

# GRAPHS

$$Y = mx + b$$

**m** = slope

**x** = variable on x axis

**b** = starting point on y axis/ y intercept

**y** intercept :  $x = 0$

**X** intercept :  $y = 0$

## Transformation Rules for Functions

Function Notation	Type of Transformation	Change to Coordinate Point
$f(x) + d$	Vertical translation <b>up</b> $d$ units	$(x, y) \rightarrow (x, y + d)$
$f(x) - d$	Vertical translation <b>down</b> $d$ units	$(x, y) \rightarrow (x, y - d)$
$f(x + c)$	Horizontal translation <b>left</b> $c$ units	$(x, y) \rightarrow (x - c, y)$
$f(x - c)$	Horizontal translation <b>right</b> $c$ units	$(x, y) \rightarrow (x + c, y)$
$-f(x)$	Reflection over <b>x-axis</b>	$(x, y) \rightarrow (x, -y)$
$f(-x)$	Reflection over <b>y-axis</b>	$(x, y) \rightarrow (-x, y)$
$af(x)$	Vertical <b>stretch</b> for $ a  > 1$	$(x, y) \rightarrow (x, ay)$
	Vertical <b>compression</b> for $0 <  a  < 1$	
$f(bx)$	Horizontal <b>compression</b> for $ b  > 1$	$(x, y) \rightarrow \left(\frac{x}{b}, y\right)$
	Horizontal <b>stretch</b> for $0 <  b  < 1$	

