Math 1201
6.3-6.4 Slope-Intercept Form of the Line

The Equation of a Line

The equation of a line can be written in three forms:
- Slope - intercept
- General
- Slope - point form

Slope – Intercept Form
A linear equation in slope - intercept form is written as:

$$y = mx + b$$

What does m and b represent?

We will now consider the graph of the linear function $y = \frac{3}{2}x + 1$.

m b

Before looking at the graph, answer the questions below:

The value of m in the equation is: $\frac{3}{2}$

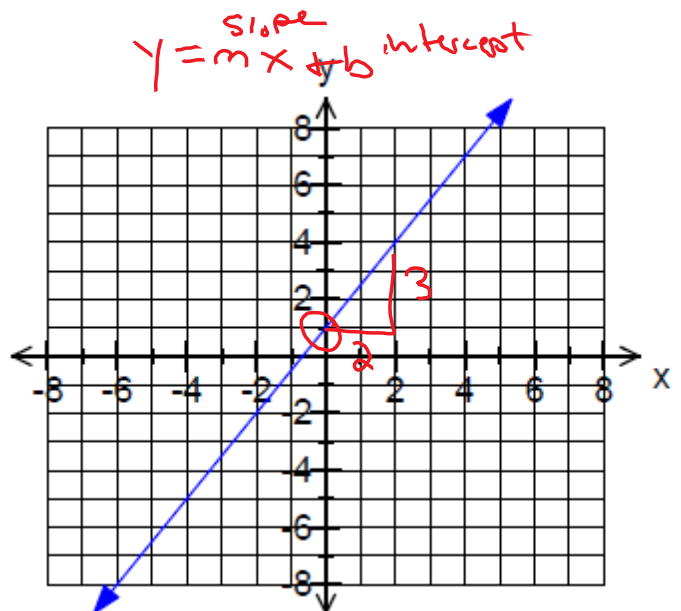The value of b in the equation is: 1

Now consider the graph:

Determine the slope of the graph:

$M = \frac{rise}{run} = \frac{3}{2}$

$Y = m \overset{slope}{\times} + b$ intercept

State the y-intercept of the graph. 1

The value in the equation that slope corresponds to is: m

The value in the equation that y-intercept corresponds to is: b

Summary

Slope – Intercept form of a linear function is written as:
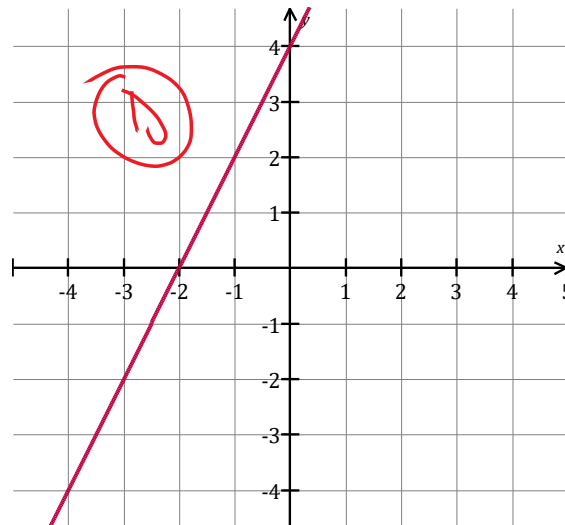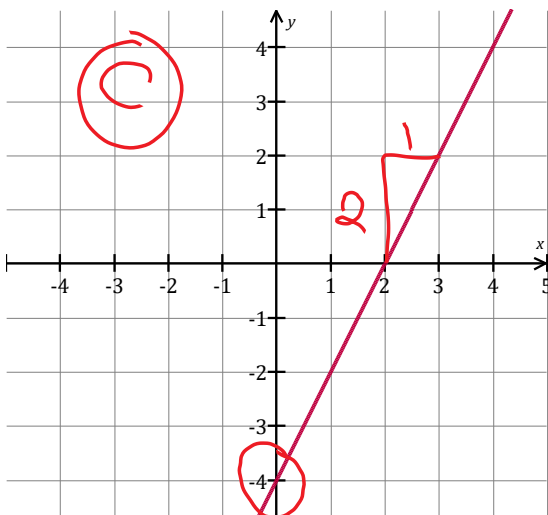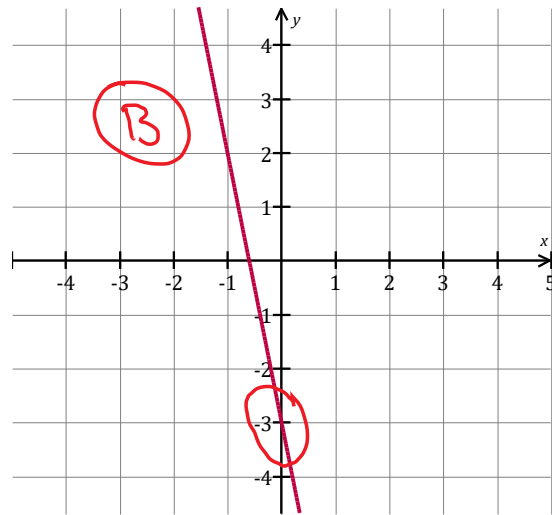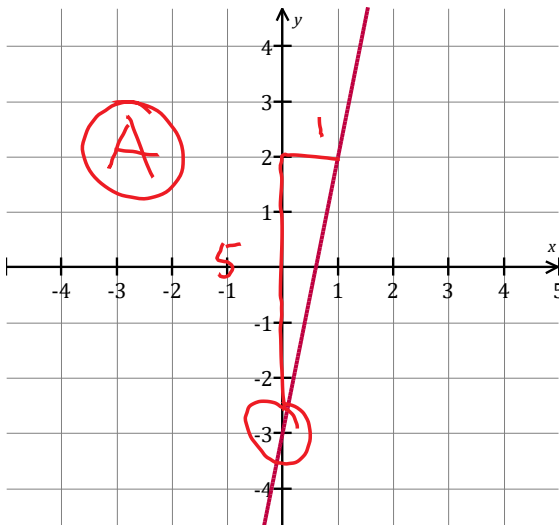
$$y = mx + b$$

where m represents **slope** and b represents **y-intercept**.

Matching Linear Graphs with Equations Written in Slope-Intercept Form

Example 1:
Match the following equations with the graphs shown below:

(A) $y = 5x - 3$ (B) $y = -5x - 3$ (C) $y = 2x - 4$ (D) $y = 2x + 4$

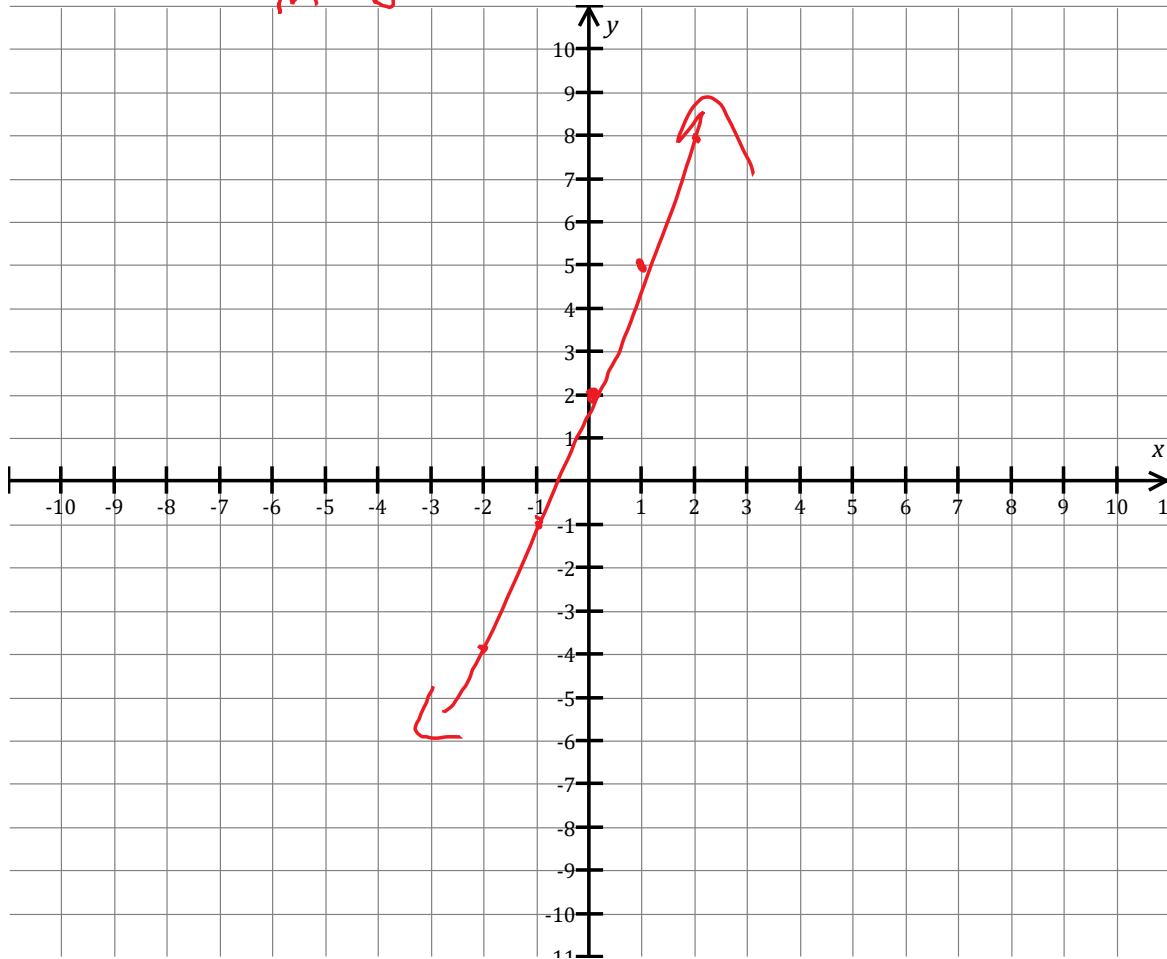**Graphing Linear Functions Written in Slope - Intercept Form**

Steps:
- Read the y-intercept, **b**, from the equation and plot it on the graph.
- Use the slope, **m**, to plot other points on the graph by starting at the y-intercept, and then used the rise and run to located other points.

Example 2:
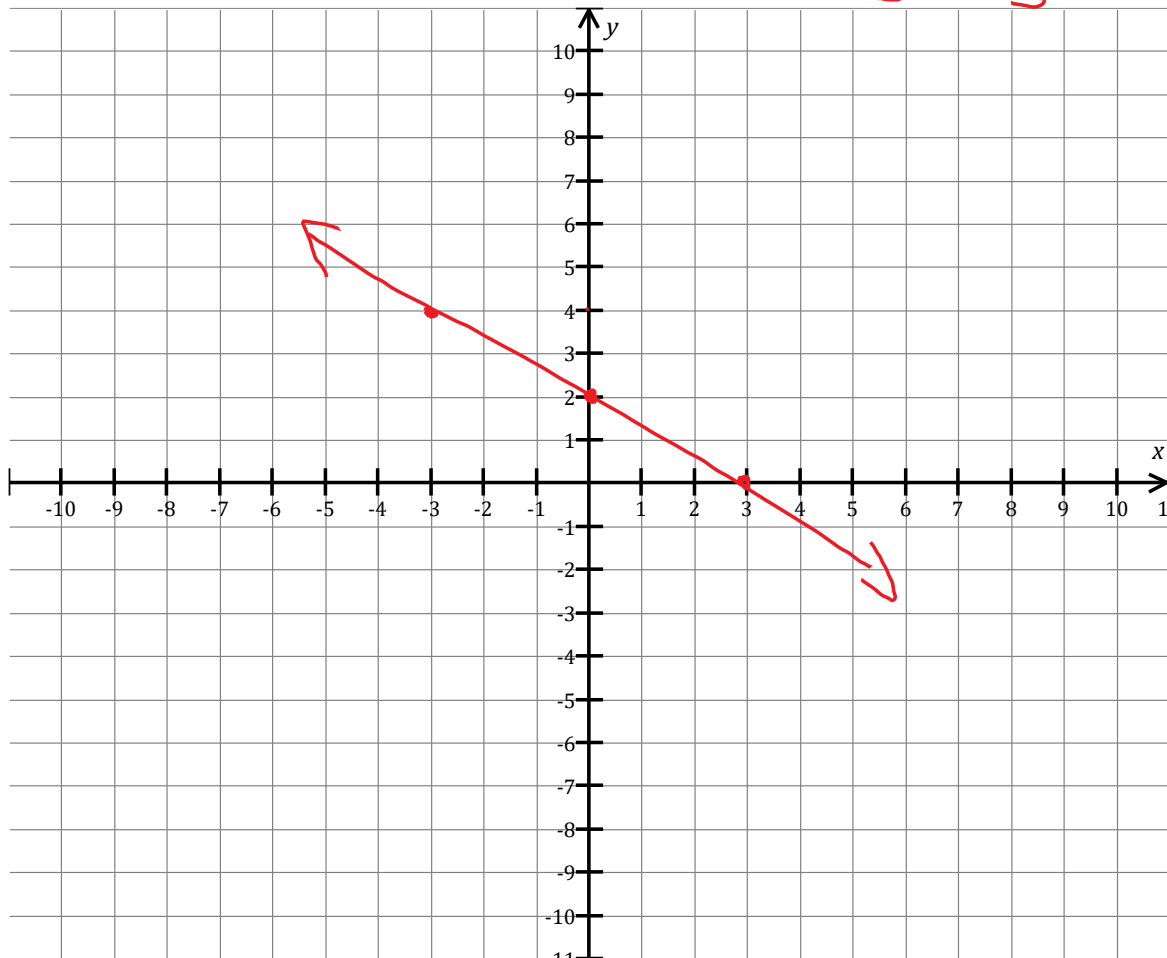Graph the function $y = 3x + 2$

$m = \dfrac{rise}{run}\ \dfrac{3}{1}$

Example 3:

Graph the function $y = -\frac{2}{3}x + 2$

$m \quad b$

$m = \frac{rise}{run} = -\frac{2}{3} = \frac{-2}{3}$
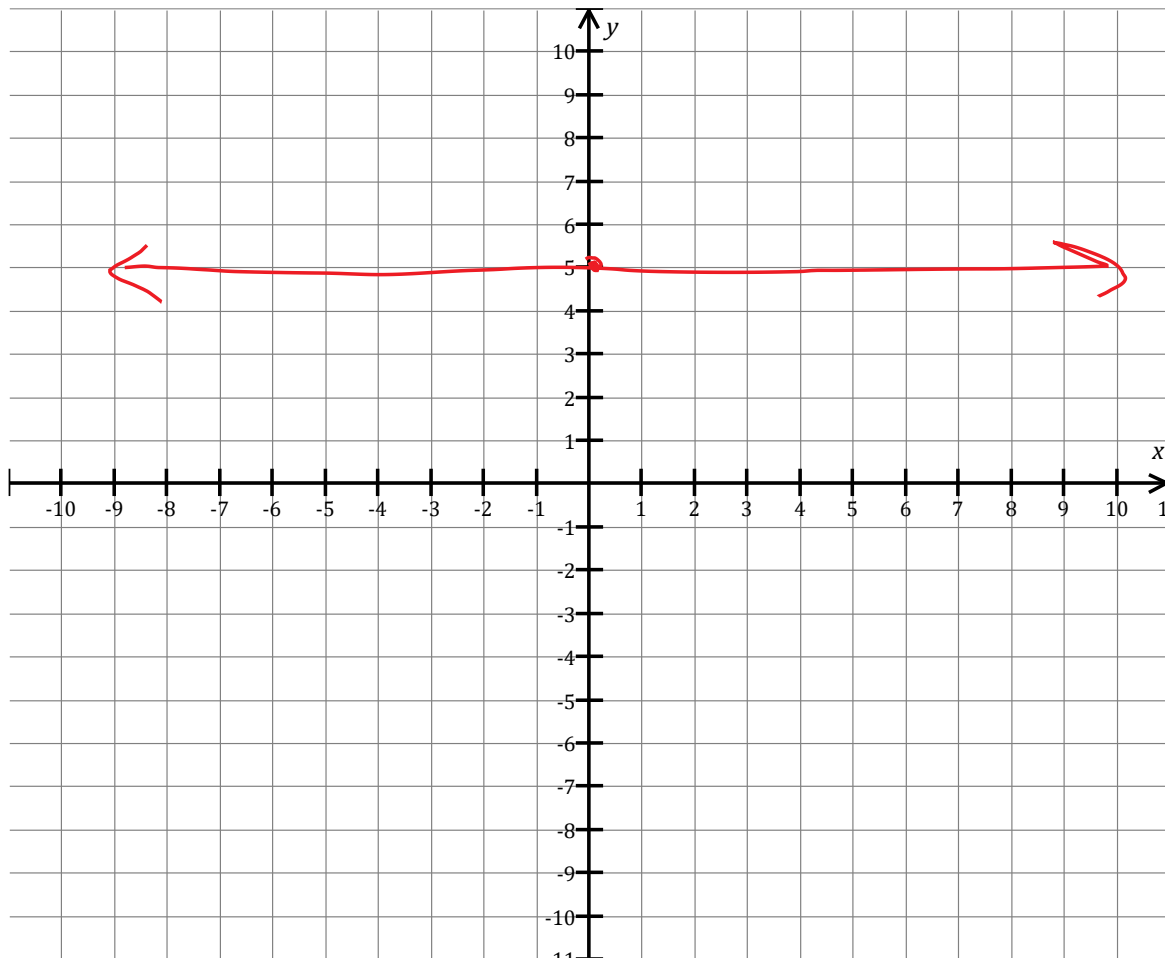

Graphing Horizontal Lines

Horizontal Lines have a y-intercept, b, but no slope, m.

$m = \frac{rise}{run} = \frac{0}{run} = 0$
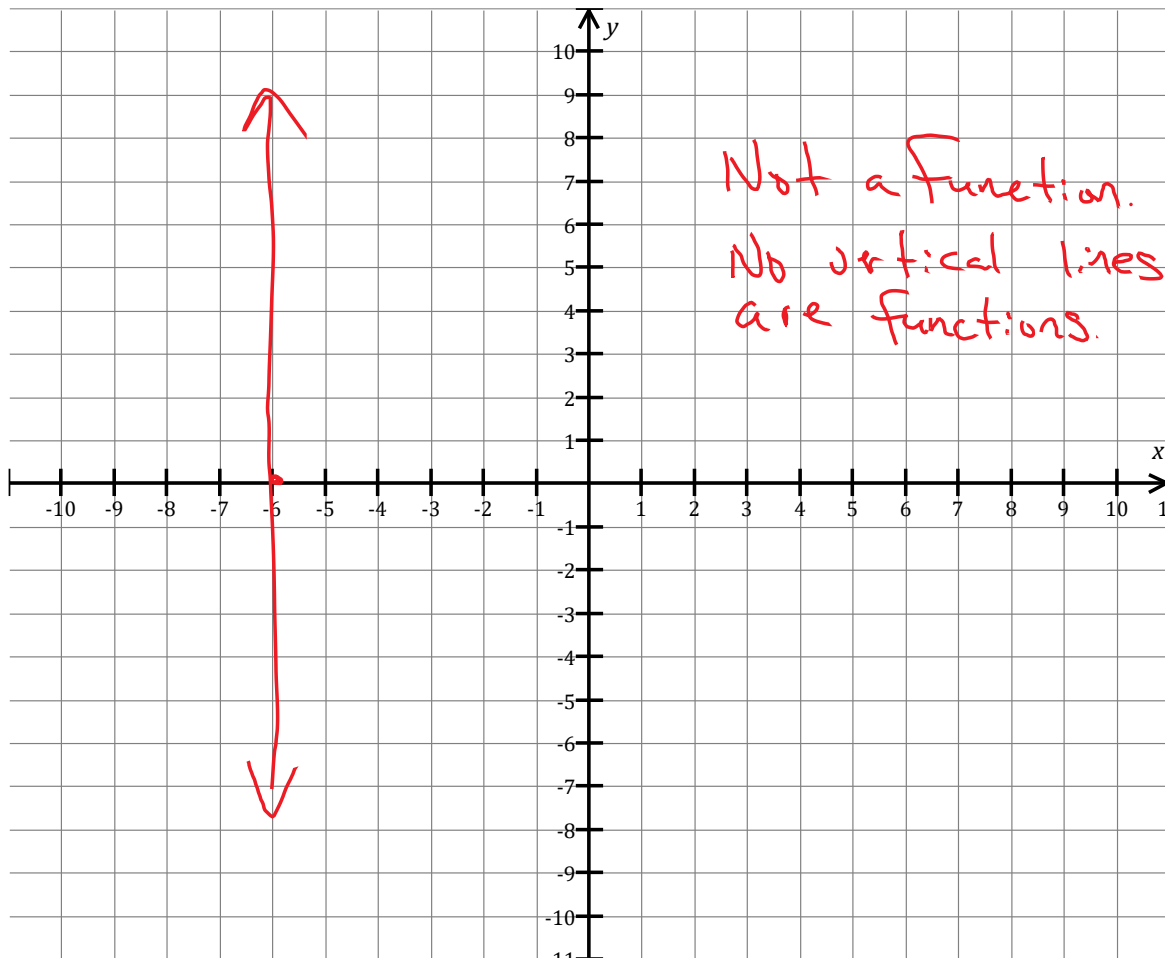
$y = 0x + b$

$y = b$

Example 4:
Graph the function $y = 5$ Think: $y = 0x + 5$

Graphing Vertical Lines

Vertical Lines have undefined slope and no y-intercept. Thus, we do not write them in the form $y = mx + b$. Since they cross the x-axis, their equation takes the form $x = x$-intercept.

$$m = \frac{rise}{run} = \frac{rise}{0}$$

Example 5:
Graph the function $x = -6$

Not a function.
No vertical lines
are functions.

Given a Graph, Write a Linear Equation in Slope-Intercept Form
Steps:
- Read the y-intercept from the graph. Label it as b.
- Determine the slope of the graph. Label it as m.
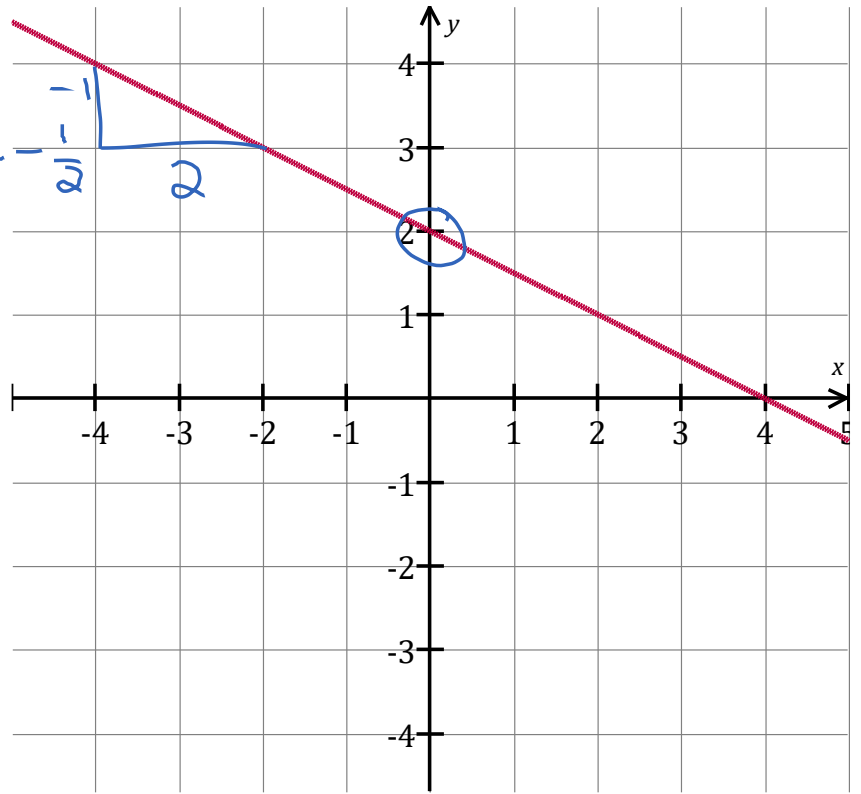- Substitute these values into $y = mx + b$.

Example 6:
Write equations for each graph shown.

$y = mx + b$

(A) $b = 2$
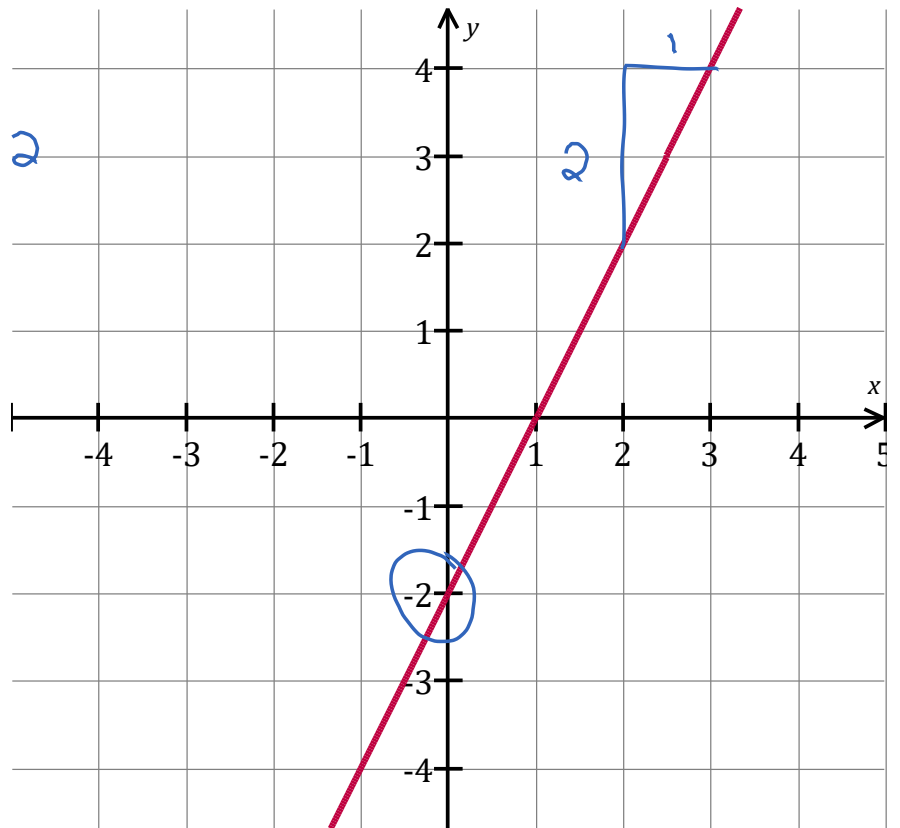
$m = \dfrac{rise}{run} = \dfrac{-1}{2} = -\dfrac{1}{2}$

$y = -\dfrac{1}{2}x + 2$

(B) $b = -2$

$m = \dfrac{rise}{run} = \dfrac{2}{1} = 2$

$y = 2x - 2$

Writing the Equation In Slope-Intercept Form of a Line Given Two Points on the Line

Example 7:
Determine the equation of a line that passes through $(2, 5)$ and $(3, 5)$.

$$y = mx + b \qquad\qquad x_1 y_1 \quad x_2 y_2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad\qquad y = 0x + b$$

$$= \frac{5 - 5}{3 - 2} \qquad\qquad 5 = 0(2) + b$$

$$\qquad\qquad\qquad\qquad b = 5$$

$$= \frac{0}{1} \qquad\qquad\qquad y = 5$$

$$= 0$$

Textbook Questions: page 362 -364 #4, 5, 6(a, b), 7, 11, 12, 17, 18, 19, 20