

GCSE Maths: Recognising graphs from their equations (Higher): answers

GCSE Maths - Quadratic and Other Graphs - Higher - Lesson 13.5

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch13-quadratic-other-graphs/higher/recognising-graphs-from-their-equations/

Exercise 13E Recognising and sketching graphs Non-calculator

1 Name the type of graph given by each equation (linear, quadratic, cubic or reciprocal) and describe its shape.

(a) $y = 3x - 2$

Answer: Linear: straight line going up as you move right

(b) $y = x^2 + 4$

Answer: Quadratic: U-shaped parabola (has a lowest point)

(c) $y = x^3 - 1$

Answer: Cubic: cubic curve rising from bottom-left to top-right

(d) $y = \frac{5}{x}$

Answer: Reciprocal: reciprocal curve in two branches, in the top-right and bottom-left parts of the grid

(e) $y = -2x^2$

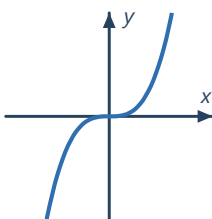
Answer: Quadratic: n-shaped parabola (has a highest point)

(f) $y = -\frac{3}{x}$

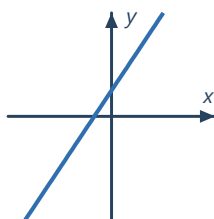
Answer: Reciprocal: reciprocal curve in two branches, in the top-left and bottom-right parts of the grid

2 Match each equation to its graph.

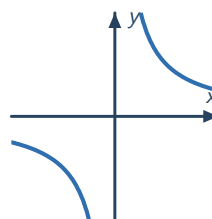
A



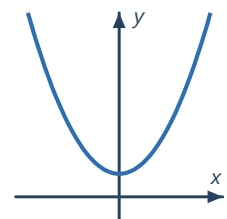
B



C



D



(a) $y = 2x + 1$

Answer: B

(b) $y = x^2 + 1$

Answer: D

(c) $y = x^3$

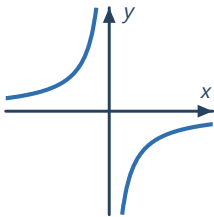
Answer: A

(d) $y = \frac{4}{x}$

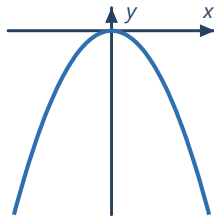
Answer: C

3 Match each equation to its graph (A to D).

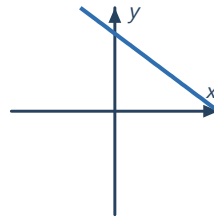
A



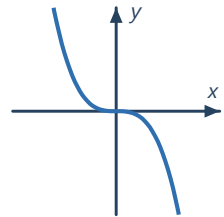
B



C



D



(a) $y = -x + 3$

Answer: C

(b) $y = -x^2$

Answer: B

(c) $y = -x^3$

Answer: D

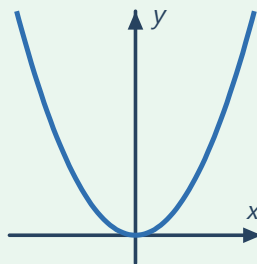
(d) $y = -\frac{2}{x}$

Answer: A

4 Sketch each graph. Your sketch should show the correct shape.

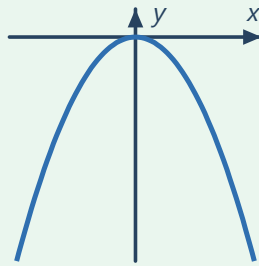
(a) Sketch $y = x^2$

Answer: Quadratic: U-shaped parabola (has a lowest point)



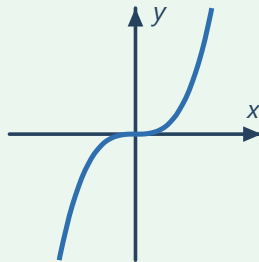
(b) Sketch $y = -x^2$

Answer: Quadratic: n-shaped parabola (has a highest point)



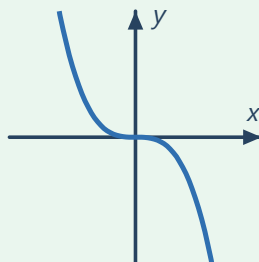
(c) Sketch $y = x^3$

Answer: Cubic: cubic curve rising from bottom-left to top-right



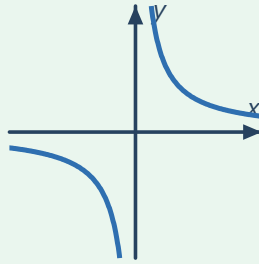
(d) Sketch $y = -x^3$

Answer: Cubic: cubic curve falling from top-left to bottom-right



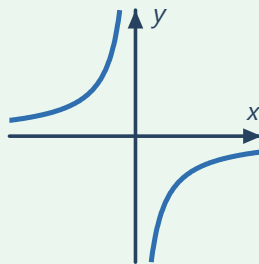
(e) Sketch $y = \frac{2}{x}$

Answer: Reciprocal: reciprocal curve in two branches, in the top-right and bottom-left parts of the grid



(f) Sketch $y = -\frac{2}{x}$

Answer: Reciprocal: reciprocal curve in two branches, in the top-left and bottom-right parts of the grid



5 Which graph could be $y = x^2 - 3$? A: crosses the y-axis at $(0, 3)$, U-shaped. B: crosses the y-axis at $(0, -3)$, U-shaped. C: crosses the y-axis at $(0, -3)$, n-shaped.

Answer: B

6 Write **true** or **false** for each statement. Give a reason.

(a) A quadratic graph is always U-shaped.

Answer: False

(b) The graph of $y = 2x + 5$ is a curve.

Answer: False

(c) The graph of $y = x^3$ goes through $(-1, -1)$.

Answer: True

(d) The graph of $y = 4 \div x$ has a point with $x = 0$.

Answer: False

7 Which of these graphs has a turning point: $y = 2x + 1$, $y = x^2 - 3$, $y = x^3$, $y = 1 \div x$?

Answer: $y = x^2 - 3$

8 Which of these points lie on the graph of $y = x^3$?

(a) (2, 8)

Answer: Yes

(b) (-2, -8)

Answer: Yes

(c) (1, 2)

Answer: No

(d) (-1, 1)

Answer: No

9 A graph is n-shaped, crosses the y -axis at 4 and crosses the x -axis at -2 and 2. Which equation could it be? $y = x^2 - 4$, $y = 4 - x^2$, $y = x^2 + 4$, $y = 4 \div x$.

Answer: $y = 4 - x^2$

10 Ravi says the graph of $y = x^2 + 1$ passes through the origin. Show that he is wrong.

Answer: At $x = 0$, $y = 1$, not 0

11 Use the values of $x = 2$ and $x = -2$ to explain the difference between the shapes of $y = x^2$ and $y = x^3$.

Answer: x^2 gives the same y ; x^3 gives opposite y -values

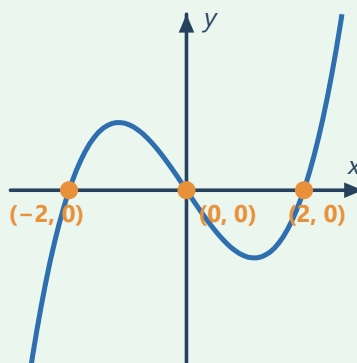
12 A parabola crosses the x -axis at (-3, 0) and (1, 0) and crosses the y -axis at (0, 3). Which equation could it be? $y = (x - 1)(x + 3)$, $y = -(x - 1)(x + 3)$, $y = (x + 1)(x - 3)$, $y = -(x + 1)(x - 3)$.

Answer: $y = -(x - 1)(x + 3)$

13 Sketch the graph of (a) $y = x^3 - 4x$ and (b) $y = 4x - x^3$. For each, show where it crosses the x -axis (you may use $x(x^2 - 4) = 0$).

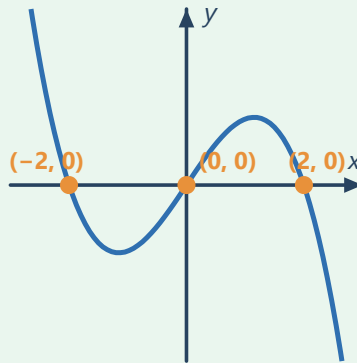
(a) $y = x^3 - 4x$

Answer: Crosses the x -axis at -2, 0 and 2; rises from bottom-left to top-right with a hump and a dip.



(b) $y = 4x - x^3$

Answer: Crosses the x-axis at -2 , 0 and 2 ; falls from top-left to bottom-right (the reflection of part (a) in the x-axis).



- 14** Zara says: "Every graph of the form $y = ax^2 + c$ is symmetrical about the y-axis." Show that she is right by comparing the y-values for x and $-x$.

Answer: $ax^2 + c$ is the same for x and $-x$