

GCSE Maths: Completing the square (Higher): worksheet

GCSE Maths - Quadratic and Simultaneous Equations - Higher - Lesson 14.10

Name: _____

Date: _____

Score: _____

15 questions. Write your answers in the spaces. Answers and step-by-step help are free at websink.site/gcse/maths/ch14-quadratics-simultaneous/higher/completing-the-square/

Exercise 14J Completing the square Non-calculator

1 Write each expression in the form $(x + p)^2 + q$.

(a) $x^2 + 4x + 1$

Answer: _____

(b) $x^2 + 10x + 3$

Answer: _____

(c) $x^2 - 6x + 2$

Answer: _____

(d) $x^2 - 2x - 5$

Answer: _____

(e) $x^2 + 3x + 1$

Answer: _____

(f) $x^2 - 12x + 40$

Answer: _____

2 Write each expression in the form $a(x + p)^2 + q$.

(a) $2x^2 + 8x + 3$

Answer: _____

(b) $3x^2 - 12x + 5$

Answer: _____

(c) $2x^2 - 4x - 1$

Answer: _____

(d) $5x^2 + 10x + 2$

Answer: _____

(e) $4x^2 + 8x + 9$

Answer: _____

(f) $-x^2 + 6x + 1$

Answer: _____

- 3** Solve by completing the square.

$x^2 + 4x - 1 = 0$. Give your answers in the form $p \pm \sqrt{q}$.

Answer:

- 4** Solve by completing the square.

$x^2 - 6x + 1 = 0$. Give your answers in the form $p \pm \sqrt{q}$.

Answer:

- 5** Solve by completing the square.

$x^2 + 8x + 3 = 0$. Give your answers in the form $p \pm \sqrt{q}$.

Answer:

- 6** Solve by completing the square.

$x^2 - 2x - 5 = 0$. Give your answers in the form $p \pm \sqrt{q}$.

Answer:

- 7** Solve by completing the square.

$x^2 + 6x + 2 = 0$. Give your answers correct to 2 decimal places.

Answer:

- 8** Solve by completing the square.

$2x^2 + 12x + 6 = 0$. Give your answers in the form $p \pm \sqrt{q}$.

Answer:

- 9** Solve by completing the square (the numbers are all multiples of 3).

$3x^2 - 18x + 15 = 0$. Give your answers in the form $p \pm \sqrt{q}$.

Answer:

- 10** Write each quadratic in completed-square form and write down the coordinates of its turning point.

(a) $y = x^2 + 6x + 5$

Answer:

(b) $y = x^2 - 4x + 7$

Answer:

(c) $y = x^2 + 2x - 8$

Answer:

(d) $y = 2x^2 - 8x + 9$

Answer:

(e) $y = x^2 - 10x$

Answer:

(f) $y = -x^2 + 6x + 1$

Answer:

- 11** Find the minimum value of $x^2 - 6x + 15$ and the value of x at which it occurs.

Answer:

- 12** Show that $x^2 + 6x + 11$ is always positive, whatever the value of x .

Answer:

- 13** $x^2 - 10x + 30 = (x + p)^2 + q$ for all values of x . Find the values of p and q .

Answer:

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

Answer:

- 15** Complete the square to explain why $x^2 + 6x + 11 = 0$ has no real solutions.

Answer:
