Suppose I have the function y=3x+4.

We may identify the format of the function as the Slop-Intercept Form.

- y = mx + b

Find points to Plot on the graph

- The point at which the line crosses the y axis of the graph is known as the **y-intercept**

- At the **y intercept** x = 0
  - y = 3x+4
  - **y intercept** = 3(0) + 4
  - **y intercept** = 4
  - **y intercept** = (0,4)

- The point at which the line crosses the x axis of the graph is known as the x-intercept

- At the **x intercept** y = 0
  - y = 3x+4
  - 0 = 3(x intercept) + 4
  - -4 = 3(x intercept)
  - $\frac{-4}{3} =$ x intercept
  - x intercept = $\frac{-4}{3}$
  - x intercept = $(-\frac{4}{3}, 0)$ OR (-1.333,0)

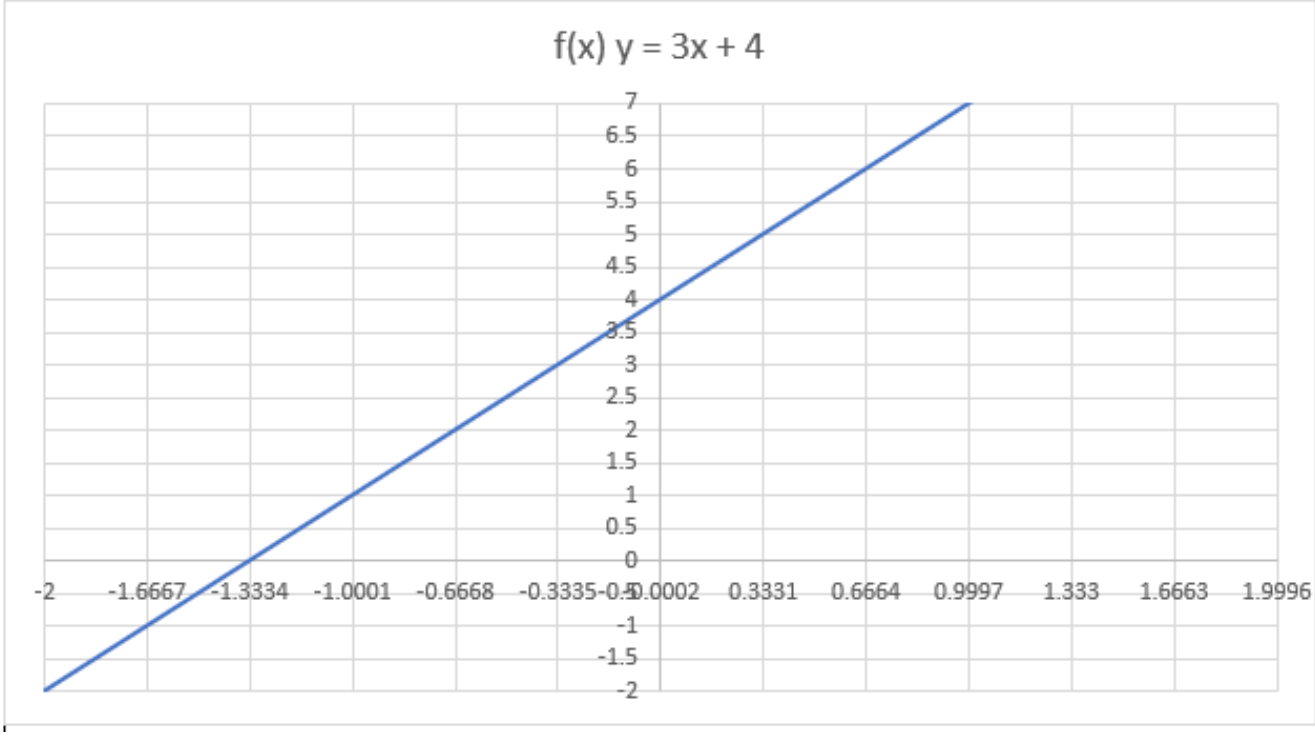
- Plot the points (0,4) and (-1.333,0) and connect the dots forming a line (image on next page)

- Notice that in the formula y = mx + b, that when x is 0,

- **b is the y intercept**.

- Now what does m represent. We can solve for m by picking any point on the line and solving. Lets pick the points (-1, 1).
  - y = mx + b
  - 1 = m(-1) + 4
  - 1-4 = m(-1)
  - -3 = m(-1)
  - -3/-1 = m
  - m = 3, yes it does the original formula was in-fact y=**3**x+b !!!, this math works at any point along the straight line.

- **m is the slope of the line:**
  - **m = $\frac{\textit{The Change in y}}{\textit{The change in x}}$ OR $\frac{y1-y2}{x1-x2}$ OR $\frac{\Delta y}{\Delta x}$**
  - If we compare points (-1, 1) to (0,4)
    - We get **m = $\frac{1-4}{-1-0}$ = $\frac{-3}{-1}$ =**
    - **m = 3, yes it does!**
- And that is the beauty of the Slope-Intercept form



Imagine yourself questioning, "What does all this, (Analytical Geometry), have to do with intro to calculus"?

I'm glad you asked!

First let's review our original function. y = 3x + 4

In calculus we can take the derivative of the function to find $\frac{dy}{dx}$ of the function

- If $\boldsymbol{y = ax^n}$ then $\boldsymbol{\frac{dy}{dx} = anx^{n-1}}$
  - y is y & x is x
  - a is the number in front of x
  - n is the exponent of x

- Now we can rewrite the formula for clarification
  - $\boldsymbol{y = 3x^1 + 4x^0}$ then $\boldsymbol{\frac{dy}{dx} = 3(1)x^{1-1} + 4(0)(NA)}$
  - $\boldsymbol{\frac{dy}{dx} = 3x^0 + 0}$
  - $\boldsymbol{\frac{dy}{dx} = 3(1) + 0}$
  - $\boldsymbol{\frac{dy}{dx} = 3}$

- **Now we can see that the derivative $\frac{dy}{dx}$ is equal the slope $\frac{\Delta y}{\Delta x}$**
  - $\boldsymbol{\frac{dy}{dx} = \frac{\Delta y}{\Delta x}}$

- **Therefore, the Derivative of a function is equal to the slope (instantaneous slope).**