



Air maths tuition

Interact, engage and perform

How to derive the Quadratic Formula

$2x^2 + 5x + 1 = 0$	$ax^2 + bx + c = 0$
$\therefore x^2 + \frac{5}{2}x + \frac{1}{2} = 0$	$\therefore x^2 + \frac{b}{a}x + \frac{c}{a} = 0$
$\therefore \left(x + \frac{5}{4}\right)^2 - \frac{25}{16} + \frac{1}{2} = 0$	$\therefore \left(x + \frac{b}{2a}\right)^2 - \frac{b^2}{4a^2} + \frac{c}{a} = 0$
$\therefore \left(x + \frac{5}{4}\right)^2 = \frac{25}{16} - \frac{1}{2}$	$\therefore \left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{c}{a}$
$\therefore x + \frac{5}{4} = \pm \sqrt{\frac{25-8}{16}}$	$\therefore x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$
$\therefore x = -\frac{5}{4} \pm \frac{\sqrt{25-8}}{4}$	$\therefore x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$
$\therefore x = \frac{-5 \pm \sqrt{17}}{4}$	$\therefore x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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