Graphs Quadratic Cubic

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Complete a table of values for $y = x^2 - 2x - 3$ from $x = -2$ to $x = 4$.

Step 1 · Substitute each x (careful with negatives)

$x = -2$: $4 + 4 - 3 = 5$

Step 2 · Continue

5, 0, –3, –4, –3, 0, 5

Step 3 · Plot and join smoothly

A U-shaped curve

Answer: y = 5, 0, –3, –4, –3, 0, 5

Check: The values are symmetrical about $x = 1$ ✓

2. Now try one with the steps

Use the graph of $y = x^2 - 2x - 3$ to find the roots, the line of symmetry and the turning point.

Step 1 · Roots: where the curve crosses y = 0

Step 2 · Symmetry: halfway between

Step 3 · Turning point: y at x = 1

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Describe the shape of the graph of $y = x^2$. [1]

2. Where does $y = x^2 - 4$ cross the x-axis? [2]

3. Where does $y = x^2 + 3x - 10$ cross the y-axis? [1]

4. Find the roots of $y = x^2 + 3x - 10$. [2]

5. $y = x^2 - 6x + 5$ has roots 1 and 5. Find its turning point. [2]

6. Find the value of $y = x^2 + 1$ when $x = -3$. [1]

7. Find the value of $y = x^3$ when $x = -2$. [1]

8. Find the value of $y = 12/x$ when $x = 3$. [1]

9. Describe the graph of $y = 4 - x^2$. [2]

10. Write down the equation of the line of symmetry of $y = x^2 - 8x + 7$. [2]

11. Use the graph of $y = x^2 - 2x - 3$ (or algebra) to solve $x^2 - 2x - 3 = 5$. [2]

12. How many solutions does $x^3 - 4x = 0$ have? [1]

13. Explain why the graph of $y = 1/x$ never crosses the y-axis. [1]

14. Which of $y = 2x + 1$, $y = x^2$, $y = x^3$ and $y = 1/x$ has two separate branches? [1]

15. Does the graph of $y = x^2 + 2x + 5$ cross the x-axis? Explain using its turning point. [3]

4. Before you hand it in

$(-2)^2$ entered as $-2^2 = -4$ in a table of values

$(-2)^2 = +4$. Use brackets: x^2 is never negative.

Joining plotted points with straight lines

Quadratics, cubics and reciprocals are smooth curves. Draw one smooth curve through the points, and a rounded bottom (not a point) at a turning point.

Drawing $y = 1/x$ continuous curve through the origin

$1/x$ is undefined at $x = 0$, so there are two separate branches.

Turning point of $y = x^2 - 6x + 5$ at (0, 5)

The turning point is on the line of symmetry, halfway between the roots 1 and 5: $x = 3$, $y = -4$.