

The quadratic formula

Use it when the question asks how many solutions, or for exact answers in surd form.

1 $b^2 - 4ac$ first

Work out the part under the square root on its own.

$$b^2 - 4ac = \boxed{\text{one number}}$$

*k in the equation? keep k in:
 $b^2 - 4ac$ is then in terms of k*

2 How many solutions

Read the sign of $b^2 - 4ac$.

$$> 0 \text{ two} \quad = 0 \text{ one} \quad < 0 \text{ none}$$

*= 0 is one repeated root
finding k? set it = 0, > 0 or < 0, solve for k*

3 Simplify the root

Split the number into a square number times the rest.

$$\sqrt{\boxed{\text{number}}} = \sqrt{\boxed{\text{square}} \times \boxed{\text{rest}}} = \sqrt{\boxed{\text{square}}} \sqrt{\boxed{\text{rest}}}$$

look for 4, 9, 16, 25, 36, 49 ...

4 Into the formula

Write the formula with the simplified root.

$$x = \frac{-b \pm \sqrt{r}}{2a}$$

5 Divide through

Divide $-b$, q and $2a$ by a common factor.

$$\frac{-b \pm q\sqrt{r}}{2a} = \frac{p \pm s\sqrt{r}}{d}$$

no factor common to all three? leave it

6 Exact answer

Leave the root in. Write both answers.

$$x = \frac{p \pm s\sqrt{r}}{d}$$

exact or surd form: no decimals

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