

Quadratic Formula

Given a general quadratic equation $ax^2 + bx + c = 0$, the solutions are given by

$$x = \frac{-b \pm \sqrt{b^2 - (4ac)}}{2a}.$$

You will find easier to work out the $b^2 - (4ac)$ by itself and then put this value into the formula. Remember also that we *always, always, always* get the quadratic equation equal to zero.

Nice Formula Questions

Use the quadratic formula to solve the following quadratics. You should find they are nice answers (fractions and/or integers).

- $x^2 - 6x + 8 = 0.$ $x = 4$ or $x = 2$
- $2x^2 + x - 3 = 0.$ $x = -\frac{3}{2}$ or $x = 1$
- $-4x^2 + 11x - 6 = 0.$ $x = 2$ or $x = \frac{3}{4}$
- $10x^2 + 11x - 6 = 0.$ $x = -\frac{3}{2}$ or $x = \frac{2}{5}$
- $9x^2 - 12x + 4 = 0.$ $x = \frac{2}{3}$ repeated

Nasty Formula Questions

Use the formula to solve the following quadratics. You should find they are nasty (long decimal) answers. Give your answers to 3 significant figures.

- $2x^2 - 3x - 7 = 0.$ $x = 2.765 \dots$ or $x = -1.265 \dots$
- $x^2 + 6x - 10 = 0.$ $x = -7.358 \dots$ or $x = 1.358 \dots$
- $-2x^2 + 2x + 7 = 0.$ $x = 2.436 \dots$ or $x = -1.436 \dots$
- $2x^2 - 3x - 7 = 2x - 1.$ $x = 3.386 \dots$ or $x = -0.886 \dots$
- $x^2 + 1 = 4x.$
- $2x^2 + 7x = 5.$
- $x^2 - 50 = 0.$
- $4x^2 = x + 2.$
- $3z^2 = 2 - 8z.$ $z = -2.90$ or $z = 0.230$

Factorising Simple Quadratics

Factorise the following quadratics. For example $x^2 + 4x - 12 = (x - 2)(x + 6)$. You are looking for two numbers that sum to 4 and multiply to -12 ; i.e. 6 and -2 .

- $x^2 + 5x - 24.$ $(x + 8)(x - 3)$
- $x^2 + 7x + 10.$ $(x + 5)(x + 2)$
- $x^2 - 15x + 56.$ $(x - 8)(x - 7)$

4. $x^2 - 6x - 40$.

$(x - 10)(x + 4)$

5. $x^2 - 81$.

$(x - 9)(x + 9)$

6. $x^2 - 5x - 14$.

$(x - 7)(x + 2)$

7. $x^2 + 3x - 154$.

$(x + 14)(x - 11)$

8. $2x^2 - 6x - 36 = x^2 - x$.

$(x - 9)(x + 4)$

Solving Simple Quadratics by Factorising

Solve the following equations by factorising. For example if you are given $x^2 + x - 6 = 0$, this factorises to $(x - 2)(x + 3) = 0$ so the solutions are $x = -3$ or $x = 2$.

1. $(x + 4)(x - 2) = 0$.

$x = -4$ or $x = 2$

2. $x^2 - 8x + 7 = 0$.

$x = 7$ or $x = 1$

3. $x^2 - 3x - 28 = 0$.

$x = 7$ or $x = -4$

4. $2x^2 + x + 3 = (x - 1)^2$.

$x = -2$ or $x = -1$