

GCSE Maths: The quadratic formula (Higher): answers

GCSE Maths - Quadratic and Simultaneous Equations - Higher - Lesson 14.9

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch14-quadratics-simultaneous/higher/the-quadratic-formula/

Exercise 14I The quadratic formula Calculator allowed

1 Solve using the quadratic formula. These solutions are rational (whole numbers or fractions).

(a) $2x^2 - x - 6 = 0$

Answer: $x = -\frac{3}{2}$ or $x = 2$

(b) $3x^2 + x - 4 = 0$

Answer: $x = -\frac{4}{3}$ or $x = 1$

(c) $x^2 - 4x - 12 = 0$

Answer: $x = -2$ or $x = 6$

(d) $2x^2 + 7x + 3 = 0$

Answer: $x = -3$ or $x = -\frac{1}{2}$

(e) $5x^2 + 4x - 1 = 0$

Answer: $x = -1$ or $x = \frac{1}{5}$

(f) $6x^2 - 5x - 4 = 0$

Answer: $x = -\frac{1}{2}$ or $x = \frac{4}{3}$

2 Solve $x^2 + 5x + 2 = 0$. Give your answers correct to 2 decimal places.

Answer: $x = -4.56$ or $x = -0.44$

3 Solve $x^2 - 3x - 5 = 0$. Give your answers correct to 2 decimal places.

Answer: $x = -1.19$ or $x = 4.19$

4 Solve $2x^2 + 3x - 4 = 0$. Give your answers correct to 2 decimal places.

Answer: $x = -2.35$ or $x = 0.85$

5 Solve $3x^2 - 8x + 2 = 0$. Give your answers correct to 2 decimal places.

Answer: $x = 0.28$ or $x = 2.39$

6 Solve $4x^2 - 7x + 1 = 0$. Give your answers correct to 2 decimal places.

Answer: $x = 0.16$ or $x = 1.59$

7 Solve $5x^2 + 2x - 4 = 0$. Give your answers correct to 2 decimal places.

Answer: $x = -1.12$ or $x = 0.72$

8 Solve, giving your answers in the form $p \pm \sqrt{q}$ or as exact fractions.

(a) $x^2 + 4x + 1 = 0$

Answer: $x = -2 \pm \sqrt{3}$

(b) $x^2 - 2x - 7 = 0$

Answer: $x = 1 \pm 2\sqrt{2}$

(c) $x^2 + 6x + 2 = 0$

Answer: $x = -3 \pm \sqrt{7}$

(d) $x^2 - 8x + 9 = 0$

Answer: $x = 4 \pm \sqrt{7}$

(e) $2x^2 + 6x + 3 = 0$

Answer: $x = \frac{-3 \pm \sqrt{3}}{2}$

(f) $3x^2 - 6x - 1 = 0$

Answer: $x = \frac{3 \pm 2\sqrt{3}}{3}$

9 Rearrange and solve $x^2 + 3x = 5$. Give your answers correct to 2 decimal places.

Answer: $x = -4.19$ or $x = 1.19$

10 Expand, rearrange and solve $x(x + 4) = 7$. Give your answers correct to 2 decimal places.

Answer: $x = -5.32$ or $x = 1.32$

11 Rearrange and solve $2x^2 = 5x + 4$. Give your answers correct to 2 decimal places.

Answer: $x = -0.64$ or $x = 3.14$

12 Expand, rearrange and solve exactly $(x + 2)(x - 3) = 5$. Give your answers in the form $p \pm \sqrt{q}$ or as exact fractions.

Answer: $x = \frac{1 \pm 3\sqrt{5}}{2}$

13 Use the discriminant to decide how many solutions each equation has. You do not need to solve them.

(a) $x^2 + x + 1 = 0$

Answer: No real solutions

(b) $x^2 - 4x + 4 = 0$

Answer: One solution

(c) $x^2 - 3x - 1 = 0$

Answer: Two solutions

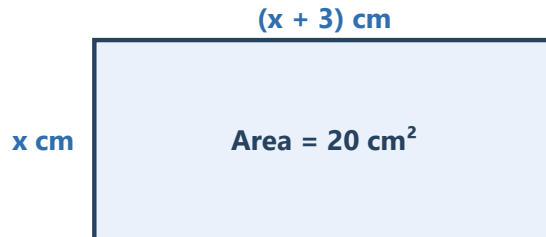
(d) $2x^2 + 3x + 5 = 0$

Answer: No real solutions

- 14** The height, h metres, of a ball t seconds after it is thrown is given by $h = 12t - 5t^2$. Find the times when the ball is 6 m above the ground. Give your answers to 2 decimal places.

Answer: $t = 0.71$ or $t = 1.69$ (seconds)

- 15** A rectangle has width x cm and length $(x + 3)$ cm. Its area is 20 cm^2 . Find the width and the length, to 2 decimal places.



Answer: width 3.22 cm, length 6.22 cm

- 16** A farmer has 40 m of fencing to fence three sides of a rectangular field. The fourth side is a wall. The two equal sides are each x m long and the area of the field is 160 m^2 . Find the possible values of x to 2 decimal places, and the possible dimensions.

Answer: $x = 5.53$ or $x = 14.47$: 5.53 m by 28.94 m or 14.47 m by 11.06 m

- 17** Use the quadratic formula to show that the solutions of $x^2 + 2x - 1 = 0$ are $x = -1 \pm \sqrt{2}$.

Answer: $x = -1 \pm \sqrt{2}$

- 18** Find all the values of k for which $x^2 + kx + 9 = 0$ has no real solutions.

Answer: $-6 < k < 6$