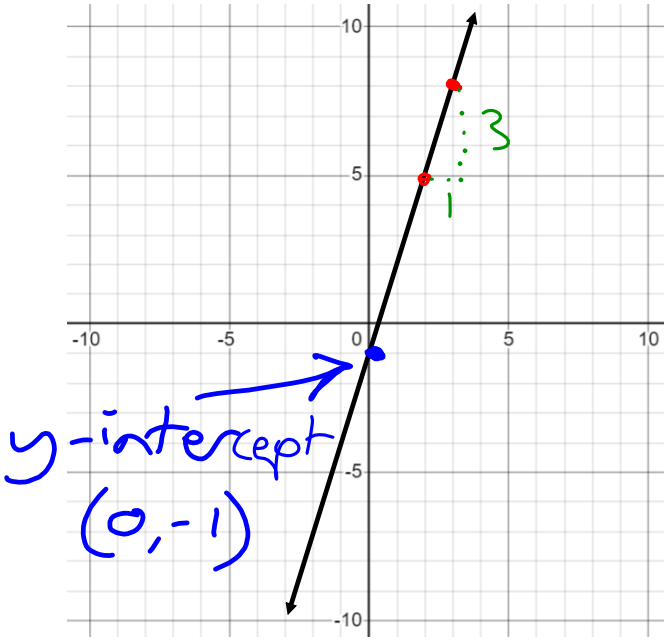
Determine the equation of a line that goes through the points $(2, 5)$ and $(3, 8)$.

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{3}{1} = 3$$




$$\Rightarrow y = mx + b$$
$$y = 3x - 1$$

MTH1W Grade 9 Mathematics

## 4.5 Equations of Lines Using Two Points

***Goal(s)*** ***- To sketch the graph of a line given two points on the line.***

***- Write the equation of a line in y = mx + b form from a graph when given two points on the line; from a table of values.***

To find the equation of a line given two points on the line:

- Use the points to find the slope of the line using the formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

- Solve for the ***y*-intercept** by substituting the ***slope*** and ***one of the points*** ***(x, y)*** into the equation, $y = mx + b$, and then solve for $b$.

- Write the equation by substituting $m$ and $b$ into $y = mx + b$.

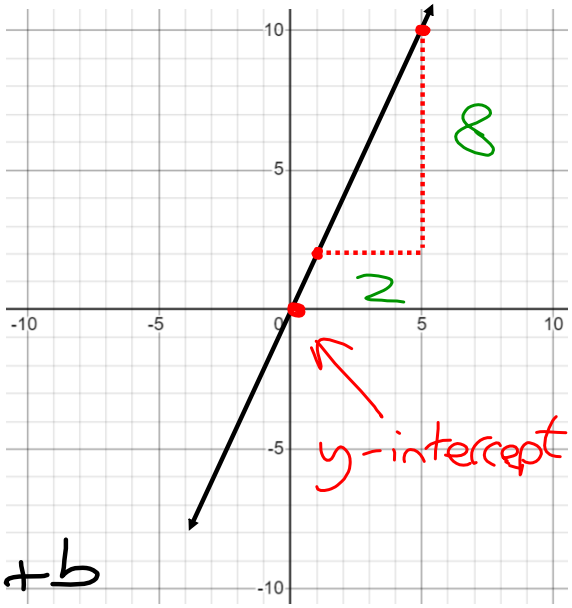
A line passes through the points $(1, 2)$ and $(5, 10)$. Sketch the line and determine its equation.

Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{10 - 2}{5 - 1}$

$= \frac{8}{4}$

$= 2$




$y = mx + b$

$y = 2x + 0$

$y = 2x$

A line passes through the points *(-3, -2)* and *(6, -8)*. Find the equation of the line.

$(x_1, y_1)$ $(x_2, y_2)$

$$\text{Slope } m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-8-(-2)}{6-(-3)}$$

$$= \frac{-6}{9}$$

$$= -\frac{2}{3}$$

use $(-3, -2)$ as $(x, y)$

$\Rightarrow y = mx + b$

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

$-2 = 2 + b$

$-2 - 2 = 2 + b - 2$

$-4 = b$

Equation is $y = -\frac{2}{3}x - 4$

Given the table of values below, determine the equation of the line in $y = mx + b$ form.

| x | y |
|---|---|
| 2 | 4 |
| 4 | 7 |
| 6 | 10 |
| 8 | 13 |

$(x_1, y_1)$

$(x_2, y_2)$

$$\text{Slope } m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{13-7}{8-4}$$

$$= \frac{6}{4}$$

$$= \frac{3}{2}$$

use $(8, 13)$ as $(x, y)$

$\Rightarrow y = mx + b$

$13 = \frac{3}{2}(8) + b$

$13 = 12 + b$

$13 - 12 = 12 + b - 12$

$1 = b$

Equation is $y = \frac{3}{2}x + 1$