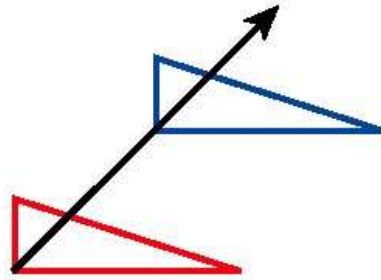


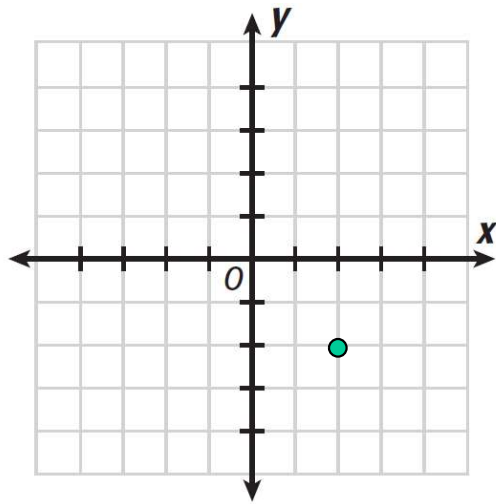
## Translation



A **translation** slides a figure along a line without turning.

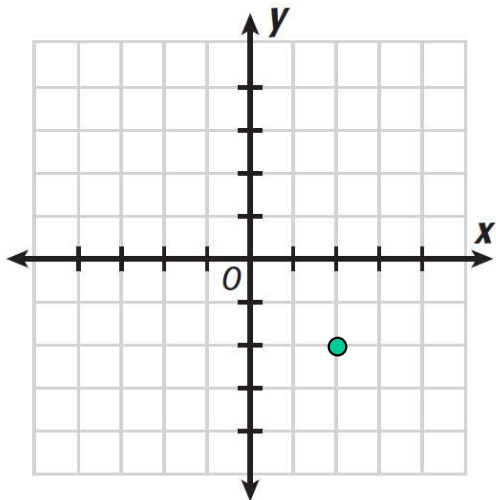
# Translation

A **translation** slides a figure along a line without turning.



**Move 6 units up**

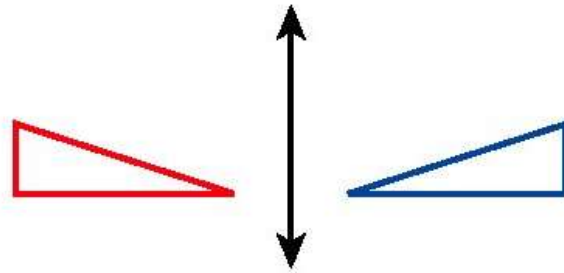
**When you translate up or down, you change the y**



**Move 6 units left**

**When you translate left or right, you change the x**

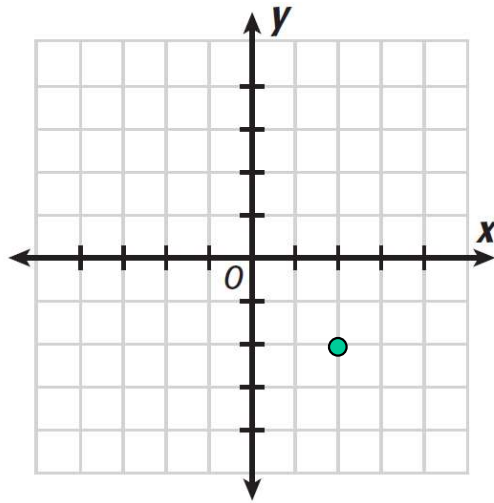
## Reflection



A **reflection** flips the figure across a line to create a mirror image.

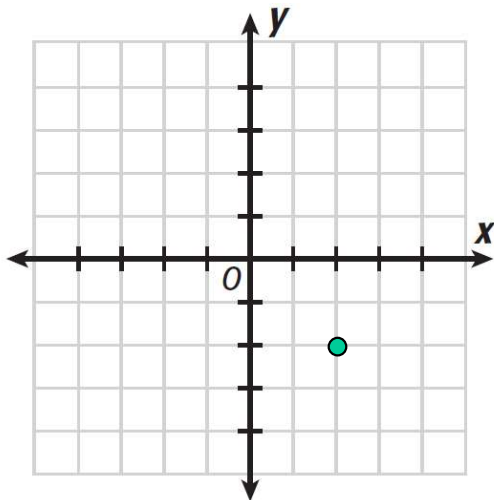
# Reflection over the x and y axis

A **reflection** flips the figure across a line to create a mirror image.



**Reflect across the y axis.**

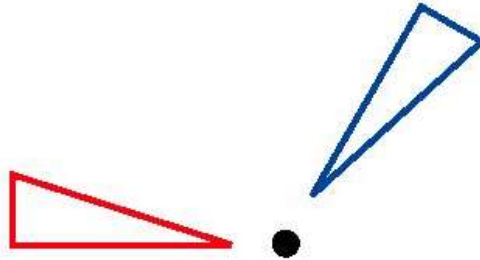
**When you reflect across the y axis, the x value becomes its opposite.**



**Reflect across the x axis.**

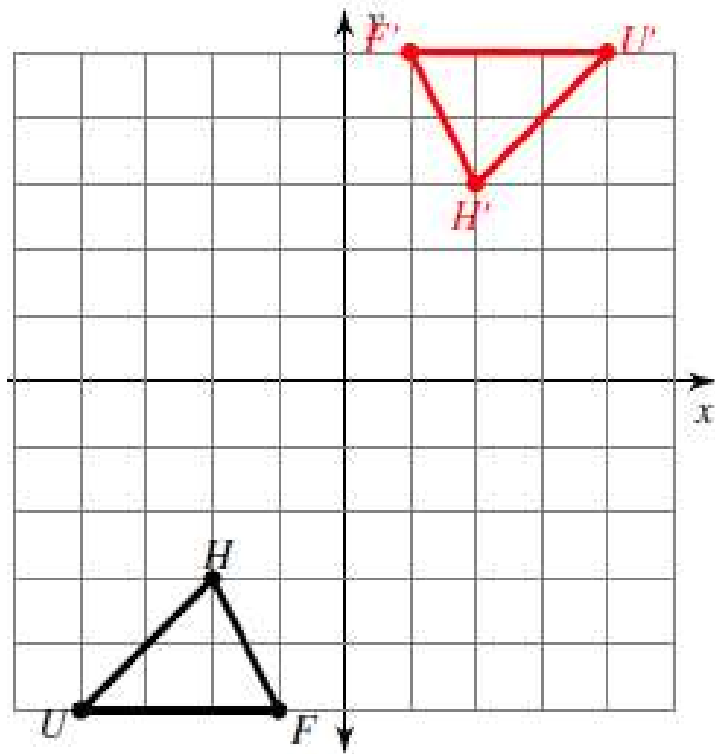
**When you reflect across the x axis, the y value becomes its opposite.**

## Rotation



A **rotation** turns the figure around a point, called the **center of rotation**.

# 180° Rotation about the origin

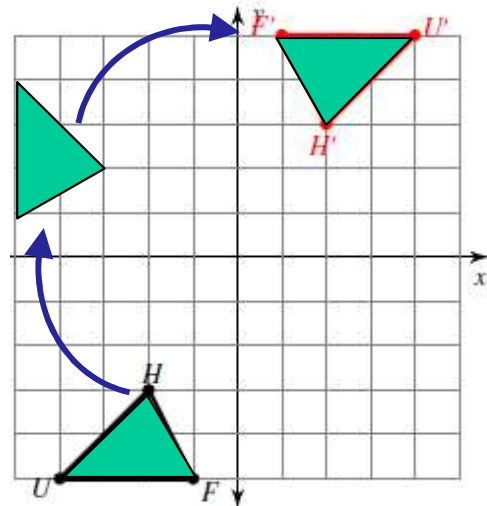


A **rotation** turns the figure around a point, called the **center of rotation**.

When you rotate 180° both the x and y values go to their opposites  
 $(x,y) \rightarrow (-x, -y)$

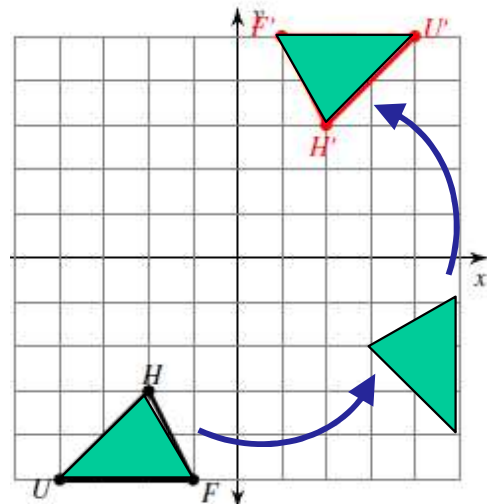
# 90° Rotation about the origin

A **rotation** turns the figure around a point, called the **center of rotation**.



When you rotate 90° clockwise both the x and y switch and the x which is the new y value is its opposite

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



When you rotate 90° counter clockwise both the x and y switch and the y which is the new x value is its opposite

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

2 90° rotations is a 180° rotation.

3 90° rotations is 270°

# Don't forget

- Reflection over the x axis  $(x,y) \rightarrow (x, -y)$
- Reflection over the y axis  $(x,y) \rightarrow (-x, y)$
- $90^\circ$  Counterclockwise  $(x,y) \rightarrow (-y,x)$
- $90^\circ$  Clockwise  $(x,y) \rightarrow (y,-x)$
- $180^\circ$  Rotation  $(x,y) \rightarrow (-x, -y)$
- Translation s units up/down  $(x,y) \rightarrow (x, y+s)$
- Translation s units right/left  $(x,y) \rightarrow (x+s, y)$
- Dilation with a scale factor of s and the origin as the center of dilation  
 $(x,y) \rightarrow (sx, sy)$