

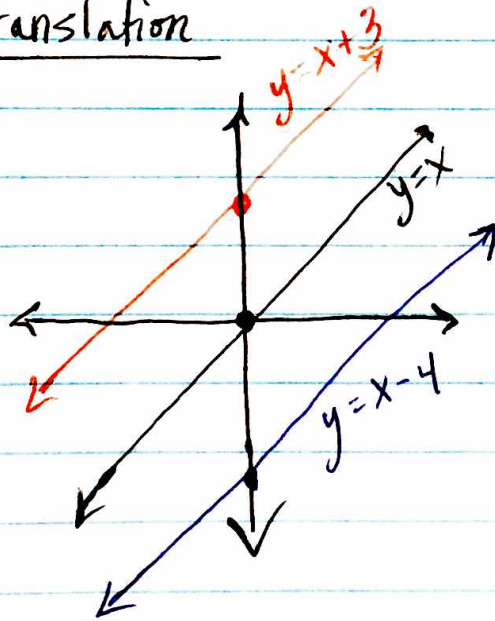
# Linear Transformations

Transformations: change of the slope and/or the y-intercept of a linear equation

3 Types of Transformations:

- 1) Translation: "slides" up or down (change in the y-intercept)
- 2) Rotation: "turns" left or right (change in the slope)
- 3) Reflection: "reflected" or "mirrored" only across the y-axis (change in sign of slope)

## Translation



Graph:  $y = x$  (parent linear equation)  
 $m = 1$   $b = 0$

Graph:  $y = x + 3$   
 $m = 1$   $b = 3$

Graph:  $y = x - 4$   
 $m = 1$   $b = -4$

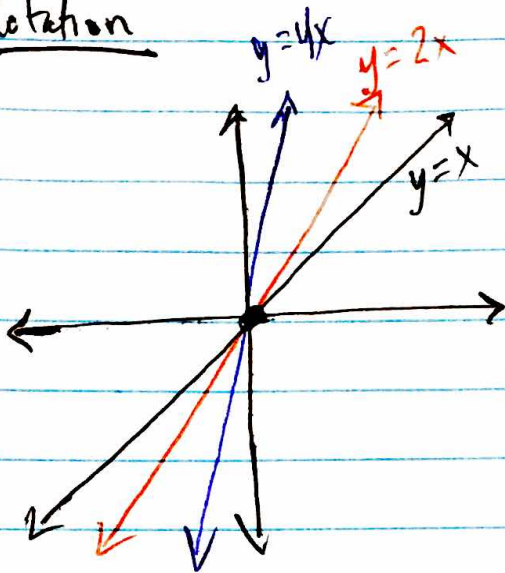
What changed?

- y-intercept ( $b$ ) changed

What didn't change?

- slope ( $m$ )

## Relation



Graph:  $y=x$   
 $m=1$   $b=0$

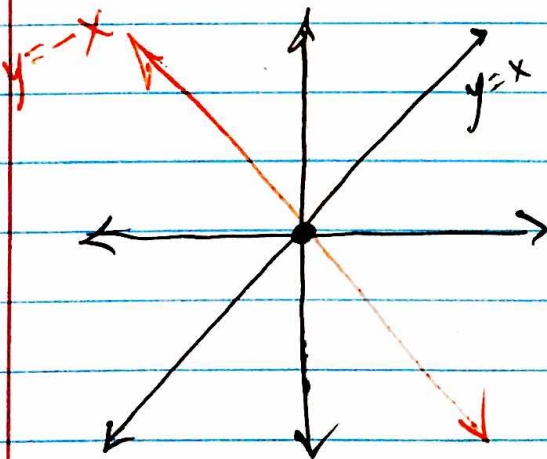
Graph:  $y=2x$   
 $m=2$   $b=0$

Graph:  $y=4x$   
 $m=4$   $b=0$

What changed?  
• slope ( $m$ )

What didn't change?  
• y-intercept ( $b$ )

## Reflection



Graph:  $y=x$   
 $m=1$   $b=0$

Graph:  $y=-x$   
 $m=-1$   $b=0$

What changed?  
• sign of the slope

What didn't change?  
• y-intercept  
• the # of the slope stayed the same



### Examples

$$y = \frac{1}{2}x$$

1)  $f(x) = \frac{1}{2}x \longrightarrow g(x) = 2x$

Rotation

2)  $f(x) = x \longrightarrow g(x) = -x$

Reflection

3)  $f(x) = x - 2 \longrightarrow g(x) = x + 6$

Translation

4)  $f(x) = 2x + 1 \longrightarrow g(x) = 3x - 2$

Translation ; Rotation