The Sutton Academy

Knowledge Rich Curriculum Plan

Year 11 Foundation – Algebra 1

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Steps to success
To learn how to expand single brackets	• Students will know how to expand single brackets by multiplying a single term over a bracket. • Students will know how to expand multiple single brackets and simplify the answer by collecting 'like terms'.	**Expand –** in maths, expand means multiply out	• Students will need to know how to multiply algebraic expressions • Students will need to know how to collect like terms • Students will need to know how to calculate with negative numbers	**Key Terms** **Expression –** numbers, symbols and operators (such as + and ×) grouped together that show the value of something. **Like Terms -** "Like terms" are terms whose variables (and their exponents such as the 2 in x2) are the same. **Expand** - to open up/ to express at length or in greater detail **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.
To learn how to expand double brackets	• Students will know how to expand double brackets and simplify answers by collecting 'like terms'.	**Expression –** numbers, symbols and operators (such as + and ×) grouped together that show the value of something. **Expand** - to open up/ to express at length or in greater detail **Like terms -** "Like terms" are terms whose variables (and their exponents such as the 2 in x2) are the same.	• Students will need to know how to expand single brackets • Students will need to know how to calculate with negative numbers	**How do you expand double brackets?** Step 1 – Multiply all terms in the second bracket by the first term in the first bracket and write these terms down. Step 2 – Multiply all terms in the second bracket by the second term in the first bracket and write these down. You should now have four terms written down. Step 3 – Collect like terms and write your answer, ensuring that you take care with the signs!
To learn how to factorise expressions into a single bracket	• Students will know how to factorise algebraic expressions into single brackets	**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 find the HCF of two numbers	

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Steps to success
To learn how to factorise quadratics into double brackets	• Students will know how to factorise quadratics in the form $ax^2 + bx + c$ where b and c are either positive or negative and a = 1 • Students will know how to factorise the difference of two squares where the coefficient of x^2 is 1	**Quadratic –** involving a squared algebraic term but no other power higher than 2	• Students need to know how to expand double brackets • Students need to know how to calculate with negative numbers	**How do we factorise and solve quadratic expressions?** **Step 1:** In order to **factorise** quadratics, we need to find two numbers where the sum is the coefficient of the x term and the product is the number within the expression. **Step 2:** Once you have found these numbers, a and b, they are then substituted into brackets as follows: $(x \pm a)(x \pm b)$ (You can check your answer by expanding the brackets.) **Step 3: Substitute** the values into the equations and solve to find 0, remembering to use inverse operations.
To learn how to substitute into formulae	• Students will know how to substitute positive and negative integers into formulae. • Students will know how to substitute positive and negative numbers into worded formulae. • 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 be able to calculate with negative numbers • Students need to able to use BIDMAS	**How do we substitute values into an expression?** Step 1 – Evaluate the letter that is being replaced, it may be more than one, you may like to highlight them Step 2 – Substitute the value into the expression Step 3 – Calculate the answer, remember to follow the order of operations (BIDMAS)
To learn how to solve linear equations	• Students will know how to solve simple two step linear equations with one unknown using the balancing method e.g. 2x+3 =15. • Students will be able to solve linear equations involving fractions and brackets.	**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 should already know how to solve one-step equations • Students will need to know how to expand single brackets	**How do we solve equations?** If we are asked to **solve** an equation we are being asked to find the value of the **variable**. To do this we must **isolate** the variable to determine the value of a single variable on its own. To isolate the variable we need to work out what is happening to it in the equation and use **inverse operations** to undo each step, being careful to ensure we do this in the correct order. Remember, the equals sign in an equation is **vital** – whatever we do to one side of the equation to isolate the variable, we must also do to the other side. This is known as the **balancing** method.

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Steps to success
To learn how to solve linear equations with unknowns on both sides	• Students will know how to solve linear equations with unknowns on both sides.		• Students will need to know how to solve two step linear equations with one unknown e.g. 2x+3 =15. • Students will be able to solve linear equations involving brackets.	**Step 1:** Identify the algebraic term with the smallest coefficient within the equation. **Step 2:** Eliminate the algebraic term with the smallest coefficient, remember to balance your equation. **Step 3:** Solve the equation.
To learn how to form and solve linear equations	• Students will know how to set up and solve equations for a word problem. • Students will know how to solve shape problems by forming equations		• Students will need to know how to solve linear equations • Students should know how to form expressions. • Students will need to know how to calculate perimeter and area	
To learn how to interpret inequalities and represent them on number lines	• Students will know that an inequality is a symbol >, ≤, <, ≥ that can be used to compare two values. • Students will know how to use the inequality symbols correctly • Students will know that > means greater than, ≤ means less than or equal to, < means less than and ≥ means greater than or equal to • Students will know how to list integers that satisfy an inequality e.g. -2< x <3. • Students will know how to represent inequalities on number lines. • Students will know how to write linear inequalities to represent a set shown on a number line.	**Integer –** whole number **Inequality –** a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. >, <, ≥ and ≤ **Satisfies –** meet the expectations, needs, or desires of	• Students should be able to use the four operations with positive and negative integers.	<u>How do you represent inequalities on a number line?</u> **Step 1:** Identify the limit of the inequality and draw a circle above. **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. <u>How do you represent inequalities on a number line with two limits?</u> **Step 1:** Identify the limits of the inequality and draw a circle above both. **Step 2:** Colour in the appropriate circle if the corresponding limit shows less than or equal to or a greater than or equal to. **Step 3:** Connect the circles with a single straight line.

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this students, need to already know that…*	Steps to success
To learn how to solve linear inequalities	• Students will know the solution set is the set of values that satisfy a given set of equations or inequalities. • Students will know how to solve simple linear inequalities in one variable, and represent the solution set on a number line. • Students will solve an inequality such as $-3 < 2x + 1 < 7$ and show the solution set on a number line. • Students will know how to solve two inequalities in x, find the solution sets and compare them to see which value of x satisfies both.	**Solve –** find an answer	• Students will know how to list integers that satisfy inequality e.g. $-2 < x < 3$. • Students will know how to represent inequalities on number lines. • Students will know how to construct inequalities to represent a set shown on a number line. • Students know how to solve one and two step equations.	<u>How do we solve inequalities?</u> If we are asked to **solve** an inequality we are being asked to find the value of the **variable**. To do this we must **isolate** the variable to determine the value of a single variable on its own. To isolate the variable we need to work out what is happening to it in the inequality and use **inverse operations** to undo each step, being careful to ensure we do this in the correct order. Remember, the sign is **vital** – whatever we do to one side of the equation to isolate the variable, we must also do to the other side. This is known as the **balancing** method.
To learn how to rearrange formulae	• Students will know how to rearrange simple formulae to change the subject. • Students will know how to rearrange kinematic formulae. • Students will know that rearrange means change the position of. • Students will know how to change the subject of a more complicated formula involving powers and roots. • Students will know that Kinematics concerns the motion of objects,	**Rearrange –** change the position of. **Formula –** A mathematical relationship or rule expressed in symbols. Example $A=\pi r^2$	• Students should have the ability to use negative numbers with the four operations and recall and use hierarchy of operations and understand inverse operations • Students should know how to expand brackets.	If we are asked to **rearrange formula** we are being asked to change the subject of the formula from the existing variable to another. To do this we must **isolate** the variable to a single variable on its own. To isolate the variable we need to work out what is happening and use **inverse operations** to undo each step, being careful to ensure we do this in the correct order. Remember, the equals sign in an equation is **vital** – whatever we do to one side of the equation to isolate the variable, we must also do to the other side. This is known as the **balancing** method.