

Exercise walk-through

E2.11

Sketching curves

IGCSE Mathematics

You must be able to

- recognise the shape of linear, quadratic, cubic and reciprocal graphs
- find the turning point of a parabola by completing the square
- state the line of symmetry of a parabola

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The method

Method — Shapes and turning points

- **Shapes:** linear (line), **quadratic** (a **parabola** , U if $a > 0$), cubic (S-shape), reciprocal (two curves).
- **Turning point:** $y = (x + 3)^2 - 8$ has its turning point at $(-3, -8)$.
- **Line of symmetry** : the vertical line through the turning point ($x = -3$ here).

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

Exercises 2.1·2.3

2.1 Write down the shape of the graph of $y = x^2 + 1$. [1]

2.2 Write down the turning point of $y = (x - 4)^2 + 2$. [1]

2.3 Write down the y -intercept of $y = 3x - 5$. [1]

Exercises 2.1·2.3

2.1 Write down the shape of the graph of $y = x^2 + 1$. [1]

2.1

- a **parabola** (a U-shaped curve)
-

2.2 Write down the turning point of $y = (x - 4)^2 + 2$. [1]

2.2

- **(4, 2)**
-

2.3 Write down the y -intercept of $y = 3x - 5$. [1]

2.3

- y -intercept **−5**

Exercises 3.1·3.3

3.1 Write $x^2 + 6x + 5$ in the form $(x + p)^2 + q$. [2]

3.2 Hence write down the coordinates of the turning point of $y = x^2 + 6x + 5$. [1]

3.3 Write down the equation of the line of symmetry of $y = x^2 + 6x + 5$. [1]

Exercises 3.1·3.3

3.1 Write $x^2 + 6x + 5$ in the form $(x + p)^2 + q$. [2]

3.1

- half of 6 is 3, $3^2 = 9$
- $x^2 + 6x + 5 = (x + 3)^2 - 9 + 5 = (\mathbf{x + 3})^2 - \mathbf{4}$

3.2 Hence write down the coordinates of the turning point of $y = x^2 + 6x + 5$. [1]

3.2

- turning point $(-\mathbf{3}, -\mathbf{4})$

3.3 Write down the equation of the line of symmetry of $y = x^2 + 6x + 5$. [1]

3.3

- line of symmetry $\mathbf{x = -3}$