The Sutton Academy

Knowledge Rich Curriculum Plan

Year 11 Foundation – Number 1

Lesson Objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success:	Feedback
To learn how to calculate with negatives.	• Students will know how to add and subtract with negative numbers using a number line. E.g. $4 - 7$ or $-3 + 5$ • Students will know how to add and subtract with negative numbers using a number line. E.g. $4 - -7$ or $-3 + -5$ • Students will know how to solve real life problems involving adding and subtracting negative numbers. • Students will know how to multiply a positive number to a negative number. • Students will know how to multiply two negative numbers together. • Students will know how to divide when one number is positive and one is negative. • Students will know how to divide when both numbers are negative. • Students will know how to solve real life problems involving multiplying and dividing of negative numbers. • Students will know how to square and cube positive and negative integers. **Avoid using terminology such as 2 negatives make a positive.**	**Negative –** Less than zero	• Students need to know how to order negative and positive integers.		
To learn how to multiply integers.	• Students will know how to multiply 2-digit integers by a 2-digit integer using column multiplication. • Students will know how to multiply 3-digit integers by a 2-digit integer using column multiplication. **Opportunity for challenge:** • Students will know how to solve more complex multi-step and/or worded problems involving multiplication with integers • Students will know how to solve real life problems involving the multiplication of integers using the column method.	**Multiplication** – the process of calculating the product of two or more numbers **Integer –** a whole number **Place Value** – the value of a digit depending on its position within a number **Question students on the different words that are used to mean multiply.**	• Students need to know how to add using column addition.	**Steps to Success – Multiplying integers.** **Step 1:** To start, write the bigger number over the smaller one, making sure that the 1s are above each other, the 10s are above each other and so on. Keeping everything in the right column is very important. **Step 2:** Then, we want to multiply each **component** of the top number by the unit of the second number and write the results of the multiplications under the line. Make sure to carry over any digit that does not belong in that column. **Step 3:** Now, we do everything we just did but this time, multiply each component of the top number by the tens. The only **difference** is because for e.g. a 2 represents a 20, everything is shifted one space to the left and a zero is put in the 1s column. For the completed step, using same methods as before. **Step 4:** Finally, we add together the two sets of numbers and write the final answer underneath the second line.	
To learn how to multiply decimals.	• Students will know how to multiply decimals using the column method. **Opportunity for challenge:** • Students will know how to solve worded problems involving multiplication of decimals. • Students will know how to solve money problems involving multiplication of decimals.	**Decimal –** a number whose whole number part and the fractional part is separated by a decimal point	• Students need to know how to multiply and divide by 10, 100, 1000 etc. • Students need to know how to multiply integers using the column method.	**Steps to Success – Multiplying decimals.** **Step 1:** Multiply each number by powers of ten to transform it from a decimal to an integer. **Step 2:** Multiply the two integers using column multiplication. **Step 3:** Adjust your answer by dividing by the powers of 10 that you multiplied by at the start (for example if you multiplied one number by 10 and the other by 100 you would need to divide by 1000 (10 x 100).	
To learn how to divide integers.	• Students will know how to divide using short and long division. • Students will know how to use short division to produce a decimal answer – they will not express these answers using remainders.	**Divide** – the act or process of separating or sharing	• Students need to know how to divide an integer by another integer that is <10 using the bus stop method.	**Steps to Success – Dividing integers** Example: 288 ÷ 9 **Step 1:** Draw a rotated L-shape with the number we are dividing on the inside, and the number we're dividing by on the outside.	

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	• Students will know how to solve more complex multi-step and worded problems involving division. • Students will know how to solve real-life problems involving the division of integers.	Question students on the different words that are used to mean divide.		**Step 2:** From there, we ask how many times 9 goes into 2 and write the answer, zero, above the line, as before. Then, we write the remainder of this division, 2, in the gap just before the next digit of the dividend. **Step 3:** We ask how many times the divisor goes into the number formed by that remainder and the next digit, which here is 28. So, 9 goes into 28 three times with a remainder of 1, meaning we write a 3 above the line and a 1 in the gap before the third digit of the dividend. **Step 4:** This process is the same and repeats until we get to the end of the number. **Step 5:** If the divisor does not fit perfectly into the divided, you can either stop once you get to the end and take the final remainder to be the remainder of the whole division, or you can put in a decimal point and keep going until you are satisfied with how many decimal points you have.	
To learn how to divide decimals.	• Students will know how to divide a decimal by an integer using short and long division. • Students will know how to divide a decimal by a decimal using short and long division. • Students will know how to solve multi-step problems involving division of decimals. • Students will know how to solve worded problems involving the division of decimals.		• Students need to know how to multiply by powers of 10. • Students need to know how to use short division involving integers.	<u>Steps to Success - Dividing Decimals</u> **Step 1:** Write the question as a fraction. **Step 2:** Multiply both the numerator and denominator by an appropriate power of ten to eliminate the decimal in the denominator but keep the fraction equivalent to the original question. **Step 3:** Divide the numerator by the denominator using the bus stop method where necessary.	
To learn how to apply numerical index laws.	• Students will know how to use the basic index laws for multiplication, division and brackets with integer bases where the powers are both positive and/or negative. • Students will know how to simplify more complex multi-step numerical expressions using the index laws. • Students will know how to find the value of a calculation involving the index laws. • Students will know how to interpret the power of 0. • Students will know how to evaluate negative powers. They will know that a negative power means that you find the reciprocal.	**Index** – An index, or a power, is the small floating number that goes next to a number or letter **Reciprocal** – The reciprocal of a number is 1 divided by the number	• Students need to know how to find powers and roots.	<u>Steps to success – Index Laws</u> There are four index laws that we use to simplify expressions or write a number as a single power: • When the bases are the same and you're multiplying, add the indices. • When the bases are the same and you're dividing, subtract the indices. • When there are brackets, multiply the indices. • The **reciprocal** of a number is 1 divided by the number. For example, the reciprocal of 5 is $\frac{1}{5}$. To evaluate a negative power, first take the reciprocal, the index changes sign, then calculate it. • An additional rule is the power of 0; anything to the power of 0 equals 1.	

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To learn how to round to an appropriate degree of accuracy.	• Students will know how to round to a given number of decimal places. • Students will know how to round to a given number of significant figures • Students will know that nonzero digits are always significant • Students will know that zeros between nonzero digits are always significant • Students will know that leading zeros are never significant.	**Rounding –** making a number simpler but keeping its value close to what it was. The result is less accurate, but easier to use **Significant –** important **One significant figure** –the first non-zero digit which has the most value	• Students need to already know how to round to the nearest 10/100/1000 etc. • Students need to know how to round to the nearest whole number.	**Steps to Success - Rounding** **Step 1:** Identify which number you are rounding to. **Step 2:** Look at the number to the right of the one identified. If it is below 5, then we keep the identified digit the same. If it is 5 or more, then we round up the identified digit. **Step 3:** Round down by cutting off the values to the right. Round up by adding one to the identified value. **Step 4:** Check your answer – Does it have a similar value to the number you started with?	
To learn how to estimate	• Students will know how to estimate answers to simple calculations by rounding all of the numbers within a question to one significant figure. • Students will know how to estimate answers to more complex, multi-step calculations by rounding numbers within a question to one significant figure including where there is a decimal in the denominator • Students will know how to estimate roots.	**Estimate –** an approximate calculation of the value of something	• Students need to know how to round to 1 significant figure. • Students need to know how to divide by a decimal.	**Steps to Success - Estimation** **Step 1:** Round the values in the question to **1 significant figure.** **Step 2:** Use BIDMAS to calculate the answer making sure to show each step.	
To learn how to find error intervals.	• Students will know how to find the upper and lowers bounds of numbers given to varying degrees of accuracy. • Students will know how to use inequality notation to specify error intervals due to rounding. • Students will know how to use inequality notation to specify error intervals due to truncation.	**Upper bound** – an element greater than or equal to all the elements in a given set **Lower bound** – an element less than or equal to all the elements in a given set **Error interval** – an expression written using inequalities that shows the range of possible values that a number could have been before it was rounded or truncated. **Inequality –** a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. >, <, ≥ and ≤ **Truncated –** cut off Split the vocabulary up between sections of the lesson.	• Students need to know how to round to different degrees of accuracy.	**Steps to Success – Finding Upper and Lower Bounds** **Step 1:** List the values with the same degree of accuracy that would come before and after the number that has been rounded with the number in the question in the middle. **Step 2:** Find the midpoint of the lowest value and the value that has been rounded – this is the lower bound. **Step 3:** Find the midpoint of the highest value and the value that has been rounded – this is the upper bound.	
Exam Preparation 1					