

YEAR 11 — EXPANDING & FACTORISING

By the end of this unit you should be able to:	MathsWatch clip	Video tutorial
• Expand & factorise with a single bracket	93 134a 94	
• Expand binomials	134b	
• Factorise quadratic expressions		Corbett
• Factorise complex quadratic expressions (H)	192	Corbett
• Solve equations equal to 0		
• Solve quadratic equations by factorisation	157	Corbett
• Solve complex quadratic equations by factorisation (H)		
• Complete the square (H)	209a 209b	Corbett
• Solve quadratic equations using the quadratic formula (H)	191	Corbett

$$ax^2 + bx + c = 0$$

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

Keywords

Expand: multiply out terms to remove brackets

Coefficient: the number in front of a letter in an algebraic term, such as $5x^3$

Quadratic: an expression in which the highest power is 2, such as $x^2 - 5x + 3$

Cubic: an expression in which the highest power is 3, such as $8 + x^3$

Estimate: read approximate values from a graph

Gradient: the steepness (or slope) of a line. A negative gradient means the line slopes downhill

Substitute: put numbers in place of letters to find the value of an expression

Reciprocal: a graph with an equation of the form $y = \frac{k}{x}$ where k is a number

Roots: the solutions when an equation equals zero (often the x-intercepts of a graph)

Exponential: a graph with an equation of the form $y = k^x$ where k is a number

Tangent: a straight line touching a curve which can be used to estimate the gradient of the curve at that point

Some (but not all) key points:

Completing the square:

$$x^2 - 6x + 5$$

$$\Rightarrow (x - 3)^2 - 3^2 + 5$$

$$\Rightarrow (x - 3)^2 - 9 + 5$$

$$\Rightarrow (x - 3)^2 - 4$$

$a = -2$ $b = -8$ $c = -24$

$$2x^2 - 8x - 24 = 0$$

Solving a quadratic by using the quadratic formula

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

The quadratic formula

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(2)(-24)}}{2(2)}$$

$$x = \frac{8 \pm \sqrt{64 - (-192)}}{4}$$

$$x = \frac{8 \pm \sqrt{256}}{4}$$

$$x = \frac{8 \pm 16}{4} = 2 \pm 4$$

$$x = 6, -2$$

Solutions (often these may be decimals)

Solve complex quadratics by factorising:

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

Factorise

$$(2x - 1)(x - 3) = 0$$

One of the brackets must equal zero

$$2x - 1 = 0 \quad \text{or} \quad x - 3 = 0$$

$$2x = 1$$

$$x = 3$$

$$x = \frac{1}{2}$$

Solutions