Lesson 4 – *Equation of a Line*

There are two ways to write the equation of a line 1) Function Form and 2) General Form.

Function Form:

$y = ax + b$ where a is the slope

b is the *y*-intercept

Ex. $y = 3x + 2$ slope = 3, y-intercept = 2

$y = -\frac{2}{3}x - 7$ slope = $-\frac{2}{3}$, y-intercept = -7

$y = x$ slope = 1, y-intercept = 0

Intercepts :

The *y*-intercept is found when *x* = 0

The *x*-intercept is found when *y* = 0

Ex. Find the x-intercept of the following line:

$y = 2x - 4$

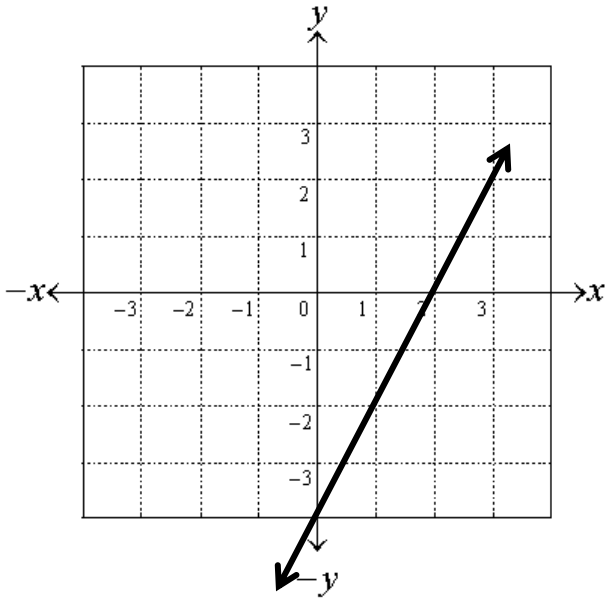
$0 = 2x - 4$

$4 = 2x$

$4 = x$

Graph the line using the intercepts.

(2,0) , (4,0)



General Form: $\boldsymbol{Ax + By + C = 0}$

Ex. $\boldsymbol{y = 2x - 4}$ can be written as $\boldsymbol{0 = 2x - y - 4}$

Ex. Express the following equation in function form and find the slope and y-intercept.

$$\boldsymbol{3x - 2y + 5 = 0}$$

$$\boldsymbol{-2y + 5 = -3x}$$

$$\boldsymbol{-2y = -3x - 5}$$

$$\boldsymbol{y = \frac{3}{2}x + \frac{5}{2}}$$

Therefore the slope is $\boldsymbol{\frac{3}{2}}$ and the y-intercept is $\boldsymbol{\frac{5}{2}}$

Ex. Given A (-3, 8) and B(6, 2) find the equation of the line in function and general form.

Step 1: Find the slope.

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 8}{6 - -3} = \frac{-6}{9} = -\frac{2}{3}$$

Step 2: Find the y-intercept (using the slope and one of points given)

$$\boldsymbol{y = ax + b}$$

$$8 = -\frac{2}{3}(-3) + b$$

$$8 = 2 + b$$

$$6 = b$$

Step 3: Write in function form

$$y = -\frac{2}{3}\,x + 6$$

Step 4: Convert to general form

$$0 = -\frac{2}{3}\,x - y + 6$$