

Graphing linear equations: the four methods

A linear equation graphs as a straight line, and two points fix a line (a third checks it). Each method is a way of finding points fast; then plot, join with a ruler, arrows at both ends.

Method	Use when	Steps	Example
1. Table of values	any equation	pick $x = -1, 0, 1$ (or values that make y whole); compute y ; plot	$y = 2x - 3$: $(-1, -5), (0, -3), (1, -1), (2, 1)$
2. Slope-intercept $y = mx + b$	solved for y	plot $(0, b)$; write m as rise/run; move rise then run; repeat	$y = -\frac{3}{4}x + 2$: $(0, 2)$, down 3 right 4 $\rightarrow (4, -1), (8, -4)$
3. Intercepts	$Ax + By = C$	$y = 0$ gives the x -intercept; $x = 0$ gives the y -intercept; join	$3x + 2y = 6$: $(2, 0)$ and $(0, 3)$; check $(4, -3)$
4. Point-slope $y - y_1 = m(x - x_1)$	a point and a slope	plot (x_1, y_1) (signs reverse inside); move by m	$y - 1 = \frac{1}{2}(x + 4)$: $(-4, 1), (-2, 2), (0, 3)$

Equation	Line	Through	Slope
$y = k$ (e.g. $y = 3$)	horizontal	every point with $y = 3$	0
$x = k$ (e.g. $x = 3$)	vertical	every point with $x = 3$	undefined
$y = 0$	the x -axis		0
$x = 0$	the y -axis		undefined

Reading a drawn line; parallel and perpendicular

[] y -intercept: where the line crosses the y -axis. Slope: two clean grid points, $(y_2 - y_1) \div (x_2 - x_1)$; rising to the right is positive. Equation: $y = (\text{slope})x + (\text{intercept})$

[] Parallel: same slope, different intercepts ($y = 2x + 1, y = 2x - 5$). Perpendicular: slopes multiply to -1 ($y = 2x + 1, y = -\frac{1}{2}x + 4$). Different slopes: one crossing point, the solution of the pair

Eight mistakes

[] (x, y) plotted as (y, x) ; slope read as run over rise; a negative slope drawn down and LEFT

[] $x = 3$ and $y = 3$ swapped; the line stopped at the points or drawn freehand

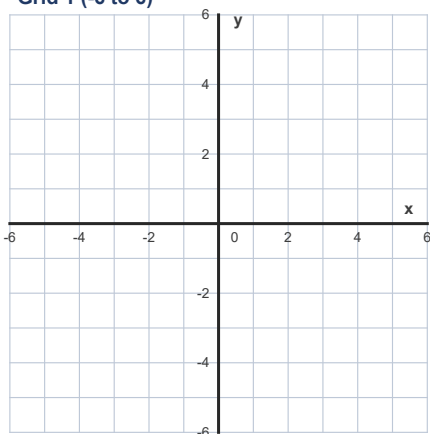
[] The x -intercept used as b ; m and b read before rearranging ($2y = 6x - 4$ has slope 3); no third-point check

From

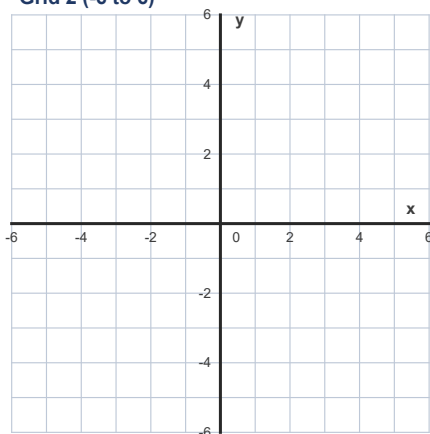
sciencewithshobha.com/blog/graphing-linear-equations-the-four-methods-table-of-values-slope-intercept-intercepts-and-point-slope-with-worked-examples-horizontal-and-vertical-lines-and-blank-grids/ · 1-on-1 online maths, KS2 to A level, Grades 3 to 12, free 30-minute first class.

Blank grids and a practice set

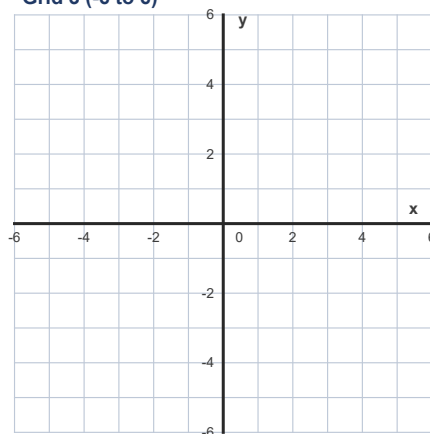
Grid 1 (-6 to 6)



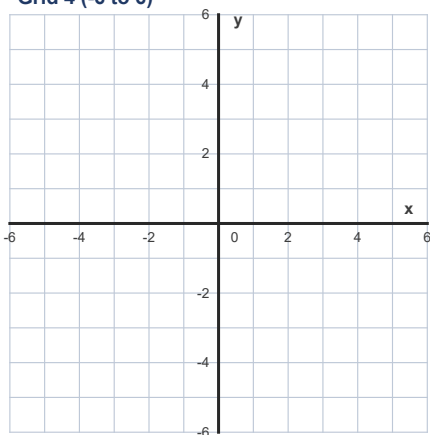
Grid 2 (-6 to 6)



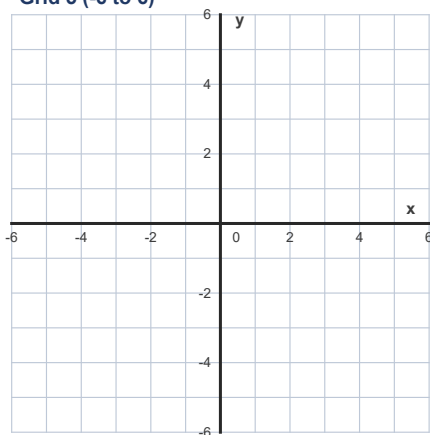
Grid 3 (-6 to 6)



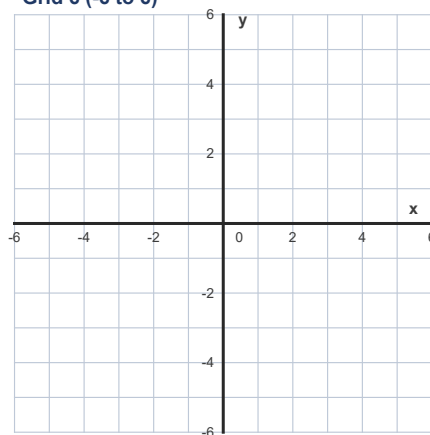
Grid 4 (-6 to 6)



Grid 5 (-6 to 6)



Grid 6 (-6 to 6)



Practice

1. $y = 3x - 2$ (give three points).
2. $y = -\frac{1}{2}x + 4$ (slope from the intercept).
3. $2x - 5y = 10$ (both intercepts).
4. $y + 2 = 2(x - 1)$ (the point, the slope, two more points).
5. Draw $x = -2$ and $y = 4$ on one grid. Where do they cross?
6. A line passes through $(1, 5)$ and $(3, 1)$. Slope and equation? Parallel or perpendicular to $y = \frac{1}{2}x + 7$?

Answers

1. $(0, -2)$, $(1, 1)$, $(2, 4)$. 2. $(0, 4)$, $(2, 3)$, $(4, 2)$. 3. $(5, 0)$, $(0, -2)$. 4. Point $(1, -2)$, slope 2; $(2, 0)$, $(3, 2)$. 5. $(-2, 4)$. 6. Slope -2; $y = -2x + 7$; perpendicular $(-2 \times \frac{1}{2} = -1)$.