

Solving quadratic equations without factorising

A LEVEL LINKS

Scheme of work: 1b. Quadratic functions – factorising, solving, graphs and the discriminants

Key points

- A quadratic equation is an equation in the form $ax^2 + bx + c = 0$ where $a \neq 0$.
- To factorise a quadratic equation find two numbers whose sum is b and whose products is ac .
- When the product of two numbers is 0, then at least one of the numbers must be 0.
- If a quadratic can be solved it will have two solutions (these may be equal).

Example 1 Solve $(x + 3)^2 = 5$. Give your solutions in surd form.

$(x + 3)^2 = 5$ $x + 3 = \pm\sqrt{5}$ $x = \pm\sqrt{5} - 3$ So $x = -\sqrt{5} - 3$ or $x = \sqrt{5} - 3$	<ol style="list-style-type: none">1 Rearrange the equation to work out x. First, add 5 to both sides.2 Square root both sides. Remember that the square root of a value gives two answers.3 Subtract 3 from both sides to solve the equation.4 Write down both solutions.
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Practice questions

1 Solve

a $(3x + 1)^2 = 9$

b $5x^2 = 20$

c $(x - 4)^2 = 8$

d $(2x - 3)^2 = 36$

Answers

1 a $x = -\sqrt{5} - 3$ or $x = \sqrt{5} - 3$ b $x = -2$ or $x = 2$

c $x = 4 - 2\sqrt{2}$ or $x = 4 + 2\sqrt{2}$ d $x = \frac{9}{2}$ or $x = -\frac{3}{2}$