

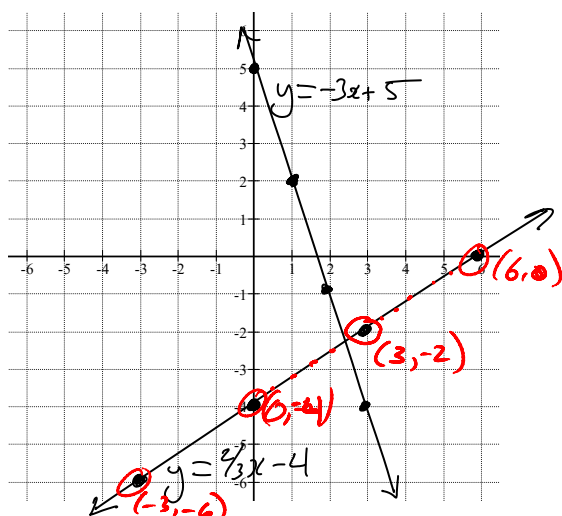
5.1B Slope-Intercept Form

y-intercept: The y-coordinate of the point where a line or curve crosses the y-axis.
The value of y when $x = 0$

slope-intercept form:

The equation of a line in the form $y = mx + b$ where m (coefficient of x) is slope and b (constant) is the y-intercept

Ex. Graph each line using the slope and y-intercept:



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

$$m = \frac{2}{3} \quad b = -4$$

$$y = -3x + 5$$

$$m = -3 \quad b = 5$$

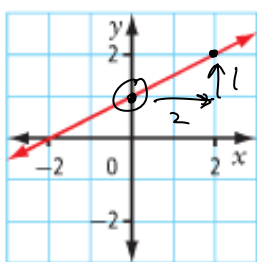
* least 3 points

* straight!

* extended/arrows

* label with equation

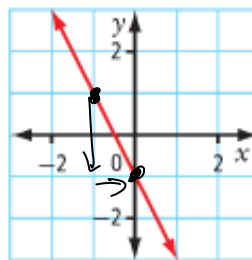
Ex. State the equation of each line shown in slope-intercept form:



$$y = mx + b$$

$$m = \frac{1}{2} \quad b = 1$$

$$y = \frac{1}{2}x + 1$$



$$m = \frac{-2}{1} \quad b = -1$$

$$= -2$$

$$y = -2x - 1$$

Ex. The line $y = \frac{1}{3}x + b$ passes through the point $(6, -1)$. Determine the value of b .

$$-1 = \frac{1}{3}(6) + b$$

$$-1 = 2 + b$$

$$b = -3$$

Ex. The line $y = mx + 5$ passes through the point $(-2, 1)$. Determine the value of m .

$$1 = m(-2) + 5$$

$$1 = -2m + 5$$

$$-4 = -2m$$

$$m = 2$$

Ex . A students' council rents a portable dunk tank as a fundraising activity. Students pay for the chance to hit a target with a ball and dunk someone into a tank of water. The relationship between the number of balls thrown, x , and the profit, y , in dollars, may be represented by the equation $3x - 2y - 600 = 0$.

- a) Rewrite the equation in slope – intercept form.

$$\begin{aligned} 3x - 2y - 600 &= 0 \\ +2y & \quad +2y \\ 3x - 600 &= 2y \\ \frac{3x - 600}{2} &= \frac{2y}{2} \end{aligned}$$

$$y = \frac{3}{2}x - 300$$

- b) State the slope of the line. What does the slope represent?

$$m = \frac{\$3}{2 \text{ balls}}$$

Profit is increasing \$1.50/ball

- c) Identify the y-intercept. What does it represent?

$$b = -\$300$$

If no balls sold, they have a deficit of \$300

cost for the tank

- d) The break-even point is the point at which the money raised equals the money spent. How many balls must the students sell to reach the break-even point?

$$\begin{aligned} 3x - 2y - 600 &= 0 \\ 3x - 2(0) - 600 &= 0 \\ 3x - 600 &= 0 \\ 3x &= 600 \\ x &= 200 \end{aligned}$$

$$\begin{aligned} y &= \frac{3}{2}x - 300 \\ 0 &= \frac{3}{2}x - 300 \\ +300 & \quad +300 \\ 300 &= \frac{3}{2}x \\ \frac{300}{3/2} &= \frac{3/2 x}{3/2} \end{aligned}$$

$$\text{profit } y = 0$$

$$x = \frac{600}{3} \times \frac{2}{1} = 200 \text{ balls}$$

Ex. An archaeologist simulates a First Nations method of boiling water. If the starting temperature of the water is 10°C and the equation $W = mt + 10$ models how the temperature, W , increases over time, t (min).

- a) After 5 min, the water temperature is 19°C . Determine the value of the parameter m . What does m represent?

$$W = mt + 10$$

$$19 = m(5) + 10$$

$$9 = 5m$$

$$m = \frac{9}{5} = 1.8^\circ\text{C}/\text{min}$$

- b) How long will it take for the water to boil?

$$100^\circ\text{C}$$

$$W = 1.8t + 10$$

$$100 = 1.8t + 10$$

$$90 = 1.8t$$

$$\frac{90}{1.8} = \frac{1.8t}{1.8} \quad t = 50 \text{ minutes}$$