GRAPHING LINEAR EQUATIONS: FACT SHEET

On the Coordinate (Cartesian) Plane, the ***y*-axis** is vertical, and the ***x*-axis** is horizontal.
Likewise, in the **ordered pair (*x*, *y*)**, the ***x*-coordinate** tells you how far to go left or right, and the ***y*-coordinate** tells you how far up or down to go.

A **linear equation** has the form $y = mx + b$ (*y* is equal to a degree 0 or 1 polynomial).
A **horizontal line** has the equation $y = b$ (some real number *b*).
A **vertical line** has the equation $x = a$ (some real number *a*).

To find the ***y*-intercept** of a line, set $x = 0$ in the equation.
To find the ***x*-intercept** of a line, set $y = 0$ in the equation.

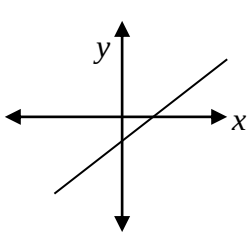
The **standard form** of a linear equation is: $Ax + By = C$ [*A, B, C* are integers, A≥ 0]

The **slope-intercept form** of a linear equation is: $y = mx + b$ (*m* = slope; *b* = *y*-intercept)

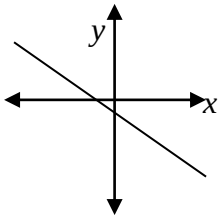
The **point-slope form** of a linear equation is: $y - y_1 = m(x - x_1)$

The **slope (*m*)** of a graph is: $\frac{"rise"}{"run"} = \frac{change-in-y}{change-in-x} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

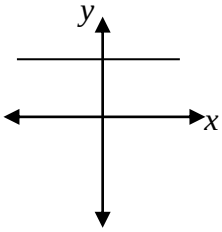
Ex: If a graph has a slope of $-\frac{3}{2} = \frac{-3}{2} = \frac{3}{-2}$, this means "right 2, down 3, right 2, down 3, ..."
or "left 2, up 3, left 2, up 3, ..."



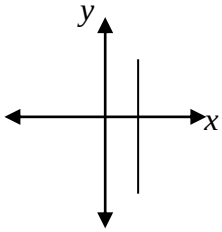
Positive slope



Negative slope



Zero slope
[Equation: $y = b$]



Undefined slope
[Equation: $x = a$]

A **horizontal** line has a **slope of 0**; a **vertical** line has an **undefined slope**.

If two lines are **parallel**, they have the **same slope**.

If two lines are **perpendicular**, their **slopes are negative reciprocals** of each other.
In other words, if a line has slope m_1, then the slope of a line perpendicular to it has slope $m_2 = -\frac{1}{m_1}$. In other words, if $m_1 = \frac{a}{b}$, then $m_2 = -\frac{b}{a}$.

A word problem involving a linear equation often used the word "**per**" to indicate the slope as (change in *y*) **per** (change in *x*)... for example, miles *per* gallon, dollars *per* hour.
In words, slope describes a **rate of change**.

e.g. $\frac{\Delta y}{\Delta x} = \frac{miles}{gallon}$ (miles *per* gallon) or $\frac{\Delta y}{\Delta x} = \frac{\$}{hour}$ (dollars *per* hour)