



The Sutton Academy

# Knowledge Rich Curriculum Plan

Year 8 Support – Algebraic Expressions, Equations and Inequalities

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Tiered Vocabulary	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Assessment
<p><b>To learn how to simplify algebraic expressions by collecting like terms.</b></p>	<ul style="list-style-type: none"> <li>• Students will know that like terms are variables (such as <math>x</math> or <math>y</math>) that are the same. E.g. <math>2x</math> and <math>x</math> are like terms, but <math>x</math> and <math>y</math> are not like terms.</li> <li>• Students will know that we can only add or subtract like terms.</li> <li>• Students will know how to collect like terms with single terms such as <math>y + y + y = 3y</math>.</li> <li>• Students will know how to collect like terms with terms multiplied by an integer bigger than one. e.g <math>2b + 3b = 5b</math></li> <li>• Students will know how to collect like terms involving multiple terms. E.g. <math>2x + 7y + 4x + 6y = 6x + 13y</math></li> <li>• Students will know that when adding or subtracting terms with same power, the power must stay the same. E.g. <math>x^2 + x^2 = 2x^2</math></li> <li>• Students will know how to collect like terms involving powers. E.g. <math>4x + 5x^2 - x + 6x^2 = 3x + 11x^2</math></li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>• Students will know how to collect like terms with composite variables. e.g. <math>2ab + 3ab = 5ab</math></li> </ul>	<p><b>Algebraic Expression</b> – A collection of variables and/or integers without an equal's sign. It cannot be solved.</p>	<ul style="list-style-type: none"> <li>• Students need to know what an expression is.</li> <li>• Students need to know how to add and subtract integers.</li> </ul>	<p>Mini-Assessment 5</p>
<p><b>To learn how to simplify algebraic expressions.</b></p>	<ul style="list-style-type: none"> <li>• Students will know that when multiplying algebraic terms together they must write each number side by side. E.g. <math>4 \times b = 4b</math></li> <li>• Students will know how to multiply with single terms such as <math>y \times y \times y = y^3</math>.</li> <li>• Students will know how to multiply algebraic expressions involving multiple letters and integers. E.g. <math>4 \times b \times c = 4bc</math> or <math>4b \times 3c = 12bc</math></li> <li>• Students will know how to multiply algebraic expressions involving the same letter. E.g. <math>5 \times g \times g = 5g^2</math></li> <li>• Students will know how to simplify algebraic expressions involving multiplication by correctly applying the index laws.</li> <li>• Students will know that when dividing algebraic terms, they must write it as a fraction. E.g. <math>b \div 4 = \frac{b}{4}</math></li> <li>• Students will know how to divide simple algebraic expressions. E.g. <math>\frac{4t}{2} = 2t</math> or <math>\frac{6t}{2t} = 3</math></li> <li>• Students will know how to simplify algebraic expressions involving division by correctly applying the index laws.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>• Students will know how to simplify algebraic expressions involving brackets by correctly applying the index laws.</li> </ul>		<ul style="list-style-type: none"> <li>• Students need to know how to multiply and divide integers.</li> <li>• Students need to know how to square integers.</li> </ul>	<p>Mini-Assessment 5</p>
<p><b>To learn how to expand single brackets.</b></p>	<ul style="list-style-type: none"> <li>• Students will know how to expand single brackets by multiplying a single integer term over a bracket. E.g. <math>2(x + 3)</math></li> <li>• 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.</li> <li>• Students will know how to expand single brackets by multiplying an algebraic term over a bracket. E.g. <math>x(x - 4)</math></li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>• Students will know how to expand single brackets by multiplying multiple terms over a bracket. e.g. <math>2ab(4a + b)</math></li> </ul>	<p><b>Expand</b> – in maths, expand means multiply out</p>	<ul style="list-style-type: none"> <li>• Students need to know how to multiply algebraic expressions.</li> <li>• Students need to know how to use index laws involving multiplications.</li> </ul>	<p>Mini-Assessment 5</p>

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Tiered Vocabulary	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Assessment
To learn how to expand two brackets and collect like terms.	<ul style="list-style-type: none"> <li>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.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to expand multiple single brackets involving index laws and then collect the like terms.</li> </ul>		<ul style="list-style-type: none"> <li>Students need to know how to expand brackets.</li> </ul>	Mini-Assessment 5
To learn how to factorise expressions into single brackets.	<ul style="list-style-type: none"> <li>Students will know how to recognise common factors of algebraic terms.</li> <li>Students will know how to factorise algebraic expressions into a single bracket by taking out common numerical factors.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to factorise algebraic expressions into a single bracket by taking out common algebraic factors.</li> </ul>	Factorise – put back into brackets by bringing common factors outside	<ul style="list-style-type: none"> <li>Students need to know how to multiply and divide algebraic expressions.</li> <li>Students need to know how to use index laws.</li> </ul>	Mini-Assessment 5
To learn how to substitute numbers into expressions and formulae.	<ul style="list-style-type: none"> <li>Students will know that substitute means putting numbers in place of letters to calculate the value of an expression.</li> <li>Students will know how to substitute positive and negative integers into simple algebraic expressions.</li> <li>Students will know that once a substitution has taken place then the order of operations applies.</li> <li>Students will know how to substitute positive and negative integers into simple formulae.</li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to substitute positive and negative numbers into worded formulae.</li> </ul>	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	<ul style="list-style-type: none"> <li>Students need to know how to use the order of operations.</li> </ul>	Mini-Assessment 5
To learn how to solve one step linear equations.	<ul style="list-style-type: none"> <li>Students will know that function machines are used to apply operations in a given order to a value known as the input.</li> <li>Students will know that the final value produced by a function machine is known as the output.</li> <li>Students will know how to use function machines to complete one step operations.</li> <li>Students will know how to use inverse operations to find an input using the output.</li> <li>Students will know how to use algebraic methods to solve one step linear equations involving addition and subtraction to find an integer solution. E.g. <math>x + 7 = 10</math> and <math>y - 4 = 8</math></li> <li>Students will know how to use algebraic methods to solve one step linear equations involving multiplication to find an integer solution. E.g. <math>3x = 18</math></li> <li>Students will know how to use algebraic methods to solve one step linear equations involving fractions to find an integer solution. E.g. <math>\frac{x}{3} = 2</math></li> </ul>	<p>Solve – find an answer</p> <p>Equation – A mathematical statement that two amounts, or groups of symbols representing an amount, are equal: Example <math>3x - 3 = 15</math></p> <p>Linear Equation – an equation between two variables that can be written in the form <math>y=mx+c</math>. Linear equations give a straight line when plotted on a graph.</p>	<ul style="list-style-type: none"> <li>Students need to know how to add, subtract, multiply and divide integers.</li> </ul>	Mini-Assessment 5
To learn how to solve two step linear equations.	<ul style="list-style-type: none"> <li>Students will know how to use function machines to complete two step operations.</li> <li>Students will know how to solve simple two step linear equations with one unknown to find an integer solution. e.g. <math>2x + 3 = 15</math></li> <li>Students will know how to solve two step linear equations involving fractions. E.g. <math>\frac{x}{2} + 3 = 4</math></li> </ul> <p><b>Opportunity for challenge:</b></p> <ul style="list-style-type: none"> <li>Students will know how to solve equations involving a bracket. E.g. <math>2(4x + 6) = 10</math></li> </ul>		<ul style="list-style-type: none"> <li>Students need to know how to solve one step equations involving addition, subtract and multiplication.</li> <li>Students need to know how to use a function machine to complete one step operations.</li> </ul>	Mini-Assessment 5

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Tiered Vocabulary	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Assessment
<b>To learn how to list integers that satisfy an inequality.</b>	<ul style="list-style-type: none"> <li>• Students will know that <math>&gt;</math> means greater than.</li> <li>• Students will know that <math>&lt;</math> means less than.</li> <li>• Students will know that <math>\geq</math> means greater than or equal to.</li> <li>• Students will know that <math>\leq</math> means less than or equal to.</li> <li>• Students will know how to use inequality signs to show inclusive and exclusive inequalities.</li> <li>• Students will know that inclusive means inequalities that concerns the symbols <math>\leq, \geq</math>.</li> <li>• Students will know that exclusive means inequalities that concerns the symbols <math>&gt;, &lt;</math>.</li> <li>• Students will know how to list some integers that satisfy an inequality. E.g. <math>x &gt; 4</math> or <math>x \leq 9</math>.</li> <li>• Students will know how to list integers that satisfy an inequality. e.g. <math>-2 \leq x &lt; 3</math></li> </ul>	<p><b>Inequality</b> – a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. <math>&gt;, &lt;, \geq</math> and <math>\leq</math></p> <p><b>Integer</b> – whole number</p>	<ul style="list-style-type: none"> <li>• Students need to know how to order numbers.</li> </ul>	Mini-Assessment 5
<b>To learn how to represent and interpret inequalities on number lines.</b>	<ul style="list-style-type: none"> <li>• Students will know that <math>&lt;</math> and <math>&gt;</math> are represented by an open circle.</li> <li>• Students will know that <math>\leq</math> and <math>\geq</math> are represented by a closed circle.</li> <li>• Students will know how to represent inequalities such as <math>x \geq 3</math>.</li> <li>• Students will know that an arrow must be drawn to the end of the number line.</li> <li>• Students will know how to represent inequalities such as <math>-1 &lt; x \leq 3</math>.</li> <li>• Students will know that a line must connect both circles.</li> <li>• Students will know how to write linear inequalities to represent a set shown on a number line such as <math>x &lt; 5</math> and <math>2 \leq x &lt; 7</math>.</li> </ul>		<ul style="list-style-type: none"> <li>• Students need to know how to list integers that satisfy an inequality.</li> </ul>	Mini-Assessment 5