The Sutton Academy

Knowledge Rich Curriculum Plan

Year 7 Support – Algebraic Expressions, Equations and Inequalities

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
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 $2b + 3b = 5b$ **Opportunity for challenge:** • Students will know how to collect like terms involving multiple terms. E.g.$2x + 7y + 4x + 6y = 6x + 13y$	**Algebraic Expression –** A collection of variables and/or integers without an equal's sign.	• Students need to know how to add and subtract integers.	**Steps to Success – Collecting Like Terms** **Step 1:** Identify the "like terms" within the expression. You need to allocate a shape/colour to each variable with the same exponent. Ensure that you include the sign in front of the term in your shape. **Step 2:** Simplify each of the "like terms". If there is no coefficient in front of the variable, the coefficient is 1. **Step 3:** Rewrite the simplified expression. (Remember to write them in order)	
To learn how to multiply 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 $4b \times 3c = 12bc$ **Opportunity for challenge:** • Students will know how to multiply algebraic expressions involving the same letter. E.g. $5 \times g \times g = 5g^2$		• Students need to know how to multiply integers.	**Simplifying expressions involving multiplication** **Step 1:** Multiply the coefficients of the variables **Step 2:** Multiply the variables – remember to add the powers for any variables represented by the same letter	
To learn how to divide algebraic expressions.	• 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 involving the division of numbers only. E.g. $\frac{4t}{2} = 2t$ **Opportunity for challenge:** • Students will know how to divide simple algebraic expressions involving the division of a mixture of numbers and letters. E.g. $\frac{6t}{2t} = 3$		• Students need to know how to divide integers	**Simplifying expressions involving division** **Step 1:** Divide the coefficients of the variables **Step 2:** Divide the variables – remember to subtract the powers for any variables represented by the same letter	
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. $2(x + 3)$ **Opportunity for challenge:** • Students will know how to expand single brackets by multiplying a single letter term over a bracket. E.g. $x(x + 3)$	**Expand –** in maths, expand means multiply out	• Students need to know how to multiply algebraic expressions.	**Steps to Success - How do we expand single brackets?** **Step 1** – Multiply the expression within the brackets by the expression outside the bracket. In order to expand the full, bracket, make sure to multiply the entire expression rather than just one term within the expression. Remember if there are indices involved that when we multiply we add them. **Step 2** – Check whether your answer can be simplified Collect any like terms to simplify the answers.	

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To learn how to substitute numbers into expressions.	• Students will know how to substitute a single positive integer into simple algebraic expressions. E.g. $2x$ *or* $x + 4$ *or* $2x + 4$ • Students will know that once a substitution has taken place then the order of operations applies. **Opportunity for challenge:** • Students will know how to substitute multiple positive integers into expressions.	**Substitution** - replacing letters with numbers in algebraic expressions	• Students need to know how to use the order of operations.	**Steps to success - Substitution** When you are given the value of each of the letters in an **expression**, we can **substitute** these into the **expression** to find the value of the expression. To do this we do the following: **Step 1:** Write the **expression** out with the calculation symbols in all of the correct places **Step 2: Substitute** the values for each letter into the correct place in the calculation **Step 3:** Calculate the answer remembering to follow BIDMAS	
To learn how to use function machines.	• Students will know that function machines are used to apply operations in a given order to a value known as the input. • Students will know that the final value produced by a function machine is known as the output. • Students will know how to use function machines to complete one step operations. • Students will know how to use function machines to complete two step operations. • Students will know how to use inverse operations to find an input using the output. **Opportunity for Challenge:** • Students will know how to find missing operations of a function machines given the input and output.	**Input** - what is put in, taken in, or operated on by any process or system. **Output** - the amount of something produced by a person, machine, or industry. **Inverse** - opposite	• Students need to know how to add, subtract, multiply and divide integers.	**Steps to Success – Function machines** **Step 1:** Place the input value at the front of the function machine. **Step 2:** Carry out the first calculation with your inputted value and the operation given in the first box of the function machine. Write this after the first operation box. **Step 3:** Carry out the next calculation with your current value and the operation given in the second box of the function machine. Write this after the second operation box. **Step 4:** Write the output as your answer. **Steps to Success – Inverse operations with function machines** **Step 1:** Place the output value at the end of the function machine. **Step 2:** Carry out the first calculation with your output value and the **inverse** operation given in the last box of the function machine. Write this before the second operation box. **Step 3:** Carry out the next calculation with your current value and the **inverse** operation given in the first box of the function machine. Write this before the first operation box. **Step 4:** Write the input as your answer.	
To learn how to solve one step linear equations.	• Students will know how to use algebraic methods to solve one step linear equations involving addition and subtraction to find a positive integer solution. E.g. $x + 7 = 10$ and $y - 4 = 8$ • Students will know how to use algebraic methods to solve one step linear equations involving multiplication to find a positive integer solution. E.g. $3x = 18$ • Students will know how to use algebraic methods to solve one step linear equations involving fractions to find a positive integer solution. E.g. $\frac{x}{3} = 2$	**Solve –** find an answer **Equation –** a mathematical statement where two algebraic expressions are equal **Linear Equation –** an equation where the highest power of x is 1	• Students need to know how to use function machines to apply operations. • Students need to know how to use a function machine to apply inverse operations.	**Steps to Success – Solving one step linear equations** **Step 1:** Determine what operation needs to happen first. Do this by going in reverse BIDMAS order. **Step 2:** Carry out the inverse operation across both sides of the equation to keep it balanced.	

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To learn how to solve two 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 need to know how to solve one step equations involving addition, subtract and multiplication.	**Steps to Success – Solving two step linear equations** **Step 1:** Determine what operation needs to happen first. Do this by going in reverse BIDMAS order. **Step 2:** Carry out the inverse operation across both sides of the equation to keep it balanced. This is usually an addition or subtraction. **Step 3:** Repeat steps one and two until the value of the letter is found.	
To learn how to interpret inequality symbols.	• Students will know how to use the symbols <, >, =, ≠ to compare small and large integer numbers. • Students will know how to use the symbols <, >, =, ≠ to compare positive and negative numbers. • Students will know how to list some integers that satisfy an inequality. E.g. $x > 4$ or $x \leq 9$. • Students will know how to list integers that satisfy an inequality. e.g. $-2 \leq x < 3$ **Opportunity for Challenge:** • Students will know how to use the symbols <, >, =, ≠ to compare decimals.	**Inequality** – a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. >, <, ≥ and ≤ **Satisfies** – meet the needs	• Students will need to know how to order positive and negative numbers.	**Key Information** • > means greater than. • < means less than. • ≥ means greater than or equal to. • ≤ means less than or equal to.	
To learn how to represent inequalities on number lines.	• Students will know that $< \text{and } >$ are represented by an open circle. • Students will know that $\leq \text{and } \geq$ are represented by a closed circle. • Students will know how to represent inequalities such as $x \geq 3$ on a number line. • 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 $-1 < x \leq 3$ on a number line. • Students will know that a line must connect both circles.		• Students need to know how to list integers that satisfy an inequality.	**Steps to Success – Drawing inequalities on a number line with one limit** **Step 1:** Identify the limit of the inequality and draw a circle above this number. **Step 2:** If the limit is **less than or equal to** or a **greater than or equal to**, colour in the circle. **Step 3:** Identify if the inequality is a greater than or less than. If it is a greater than, draw the arrow pointing to the right. If it is a less than, draw the arrow pointing to the left. **Steps to Success – Drawing inequalities on a number line with two limits** **Step 1:** Identify the limits of the inequality and draw a circle above both numbers. **Step 2:** If the first sign is **less than or equal**, colour in the first circle. **Step 3:** IF the second sign is **greater than or equal to**, colour in the second circle. **Step 4:** Connect the circles with a single straight line. **Steps to Success – Writing inequalities from a number line with one limit** **Step 1:** Write down the letter. **Step 2:** If the circle is not coloured in then the limit is **less than** or **greater then**. If the circle is coloured in, then the limit is **less than or equal to** or a **greater**	

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				than or equal to. Write the sign to the right of your letter. **Step 3:** Identify the limit of the inequality by looking at the number which the circle is above. Write this number down on the right of your inequality sign. **Step 4:** Double check that your inequality makes sense for the diagram you have. **Steps to Success – Writing inequalities from a number line with two limits** **Step 1:** Write down the letter. **Step 2:** If the first circle is not coloured in then the limit is **less than**. If the first circle is coloured in, then the limit is **less than or equal to**. Write the sign to the left of your letter – pointing it to the left. **Step 3:** If the second circle is not coloured in then the limit is **less than**. If the second circle is coloured in, then the limit is **less than or equal to**. Write the sign to the right of your letter – pointing it to the left. **Step 4:** Identify the limits of the inequality by looking at the numbers which each circle is above. Write these numbers down. The smallest number should be on the left and the biggest number should be on the right. **Step 5:** Double check that your inequality makes sense for the diagram you have.	
Mini Assessment 5					