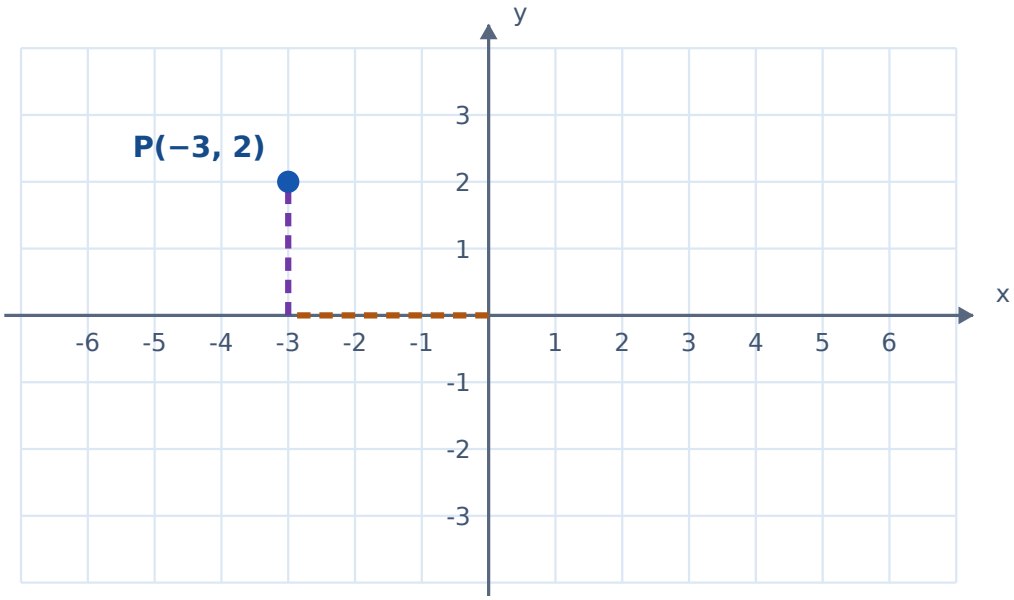
Coordinates and quadrants

Down the hall, up the stairs: read x first, then y.

The ordered pair (x, y)

x tells you the horizontal movement (over and back). y tells you the vertical movement (up and down). A negative x means left; a negative y means down.



From the origin, move 3 units left, then 2 units up. P is in Quadrant II.

II · top left

x negative, y positive

I · top right

x positive, y positive

III · bottom left

x negative, y negative

IV · bottom right

x positive, y negative

On an axis?

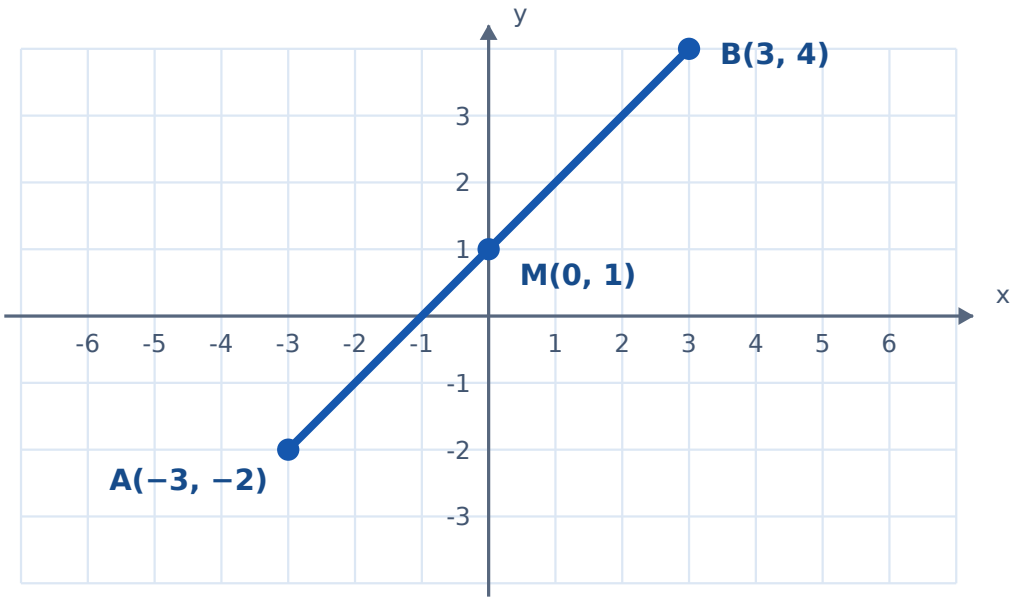
If x = 0 or y = 0, the point lies on an axis, not in a quadrant. The origin is (0, 0).

Midpoint

Average the x-coordinates and the y-coordinates separately.

Formulae and Tables · printed page 18

Find the formula under Co-ordinate geometry → Line.



M lies halfway along the segment from A to B.

Find the midpoint of A(−3, −2) and B(3, 4).

$M=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$	Label A as point 1 and B as point 2.
$M=\left(\frac{-3+3}{2},\frac{-2+4}{2}\right)$	Substitute the x-values together and the y-values together.
$M=\left(\frac{0}{2},\frac{2}{2}\right)$	Add each pair before dividing.

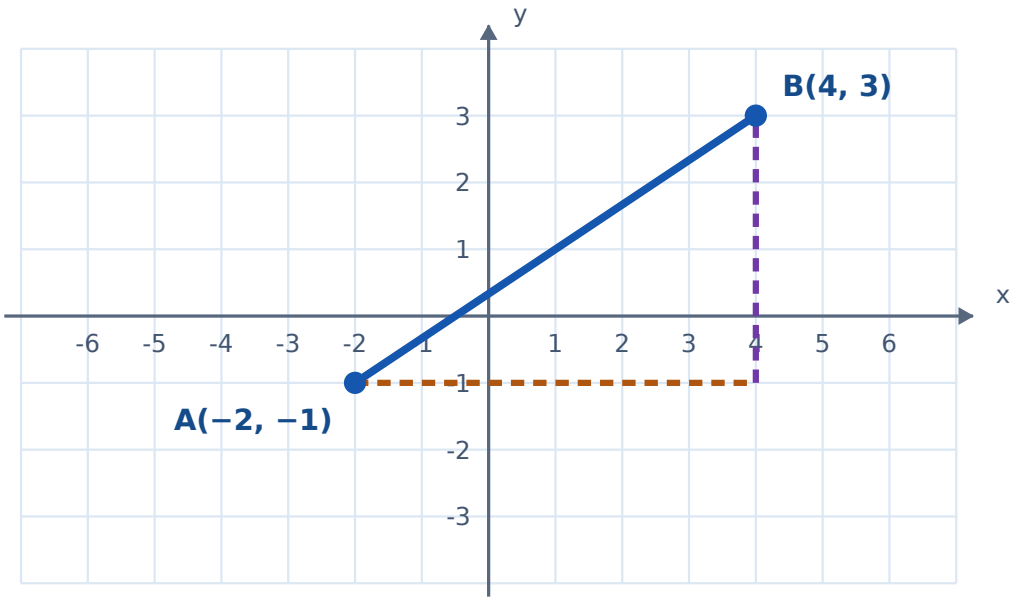
$M=(0,1)$

Distance between two points

The distance formula gives the straight-line length from A to B.

Formulae and Tables · printed page 18

Find the formula under Co-ordinate geometry → Line.



The dashed sides show 6 units across and 4 units up. The blue segment is the distance.

Find the distance from A(−2, −1) to B(4, 3).

$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$	Write the distance formula. A is point 1; B is point 2.
$d=\sqrt{(4-(-2))^2+(3-(-1))^2}$	Subtract the coordinates in the same order. Keep brackets around negative values.
$d=\sqrt{6^2+4^2}=\sqrt{52}$	Square each difference, then add.

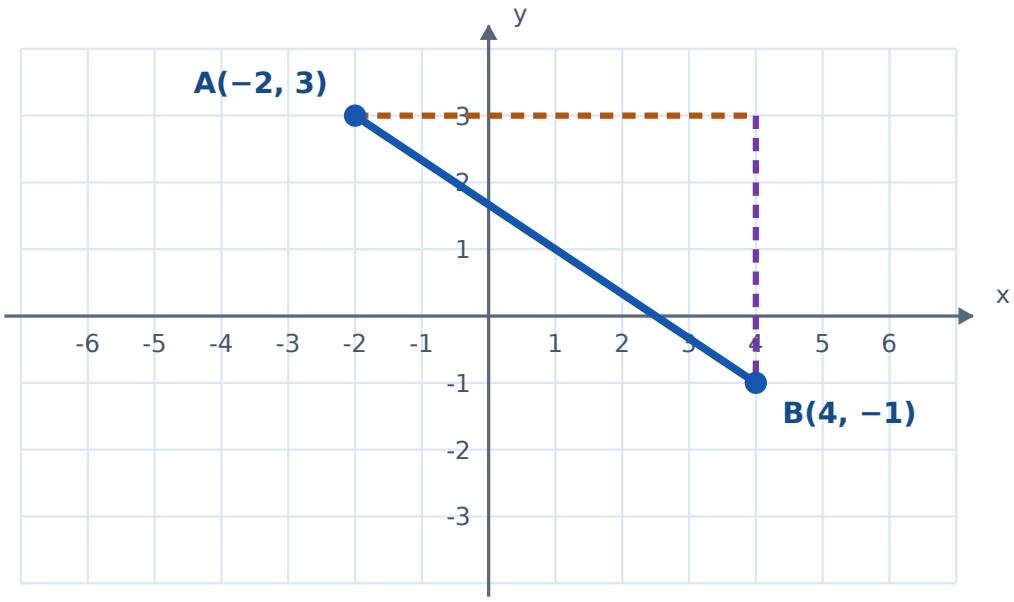
$d=2\sqrt{13}\approx 7.21$ units

Slope of a line

Slope compares the up/down change with the over/back change.

Formulae and Tables · printed page 18

Find the formula under Co-ordinate geometry → Line.



From A to B: move 6 units right and 4 units down. The line falls from left to right.

Find the slope through A(−2, 3) and B(4, −1).

$m = \frac{y_2 - y_1}{x_2 - x_1}$	Write the slope formula. The y-values go on top.
$m = \frac{-1 - 3}{4 - (-2)}$	Subtract A from B both above and below the bar.
$m = \frac{-4}{6}$	Simplify the numerator and denominator.
$m = -\frac{2}{3}$	

Reading slope at a glance

Read the line from left to right to decide whether the slope is positive, negative, zero or undefined.

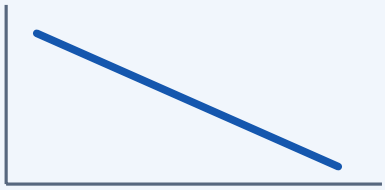
Positive

The line rises.



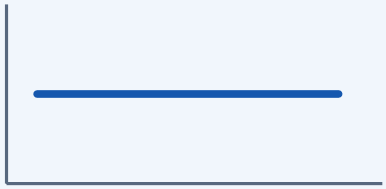
Negative

The line falls.



Zero

The line is horizontal.



Undefined

The line is vertical.



Why is vertical slope undefined?

$x_2 - x_1 = 0$

On a vertical line, the x-coordinates are the same. You cannot divide by zero.

Quick check

Midpoint: average. Distance: square, add and square-root. Slope: y-change over x-change. For subtraction, keep the same point order.

JUNIOR CYCLE HIGHER LEVEL · CHAPTER PRACTICE

Coordinate Geometry 1

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

20.1 · Fluency

Find the midpoint of $(-4, 1)$ and $(2, 7)$.

20.2 · Variation

Find the slope through $(1, -2)$ and $(5, 4)$.

20.3 · Choose a method

Find the distance between $(-2, 3)$ and $(4, -5)$.

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