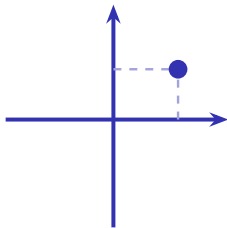


Coordinate Geometry

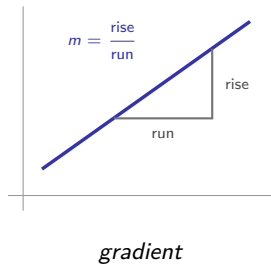
IGCSE Mathematics ■ Topic 3

IGCSE Mathematics

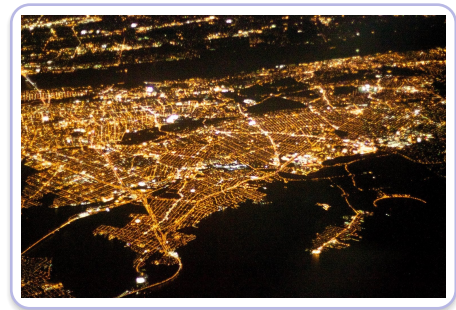
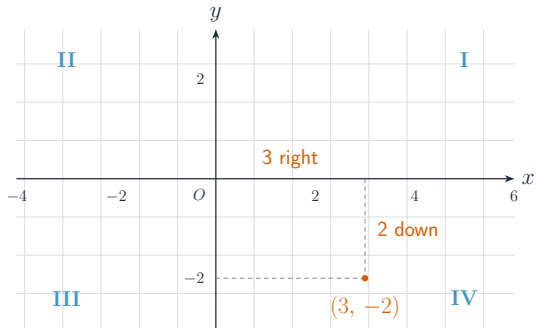


What we will cover

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

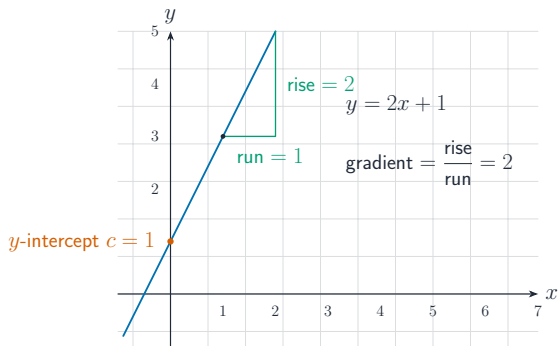


Coordinates and axes



coordinates grid

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

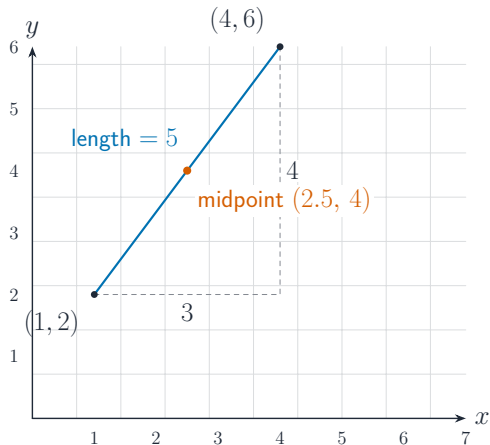


$$m = \frac{\text{change in } y}{\text{change in } x} = \frac{\text{rise}}{\text{run}}$$

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

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

Length and midpoint



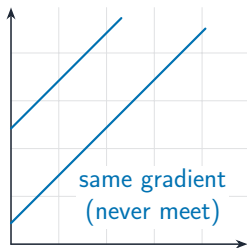
$$\text{length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

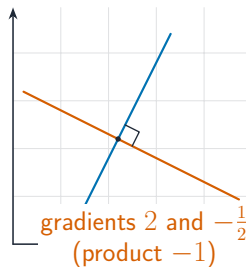
$(1, 2)$ to $(4, 6)$: length 5, midpoint $(2.5, 4)$.

Parallel and perpendicular

Parallel



Perpendicular



■ **parallel** 平行 – same gradient

■ **perpendicular** 垂直 –

$$m_1 \times m_2 = -1$$

So flip the fraction & change the sign.

Topic 3 – key takeaways

1 Line

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

2 Gradient

rise over run

3 Length

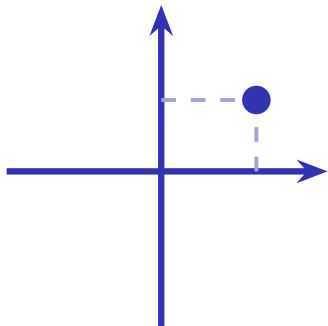
Pythagoras on the gaps; midpoint averages

4 Lines

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

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