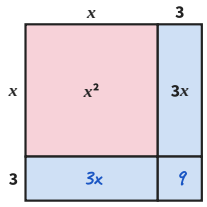
Completing the square

ANSWERS

1

Expand $(x + 3)^2$.



$(x + 3)^2$ = $x^2 + 6x + 9$

2

Expand $(x - 4)^2$.

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

= $x^2 - 8x + 16$

3

Write $x^2 + 10x + 25$ as a bracket squared.

$10 \div 2$ = 5

$x^2 + 10x + 25$ = (x $+ 5$)^2

4

Write $x^2 + 6x + 5$ in the form $(x + p)^2 + q$.

$6 \div 2$ = 3

$x^2 + 6x + 5$ = (x $+ 3$)^2 − 9 + 5

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

5

Write $x^2 - 4x + 7$ in the form $(x + p)^2 + q$.

$-4 \div 2$ = -2

$x^2 - 4x + 7$ = (x $- 2$)^2 − 4 + 7

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

6

Write $x^2 + 12x + 20$ in the form $(x + p)^2 + q$.

$12 \div 2$ = 6

$x^2 + 12x + 20$ = (x $+ 6$)^2 − 36 + 20

= $(x + 6)^2 - 16$

7

Write down the turning point of each curve.

(a) $y = (x - 3)^2 + 5$

Turning point (3 , 5)

(b) $y = (x + 2)^2 - 7$

Turning point (-2 , -7)

8

Find the turning point of $y = x^2 + 8x + 10$.

$8 \div 2$ = 4

$x^2 + 8x + 10$ = (x $+ 4$)^2 − 16 + 10

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

Turning point (-4 , -6)

Completing the square *further practice*

ANSWERS

9

Write $x^2 - 12x + 36$ as a bracket squared.

$-12 \div 2 = -6$

$(-6)^2 = 36$

Answer $(x - 6)^2$

10

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

$(x + 1)^2 - 1 + 8$

$= (x + 1)^2 + 7$

Answer $(x + 1)^2 + 7$

11

Write $x^2 - 10x + 4$ in the form $(x + p)^2 + q$.

$(x - 5)^2 - 25 + 4$

$= (x - 5)^2 - 21$

Answer $(x - 5)^2 - 21$

12

Find the turning point of $y = x^2 - 6x + 13$.

$(x - 3)^2 - 9 + 13$

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

Answer $(3, 4)$

13

$x^2 + 8x + c = (x + p)^2 + 3$.

Find the values of p and c.

$p = 8 \div 2 = 4$

$c - 16 = 3$

Answer $p = 4$, $c = 19$

14

Find the smallest value of $x^2 + 4x + 9$, and the value of x that gives it.

$(x + 2)^2 + 5$

$(x + 2)^2$ is 0 when $x = -2$

Answer 5, when $x = -2$

15

Solve $x^2 + 6x - 7 = 0$ by completing the square.

$(x + 3)^2 - 16 = 0$

$x + 3 = 4$ or -4

Answer $x = 1$ or $x = -7$

16

Kim writes

$x^2 - 12x + 3 = (x - 6)^2 + 39$.

Explain her mistake.

Then write it correctly.

she added 36: take it away

$3 - 36 = -33$

Answer $(x - 6)^2 - 33$