

Algebra 1 - Graphing Linear Equations - Lesson

Common Core A-REI.D.10, F-IF.C.7a, A-CED.A.2 · maths-pdf.fr/en/

The graph of a linear equation is a straight line made of all the points that satisfy the equation. From $y = mx + b$, plot the y-intercept b and use the slope m as rise over run. From standard form $Ax + By = C$, find both intercepts and connect them.

Algebra 1 · Common Core State Standards: **A-REI.D.10, F-IF.C.7a, A-CED.A.2**

Key facts

- Every point on the line is a solution of the equation, and every solution is on the line.
- In $y = mx + b$, m is the slope and b is the y-intercept.
- Find intercepts by setting $x = 0$ for the y-intercept and $y = 0$ for the x-intercept.
- Point-slope form $y - y_1 = m(x - x_1)$ uses a known point and the slope.
- $y = k$ is horizontal with slope 0; $x = h$ is vertical with undefined slope.

What does the graph of an equation show?

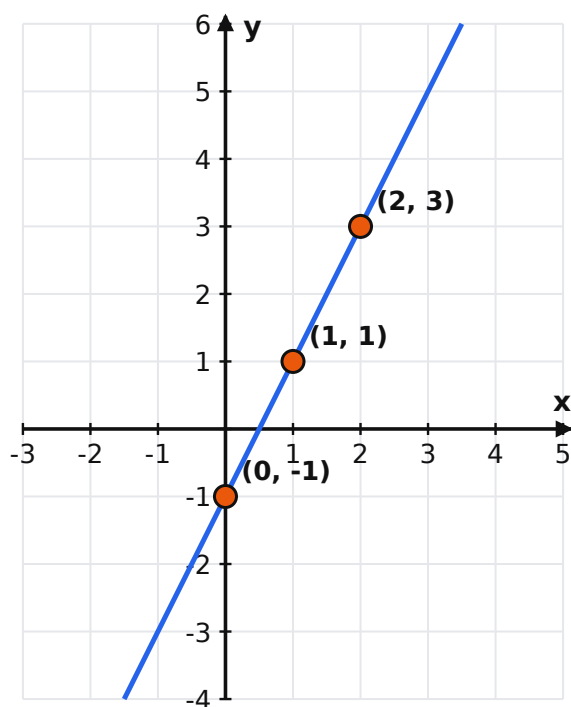
The graph of an equation in two variables is the set of all points (x,y) that make the equation true. For a linear equation, every solution lies on one straight line, and every point on the line is a solution.

Form	Equation	Gives you
Slope-intercept	$y = mx + b$	slope m , y-intercept b
Point-slope	$y - y_1 = m(x - x_1)$	slope m , point (x_1, y_1)
Standard	$Ax + By = C$	easy intercepts

Three forms of a linear equation.

How do you graph from slope-intercept form?

In $y = mx + b$, the number m is the slope and b is the y-intercept.



The graph of $y = 2x - 1$: start at the y-intercept $(0, -1)$, then go up 2 and right 1.

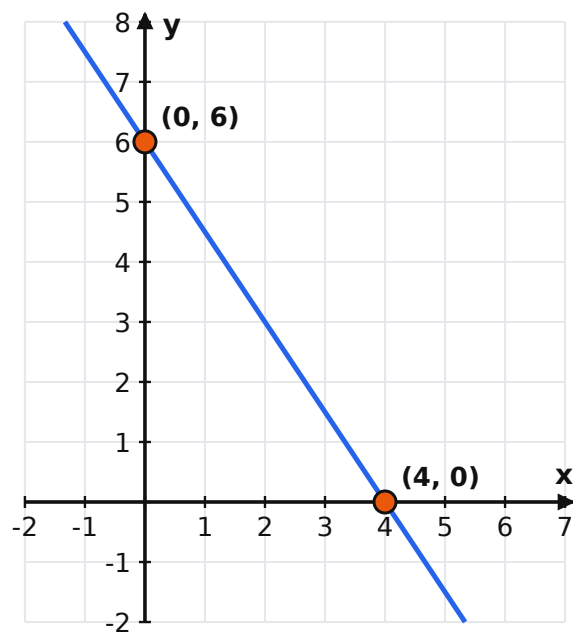
1. Plot the y-intercept $(0, b)$ on the y-axis.
2. Use the slope as rise over run to plot a second point.
3. Plot a third point as a check and draw a line through them.

Intercepts

The **y-intercept** is where the line crosses the y-axis ($x = 0$). The **x-intercept** is where it crosses the x-axis ($y = 0$).

How do you graph standard form $Ax + By = C$?

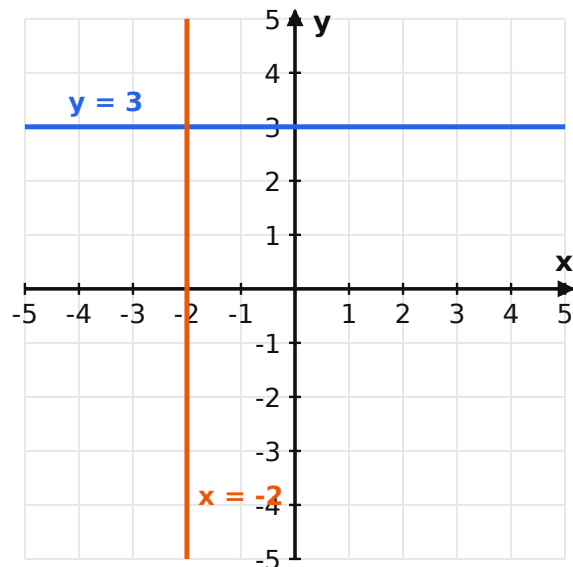
Find the intercepts. Let $x = 0$ and solve for y , then let $y = 0$ and solve for x . For $3x + 2y = 12$, setting $x = 0$ gives $y = 6$, and setting $y = 0$ gives $x = 4$.



The line $3x + 2y = 12$ crosses the axes at $(4, 0)$ and $(0, 6)$.

What about horizontal and vertical lines?

The equation $y = 3$ is a horizontal line through 3 on the y-axis, with slope 0. The equation $x = -2$ is a vertical line through -2 on the x-axis, with undefined slope.



A horizontal line $y = 3$ and a vertical line $x = -2$.

How do you graph point-slope form?

For $y-1=2(x-3)$, plot the point $(3,1)$, then use the slope 2 to move up 2 and right 1. **Example:** $y+2=\frac{1}{2}(x-4)$ goes through $(4,-2)$ with slope $\frac{1}{2}$.

Tip: Check every graph with a third point. If you plot the y-intercept and use the slope to find a second point, a third point taken from the equation should land on the same line. Points that are not in a straight line signal an arithmetic slip.

Questions about graphing linear equations

How do you graph a line from $y = mx + b$?

Plot the y-intercept $(0, b)$, then move up or down by the rise and right by the run to find another point. Draw a line through the points.

How do you find the x-intercept?

Set $y = 0$ and solve for x . For $3x + 2y = 12$ you get $3x = 12$, so the x-intercept is $(4, 0)$.

What does it mean for a point to be on the graph?

Its coordinates make the equation true. Substitute x and y into the equation; if both sides match, the point is on the line.

What is the graph of $x = 5$?

A vertical line through 5 on the x-axis. Every point on it has x-coordinate 5, and its slope is undefined.

How do you convert standard form to slope-intercept form?

Solve for y . For $6x + 3y = 9$, subtract $6x$ to get $3y = 9 - 6x$, then divide by 3 to get $y = -2x + 3$.