IGCSE MATHEMATICS • EXERCISE SHEET

E3.1 Coordinates

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

Objective

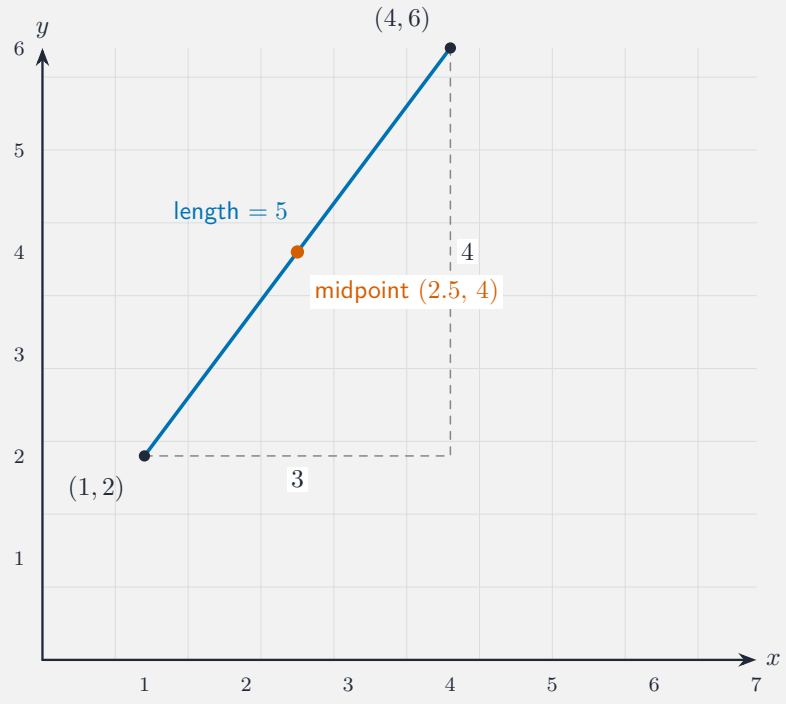
Build the skills to answer Extended exam questions on **coordinates** 坐标—plotting points, and finding the **length** 长度 and **midpoint** 中点 of a line segment.

You must be able to:

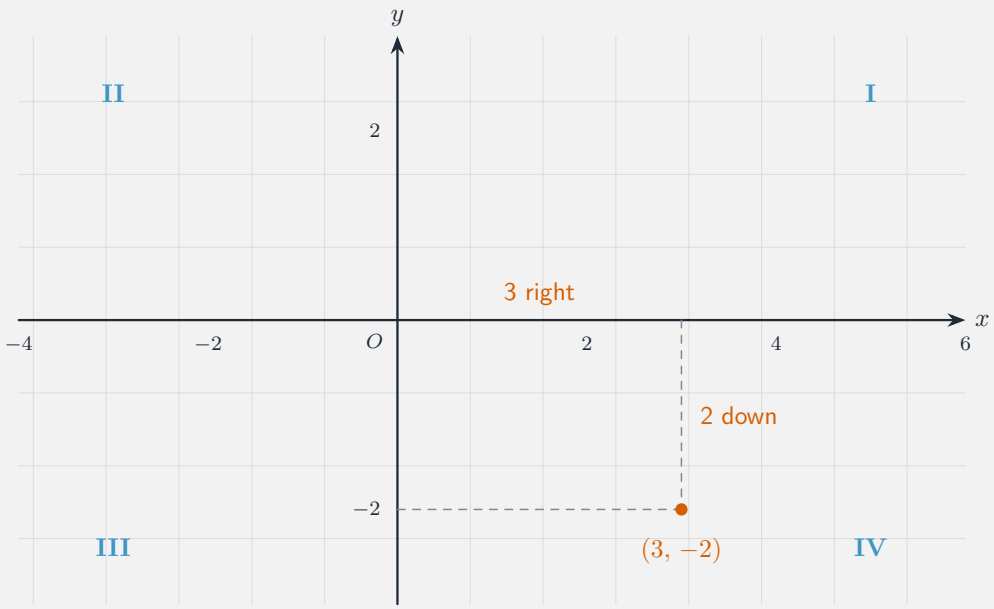
- plot and read coordinates (x, y)
- find the length of a segment using Pythagoras
- find the midpoint of a segment

1 Worked examples

■ Length and midpoint



(x, y): first across, then up



Points are plotted on the coordinate plane

$$\text{length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

- **Worked $(1, 2)$ to $(4, 6)$:** length $= \sqrt{3^2 + 4^2} = 5$; midpoint $= (2.5, 4)$.

Answer shapes: **M1** a correct method, **A1** the correct answer.

2 Practice

2.1 Find the midpoint of the segment joining $(2, 3)$ and $(6, 9)$. [2]

2.2 Find the length of the segment from $(0, 0)$ to $(3, 4)$. [2]

2.3 Write down the coordinates of the point 3 left and 2 up from the origin. [1]

3 Exam-style questions

3.1 $A = (1, 1)$ and $B = (7, 9)$.

(a) Find the midpoint of AB. [2]

(b) Find the length of AB. [2]

3.2 $M(3, 5)$ is the midpoint of PQ. Given $P = (1, 2)$, find the coordinates of Q. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **E3.1 Coordinates** past-paper sheet in the Library, or try this in **Practice mode**:

- 0580/22 N25 —Q17 (coordinates / length / midpoint)

Solutions

Marking: **M1** a correct method, **A1** the correct answer.

2.1 $\left(\frac{2+6}{2}, \frac{3+9}{2}\right) = (4, 6)$.

2.2 $\sqrt{3^2 + 4^2} = \sqrt{25} = 5$.

2.3 $(-3, 2)$.

3.1 (a) $\left(\frac{1+7}{2}, \frac{1+9}{2}\right) = (4, 5)$. (b) $\sqrt{(7-1)^2 + (9-1)^2} = \sqrt{36 + 64} = \sqrt{100} = 10$.

3.2 if M is the midpoint, $Q = (2 \times 3 - 1,\ 2 \times 5 - 2) = (5, 8)$.