

Solving Quadratic Equations

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Solve $x^2 + x - 12 = 0$ by factorising.

Step 1 · Multiply to -12 , add to $+1$
 $+4$ and -3

Step 2 · Factorise

$$(x + 4)(x - 3) = 0$$

Step 3 · Each bracket = 0

$$x = -4 \text{ or } x = 3$$

Answer: $x = -4$ or $x = 3$

Check: $(-4)^2 - 4 - 12 = 0$ ✓ and $9 + 3 - 12 = 0$ ✓

2. Now try one with the steps

Solve $x^2 - 6x = 0$.

Step 1 · Common factor x

Step 2 · Each factor = 0

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Solve $x^2 - 5x + 6 = 0$. [3]

2. Solve $x^2 + 3x - 10 = 0$. [3]

3. Solve $x^2 - 9 = 0$. [2]

4. Solve $x^2 = 4x$. [2]

5. Solve $x^2 - 10x + 25 = 0$. [2]

6. Solve $x^2 + 8x + 15 = 0$. [3]

7. Solve $x^2 - x = 12$. [3]

8. Write down the solutions of $(x - 3)(x + 7) = 0$. [1]

9. Where does the graph of $y = x^2 - 2x - 3$ cross the x-axis? [2]

10. The graph of $y = x^2 - 3$ crosses the x-axis twice. Estimate the x-coordinates to 1 decimal place. [2]

11. A rectangle is x cm wide and $(x + 4)$ cm long. Its area is 21 cm^2 . Find x . [3]

12. Two consecutive positive integers multiply to 56. Find them. [3]

13. Solve $3x^2 - 7x + 2 = 0$ by factorising. [3]

14. Solve $6x^2 + x - 2 = 0$ by factorising. [4]

15. Solve $x^2 + 4x - 7 = 0$, giving your answers to 2 decimal places. [3]

4. Before you hand it in

$(x + 4)(x - 3) = 0 \rightarrow x = 4 \text{ or } x = -3$

Solve each bracket: $x + 4 = 0$ gives $x = -4$; $x - 3 = 0$ gives $x = 3$.

$x^2 = 4x \rightarrow \text{divide by } x \rightarrow x = 4$

Rearrange to $x^2 - 4x = 0$ and factorise: $x(x - 4) = 0$, so $x = 0$ or $x = 4$.

$x^2 + 2x = 15 \rightarrow x(x + 2) = 15 \rightarrow x = 15 \text{ or } x + 2 = 15$

The rule only works for a product equal to ZERO. Rearrange to $x^2 + 2x - 15 = 0$ first.

$x^2 = 9 \rightarrow x = 3$

$(-3)^2 = 9$ too. $x = 3$ or $x = -3$.