

LESSON 1: Review of linear graphs

Linear graphs simply refer to graphs of straight lines

You can sketch **the graph of a straight line** if you have any **one** of the following:

the x -intercept and the y -intercept

the slope and the y -intercept

the slope and any other point.

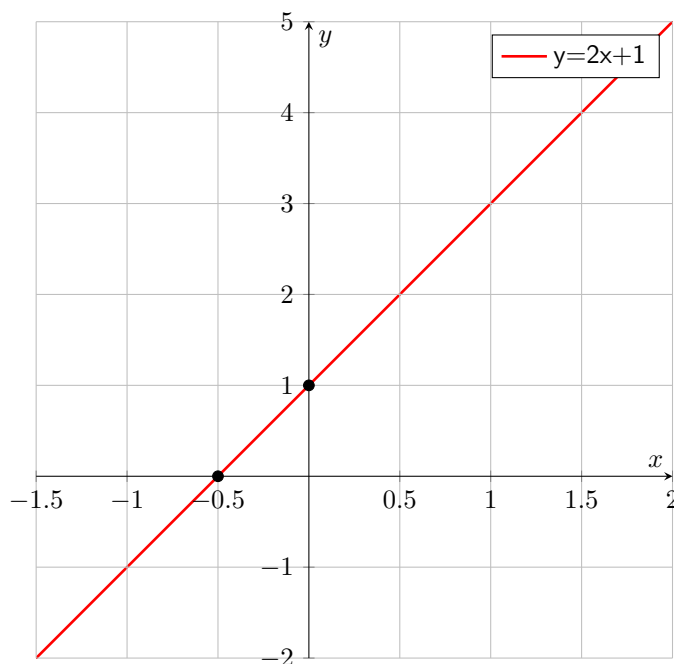
two points on the line

Using the x -intercept and the y -intercept

Example 1: Sketch the graph of $y = 2x + 1$

From the equation $y = 2x + 1$:

- the y -intercept is 1 (obtained by substituting $x = 0$ and then solving for y – that is, $y = 2 \times 0 + 1 = 1$);
- the x -intercept is -0.5 (obtained by substituting $y = 0$ and then solving for x – that is, $0 = 2x + 1 \implies -1 = 2x \implies -\frac{1}{2} = x$. In decimal, $-\frac{1}{2}$ is -0.5).



Example 2: Find the x and y intercepts of the equation $2x + 3y + 6 = 0$. Then sketch the graph

- the x intercept is obtained by substituting $y = 0$ and then solving for x . So:

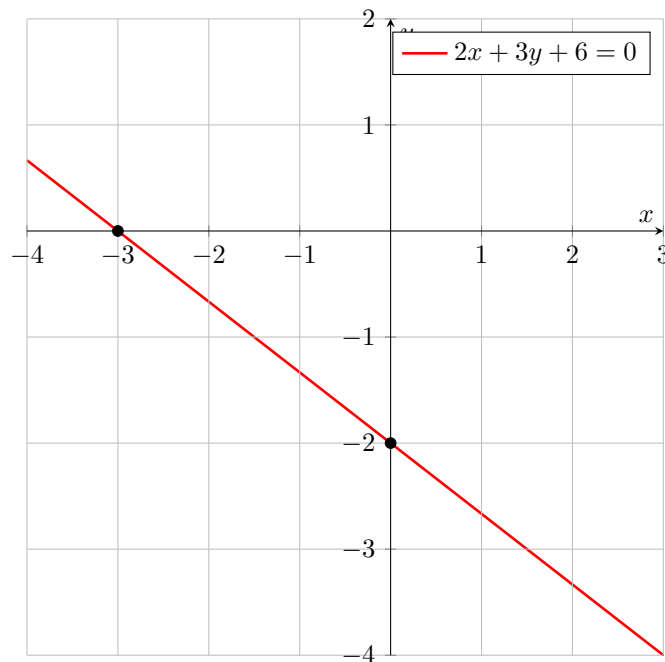
$$\begin{aligned}2x + 3(0) + 6 &= 0 \\2x &= -6 \\ \therefore x &= -3\end{aligned}$$

Thus, the x -intercept is $x = -3$.

- the y -intercept is obtained by substituting $x = 0$ and then solving for y . So:

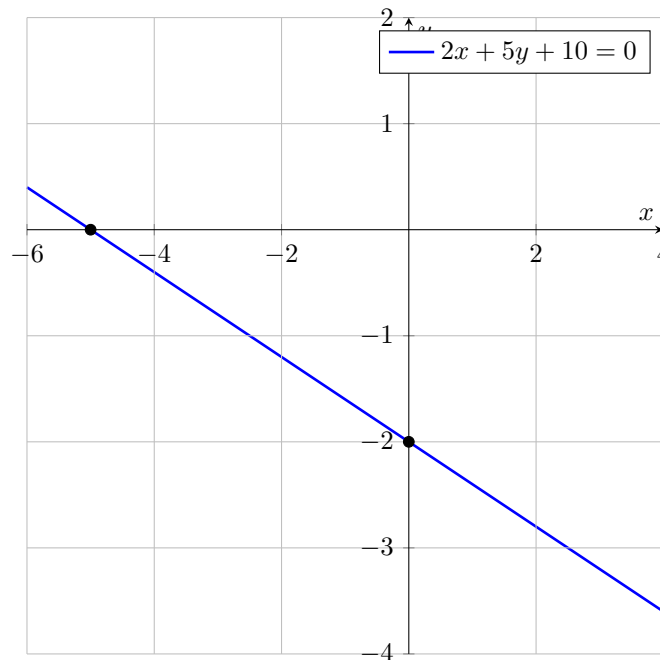
$$\begin{aligned}2(0) + 3y + 6 &= 0 \\3y &= -6 \\ \therefore y &= -2\end{aligned}$$

Thus, the y -intercept is $y = -2$.



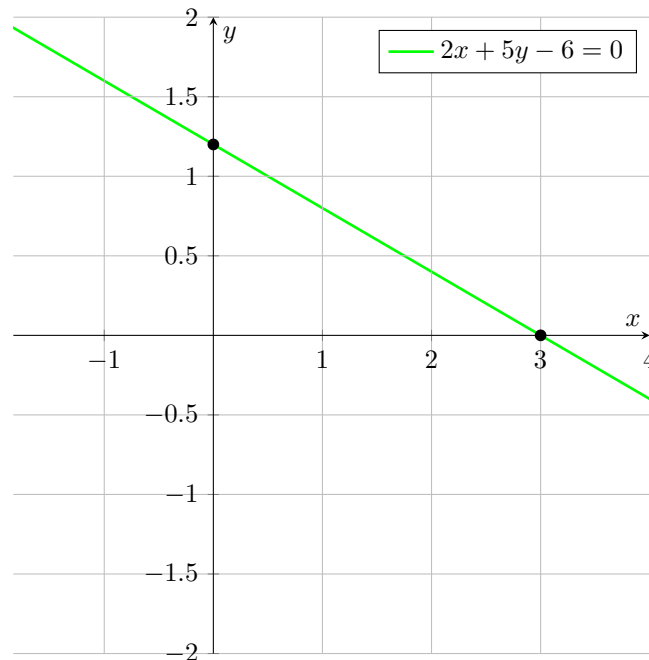
Example 3: Find the x and y intercepts of the linear equation $2x + 5y + 10 = 0$. Then sketch the graph.

- x -intercept: $2x + 10 = 0 \implies 2x = -10 \implies x = -5$. The x -intercept is -5 .
- y -intercept: $5y + 10 = 0 \implies 5y = -10 \implies y = -2$. The y -intercept is -2 .



Example 4: Find the x and y intercepts of the linear equation $2x + 5y - 6 = 0$. Then sketch the graph.

- x -intercept: $x = 3$;
- y -intercept: $y = \frac{6}{5}$.



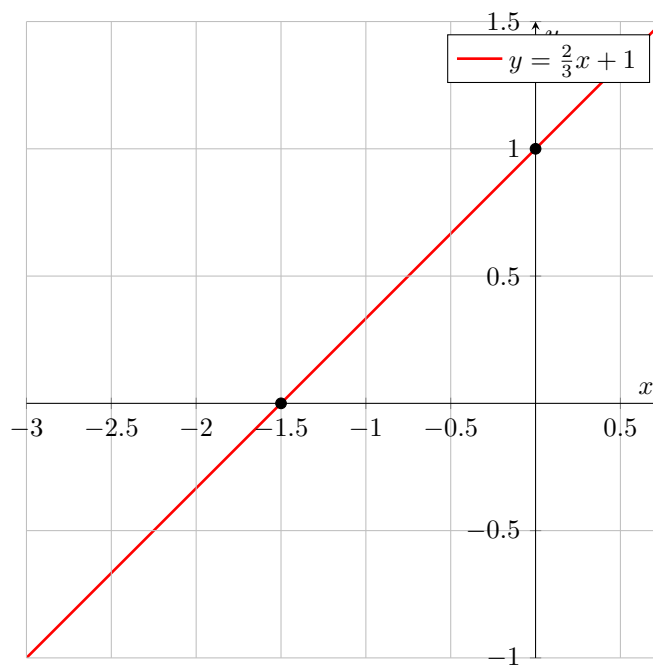
Example 5: Find the x and y intercepts of the line $y = \frac{2}{3}x + 1$. Then sketch the graph.

ANS: x -intercept: $-\frac{3}{2}$; y -intercept: 1. OBTAINED as follows:

- for the x -intercept, substitute 0 for y and then solve for x :

$$\begin{aligned} 0 &= \frac{2}{3}x + 1 \\ 0 - 1 &= \frac{2}{3}x \\ -1 &= \frac{2}{3}x \\ -1 \div \left(\frac{2}{3}\right) &= x \\ -1 \times \frac{3}{2} &= x \\ -\frac{3}{2} &= x \end{aligned}$$

- for the y -intercept, substitute 0 for x and then solve for y . Since $y = \frac{2}{3}x + 1$, we obtain $y = \frac{2}{3} \times 0 + 1 = 0 + 1 = 1$. So the y -intercept is 1.



Using other strategies

It would be somewhat challenging to use the x and y intercepts to sketch the graph of an equation like

$$7x + 13y - 9 = 0,$$

because the intercepts in this case ($\frac{9}{7}$ and $\frac{9}{13}$) are not very nice fractions. In such situations, alternate strategies are preferred. For example, the **slope** and a **chosen point** on the line can be used.

