

## Solving Quadratic Equations Using Different Methods

There are three algebraic methods for solving quadratic equations: (a) By factorising (b) Using the quadratic formula (c) By completing the square

Solve each of the following quadratic equations using each of the three methods, remembering that sometimes it is not possible to solve by factorising. When using the quadratic formula, give your answers to 2 decimal places.

Equation	By Factorising	By Formula	By Completing the Square	Equation	By Factorising	By Formula	By Completing the Square
$x^2 + 4x + 3 = 0$	$(x + 3)(x + 1) = 0$ $x = -3$ or $x = -1$	$a = 1, b = 4, c = 3$ $x = \frac{-4 \pm \sqrt{16 - 12}}{2}$ $x = -3$ or $x = -1$	$(x + 2)^2 - 4 + 3 = 0$ $(x + 2)^2 = 1$ $x = -2 \pm \sqrt{1}$ $x = -3$ or $x = -1$	$3x^2 - 12x = 0$	$3x(x - 4) = 0$ $x = 0$ or $x = 4$	$a = 3, b = -12, c = 0$ $x = \frac{12 \pm \sqrt{144 - 0}}{6}$ $x = 0$ or $x = 4$	$3(x - 2)^2 - 12 = 0$ $(x - 2)^2 = 4$ $x = 0$ or $x = 4$
$x^2 - 6x + 8 = 0$	$(x - 4)(x - 2) = 0$ $x = 4$ or $x = 2$	$a = 1, b = -6, c = 8$ $x = \frac{6 \pm \sqrt{36 - 32}}{2}$ $x = 4$ or $x = 2$	$(x - 3)^2 - 9 + 8 = 0$ $(x - 3)^2 = 1$ $x = 3 \pm \sqrt{1}$ $x = 4$ or $x = 2$	$2x^2 - 9x - 5 = 0$	$(2x + 1)(x - 5) = 0$ $x = -\frac{1}{2}$ or $x = 5$	$a = 2, b = -9, c = -5$ $x = \frac{9 \pm \sqrt{81 + 40}}{4}$ $x = -\frac{1}{2}$ or $x = 5$	$2\left(x - \frac{9}{4}\right)^2 = \frac{121}{8}$ $x = \frac{9}{4} \pm \sqrt{\frac{121}{16}}$ $x = -0.5$ or $x = 5$
$x^2 - x - 12 = 0$	$(x - 4)(x + 3) = 0$ $x = 4$ or $x = -3$	$a = 1, b = -1, c = -12$ $x = \frac{1 \pm \sqrt{1 + 48}}{2}$ $x = 4$ or $x = -3$	$\left(x - \frac{1}{2}\right)^2 - \frac{1}{4} - 12 = 0$ $x = \frac{1}{2} \pm \sqrt{\frac{49}{4}}$ $x = 4$ or $x = -3$	$2x^2 + 8x - 1 = 0$	<i>Doesn't factorise</i>	$a = 2, b = 8, c = -1$ $x = \frac{-8 \pm \sqrt{64 + 8}}{4}$ $x = 0.12$ or $x = -4.12$	$2(x + 2)^2 - 8 - 1 = 0$ $(x + 2)^2 = \frac{9}{2}$ $x = 0.12$ or $x = -4.12$
$x^2 + 4x - 2 = 0$	<i>Doesn't factorise</i>	$a = 1, b = 4, c = -2$ $x = \frac{1 \pm \sqrt{16 + 8}}{2}$ $x = 0.45$ or $x = -4.45$	$(x + 2)^2 - 4 - 2 = 0$ $(x + 2)^2 = 6$ $x = -2 \pm \sqrt{6}$ $x = 0.45$ or $x = -4.45$	$x^2 + 3x = 18$	$x^2 + 3x - 18 = 0$ $(x + 6)(x - 3) = 0$ $x = -6$ or $x = 3$	$a = 1, b = 3, c = -18$ $x = \frac{-3 \pm \sqrt{9 + 72}}{2}$ $x = -6$ or $x = 3$	$\left(x + \frac{3}{2}\right)^2 - \frac{9}{4} - 18 = 0$ $x = -\frac{3}{2} \pm \sqrt{\frac{81}{4}}$ $x = -6$ or $x = 3$
$x^2 + 2x - 5 = 0$	<i>Doesn't factorise</i>	$a = 1, b = 2, c = -5$ $x = \frac{-2 \pm \sqrt{4 + 20}}{2}$ $x = 1.45$ or $x = -3.45$	$\left(x + \frac{1}{2}\right)^2 - \frac{1}{4} - 5 = 0$ $\left(x + \frac{1}{2}\right)^2 = \frac{21}{4}$ $x = 1.45$ or $x = -3.45$	$2x^2 = 4x + 1$	<i>Doesn't factorise</i>	$a = 2, b = -4, c = -1$ $x = \frac{4 \pm \sqrt{16 + 8}}{4}$ $x = 2.22$ or $x = -0.22$	$2(x - 1)^2 - 2 - 1 = 0$ $(x - 1)^2 = \frac{3}{2}$ $x = 2.22$ or $x = -0.22$