Knowledge Rich Curriculum Plan

Year 8 Core – Algebraic Expressions, Equations and Inequalities

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this, students need to already know that…*	Assessment
To learn how to simplify algebraic expressions by collecting like terms.	• Students will know that like terms are variables (such as x or y) that are the same. E.g. $2x$ and x are like terms, but x and y are not like terms. • Students will know that we can only add or subtract like terms. • Students will know how to collect like terms with single terms such as $y + y + y = 3y$. • Students will know how to collect like terms with terms multiplied by an integer bigger than one. e.g $2b + 3b = 5b$ • Students will know how to collect like terms involving multiple terms. E.g.$2x + 7y + 4x + 6y = 6x + 13y$ • Students will know that when adding or subtracting terms with same power, the power must stay the same. E.g.$x^2 + x^2 = 2x^2$ • Students will know how to collect like terms involving powers. E.g. $4x + 5x^2 - x + 6x^2 = 3x + 11x^2$ • Students will know how to collect like terms with composite variables. e.g. $2ab + 3ab = 5ab$	Algebraic Expression – A collection of variables and/or integers without an equal's sign. It cannot be solved.	• Students need to know that an expression is a set of terms and constants combined using any of the 4 operations. • Students need to know how to add and subtract integers.	Mini-Assessment 5
To learn how to multiply and divide algebraic expressions.	• Students will know that when multiplying algebraic terms together they must write each number side by side. E.g. $4 \times b = 4b$ • Students will know how to multiply with single terms such as $y \times y \times y = y^3$. • Students will know how to multiply algebraic expressions involving multiple letters and integers. E.g. $4 \times b \times c = 4bc$ or $4b \times 3c = 12bc$ • Students will know how to multiply algebraic expressions involving the same letter. E.g. $5 \times g \times g = 5g^2$ • Students will know that when dividing algebraic terms, they must write it as a fraction. E.g. $b \div 4 = \frac{b}{4}$ • Students will know how to divide simple algebraic expressions. E.g. $\frac{4t}{2} = 2t \ or \ \frac{6t}{2t} = 3$ • Students will know how to simplify expressions using index laws. • Students will know that index laws are the rules for simplifying expressions involving powers of the same base number. • Students will know how to simplify algebraic expressions involving multiplication by correctly applying the index laws. • Students will know how to simplify algebraic expressions involving division by correctly applying the index laws. • Students will know how to simplify algebraic expressions involving brackets by correctly applying the index laws. **Opportunity for challenge:** • Students will know how to simplify algebraic expressions with a mixture of the index laws.		• Students need to know how to multiply and divide integers. • Students need to know how to square integers.	Mini-Assessment 5
To learn how to expand single brackets.	• Students will know how to expand single brackets by multiplying a single integer term over a bracket. E.g. $2(x + 3)$ • Students will know that in order to fully expand a single bracket they must multiply the integer on the outside of the bracket to every term inside the bracket. • Students will know how to expand single brackets by multiplying an algebraic term over a bracket. E.g. $x(x - 4)$ • Students will know how to expand single brackets by multiplying multiple terms over a bracket. e.g. $2ab(4a + b)$	Expand – in maths, expand means multiply out	• Students need to know how to multiply algebraic expressions. • Students need to know how to use index laws involving multiplications.	Mini-Assessment 5

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	• Students will know how to expand multiple single brackets and simplify the answer by collecting like terms with a mixture of positive and negative values. • Students will know how to expand multiple single brackets involving index laws and then collect the like terms. E.g. $x(x+3) + x(2x+4)$			
To learn how to expand double brackets.	• Students will know that when expanding double brackets, they must multiply every term in the first bracket by every term in the second bracket and then simplify by collecting like terms. • Students will know how to expand double brackets.	**Quadratic –** involving a squared algebraic term but no other power higher than 2	• Students need to know how to collect like terms. • Students need to know how to multiply algebraic terms.	Mini-Assessment 5
To learn how to form algebraic expressions.	• Students will know how to write simple expressions based on worded scenarios with additions and subtractions. • Students will know how to write simple expressions based on worded scenarios with multiplications and divisions. • Students will know how to write expressions based on multi-step events.	**Algebraic Expression –** A collection of variables and/or integers without an equal's sign. It cannot be solved.	• Students need to know that an expression is a set of terms and constants combined using any of the 4 operations.	Mini-Assessment 5
To learn how to factorise expressions into single brackets.	• Students will know how to recognise common factors of algebraic terms. • Students will know how to factorise algebraic expressions into a single bracket by taking out common numerical factors. • Students will know how to factorise algebraic expressions into a single bracket by taking out common algebraic factors. Opportunity for challenge: • Students will know how to factorise algebraic expressions into a single bracket by taking out multiple common factors.	**Factorise –** put back into brackets by bringing common factors outside **Highest Common Factor –** the largest number that both or all of the numbers can be divided by	• Students need to know how to multiply and divide algebraic expressions. • Students need to know how to use index laws.	Mini-Assessment 5
To learn how to substitute numbers into expressions and formulae.	• Students will know that substitute means putting numbers in place of letters to calculate the value of an expression. • Students will know how to substitute positive and negative integers into simple algebraic expressions. • Students will know that once a substitution has taken place then the order of operations applies. • Students will know how to substitute positive and negative integers into simple formulae. • Students will know how to positive and negative numbers into worded formulae. Opportunity for challenge: • Students will know how to substitute positive and negative numbers into kinematics formulae.	**Substitution –** the action of replacing someone or something with another person or thing. In algebra "substitution" means putting numbers where the letters are in an algebraic expression	• Students need to know how to use the order of operations.	Mini-Assessment 5
To learn how to solve two step linear equations.	• Students will know how to solve one step linear equations. • Students will know how to solve simple two step linear equations with one unknown to find an integer solution. e.g. $2x + 3 = 15$ • Students will know how to solve two step linear equations involving fractions. E.g. $\frac{x}{2} + 3 = 4$ • Students will know that they can get positive and negative solutions. Opportunity for challenge: • Students will know how to expressions non-integer solutions.	**Solve –** find an answer **Equation –** A mathematical statement that two amounts, or groups of symbols representing an amount, are equal: Example $3x - 3 = 15$ **Linear Equation –** an equation between two variables that can be written in the form y=mx+c. Linear equations give a straight line when plotted on a graph.	• Students need to know how to use a function machines to complete a set of operations.	Mini-Assessment 5

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To learn how to solve multi-step linear equations.	• Students will know how to solve equations which involve expressions over a fraction. E.g. $\frac{2x+3}{4} = 12$ • Students will know how to solve equations involving a bracket. E.g. $2(4x + 6) = 10$ **Opportunity for challenge:** • Students will know how to solve equations with unknowns on both sides. E.g. $2x + 6 = 4x - 8$		• Students need to know how to solve two-step linear equations.	Mini-Assessment 5
To learn how to represent and interpret inequalities on number lines.	• Students will know that > means greater than. • Students will know that < means less than. • Students will know that ≥ means greater than or equal to. • Students will know that ≤ means less than or equal to. • Students will know how to use inequality signs to show inclusive and exclusive inequalities. • Students will know that inclusive means inequalities that concerns the symbols ≤, ≥. • Students will know that exclusive means inequalities that concerns the symbols >,<. • Students will know how to list some integers that satisfy an inequality. E.g. $x > 4$ or $x \le 9$. • Students will know how to list integers that satisfy an inequality. e.g. $-2 \le x < 3$ • Students will know that $<$ and $>$ are represented by an open circle. • Students will know that $\le$ and $\ge$ are represented by a closed circle. • Students will know how to represent inequalities such as $x \ge 3$. • Students will know that an arrow must be drawn to the end of the number line. • Students will know how to represent inequalities such as $-1 < x \le 3$. • Students will know that a line must connect both circles. • Students will know how to write linear inequalities to represent a set shown on a number line such as $x < 5$ and $2 \le x < 7$.	**Inequality** – a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. >, <, ≥ and ≤ **Integer** – whole number **Satisfies** – meet the expectations, needs, or desires of	• Students need to know how to order numbers.	Mini-Assessment 5
To learn how to solve linear inequalities.	• Students will know that the solution to solving a linear inequality will actually give a range of possible solutions. • Students will know how to solve simple one step linear inequalities. • Students will know how to solve two step linear inequalities. E.g. $2x + 8 \le 10$ **Opportunity for challenge:** • Students will know how to solve inequalities and then represent the solution on a number line.	**Solve** – find an answer	• Students need to know how to solve one and two step linear equations.	Mini-Assessment 5