

Expressions

Key Knowledge/Prior Learning KS2/3 and Retrieval and Suggested Starters

- Forming basic expressions
- BIDMAS
- Identifying terms, expressions, equations, formula and identities
- Multiplying and dividing terms
- Indices

KS3 National Curriculum – what students will be practicing and Key Questions

Simplify and manipulate algebraic expressions by:

- Simplifying expressions by collecting like terms
- Forming Expressions
- Substituting into Expressions and Formulae.
- Expanding Brackets (single, 2 single and double).
- Expand, simplify and factorise (3 part questions)
- Factorising Expressions inc quadratics
- Simplify basic algebraic fractions

Specific Ambitious Knowledge

- Methods for expand single brackets: arrows vs grid.
- Methods of expanding double brackets:
 - FOIL
 - Grid
 - Distributive Law (Partitioning)
 - Column Method
 - By inspection
- Methods to factorise:
 - factor tables,
 - Grids,
 - Partitioning Methods for factorising: Table for factors and use of grid.

Key Vocabulary/Literacy Opportunities

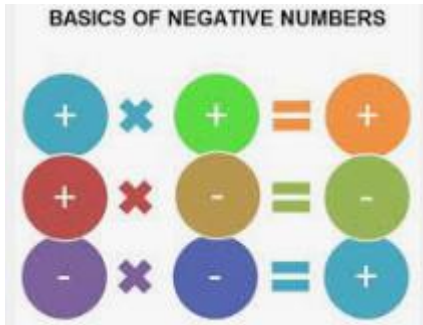
- Expressions, Equation, Identity, Formula, Term
- Simplify
- Substitution/Substitute
- Expand or Multiply Out
- Factorise
- Binomial
- Quadratic

- Common Factor
- Multiple

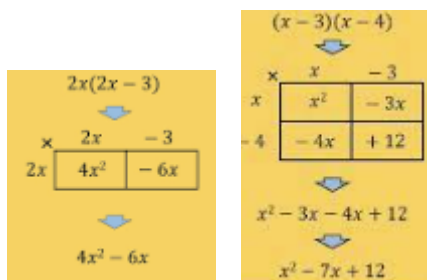
Key Formulae/Knowledge and Misconceptions

When collecting like terms – adding different powers together

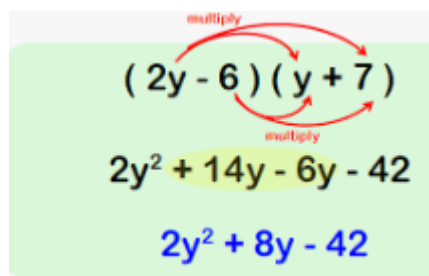
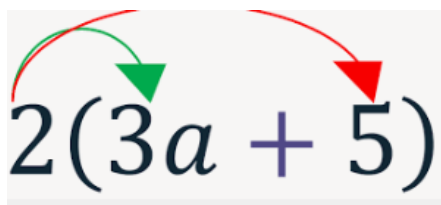
Expanding:
Negative number rules:



Grid method expanding



Foil expanding



Column method expanding

$$(x+4)(2x+3)$$

$$\begin{array}{r} x \quad +4 \\ \times \quad 2x \quad +3 \\ \hline \quad +3x \quad +12 \\ 2x^2 + 8x \\ \hline 2x^2 + 11x + 12 \end{array}$$

Partitioning

$$\begin{array}{r} (x+4)(2x+3) \\ \swarrow \quad \searrow \\ x(2x+3) \quad +4(2x+3) \\ 2x^2 + 3x + 8x + 12 \\ 2x^2 + 11x + 12 \end{array}$$

Factorising

Factorising into single

Factorising:

$$9x + 12$$

1) Find the HCF of the terms.

2) Divide each term by the HCF.

$$\frac{9x}{3} = 3x \quad \frac{12}{3} = 4$$

$$3(3x + 4)$$

The HCF must be outside the brackets for full marks

Factorising quadratics methods:

$$\begin{aligned}
 x^2 - x - 30 &= \underbrace{x^2 - 6x}_{\text{group}} + \underbrace{5x - 30}_{\text{group}} \\
 &= x(x - 6) + 5(x - 6) \\
 &= (x - 6)(x + 5)
 \end{aligned}$$

Add and Times

Factor $x^2 + 11x + 24$

The goal: Find two numbers that multiply to form 24 and add to form 11.

Factors of 24:

1 · 24	Added	1 + 24 = 25
2 · 12		2 + 12 = 14
3 · 8		3 + 8 = 11
4 · 6		4 + 6 = 10

These are the factors

Using a grid

$x^2 + 6x + 8$

x	x	4	$? \cdot x = 8$
x	x^2	$4x$	$? + = 6$
$+2$	$2x$	8	$8, 1 = 9x$
			$4, 2 = 6\checkmark$

$(x+4)(x+2)$

Maths in Context (Historical, Real Life and Student Thinking Points)

- A binomial expression consists of 2 terms. It comes from modern day Latin, a hybrid of "bi" meaning two and nomius, from nomen or name.

- Types of Brackets:

Round brackets ()
 Square brackets []
 Brace brackets { }
 Angle brackets < >

A show that question from the 19th century:

$$(x + y)(x + z) + (y + z)(y + x) + (z + x)(z + y) - (x + y + z) = y^2 + zx + xy$$

Projects/Enrichment/Investigations

- Factorising with multilink: https://nrich.maths.org/factorising?utm_source=secondary-map
- Plus Minus: https://nrich.maths.org/658?utm_source=secondary-map
- Expanding DOTS investigation:
- Expanding Brackets and Collecting Common Terms – Problem Solving:
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