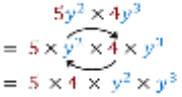
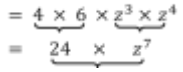
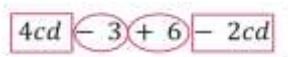
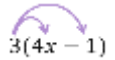
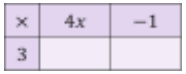
Mathematics Mastery

Y7 U6 Expressions

Building on:	KS2: - Introduction to the concept of algebra - Expressing missing number problems algebraically - Using substitution in simple formulae (e.g. Area, perimeter, volume and word problems) - Enumerating possible combinations of two variables (e.g. $y = 4 + x$. What values could x and y take if only numbers less than 10 are used?)		KS3: - Commutativity and distributivity - Finding factors and multiples - Using the order of operations with positive and negative numbers - Arithmetic with positive and negative numbers (addition, subtraction, multiplication and division)		
Leading to:	KS3: - Substitution into formulae and expressions - Forming and solving linear equations - Rearranging equations and formulae		KS4: - Solving simultaneous equations - Forming and solving quadratic equations and expressions		
Representations	Alegbra tiles to represent variables  Arrays to represent multiplication 	Colours to group terms  Braces (curly brackets) when simplifying 	Shapes to indicate like terms 	Loops to represent multiplication when expanding brackets  Multiplication grids to expand brackets 	Acronym pyramid to support substitution using the correct order of operations 
Lesson	**Lesson title**	**Prior knowledge**	**Learning Objectives**	**Example question**	**New vocabulary**
1	Introduction to algebra	- Commutativity (from U2) - Numerical expressions (from U2-U5)	- Understand that in algebra we follow conventions: when multiplying numbers and letters, we do not write the x sign and place the number before the letter - Understand that the coefficient of x tells how many xs there are. If there is no coefficient written, the coefficient is 1 - Be able to write a two-step expression from a description or contextual problem using correct algebraic notation	Write an expression that represents: a) I think of a number and subtract 1 b) I think of a number and subtract it from 4 c) I think of a number and multiply it by 2. I then add 7 I have x red sweets and y green sweets. Write an expression to show how many sweets I have altogether. Write $r \times 5$ using correct algebraic notation.	Alegbra Variable General relationships Algebraic expression Conventions Coefficient

2	Simplifying (multiplication)	- Multiplying negative numbers (from U5) - Introduction to algebra (from L1)	- Understand it is a convention to write expressions in simplest form - Understand it is a convention to write letters in expressions in alphabetical order - Be able to simply an algebraic expression involving multiplication with one or more variables	Simplify these expressions using correct mathematical notation: a) $a \times 3$ b) $4g \times$ d c) $2a \times 5c$ d) $3e \times -4d$ e) $-8p \times -2m$	Simplest form Simplify
3	Simplifying (indices)	- Negative numbers and indices (from U5) - Simplifying (multiplication) (from L2)	- Be able to simplify expressions when multiplying indices with the same base (number or variable) - Be able to simplify expressions involving indices and coefficients	Simplify: a) $(2q)^6 \times q^2$ b) $a^4 \times 3a$ c) $2n^3 \times 5n^3$	No new vocabulary introduced in this lesson
4	Substitution	- Order of operations (from U4) - Negative numbers (from U5)	- Understand that substitution is when we give a specific value to variables in an expression - Understand evaluating an expression means calculating its value after substituting - Be able to use order of operations to evaluate multi-step expressions involving substitution of positive and negative values	$x = 1,\ y = 3$ and $z = -2$ Evaulate these expressions: a) $2y$ b) $3 + 2z$ c) $5 \times (x + y)$ d) $-5z$ e) $3y + 3z$	Substitution Evaluate Find the value of
5	Substitution (indices)	- Substitution (from L4) - Indices (from U5)	- Understand that we use brackets to show that an index applies to the negative number - Be able to evaluate multi-step expressions involving negative numbers and indices - Be able to evaluate multi-step expressions involving negative numbers and indices using a calculator	Evaluate these expressions when $x = 2,\ y = -3$ and $z = -4$ a) z^2 b) $x^3 - x$ c) $(3y + 6)^2$ d) $-5z^3 + 3x^2 + 4$	No new vocabulary introduced in this lesson
6	Collecting like terms	- Factors and multiples (from U3) - Negative numbers (from U5)	- Understand that like terms are those that are constants, multiples of the same variable, and multiples of the same products of variables - Understand that each term has a positive or negative direction - Be able to simplify expressions with multiple sets of like terms	Simplify these expressions fully: a) $m + m +$ m + m b) $5e - 2e + 4e$ c) $3x + 5y + 2x - 2y$ d) $4x + 3 - x + 5$ e) $10cd + 3c + 5d - 7cd + d + 4$	Term Like terms Constants Collecting

7	Expanding brackets	- Brackets are grouping symbols (from U4) - Distributive property (from U2) - Subtracting is the same as adding a negative (from U5) - Simplification by multiplication (from L2)	- Understand brackets are multiplied by the coefficient - Understand that expanding brackets means everything inside the brackets is multiplied by the coefficient (distributive law) - Be able to multiply a single numerical or algebraic term over brackets	Use distributivity to rewrite the expression without brackets: $5(2c - 4) = ... \times ... + ... \times ...$ Use multiplication grids to expand the brackets: a) $5(x + 7)$ b) $6(4 - 3y)$ Expand the brackets: a) $t(8 - 3t) =$ b) $-3(2s - 5) =$	Expanding Expand
8	Expanding and collecting	- Commutativity of addition (from U2) - Negative numbers (from U5) - Collecting like terms (from L7) - Expanding brackets (from L8)	- Understand that an expression can have more than one set of brackets and that each set of brackets has its own coefficient - Be able to simplify expressions with one set of brackets and additional terms - Be able to expand and collect like terms where coefficients are positive or negative (excluding where the coefficient of a pair of brackets is 1 or −1)	Simplify the expressions: a) $7(3x - 5) - 5x =$ b) $4(5x + 3) + 2(4 - x) =$ c) $5(3x + 2) - 3(2x + 4) =$	No new vocabulary introduced in this lesson
9	Algebraic factors	- Factors and multiples (from U3) - Simplifying by multiplying (from L2) - Simplifying with indices (from L3)	- Understand that factors can be algebraic as well as numerical - Understand that the highest common factor can be a combination of letters and numbers - Be able to identify factors, including the highest common factor, of single-term algebraic expressions	List the factors of: a) $16a$ b) $4xy$ List the common factors of 6x and $9x$ Find the HCF of: a) $3x$ and 9 b) $8a$ and $12b$ c) y^2 and y d) $10pq$ and $15pqr$ e) 4cd and $2c^2$	No new vocabulary introduced in this lesson
10	Factorising	- Factors and multiples (from U3) - Simplifying by multiplying (from L2) - Expanding brackets (from L8) - Algebraic factors (from L9)	- Understand factorising means writing an expression as a multiple of a single set of brackets. It is the opposite of expanding - Understand that to fully factorise, the coefficient of the brackets must be the highest common factor (HCF) of the terms in the expression - Be able to fully factorise expressions where the coefficient is a number, variable, or multiple of a variable (not a combination of variables)	Fully factorise each expression: a) $3a + 12 =$ b) $6 - 18b =$ c) $y^2 - 2y =$ d) $15x + 6xy =$	Factorising Fully factorising