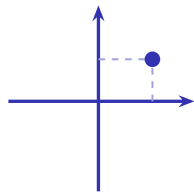


Coordinate Geometry

IGCSE Mathematics ■ Topic 3

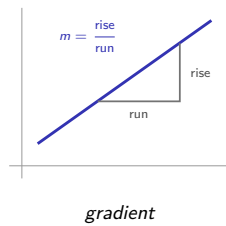
IGCSE Mathematics



Coordinate Geometry

What we will cover

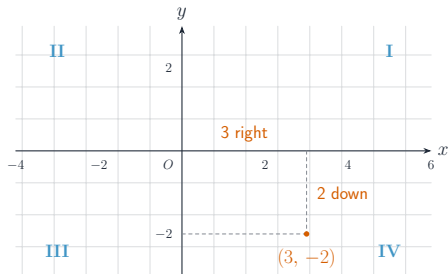
- 1 Coordinates & axes
- 2 The line $y = mx + c$
- 3 Gradient
- 4 Length & midpoint
- 5 Parallel & perpendicular



1

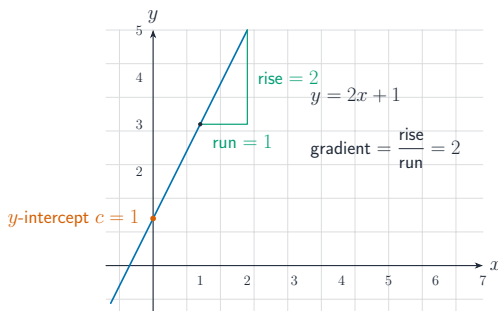
Lines

Coordinates and axes



- The two number lines are the **axes** 坐标轴: the **horizontal** 水平 x-axis and the **vertical** 竖直 y-axis.
- They cross at the **origin** 原点, the point $(0, 0)$.
- The axes split the grid into four **quadrants** 象限.

The line $y = mx + c$



$y = mx + c$: m is the **gradient** 斜率, c is the **intercept** 截距 (where it crosses the y-axis).

Rearrange $ax + by = c$ into $y = mx + c$ to read off m & c .

Gradient



$$m = \frac{\text{change in } y}{\text{change in } x} = \frac{\text{rise}}{\text{run}}$$

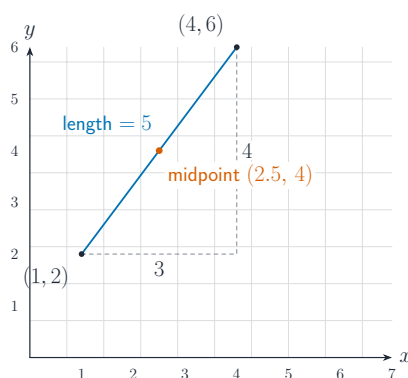
Through $(1, 2)$ and $(4, 11)$

$$m = \frac{11 - 2}{4 - 1} = \frac{9}{3} = 3$$

2 Segments

Coordinate Geometry
└ Segments

Length and midpoint



A **line segment** 线段 is the straight piece between two points.

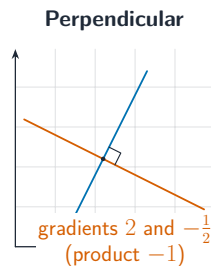
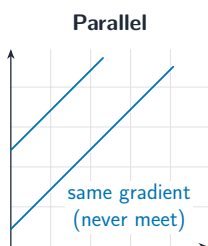
To find the **length** 长度 of the segment between (x_1, y_1) and (x_2, y_2) , use **Pythagoras' theorem** 勾股定理 on the horizontal and vertical gaps:

$$\text{length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

To find the...

Coordinate Geometry
└ Segments

Parallel and perpendicular



■ **parallel** 平行 – same gradient

■ **perpendicular** 垂直 –
 $m_1 \times m_2 = -1$

So flip the fraction & change the sign.

3

Recap

Coordinate Geometry
└ Recap

Topic 3 – key takeaways

1 Line

$y = mx + c$: gradient m , intercept c

2 Gradient

rise over run

3 Length

Pythagoras on the gaps; midpoint averages

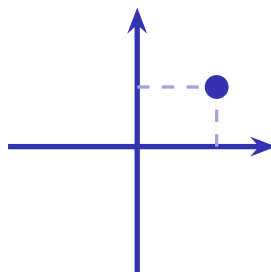
4 Lines

parallel: same m ; perpendicular:
 $m_1 m_2 = -1$

Coordinate Geometry
└ Recap

Check yourself

- 1 In $y = 4x - 1$, what is the gradient?
- 2 Find the gradient through $(1, 2)$ and $(4, 11)$.
- 3 What is the midpoint of $(1, 2)$ and $(4, 6)$?
- 4 What do perpendicular gradients multiply to?



Answers 1. 4 2. 3 3. $(2.5, 4)$ 4. -1