

## Quadratic formula proof - solution

Step 1	Subtract $c$ from both sides	$ax^2 + bx = -c$
Step 2	Divide both sides by $a$	$x^2 + \frac{b}{a}x = -\frac{c}{a}$
Step 3	Complete the square on the left hand side	$\left(x + \frac{b}{2a}\right)^2 - \frac{b^2}{4a^2} = -\frac{c}{a}$
Step 4	Add $\frac{b^2}{4ac}$ to both sides	$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{c}{a}$
Step 5	Make the right hand side into a single expression	$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$
Step 6	Take the square root of both sides	$\left(x + \frac{b}{2a}\right) = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$
Step 7	Simplify the denominator on left hand side	$\left(x + \frac{b}{2a}\right) = \pm \frac{\sqrt{b^2 - 4ac}}{2a}$
Step 8	Subtract $\frac{b}{2a}$ from both sides.	$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$

We now have the quadratic formula