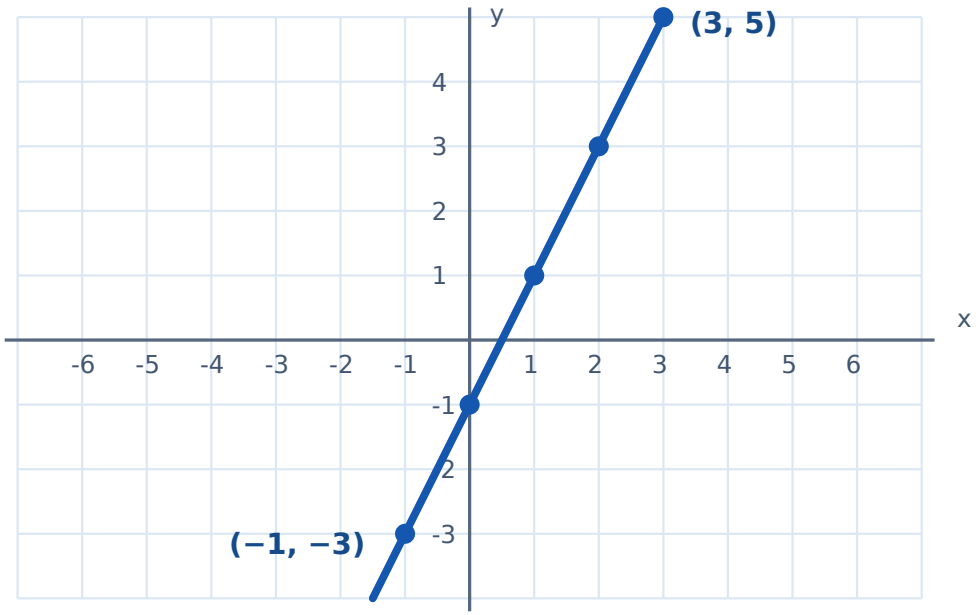
Drawing a line from a table

Every non-vertical straight line can be written as y = mx + c.

What do m and c tell you?

m is the slope (gradient). c is the y-value where the line crosses the y-axis, at (0, c).

x	−1	0	1	2	3
y	−3	−1	1	3	5



Plot each (x, y) pair and draw a straight line through the points.

Work out the first point on y = 2x − 1.

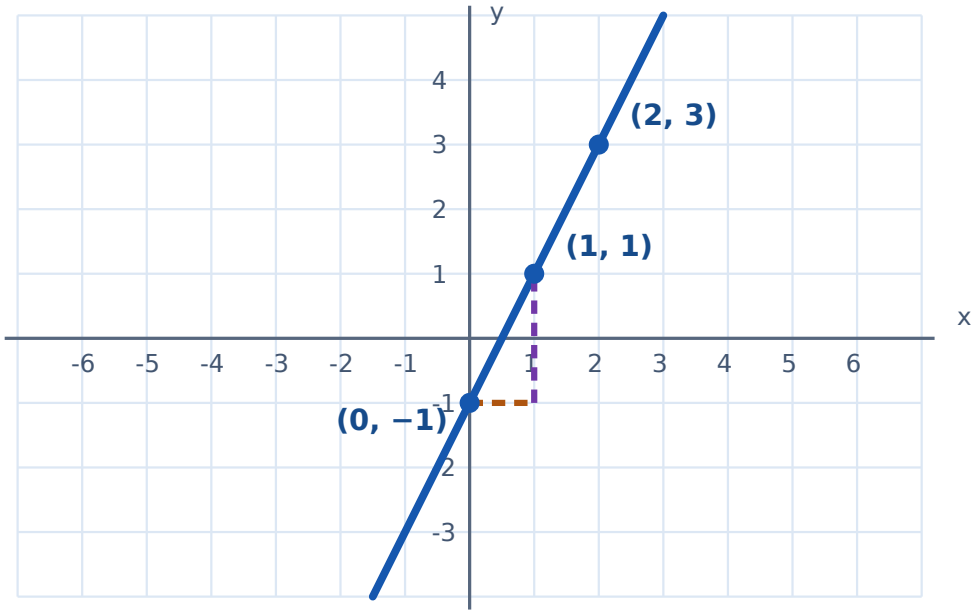
$y = 2(-1) - 1$	Put −1 in place of x.
$y = -2 - 1$	Multiply first, then subtract 1.
$(-1, -3)$	

Drawing with slope and intercept

Draw the same line, y = 2x − 1, without making a table.

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See Co-ordinate geometry → Line for the slope and straight-line equations.



Start at (0, −1). The dashed steps show 1 right, then 2 up.

Use c to start and m to find a second point.

$c = -1$	Plot (0, −1) on the y-axis.
$m = \frac{2}{1}$	The numerator says up 2. The denominator says right 1.
$(0, -1) \longrightarrow (1, 1)$	Plot the next point and draw the line. Use (2, 3) as a check.

$y = 2x - 1$

Intercepts and special lines

The intercept is where the line meets an axis.

Which coordinate is zero?

On the y-axis, x = 0. On the x-axis, y = 0.

Find both intercepts of y = 3x − 6.

$y = 3(0) - 6 = -6$	Put x = 0 to find the y-intercept.
$(0, -6)$	Give the intercept as a point.
$0 = 3x - 6$	Put y = 0 to find the x-intercept.
$6 = 3x$	Add 6 to both sides.
$x = 2$	Divide both sides by 3.

$(0, -6)$ and $(2, 0)$

Horizontal and vertical lines

A horizontal line through (5, −2) has equation y = −2. A vertical line through the same point has equation x = 5. A vertical line has undefined slope.

Finding an equation from two points

Find the slope first. Use one point to find c, then check with the other.

Formulae and Tables · printed page 18

See Co-ordinate geometry → Line for the slope and straight-line equations.

Find the equation through (1, 5) and (4, 11).

$m=\frac{y_2-y_1}{x_2-x_1}$	Write the slope formula.
$m=\frac{11-5}{4-1}$	Substitute both points in the same order.
$m=\frac{6}{3}=2$	Simplify to get the slope.
$y=2x+c$	Insert the slope. If the slope is given, start here with that value.
$5=2(1)+c$	Use the point (1, 5).
$5=2+c$	Multiply first.
$c=5-2=3$	Subtract 2 from both sides.
$y=2x+3$	

Check the other point

When x = 4, y = 2(4) + 3 = 11. So (4, 11) fits. From a graph, you can use any two clearly marked points in the same way.

Parallel and perpendicular lines

Parallel lines go in the same direction. Perpendicular lines meet at a right angle.

Parallel lines

Distinct non-vertical lines with the same slope are parallel. If they also have the same intercept, they are the same line. Two distinct vertical lines are also parallel.

Find the parallel to y = 2x + 5 through (4, 1).

$y = 2x + c$	Keep the slope 2.
$1 = 2(4) + c$	Substitute the point.
$c = 1 - 8 = -7$	Subtract 8 from both sides.
$y = 2x - 7$	

Find the perpendicular to y = 2x + 5 through (4, 1).

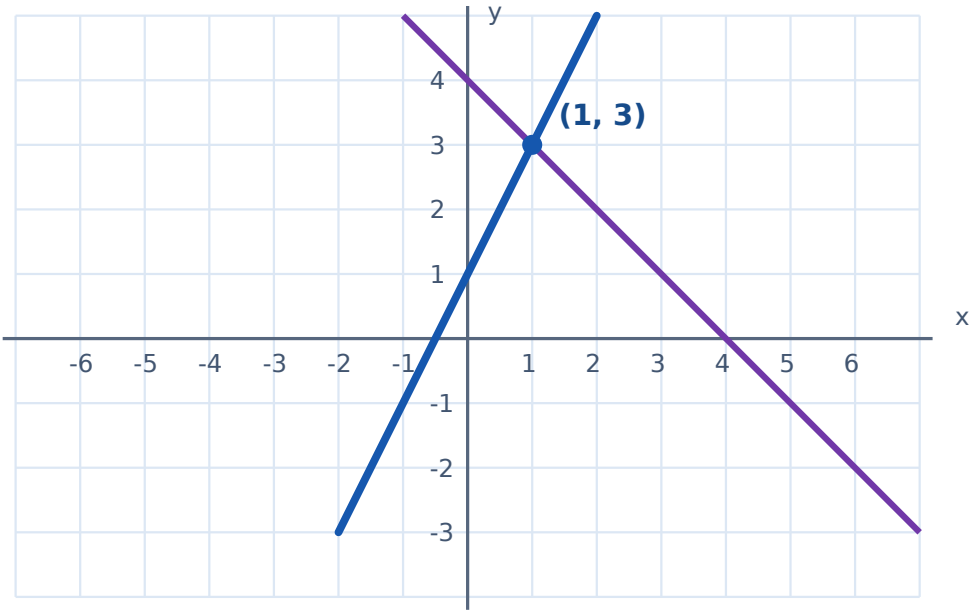
$m_2 = -\frac{1}{2}$	Flip the slope 2 over 1 and change the sign.
$1 = -\frac{1}{2}(4) + c$	Use the new slope and substitute the point.
$1 = -2 + c$	Multiply first.
$c = 1 + 2 = 3$	Add 2 to both sides.
$y = -\frac{1}{2}x + 3$	

Special case

A horizontal line is perpendicular to a vertical line. Do not try to take the reciprocal of slope zero.

Finding where two lines meet

At the intersection, the same x and y satisfy both equations.



The blue line is y = 2x + 1. The purple line is y = −x + 4.

Find the intersection of y = 2x + 1 and y = −x + 4.

$2x+1=-x+4$	Both expressions equal y, so set them equal.
$3x=3$	Add x to both sides, then subtract 1.
$x=1$	Divide both sides by 3.
$y=2(1)+1=3$	Substitute x into either original equation.

$(1,3)$

Check both lines

The second equation gives y = −1 + 4 = 3 too. The point fits both lines.

JUNIOR CYCLE HIGHER LEVEL · CHAPTER PRACTICE

Coordinate Geometry 2

Try the questions before opening the separate answer key. Show one step per line.

21.1 · Fluency

Write the line through (2, 7) with slope 3 in y = mx + c form.

21.2 · Variation

Find the equation of the line perpendicular to y = 4x + 1 through (0, 3).

21.3 · Choose a method

Find the intersection of y = 3x − 2 and y = −x + 6.

Check your work: are the sign, units and level of accuracy appropriate?