

Graphing Linear Relationships

The graph of a linear relationship ($ax + by + c = 0$) is a straight line. The graph can be drawn if at least two ordered pairs of the relationship are known. This information can be determined several different ways.

Example 1: Table of Values

Sketch the graph of $2y = 4x - 2$.

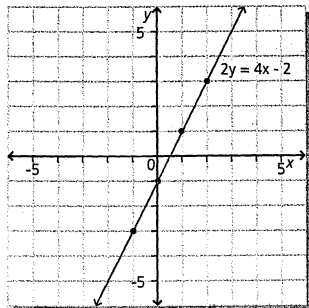
Solution

A table of values can be created.

Express the equation in the form $y = mx + b$.

$$\begin{aligned} \frac{2y}{2} &= \frac{4x-2}{2} \\ y &= 2x-1 \end{aligned}$$

x	y
-1	$2(-1) - 1 = -3$
0	$2(0) - 1 = -1$
1	$2(1) - 1 = 1$
2	$2(2) - 1 = 3$



Example 2: Using Intercepts

Sketch the graph of $2x + 4y = 8$.

Solution

The intercepts of the line can be found.

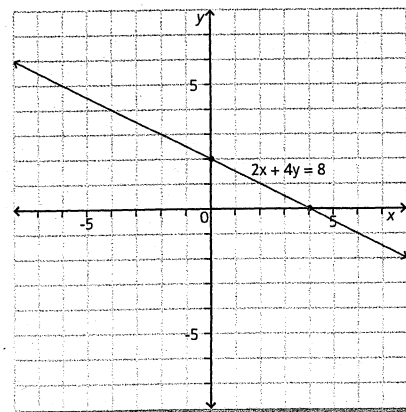
For the x -intercept, let $y = 0$.

$$\begin{aligned} 2x &= 8 \\ x &= 4 \end{aligned}$$

For the y -intercept, let $x = 0$.

$$\begin{aligned} 4y &= 8 \\ y &= 2 \end{aligned}$$

x	y
4	0
0	2



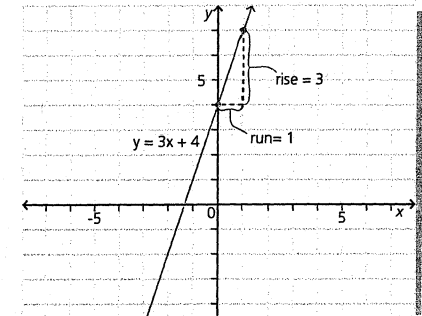
Example 3: Using the Slope and y -intercept

Sketch the graph of $y = 3x + 4$.

Solution

When the equation is in the form $y = mx + b$, the slope and y -intercept can be determined.

$y = 3x + 4$; the line has a slope of 3 and a y -intercept of 4.



Practise

1. Express each equation in the form $y = mx + b$.

- (a) $3y = 6x + 9$
 (b) $2x - 4y = 8$
 (c) $3x + 6y - 12 = 0$
 (d) $5x = y - 9$
 (e) $2x - 5y = 20$
 (f) $4x - y - 6 = 0$
 (g) $2x + 2y = 2$
 (h) $5x - 10 = -3y$

2. Graph each equation using a table of values where $x \in \{-2, -1, 0, 1, 2\}$.

- (a) $y = 3x - 1$ (b) $y = 5x + 2$
 (c) $y = \frac{1}{2}x + 4$ (d) $y = \frac{2x+4}{2}$
 (e) $2y = 4x + 8$ (f) $2x + 3y = 6$
 (g) $y = 4$ (h) $x = -5$

3. Determine the x - and y -intercepts of each equation.

- (a) $x + y = 10$
 (b) $2x + 4y = 16$
 (c) $5x - 7y = 35$
 (d) $9x = 54 - 6y$

- (e) $36 = 9y - 4x$
 (f) $50 - 10x - y = 0$
 (g) $\frac{x}{2} + \frac{y}{4} = 1$
 (h) $\frac{x}{5} - \frac{y}{10} = 2$

4. Graph each equation by determining the intercepts.

- (a) $x + y = 4$ (b) $x - y = 3$
 (c) $2x + y = 6$ (d) $-x + 4y = 8$
 (e) $2x + 5y = 10$ (f) $3x - 4y = 12$
 (g) $2x - 4y = -8$ (h) $-7x - 3y = 21$

5. Graph each equation using the slope and y -intercept.

- (a) $y = 2x + 3$ (b) $y = -x - 5$
 (c) $y = \frac{2}{3}x + 1$ (d) $y = -\frac{3}{4}x - 2$
 (e) $2y = x + 6$ (f) $2x + 3y = -6$
 (g) $8 - x = 4y$ (h) $x + y + 1 = 0$

6. Graph each equation. Use the most suitable method.

- (a) $y = 5x + 2$ (b) $3x - y = 6$
 (c) $y = -\frac{2}{3}x + 4$ (d) $4x = 20 - 5y$