The Sutton Academy

Knowledge Rich Curriculum Plan

Year 11 Higher – Algebra 1

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Steps to Success	Prior Knowledge: *In order to know this students, need to already know that…*	Feedback
To learn how to expand and simplify brackets	• Students will know how to expand and simplify an expression in the form $(x \pm a)(x \pm b) \pm (x \pm c)(x \pm d)$ including where brackets are squared • Students will know how to expand three brackets and simplify their answers including where brackets are squared or cubed • Students will know how to form expressions by expanding brackets	**Algebraic Expression –** A collection of variables and/or integers without an equals sign. It cannot be solved. **Expand –** in maths, expand means multiply out	**Expanding Double Brackets – Steps to Success** **Step 1:** Multiply the first term in the first bracket by the first term in the second bracket. Take care with negatives! **Step 2:** Multiply the first term in the first bracket by the second term in the second bracket. Take care with negatives! **Step 3:** Multiply the second term in the first bracket by the first term in the second bracket. Take care with negatives! **Step 4:** Multiply the second term in the first bracket by the second term in the second bracket. Take care with negatives! **Step 5:** Simplify your answer by collecting like terms. **Expanding Three Brackets – Steps to Success** **Step 1:** Expand out the first two brackets and simplify your answer. **Step 2:** Put your answer back into a bracket and put the third bracket next to it. **Step 3:** Expand the resulting two brackets by multiplying the first term in the first bracket by both parts of the second bracket, followed by the second term in the first bracket by both parts of the second bracket and then finally the third part of the first bracket by the third part of the second bracket. **Step 4:** Simplify your answer.	• Students should already know how to expand single and double brackets	
To learn how to factorise quadratics where the co-efficient of x^2 is greater than 1	• 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 greater than 1	**Factorise –** put back into brackets by bringing common factors outside **Quadratic –** involving a squared algebraic term but no other power higher than 2 **Co-efficient –** a number placed before and	**Factorising quadratics in the form $ax^2 + bx + c$ where $a > 1$** **Step 1:** Find the two numbers that multiply together to give the product of a and c and sum to b. We will call the two numbers we find 'd' and 'e'. **Step 2:** Rewrite the factorised expression as $ax^2 \pm dx \pm ex + c$.	• Students need to know how to factorise into single 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	

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		multiplying the variable in an algebraic expression	**Step 3:** Draw a line down the centre of the new expression, splitting it in half. **Step 4:** Factorise either side of the line into single brackets. **Step 5:** Check that the two brackets match and then copy this bracket as one of your brackets. The other bracket comprises of the parts you brought outside of the brackets when you factorised.		
To learn how to solve linear equations	• Students will know how to solve linear equations involving fractions • Students will know how to solve linear equations involving unknowns on both sides • Students will know how to solve linear equations involving unknowns on both sides • Students will know how to solve linear equations with unknowns on both sides including where there are 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. **Inverse –** opposite	**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.	• Students should know how to solve linear equations in the form ax + b = c • Students should know how to solve linear equations in the form a(bx + c) = d	
To learn how to form and solve linear equations	• Students will know how to form and solve linear equations for a worded scenario • Students will know how to form and solve linear equations involving shape		**Steps to Success – Forming Algebraic Expressions** **Step 1:** Form expressions for each worded statement **Step 2:** Combine your expressions to create an equation (this is usually done by adding the expressions together and making it equal to a total given in the question. Alternatively, you might need to make two algebraic expressions equal to each other – read the question carefully!) **Step 3:** Solve the equation to find the value of one unknown **Step 4:** Check what the question is asking you for and ensure you answer	• Students will need to know how to calculate perimeter and area • Students will need to know the basic angle facts • Students will need to know the properties of special triangles	

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			the question (this might involve substituting your answer back into one of the expressions you formed at the beginning!)		
To learn how to represent, interpret and solve linear inequalities	• Students will know how to represent inequalities on a number line • Students will know how to write the inequality represented on a number line • Students will know how to solve linear inequalities	**Inequality –** a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. >, <, ≥ and ≤	**How do we solve inequalities?** 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.	• Students will need to know how to solve linear equations • Students should already know how to list integers that satisfy an inequality	
To learn how to rearrange formulae	• Students will know how to rearrange formulae involving fractions, powers and roots • Students will know how to rearrange formulae involving brackets • Students will know how to rearrange formulae where factorisation is required to isolate the variable we are trying to make the subject	**Rearrange –** change the position of. **Formula –** A mathematical relationship or rule expressed in symbols. Example $A=\pi r^2$	**Steps to success – Rearranging formulae** Rearranging formulae is when you change the subject of an equation or a formula. Y is the subject of this formula: $y = 3x + 2$ To rearrange formulae we use a method similar to solving equations except that when rearranging formulae you aren't working out an actual value for x, instead you are making a different **variable** the subject of the formula. We can rearrange the formula above to make x the subject. To do this we need to work out what is currently happening to the **variable** that we want to make the subject and	• Students will need to know how to factorise • Students should already know how to rearrange very simple formulae	

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			use **inverse operations** to undo each operation and change the subject. You can this of this as doing the opposite in reverse BIDMAS 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. When we do this to the above formula we get: $x = \frac{y-2}{3}$		
To learn how to simplify algebraic fractions	• Students will know how to simplify algebraic fractions		**Steps to Success - Simplifying algebraic fractions** We simplify algebraic fractions in the same way as we simplify numerical fractions – by finding common factors and dividing both the numerator and denominator by the common factor **Step 1: Factorise** everything you can **Step 2:** Cancel out any brackets that are common to both the numerator and denominator **Step 3:** Check whether there is a common numerical factor in all parts of the numerator and denominator – if there is, divide by this factor **Step 4:** Double check your answer is in its simplest form	• Students will need to know how to factorise into single brackets • Students will need to know how to factorise into double brackets	
To learn how to add and subtract algebraic fractions	• Students will know how to add and subtract algebraic fractions where the denominator is numerical • Students will know how to add and subtract algebraic fractions where the denominator is algebraic • Students will know how to solve equations involving the addition and subtraction of algebraic fractions but only where the denominator is numerical	**Denominator –** the bottom number in a fraction **Numerator –** the top number in a fraction	**How do we add and subtract algebraic fractions?** We add and subtract algebraic fractions in the same way as we add and subtract numerical fractions: **Step 1:** Find a common denominator, if the denominator is algebraic multiply the two denominators together using brackets. **Step 2:** Keep your fractions equivalent – whatever you have done	• Students will need to know how to add and subtract fractions • Students will need to know how to expand brackets	

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			to the numerator you must also do to the denominator. **Step 3:** Expand out anything that needs expanding on the numerator. **Step 4:** Add the numerators, remember the denominator stays the same. **Step 5:** Simplify your answer if you can.		
To learn how to multiply and divide algebraic fractions	• Students will know how to multiply and divide algebraic fractions and will understand why factorisation and cross-cancelling is the easiest method for this		**Steps to Success – Multiplying algebraic fractions.** **Step 1:** Factorise everything that you can. **Step 2:** Cancel out any common factors diagonally. **Step 3:** Multiply the numerators. **Step 4:** Multiply the denominators. **Step 5:** Check whether you can simplify your answer further **Steps to Success – Dividing algebraic fractions.** **Step 1:** Keep the first fraction the same, change the 'divide' to a multiply, find the reciprocal of the second fraction. **Step 2:** Factorise everything that you can. **Step 3:** Cancel out any common factors diagonally. **Step 4:** Multiply the numerators. **Step 5:** Multiply the denominators. **Step 6:** Check whether you can simplify your answer further.	• Students will need to know how to multiply and divide fractions • Students will need to know how to factorise into single and double brackets	