The Sutton Academy

# Knowledge Rich Curriculum Plan

Year 9 Core – Place Value, Calculations, Powers and Roots

| Lesson objective | Intended Knowledge: | Tiered Vocabulary | Prior Knowledge: | Steps to Success | Feedback |
|---|---|---|---|---|---|
| **To learn how to compare and order numbers.** | • Students will know that to order decimals we must compare each digit within the number individually, starting with the highest value digit.<br>• Students should already know how to order positive and negative integers.<br>• Students will know how to solve real life problems that involve comparing positive and negative integers.<br>• Students will know how to use the symbols <, >, =, ≠ to compare small and large integer numbers.<br>• Students will know how to use the symbols <, >, =, ≠ to compare positive and negative numbers.<br>• Students will know how to use the symbols <, >, =, ≠ to compare decimals.<br>• Students will know how to compare a mixture of negative numbers and decimals. | | • Students should already know how to order positive integers.<br>• Students need to know how to identify the value of a digit within a number. | **Steps to Success – Ordering Numbers**<br>**Step 1:** Identify the first digit of each number and look at it's place value, the number with the greatest place value is biggest.<br>**Step 2:** If the place value is the same, look at the size of the digit, If the digit is larger, then the number is larger.<br>**Step 3:** If the value of the digits is the same, you go to the next digit to the right and compare the size of those digits.<br>**Step 4:** Repeat until you have ordered all of the numbers | |
| **To learn how to multiply decimals.** | • Students will know how to multiply decimals by integers.<br>• Students will know how to multiply decimals by decimals.<br>• Students will know how to solve multi-step problems involving multiplication of decimals. | **Integer –** a whole number<br>**Decimal –** a number whose whole number is separated by a decimal point<br><br>Use a spider diagram to show different words which mean to multiply. E.g. product | • Students need to know how to multiply and divide by powers of 10.<br>• Students need to know how to multiply 2-digit and 3-digit integers by a 2-digit integer using column multiplication.<br><br>• ***IF STUDENTS STRUGGLE THIS IS WHERE THE PRIOR KNOWLEDGE CONSOLIDATION SLIDE IS ESSENTIAL!*** | **Step 1:** Multiply each number by powers of ten to transform it from a decimal to an integer<br>**Step 2:** Multiply the two integers using column multiplication<br>**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 with decimals.** | • Students will know how to divide a decimal by an integer using short division.<br>• Students will know how to divide a decimal.<br>• Students will know that they will not need to make any extra adjustments to their answer as its equivalent to the original divide.<br>• Students will know how to solve simple real-life problems involving the division of decimals. | | • Students need to know how to divide 2-digit and 3-digit integers by a 1-digit integers using short division.<br>• Students need to know how to divide 2-digit and 3-digit integers by 2-digit integers using short division.<br>• Students need to know how to multiply by powers of 10.<br><br>• ***IF STUDENTS STRUGGLE THIS IS WHERE THE PRIOR KNOWLEDGE CONSOLIDATION SLIDE IS ESSENTIAL!*** | **Step 1:** Write the question as a fraction.<br>**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.<br>**Step 3:** Divide the numerator by the denominator using the bus stop method where necessary. | |

| Lesson objective | Intended Knowledge: | Tiered Vocabulary | Prior Knowledge: | Steps to Success | Feedback |
|---|---|---|---|---|---|
| **To learn how to calculate with negative numbers.** | • Students will know how to add and subtract with negative numbers using a number line. E.g. $4-7$ or $-3+5$<br>• Students will know how to add and subtract with negative numbers using a number line. E.g. $4--7$ or $-3+-5$<br>• Students will know how to multiply a positive number to a negative number.<br>• Students will know how to multiply two negative numbers together.<br>• Students will know how to divide when one number is positive and one is negative.<br>• Students will know how to divide when both numbers are negative.<br>• Students will know how to solve real life problems involving adding, subtracting, multiplying and dividing of negative numbers.<br>Avoid using terminology such as 2 negatives make a positive. Make sure students understand why. | Negative – less than zero | • Students need to know how to order positive and negative numbers.<br>• Students need to know how to add, subtract, multiply and divide positive integers. | <u>Adding and Subtracting Numbers</u><br>Think of positive numbers as **hot** and negative numbers as **cold**.<br>**Adding a negative number** is like adding cold air to a room — it makes the room colder. So, the number goes **down**.<br>**Subtracting a negative number** is like removing cold air from a room — it makes the room warmer. So, the number goes **up**. | |
| **To learn how to use numerical index laws.** | • Students will know how to use the basic index law for multiplication with an integer base.<br>• Students will know how to use the basic index law for division with an integer base.<br>• Students will know how to use the basic index law for brackets with an integer base.<br>• Students will know how to interpret the power of 0.<br>• Students will know how to use the basic index laws involving negative powers.<br>**Opportunity for challenge:**<br>• Students will know how to use a mixture of the index laws within the same problem.<br>Show students how it works rather than just using tricks. | Indices – (Plural of index) or powers, are the small floating number that goes next to a number or letter | • Students should already know how to find powers and roots of integer numbers. | When we **multiply** numbers or letters with powers we add the powers, but only when the base number or letter is the same!!!<br><br>When we **divide** numbers or letters with powers we subtract the powers, but only when the base number or letter is the same!!!<br><br>When there is a number inside a bracket with powers and another power on the outside, we **multiply** the powers<br><br><u>Negative Indices - Steps to Success</u><br>To find the value of any number raised to a negative power, find the answer if the power was positive and then find the **reciprocal** of your answer, algebraically this can be written as:<br>$a^{-b}=\frac{1}{a^b}$ | |

| Lesson objective | Intended Knowledge: | Tiered Vocabulary | Prior Knowledge: | Steps to Success | Feedback |
|---|---|---|---|---|---|
| **To learn how to use the order of operations.** | • Students will know that division and multiplication are interchange operations.<br>• Students will know that when a calculation has only addition and subtract involved that they must calculate from left to right.<br>• Students will know how to apply the order of operations to complete simple calculations using BIDMAS. E.g. $3 + 10 \div 5$ or $4 \times (2 + 3)$<br>• Students will know how to apply the order of operations to calculations involving indices. E.g. $5 + 4^2 \div 8$<br>• Students will know how to apply the order of operations to calculations involving several steps. E.g. $(6 + 5) \times 4^2 \div 8$<br>• Students will know how to place brackets in a calculation to obtain a certain answer.<br>**Opportunity for challenge:**<br>• Students will know how to solve BIDMAS problems involving negative numbers.<br>They will not think that division comes before multiplication or addition comes before subtraction. | | • Students need to know how to calculate powers and roots of integer numbers. | **BIDMAS – Steps to Success**<br>**Step 1:** Prioritise any calculation involving brackets.<br>**Step 2:** Next we prioritise any calculation involving indices.<br>**Step 3:** Then Prioritise any calculation involving multiplication; and division (You MUST answer these going left to right.)<br>**Step 4:** Finally, prioritise any calculation involving addition and subtraction (You MUST answer these going left to right.) | |
| Mini-Assessment 1 | | | | | |