

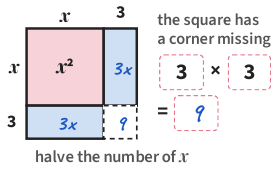
Completing the Square

ANSWERS

1

Complete the square for

$$x^2 + 6x + 5$$



$$(x + 3)^2 - 4 + 5$$

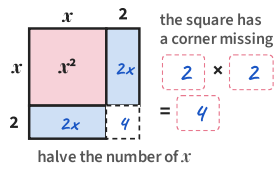
Turning point $(-3, -4)$

Answer $(x + 3)^2 - 4$

2

Complete the square for

$$x^2 + 4x + 7$$



$$(x + 2)^2 - 4 + 7$$

Turning point $(-2, 3)$

Answer $(x + 2)^2 + 3$

3

Complete the square for

$$x^2 + 8x + 10$$

halve the number of x

$$(x + 4)^2 - 16 + 10$$

Turning point $(-4, -6)$

Answer $(x + 4)^2 - 6$

4

Complete the square for

$$x^2 - 6x + 2$$

halve the number of x

$$(x - 3)^2 - 9 + 2$$

Turning point $(3, -7)$

Answer $(x - 3)^2 - 7$

5

Complete the square for

$$x^2 + 10x - 3$$

$$(x + 5)^2 - 25 - 3$$

Turning point $(-5, -28)$

Answer $(x + 5)^2 - 28$

6

Find the smallest value of

$x^2 - 8x + 20$ and the value of x that gives it.

$$(x - 4)^2 + 4$$

Answer $4, \text{ when } x = 4$

7

Solve $x^2 + 4x - 5 = 0$ by completing the square.

$$(x + 2)^2 = 9$$

Answer $x = 1 \text{ or } x = -5$

8

Write $2x^2 + 8x + 3$ in the form $a(x + p)^2 + q$.

$$2(x^2 + 4x) + 3$$

Answer $2(x + 2)^2 - 5$

Completing the Square further practice

ANSWERS

9

Write $x^2 + 5x + 2$ in the form $(x + p)^2 + q$.

$$\text{half of } 5 \text{ is } \frac{5}{2} \text{ and } \left(\frac{5}{2}\right)^2 = \frac{25}{4}$$

Answer $\left(x + \frac{5}{2}\right)^2 - \frac{17}{4}$

10

The graph of $y = x^2 + bx + c$ has its turning point at $(4, -3)$. Find the values of b and c .

$$(x - 4)^2 - 3 = x^2 - 8x + 13$$

Answer $b = -8, c = 13$

11

Which has the smaller minimum value, $x^2 - 6x + 11$ or $x^2 + 4x + 5$? Show how you know.

$$(x - 3)^2 + 2 \text{ and } (x + 2)^2 + 1$$

Answer $x^2 + 4x + 5$

12

The cost, £ C , of running a bakery oven for a day at setting s is $C = s^2 - 14s + 60$. Find the setting that makes the cost as low as possible, and that lowest cost.

$$C = (s - 7)^2 + 11$$

Answer setting 7, £11

13

A rectangle is x cm wide and $(x + 6)$ cm long. Its area is 11 cm^2 . Complete the square to find x . Give your answer in surd form.

$$x^2 + 6x - 11 = 0, \text{ so } (x + 3)^2 = 20$$

$$x + 3 = \pm\sqrt{20} = \pm 2\sqrt{5}$$

Answer $x = 2\sqrt{5} - 3 \text{ cm}$

14

Write $3x^2 - 12x + 7$ in the form $a(x + p)^2 + q$. Then write down the turning point of $y = 3x^2 - 12x + 7$.

$$3(x^2 - 4x) + 7 = 3((x - 2)^2 - 4) + 7$$

Answer $3(x - 2)^2 - 5, (2, -5)$

15

A rectangular flower bed has 24 m of edging all the way round. Its width is x m. Show that its area is $(12x - x^2) \text{ m}^2$. Then complete the square to find the largest area it can have.

$$\text{length } (12 - x) \text{ m, so area } x(12 - x)$$

$$12x - x^2 = 36 - (x - 6)^2$$

Answer 36 m^2

16

Priya says $x^2 - 4x + 9 = 0$ has no solutions. Use completing the square to explain why she is right.

$$x^2 - 4x + 9 = (x - 2)^2 + 5$$

a square is never negative, so it is at least 5

Answer it is never 0, so no solutions