

Completing the Square

GCSE Maths · Practice Questions

20 questions · 62 marks total

jtmaths.org · free maths resources

Section A · Foundation

Questions 1–3 are the most straightforward; they get harder as you go on. Question 10 is the most challenging.

1 [1 mark]

What number must be put in the box to make $x^2 + 6x + \square$ a perfect square?

.....

2 [2 marks]

Write $x^2 + 4x + 1$ in the form $(x + a)^2 + b$

.....

3 [2 marks]

Write $x^2 - 6x + 10$ in the form $(x + a)^2 + b$

.....

4 [2 marks]

Write $x^2 + 10x$ in the form $(x + a)^2 + b$

.....

5 [3 marks]

(a) Write $x^2 - 8x + 20$ in the form $(x + a)^2 + b$

(b) Write down the smallest possible value of $x^2 - 8x + 20$ and the value of x that gives it.

.....

6 [3 marks]

Write $x^2 + 3x + 1$ in the form $(x + a)^2 + b$

.....

7

[3 marks]

Solve $x^2 + 6x + 5 = 0$ by completing the square.

8

[3 marks]

Solve $x^2 - 4x - 1 = 0$ by completing the square, giving your answers in surd form.

9

[4 marks]

A curve has equation $y = x^2 + 8x + 3$

- (a) Write the equation in the form $y = (x + a)^2 + b$
 - (b) Write down the coordinates of the minimum point.
 - (c) Write down the equation of the line of symmetry.
-

10

[4 marks]

Solve $x^2 + 5x + 3 = 0$ by completing the square.
Give your answers to 2 decimal places.

Section B · Higher

Higher-tier style. Again, questions 1–3 are the gentlest and question 10 is the hardest.

1

[2 marks]

Write $x^2 - 12x + 40$ in the form $(x + a)^2 + b$

2

[2 marks]

Write down the coordinates of the minimum point of $y = (x - 3)^2 + 7$

.....

3

[3 marks]

Write $2x^2 + 8x + 5$ in the form $a(x + b)^2 + c$

.....

4

[3 marks]

Write $3x^2 - 12x + 7$ in the form $a(x + b)^2 + c$

.....

5

[4 marks]

(a) Write $5 + 4x - x^2$ in the form $a - (x + b)^2$

(b) Hence write down the maximum value of the expression and the value of x at which it occurs.

.....

6

[4 marks]

Solve $2x^2 - 8x + 3 = 0$ by completing the square.

Give your answers in surd form.

.....

7

[4 marks]

A curve has equation $y = x^2 - 6x + 11$

(a) Complete the square.

(b) Write down the turning point.

(c) Explain why the equation $x^2 - 6x + 11 = 0$ has no real solutions.

.....

8

[4 marks]

The graph of $y = x^2$ is translated to give the graph of $y = (x + 3)^2 - 5$

- (a) Describe fully the transformation.
 - (b) Write down the turning point of the new graph.
 - (c) Write down the equation of the line of symmetry.
-

9

[4 marks]

Find the maximum value of $7 + 6x - x^2$ and the value of x at which it occurs.

.....

10

[5 marks]

- (a) Prove that $x^2 + 6x + 11$ is positive for every value of x .
 - (b) Find the least possible value of $2x^2 - 12x + 23$ and the value of x that gives it.
-