

Graphs from quadratic equations

Year 7 About 70 minutes No calculator 45 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/ks3-year-7-graphs-from-quadratic-equations/

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark] **A2** Needed today [1 mark]
 Work out $(-3)^2$. Work out $x^2 + 3x$ when $x = -2$.

Answer

Answer

- A3** Last lesson [1 mark] **A4** From chapter 6 [1 mark]
 Write down the gradient of the line $y = 6 - 4x$. Work out the volume of a cuboid 5 cm by 4 cm by 3 cm.

Answer

Answer

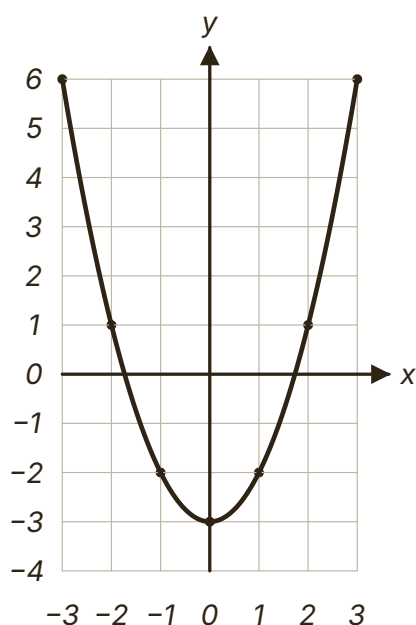
B Example, then your turn

Year 7

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Make a table of values for $y = x^2 - 3$ for x from -3 to 3 , and draw the graph.



Hint Square x first, then subtract 3. A negative number squared is positive: $(-3)^2 = 9$.

- B1** Complete the table of values [2 marks]
 for $y = x^2 + 2$.

x	-3	-2	-1	0	1	2	3
y							

EXAMPLE 2

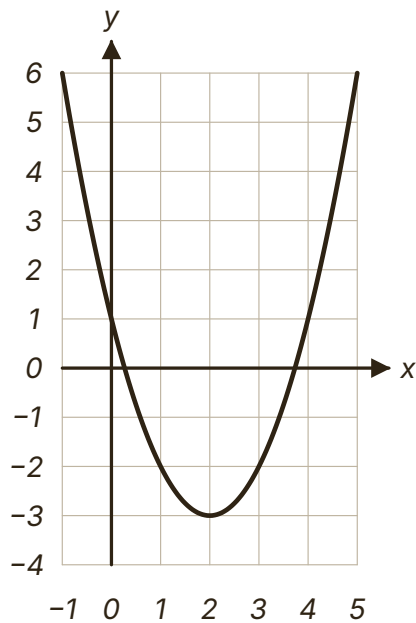
Complete a table of values for $y = x^2 + 2x$ for x from -3 to 2 .

x	-3	-2	-1	0	1	2
x^2	9	4	1	0	1	4
$2x$	-6	-4	-2	0	2	4
y	3	0	-1	0	3	8

Hint Use one row for x^2 and one for $2x$, then add the two rows to get y .

EXAMPLE 3

The graph of $y = x^2 - 4x + 1$ is drawn. Write down the lowest point and the line of symmetry.

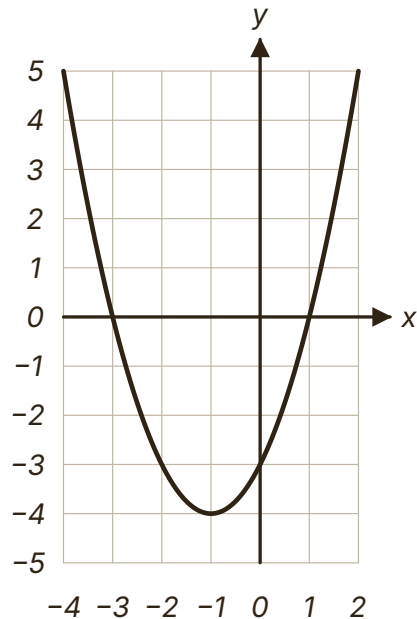


Hint The lowest point is the bottom of the U. The line of symmetry is the vertical line through it.

B2 Complete the table of values [2 marks]
for $y = x^2 - 3x$.

x	-1	0	1	2	3	4
x^2						
$-3x$						
y						

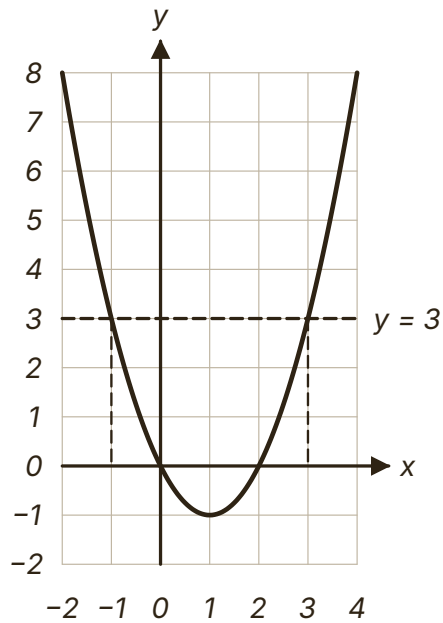
B3 The graph of $y = x^2 + 2x - 3$ is drawn. Write down (i) the lowest point, (ii) the line of symmetry, (iii) where the curve crosses the x -axis. [3 marks]



Answer

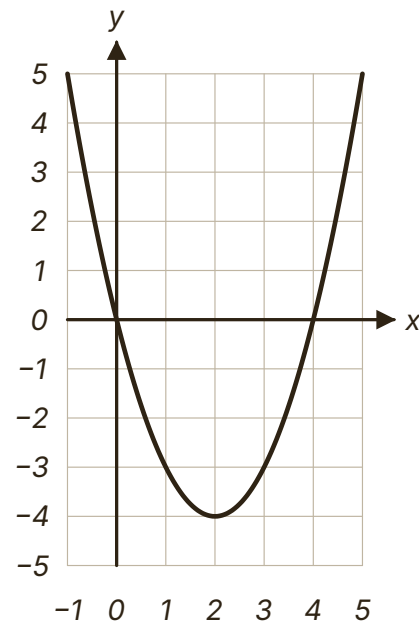
EXAMPLE 4

The graph of $y = x^2 - 2x$ is drawn. Use it to solve $x^2 - 2x = 3$.



Hint Draw the line $y = 3$. The solutions are the x values where the line meets the curve.

B4 The graph of $y = x^2 - 4x$ is drawn. Use it to solve $x^2 - 4x = 5$. [3 marks]



Answer

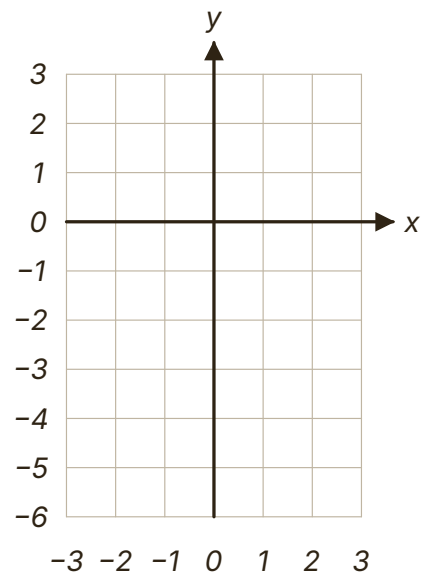
c Practice

Year 7

C1 Complete the table of values for $y = x^2 - 6$. [2 marks]

x	-3	-2	-1	0	1	2	3
y							

C2 Use your table from C1 to draw the graph of $y = x^2 - 6$ on the grid. [3 marks]



- C3** Which of these equations give a curved graph? Give a reason. [2 marks]
 $y = 3x + 2$ $y = x^2 - 1$ $y = 5 - x$ $y = 2x^2$
- C4** Where does the graph of $y = x^2 + 3$ cross the y -axis? [2 marks]
 How is its graph different from the graph of $y = x^2$?

Answer

Answer

D Exam-style questions

GCSE Foundation

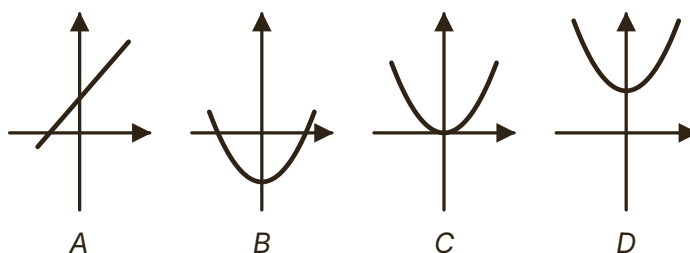
- D1** Mia works out $y = x^2 - 7$ when $x = -4$. She says, " $y = -23$." [3 marks]

Mia is wrong. Explain her mistake and work out the correct value of y .

Answer

- D2** Here are four sketches. Match each equation to its sketch. [4 marks]

$y = x^2$ $y = x + 2$ $y = x^2 + 6$ $y = x^2 - 3$



Answer

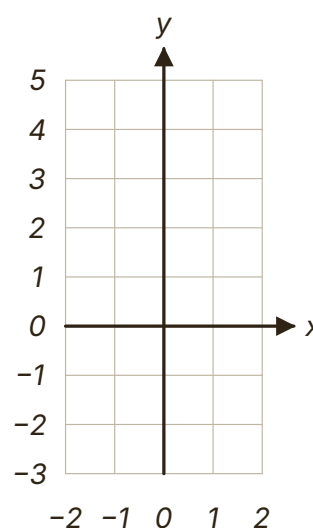
- D3** This question is about $y = 2x^2 - 3$.

- (a) Complete the table of values. [2 marks]

x	-2	-1	0	1	2
y					

- (b) On the grid, draw the graph of $y = 2x^2 - 3$ for x from -2 to 2 . [2 marks]

- (c) Write down the coordinates of the lowest point of the graph. [1 mark]



Answer

Total for D3: 5 marks

D4 The graph of $y = x^2 + 4x - 1$ is drawn on the grid.

- (a) Write down the lowest point. [1 mark]

Answer

- (b) Write down the line of symmetry. [1 mark]

Answer

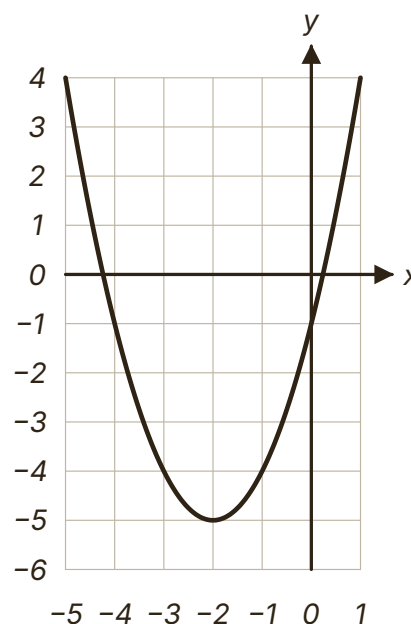
- (c) Use the graph to solve $x^2 + 4x - 1 = 4$. [2 marks]

Answer

- (d) Use the graph to estimate the solutions of $x^2 + 4x - 1 = 0$. [2 marks]

Answer

Total for D4: 6 marks



E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** The curve $y = x^2 + bx$ passes through the point $(2, -4)$. Find the value of b . The curve crosses the x -axis at O and at one other point. Find that point. [4 marks]

Answer $b = \dots\dots$ and $(\dots\dots, \dots\dots)$

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Put $x = 2$ and $y = -4$ into $y = x^2 + bx$.
Hint 2 $-4 = 4 + 2b$, so $b = -4$ and the curve is $y = x^2 - 4x$.
Hint 3 It crosses the x -axis where $y = 0$: $x^2 - 4x = 0$. Try $x = 0, 1, 2, 3, 4$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can make a table of values for an equation with an x^2 , squaring negative numbers correctly. ☐ ☐ ☐

I can draw a smooth U-shaped graph from a table. ☐ ☐ ☐

I can read the lowest point and the line of symmetry from a graph. ☐ ☐ ☐

I can solve an equation by reading where a curve meets a line. ☐ ☐ ☐