The Quadratic Formula

GCSE Maths · Higher tier · 20 questions · 68 marks

Name _____ Date _____ Score _____ / 68

Start at Level 1 and climb. Stuck? The worked answers show every step.

Level 1 · Warm-up | Level 2 · Build | Level 3 · Exam-style | Level 4 · Challenge

Level 1 · Warm-up

13 marks

Substituting into the formula, with equations already in the form $ax^2 + bx + c = 0$.

1 Write down the values of a, b and c you would use in the quadratic formula to solve $3x^2 - 5x + 1 = 0$. [1 mark]

Answer _____

2 Solve $x^2 + 6x + 4 = 0$. Give your answers in surd form. [3 marks]

Answer _____

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

Answer _____

4 Solve $2x^2 + 3x - 1 = 0$. Give your answers correct to 2 decimal places. [3 marks]

Answer _____

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

Answer _____

Level 2 · Build 15 marks
Rearranging first, negative coefficients and exact surd answers.

6 Solve $3x^2 = 7x - 1$. Give your answers correct to 2 decimal places. [3 marks]

Answer _____

7 Solve $x^2 - 6x + 2 = 0$. Give your answers in the form $a \pm \sqrt{b}$. [3 marks]

Answer _____

8 Solve $5x^2 + 2x - 4 = 0$. Give your answers correct to 2 decimal places. [3 marks]

Answer _____

9 Solve $x(x + 4) = 7$. Give your answers correct to 2 decimal places. [3 marks]

Answer _____

10 Solve $2x^2 - 4x - 3 = 0$. Give your answers in the form $\frac{a \pm \sqrt{b}}{c}$, where a, b and c are whole numbers. [3 marks]

Answer _____

Level 3 · Exam-style 20 marks
Show that, contexts and spotting mistakes, in real GCSE style.

11 (a) A rectangle has length $(x+3)$ cm and width $(x-1)$ cm. Its area is 20 cm^2. Show that $x^2 + 2x - 23 = 0$. [2 marks]

Answer _____

(b) Solve $x^2 + 2x - 23 = 0$ to find the value of x. Give your answer correct to 2 decimal places. [3 marks]

Answer _____

12 Hari uses the quadratic formula to solve $x^2 - 3x - 5 = 0$. He writes $x = \dfrac{-3 \pm \sqrt{9 - 20}}{2}$. Explain the two mistakes Hari has made, and solve the equation correctly, giving your answers to 2 decimal places. [3 marks]

Answer _____

13 Solve $4x^2 - 12x + 7 = 0$. Give your answers in their simplest exact form. [3 marks]

Answer _____

14 (a) Show that the equation $\frac{2}{x} + \frac{1}{x+1} = 1$ can be written as $x^2 - 2x - 2 = 0$. [3 marks]

Answer _____

(b) Hence solve $\frac{2}{x} + \frac{1}{x+1} = 1$. Give your answers in the form $a \pm \sqrt{b}$. [2 marks]

Answer _____

15 The height, h metres, of a ball t seconds after it is thrown is $h = 2 + 20t - 5t^2$. Find the two times when the ball is 10 m high. Give your answers correct to 2 decimal places. [4 marks]

Answer _____

Level 4 · Challenge 20 marks
Grade 8–9: fractions, Pythagoras, unknown coefficients and exact answers.

16 Show that the solutions of $x^2 + 8x + 11 = 0$ can be written as $x = -4 \pm \sqrt{5}$. [3 marks]

Answer _____

17 (a) A right-angled triangle has shorter sides x cm and $(x + 2)$ cm, and hypotenuse $(2x - 1)$ cm. Show that $2x^2 - 8x - 3 = 0$. [3 marks]

Answer _____

(b) Work out the length of the hypotenuse. Give your answer correct to 2 decimal places. [3 marks]

Answer _____

18 The equation $x^2 + px + 7 = 0$ has solutions $x = -3 \pm \sqrt{2}$. Find the value of p. [3 marks]

Answer _____

19 Solve $\frac{2x + 1}{x - 2} = x + 3$. Give your answers correct to 2 decimal places. [4 marks]

Answer _____

20 A rectangle is 3 cm longer than it is wide. Its diagonal is 10 cm long. Work out the width of the rectangle. Give your answer correct to 2 decimal places. [4 marks]

Answer _____