 3**

Use the information below to sketch the image of  $\triangle XYZ$  after a glide reflection.

$$X(-6,-2), Y(-3,-5), Z(-1,-1)$$

$$\text{Translation: } (x, y) \rightarrow (x + 7, y - 2)$$

Reflection: over the x-axis

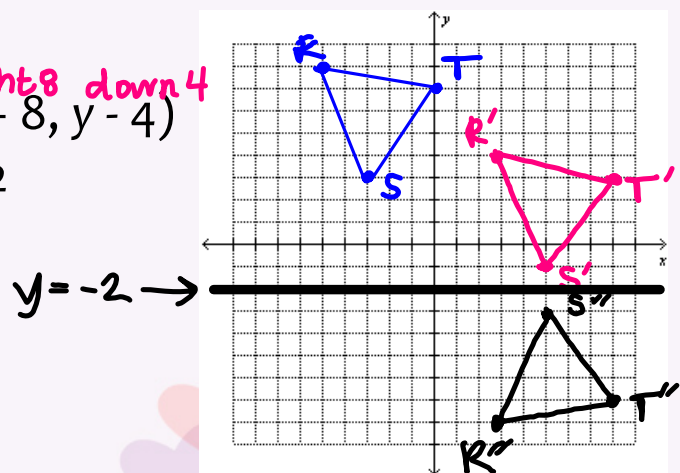
**Example 4**

Use the information below to sketch the image of  $\triangle RST$  after a glide reflection.

$$R(-5,8), S(-3,3), T(0,7)$$

$$\text{Translation: } (x, y) \rightarrow (x + 8, y - 4)$$

Reflection: over the  $y = -2$



**Example 5**

Use the information below to sketch the image of  $\triangle DEF$  by performing the following composition of transformations.

$$D(5,7), E(8,3), F(2,4)$$

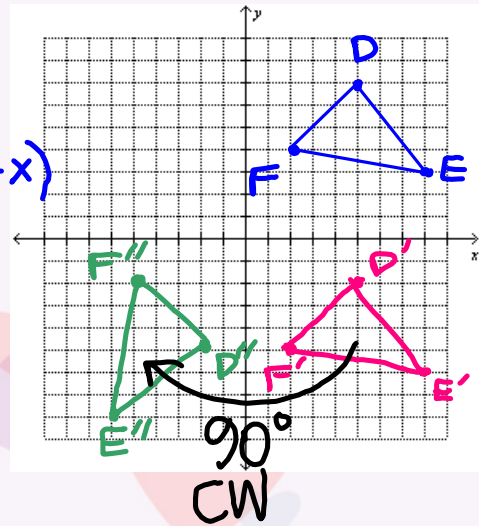
$$\text{Translation: } (x, y) \rightarrow (x, y - 9) \quad \text{down } 9$$

$$\text{Rotation: } 90^\circ \text{ clockwise } (x, y) \rightarrow (y, -x)$$

$$D' (5, -2) \rightarrow D'' (-2, -5)$$

$$E' (8, -6) \rightarrow E'' (-6, -8)$$

$$F' (2, -5) \rightarrow F'' (-5, -2)$$

**Example 6**

Use the information below to sketch the image of  $\triangle LMN$  by performing the following composition of transformations.

$$L(-7,-2), M(-1,-1), N(-4,-6)$$

$$\text{Translation: } (x, y) \rightarrow (x + 8, y + 7) \quad \text{right } 8 \text{ up } 7$$

$$\text{Rotation: } 90^\circ \text{ counterclockwise } (x, y) \rightarrow (-y, x)$$

$$L' (1, 5) \rightarrow L'' (-5, 1)$$

$$M' (7, 6) \rightarrow M'' (-6, 7)$$

$$N' (4, 1) \rightarrow N'' (-1, 4)$$

