

## Topic: Solving Quadratics by Factorising

Topic/Skill	Definition/Tips	Example
1. Quadratic	A quadratic expression is of the form $ax^2 + bx + c$ where $a, b$ and $c$ are numbers, $a \neq 0$	Examples of quadratic expressions: $x^2$ $8x^2 - 3x + 7$ Examples of non-quadratic expressions: $2x^3 - 5x^2$ $9x - 1$
2. Factorising Quadratics	When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that <b>add to give b</b> and <b>multiply to give c</b> .	$x^2 + 7x + 10 = (x + 5)(x + 2)$ (because 5 and 2 add to give 7 and multiply to give 10) $x^2 + 2x - 8 = (x + 4)(x - 2)$ (because +4 and -2 add to give +2 and multiply to give -8)
3. Difference of Two Squares	An expression of the form $a^2 - b^2$ can be factorised to give $(a + b)(a - b)$	$x^2 - 25 = (x + 5)(x - 5)$ $16x^2 - 81 = (4x + 9)(4x - 9)$
4. Solving Quadratics ( $ax^2 = b$ )	Isolate the $x^2$ term and square root both sides. Remember there will be a <b>positive and a negative solution</b> .	$2x^2 = 98$ $x^2 = 49$ $x = \pm 7$
5. Solving Quadratics ( $ax^2 + bx = 0$ )	<b>Factorise</b> and then <b>solve = 0</b> .	$x^2 - 3x = 0$ $x(x - 3) = 0$ $x = 0 \text{ or } x = 3$
6. Solving Quadratics by Factorising ( $a = 1$ )	<b>Factorise</b> the quadratic in the usual way. <b>Solve = 0</b> Make sure the equation = 0 before factorising.	Solve $x^2 + 3x - 10 = 0$ Factorise: $(x + 5)(x - 2) = 0$ $x = -5 \text{ or } x = 2$
7. Factorising Quadratics when $a \neq 1$	When a quadratic is in the form $ax^2 + bx + c$ <ol style="list-style-type: none"><li>1. Multiply <math>a</math> by <math>c = ac</math></li><li>2. Find two numbers that add to give <math>b</math> and multiply to give <math>ac</math>.</li><li>3. Re-write the quadratic, replacing <math>bx</math> with the two numbers you found.</li><li>4. Factorise in pairs – you should get the same bracket twice</li><li>5. Write your two brackets – one will be the repeated bracket, the other will be made of the factors outside each of the two brackets.</li></ol>	Factorise $6x^2 + 5x - 4$ <ol style="list-style-type: none"><li>1. <math>6 \times -4 = -24</math></li><li>2. Two numbers that add to give +5 and multiply to give -24 are +8 and -3</li><li>3. <math>6x^2 + 8x - 3x - 4</math></li><li>4. Factorise in pairs: <math display="block">2x(3x + 4) - 1(3x + 4)</math></li><li>5. Answer = <math>(3x + 4)(2x - 1)</math></li></ol>
8. Solving Quadratics by Factorising ( $a \neq 1$ )	<b>Factorise</b> the quadratic in the usual way. <b>Solve = 0</b> Make sure the equation = 0 before factorising.	Solve $2x^2 + 7x - 4 = 0$ Factorise: $(2x - 1)(x + 4) = 0$ $x = \frac{1}{2} \text{ or } x = -4$