Guide to:
The quadratic formula

maths Links

Explanation:

Use the quadratic formula $\mathbf{x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}}$ when a quadratic equation $\mathbf{ax^2 + bx + c = 0}$ cannot be easily factorised, or when the question asks for solutions to a given number of decimal places or significant figures, or in surd form.

Always rearrange the equation so that the right-hand side equals **0** first, then write down the values of a, b, and c including their signs. Put negative numbers in brackets when substituting into $(-b)^2 - 4(a)(c)$ so your calculator squares the negative sign properly.

Example 1: Solve $2x^2 - 7x - 3 = 0$ to 2 d.p.

Solution:

Here **a = 2**, **b = −7**, **c = −3**

$x = \frac{-(-7) \pm \sqrt{((-7)^2 - 4(2)(-3))}}{2(2)}$

$x = \frac{7 \pm \sqrt{(49 + 24)}}{4} = \frac{7 \pm \sqrt{73}}{4}$

x = 3.8860... or x = −0.3860...

Answer: x = 3.89 or x = −0.39 (2 d.p.)

Example 2: Solve $x^2 + 6x = 4$ in the form $p \pm \sqrt{q}$.

Solution:

Rearrange to $x^2 + 6x - 4 = 0$ (a = 1, b = 6, c = −4)

$x = \frac{-6 \pm \sqrt{(6^2 - 4(1)(-4))}}{2(1)} = \frac{-6 \pm \sqrt{52}}{2}$

Since $\sqrt{52} = \sqrt{4} \times \sqrt{13} = 2\sqrt{13}$:

$x = \frac{-6 \pm 2\sqrt{13}}{2} = -3 \pm \sqrt{13}$

Answer: x = −3 ± √13

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