

## E Summer 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).

1.  $x^2 - 6x + 8 = 0$ .

$x = 4$  or  $x = 2$

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

$x = -\frac{3}{2}$  or  $x = 1$

3.  $-4x^2 + 11x - 6 = 0$ .

$x = 2$  or  $x = \frac{3}{4}$

4.  $10x^2 + 11x - 6 = 0$ .

$x = -\frac{3}{2}$  or  $x = \frac{2}{5}$

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.

1.  $2x^2 - 3x - 7 = 0$ .

$x = 2.765 \dots$  or  $x = -1.265 \dots$

2.  $x^2 + 6x - 10 = 0$ .

$x = -7.358 \dots$  or  $x = 1.358 \dots$

3.  $-2x^2 + 2x + 7 = 0$ .

$x = 2.436 \dots$  or  $x = -1.436 \dots$

4.  $2x^2 - 3x - 7 = 2x - 1$ .

$x = 3.386 \dots$  or  $x = -0.886 \dots$

5.  $x^2 + 1 = 4x$ .

6.  $2x^2 + 7x = 5$ .

7.  $x^2 - 50 = 0$ .

8.  $4x^2 = x + 2$ .

9.  $3z^2 = 2 - 8z$ .

$z = -2.90$  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  $-2$ .

1.  $x^2 + 5x - 24$ .

$(x + 8)(x - 3)$

2.  $x^2 + 7x + 10$ .

$(x + 5)(x + 2)$

3.  $x^2 - 15x + 56$ .

$(x - 8)(x - 7)$

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  $x = -1$