The Sutton Academy

Knowledge Rich Curriculum Plan

Year 11 Higher – Number 1

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to calculate with numbers written in standard form.	• Students will know how to adjust a number written in the form a x 10^n where a > 10 or a ≤ 0 so that it is written in standard form (in the form a x 10^n where 1 ≤ a < 10) • Students will know how to compare and order numbers written in standard form and how the x10^n affects the size of one number compared with another. • Students will know that to add and subtract numbers written in standard form. • Students will know how to multiply numbers in standard form. • Students will know how to divide numbers in standard form. • Students will know how to solve more complex non-calculator standard form problems including substitution problems and worded problems.	**Standard form -** a way of writing down very large or very small numbers easily, a number is written in standard form when it is written in the form a x 10^n where 1 ≤ a < 10	• Students need to know how to convert from standard form to ordinary numbers and vice versa.	<u>Steps to Success - Adding and subtracting numbers in standard form</u> **Step 1:** Write the numbers as ordinary numbers by multiplying or dividing by powers of 10. **Step 2:** Add or subtract the numbers using the column method. **Step 3:** Convert your answer into standard form, if necessary. <u>Steps to Success – Multiplying numbers in standard form</u> **Step 1:** Multiply the 'a' for each number written in standard form. **Step 2:** Multiply the two 10^n parts. Remember that we will need to add the powers. **Step 3:** Put the two parts back together. **Step 4:** If necessary, check your answer is written in standard form, if not you will need to adjust your answer. <u>Steps to Success – Dividing numbers in standard form</u> **Step 1:** Divide the 'a' for each number written in standard form. **Step 2:** Divide the two 10^n parts. Remember that we will need to subtract the powers. **Step 3:** Put the two parts back together. **Step 4:** If necessary, check your answer is written in standard form, if not you will need to adjust your answer.	
To learn how to solve problems with standard form.	• Students will know how to carry out basic calculations with numbers written in standard form using a calculator and interpret a calculator display where answers are given in standard form or as ordinary numbers that need converting to standard form. • Students will know how to solve more complex problems with numbers written in standard form both with a calculator (as appropriate).		• Students need to know how to convert from standard form to ordinary numbers and vice versa.		
To learn how to add, subtract and expand brackets with surds.	• Students will know that to add and subtract surds we use similar rules to collecting like terms and that therefore √a + √a = 2√a etc. • Students will know how to add and subtract surds. • Students will know how to expand single brackets with surds, including where simplification of surds is required. • Students will know how to expand and simplify double brackets with surds including where resulting surds need simplifying. They will know how to do this where the numerator is an integer, single surd or an expression involving surds and/or integers. • Students will know how to solve problems involving the expanding of single or double brackets with surds.	**Surd –** a square root which cannot be reduced to a whole number. Surds are irrational numbers. **Irrational Numbers** – Numbers which, when written in decimal form, would go on forever without any repeating pattern **Expand –** multiply out	• Students need to know simplify surds. • Students need to know how to expand single and double brackets with algebraic terms.	<u>Steps to Success – Adding and Subtracting Surds</u> **Step 1:** Ensure the number under the root is the same, if not simplify each of the surds as much as possible. **Step 2:** Collect any roots with the same number together like you would with algebra (for instance $3\sqrt{a} + 5\sqrt{a} = 8\sqrt{a}$). ***Remember you can only collect the same roots together!*** <u>Steps to Success – Expanding single brackets involving Surds</u> **Step 1:** Using the rules for multiplying with surds, multiply everything on the outside of the bracket by everything on the inside of the bracket, remember to apply the rules of negatives. **Step 2:** Check whether any of your products can be simplified. If they can you must simplify them. <u>Steps to Success – Expanding double brackets involving Surds</u> **Step 1:** Using the rules for multiplying with surds, multiply the first term in the first bracket by each of the terms in the second bracket. **Step 2:** Using the rules for multiplying with surds, multiply the second term in the first bracket by each of the terms in the second bracket. **Step 3:** Check whether any of the square roots or surds that have been produced can be simplified and simplify where possible **Step 4:** Collect like terms together using the rules for adding and subtracting surds.	

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to rationalise denominators.	•Students will know how to rationalise the denominator when a single surd is in the denominator. •Students will know how to rationalise the denominator when the denominator has two parts separated by a + or a - e.g. $\frac{5}{\sqrt{2}+1}$ or $\frac{\sqrt{2}+3}{\sqrt{3}-1}$ etc. •Students will know how to solve more complex, multi-step, exam style problems involving surds.	**Rationalise –** to make something rational **Rational number** – numbers that can be written as a fraction where both the numerator and the denominator are integers, and the denominator is not zero. **Denominator –** the bottom number in a fraction	• Students need to know how to expand single and double brackets with surds. • Students need to know how to simplify surds.	**Steps to Success – Rationalising the denominator with a single surd in the denominator** **Step 1:** Multiply the numerator and denominator by the surd that is in the denominator. This will keep your fraction equivalent. **Step 2:** Simplify the answer as fully as possible. **Steps to Success – Rationalising the denominator with a more complex denominator** **Step 1:** Multiply the numerator and denominator by the entire denominator but change the sign. **Step 2:** Expand out the numerator and simplify **Step 3:** Expand out the denominator and simplify **Step 4:** Check if your final answer can be simplified (remember to check you have simplified all of the surds as fully as possible!)	
To learn how to solve problems involving surds.	•Students will know how to solve more complex, multi-step, exam style problems involving surds.		• Students need to know how to add, subtract, multiply and divide surds. • Students need to know how to expand brackets with surds. • Students need to know how to rationalise denominators.		
To learn how to add, subtract, multiply and divide fractions. Band 2 to do this in boost!	• Students will know how to add mixed numbers. • Students will know how to subtract mixed numbers. • Students will know how to multiply integers by fractions. • Students will know how to multiply mixed numbers. • Students will know how to divide integers by fractions. • Students will know how to divide fractions by integers. • Students will know how to divide mixed numbers. Students will know to write their answers in the simplest form when possible. • Students will know solve real-life problems involving adding, subtracting multiplying and dividing fractions. •Students will know how to solve multi-step/complex problems involving adding, subtracting, multiplying and dividing fractions. **Opportunity for challenge:** •Students will know how to add, subtract, multiply and divide with simple single termed algebraic fractions.	**Fraction –** a way of representing the parts of a whole **Denominator –** the bottom number in a fraction **Numerator –** the top number in a fraction **Improper Fraction –** a fraction where the numerator is larger than the denominator **Mixed Number –** a number consisting of an integer and a proper fraction **Equivalent –** equal in value **Simplify –** make something simpler or easier to manage	• Students need to know how to add, subtract, multiply and divide fractions. • Students need to know how to simplify fractions. • Students need to know how to convert between mixed numbers and improper fractions.	**Steps to Success – Adding and subtracting fractions** **Step 1:** In order to add and subtract fractions, you need both fractions to have a common denominator. There are two main methods for choosing a common denominator: • Use the lowest common multiple (LCM) of the two denominators. • Use the product of the two denominators. **Step 2:** Once you have chosen your common denominator you have to ensure you keep the fractions equivalent to the original fractions in the question. This means that whatever you have done to the denominator of the original fraction, you must also do to the numerator. **Step 3:** You can now just need to add or subtract the two numerators. The denominator stays the same. **Step 4:** Check whether your answer can be simplified and/or converted into a mixed number. **Steps to Success - Multiplying fractions** **Step 1:** Convert any mixed numbers into improper fractions and/or write any integers as a fraction over 1. **Step 2:** Multiply the numerators. **Step 3:** Multiply the denominators. **Step 4:** Check whether your answer can be simplified and/or converted into a mixed number. **Steps to Success - Dividing fractions**	

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
		Convert – change a value from one form to another **Reciprocal –** The reciprocal of a number is 1 divided by the number		**Step 1:** Convert any mixed numbers into improper fractions and/or write any integers as a fraction over 1 **Step 2:** Keep the first fraction the same, change the divide into a multiply and find the reciprocal of the second fraction. **Step 3:** Multiply the numerators. **Step 4:** Multiply the denominators. **Step 5:** Check whether your answer can be simplified and/or converted into a mixed number.	
To learn how to convert between recurring decimals and fractions.	• Students will know how to write out recurring decimals. E.g. $0.\dot{4}\dot{5} = 0.4545454\ldots$ • Students will know how to convert recurring decimals to fractions using the algebraic method. • Students will know how to carry out calculations involving recurring decimals by converting the decimals to fractions and then carrying out the calculation.	**Recurring -** occurring again periodically or repeatedly	• Students need to know how to convert fractions to recurring decimals using division.	<u>Steps to Success – Recurring decimals to fractions</u> **Step 1:** Write out the recurring decimal and put this equal to x. Remember to show the recurring dots on the end of the number or put three dots at the end. **Step 2:** Determine what power of 10 you need to multiply the equation by: • If there is one recurring number, then multiply by 10. • If there are two recurring numbers, then multiply by 100. • IF there are three recurring numbers, then multiply by 1000. **Step 3:** Multiply both sides of the equation by this power of 10. Check that your decimals are lined up with the equation of x. **Step 4:** Subtract your x equation from the equation you have just created. You should end up with a simple equation as your recurring decimals should disappear. **Step 5:** Rearrange the equation to make x the subject. **Step 6:** If necessary, multiply the numerator and denominator by a power of 10 to get rid of any decimals. **Step 7:** Simplify the fraction if the question asks you to. ***All working out must be shown***	
To learn how to calculate percentage change.	• Students will know how to calculate the value of a profit or loss and use it to determine percentage profit or loss. • Students will know that $percentage\ profit = \frac{profit}{expense} \times 100$ • Students will know that $percentage\ loss = \frac{loss}{expense} \times 100$ • Students will know how to calculate percentage change with and without a calculator. •Students will know how to solve real-life problems involving percentage change.	**Profit –** a financial gain, the difference between the amount earned and the amount spent in buying, operating or producing something **Expense –** the cost incurred in or required for something	• Students need to know how express one number as a percentage of another.	<u>Steps to Success- Percentage Change</u> Both profit and loss can follow the same formula: **Step 1:** Identify the change by subtracting the smaller amount from the greater amount. **Step 2:** Identify the original cost or expense. **Step 3:** Substitute into the following formula: $$Percentage\ change = \frac{change}{original\ cost\ or\ expense} \times 100$$	
To learn how to solve problems involving reverse percentages.	• Students will know how to find the original amount given the final amount after a percentage increase or decrease (reverse percentages). • Students will know how to find the original amount using reverse percentages with and without a calculator. • Students will know how to recognise when they need to use reverse percentages. •Students will know how to solve real-life problems using reverse percentages including VAT.	**VAT – Value Added Tax** – a tax that is applied to the purchase price of certain goods, services and other taxable supplies that are bought and sold within the UK. Standard VAT is 20%.	• Students need to know how to solve basic direct proportion problems.	<u>Steps to Success - Reverse percentages</u> **Step 1:** There are 3 types of reverse percentage questions. Firstly, identify whether is an increased percentage, a decreased percentage or the same percentage. **Step 2:** • If the original amount has been reduced by a percentage subtract the percentage from 100%. • If the original amount has been increased by a percentage add the percentage to 100%. • If the original amount is equal to the percentage change then go to step 3. **Step 3:** Write this percentage equal to the new amount given in the question. **Step 4:** Divide to find 1%. **Step 5:** Multiply the answer by 100 to find 100%.	

Lesson	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
				Step 6: Check that the answer looks right. You can also check by calculating the increase/decrease with your answer.	
To learn how to solve problems involving compound interest and depreciation.	• Students will know how to calculate the compound interest of an amount. • Students will know how to calculate the compound depreciation of an amount. • Students will know how to calculate compound interest or depreciation of an amount using a calculator. • Students will know how to solve a problem involving compound interest or depreciation. • Students will know how to calculate the number of years needed to find a certain total value or interest. • Students will know how to set up a compound interest or depreciation equation to find an unknown percentage.	**Interest -** a fee paid for borrowing money or an amount earned by saving money in a bank account that pays it **Compound Interest –** the interest on a loan or deposit that accrues on both the initial value and the accumulated interest from previous periods. **Depreciation –** a decrease in the value **Accumulated –** built up over time **Accrued –** received **Initial –** starting/original amount	• Students need to know how to find the percentage increase and decrease of an amount using a multiplier.	**Steps to Success – Compound interest** **Step 1:** Add the percentage to 100% and divide by 100 to find the multiplier. **Step 2:** Calculate the compound interest by filling in the calculation: $Original\ amount \times multiplier^n$ Where n is the number of years the money is invested for **Steps to Success – Compound depreciation** **Step 1:** Subtract the percentage from 100% to find the percentage multiplier. **Step 2:** Calculate the compound interest by filling in the calculation: $Original\ amount \times multiplier^n$ Where n is the period of time.	
Exam Preparation 1					