The Sutton Academy

Knowledge Rich Curriculum Plan

Year 7 Core – Powers, Root and Calculations

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to calculate powers and roots.	• Students will know how to use integer powers of 2, 3, 4, 5. • Students will know how to calculate with an integer power of 2. (Square numbers) • Students will know how to calculate with an integer power of 3 (Cube Numbers) • Students will know how to calculate square roots of numbers. • Students will know how to calculate cube roots of numbers. • Students will know the difference between the symbol of a square root and cube root. • Students will know that powers and their subsequent roots are inverse operations of one another. **Opportunity for challenge:** • Students will know how to find the value of a negative number raised to an integer power. • Students will understand why we can only find certain square roots for negative numbers.	**Index** – An index, or a power, is the small floating number that goes next to a number or letter **Square** – When you are asked to square a number you are being asked to multiply it by itself **Square numbers** – The result when you multiply a number by itself **Cube** – When you are asked to cube a number you are being asked to multiply it by itself three times! **Cube Numbers** – The result when you cube a number **Square Root** - This is the number that is multiplied by itself to get a square number! **(Please print these – DO NOT MAKE STUDENTS WRITE THEM OUT)**	• Students need to know how to find a square number. • Students need to know how to multiply integers.		
To learn how to use the order of operations.	• Students will know that division and multiplication are interchange operations. • Students will know that when a calculation has only addition and subtract involved that they must calculate from left to right. • Students will know how to apply the order of operations to complete simple calculations using BIDMAS. E.g. $3 + 10 \div 5$ or $4 \times (2 + 3)$ • Students will know how to apply the order of operations to calculations involving indices. E.g. $5 + 4^2 \div 8$ They will not think that division comes before multiplication or addition comes before subtraction.	**Index (plural indices)** – An index, or a power, is the small floating number that goes next to a number or letter	• Students need to know how to calculate powers of integer numbers. • Students need to know how to add, subtract, multiply and divide integers.	**Steps to Success - BIDMAS** **Step 1:** Prioritise any calculation involving brackets. **Step 2:** Next we prioritise any calculation involving indices. **Step 3:** Then Prioritise any calculation involving multiplication; and division. **Step 4:** Finally, prioritise any calculation involving addition and subtraction (You MUST answer these going left to right.)	
To learn how to round to the nearest 10, 100, 1000 and to a given number of decimal places.	• Students will know how to round to the nearest 10, 100, 1000. • Students will know how to round to the nearest whole number. • Students will know how to round to a given number of decimal places • Students will know to identify the number they are rounding to, look at the number to the right of it and decide whether to round up or down.	**Rounding –** making a number simpler but keeping its value close to what it was. The result is less accurate, but easier to use	• Students need to know how to identify the place value of a digit within a number.	**Steps to Success – Rounding** **Step 1:** Identify the correct column **Step 2:** Look at the digit after the column, If it is **below 5**, then we keep the cut-off digit the same. If it is **5 or more**, then we round up the cut-off digit.	

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	• Students will know to round up if the digit to the right is 5-9. • Students will know to round down if the digit to the right is 0-4. • Students will know that to round up they must add one to the number they are rounding to. • Students will know that to round down they must not subtract one from the number they are rounding to. • Students will know that their rounded value will be similar to their original value – they can use this to check answers.				
To learn how to round to a given number of significant figures.	• Students will know how to round integers to one significant figure. • Students will know how to round integers to two significant figures. • Students will know that their rounded value will be similar to their original value – they can use this to check answers. **Opportunity for challenge:** • Students will know how to round decimals to one significant figure. • Students will know how to round decimals to two significant figures.	**Significant –** important **One significant figure** –the first non-zero digit which has the most value	• Students need to know how to identify the place value of a digit within a number. • Students need to know how to round to the nearest 10, 100 and 1000.	**Steps to Success – Significant figures** **Step 1:** Determine the cut-off point. Draw a line after the desired number of significant figures. **Step 2:** Look at the first digit after the cut-off point. If it is below 5, then we keep the cut-off digit the same.If it is 5 or more, then we round up the cut-off digit. **Step 3** Add any necessary 0's, delete any unnecessary 0's.	
To learn how to estimate.	• Students will know that to estimate a calculation they must first round each number to one significant figure and then use the order of operations to calculate. • Students will know how to estimate the solution to a simple calculation. E.g. 483×52 **Opportunity for challenge:** • Students will know how to estimate calculations involving fractions when the denominator rounds to an integer.	**Estimate –** an approximate calculation of the value of something	• Students need to know how to round to one significant figure. • Students need to know how to carry out calculations using the order of operations.	**Steps to Success - Estimating** **Step 1:** Round the values in the question to 1 significant figure **Step 2:** Put the rounded numbers into the equation **Step 3:** Calculate the answer	
To learn how to use a calculator.	• Students will know that a calculator uses the order of operations. • Students will know how to input fractions into the calculator. • Students will know how to convert fractions to decimals using the standard to decimal button. • Students will know how to calculate numbers with powers. • Students will know how to calculate the roots of numbers. • Students will know how to use a calculator to solve more complex problems involving a mixture of fractions, powers and root. • Students will know how to write the values from the calculator display.		• Students need to know how to use calculator to solve simple calculations with all 4 operations.		

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	Opportunity for challenge: • Students will know how to rounded their answers to a given degree of accuracy.				
To learn how to find the highest common factor of two numbers.	• Students will know how to list all the factors of a number systematically, starting with 1 and itself. • Students will know how to select the correct number from a list of numbers when given descriptions of a number such as 'a factor of ', 'an even factor of', etc. • Students will know how to find the highest common factor (HCF) of two numbers by listing. **Opportunity for challenge:** • Students will know how to find the HCF of three numbers.	Common – shared Factor – A factor is a number that divides into a given number without leaving a remainder Highest Common Factor – the largest number that both or all of the numbers can be divided by.	• Students need to know how to divide integers.	**Steps to Success HCF from lists** **Step 1:** List the factors of both the numbers **Step 2:** Identify the largest number they both have in common, this is the Highest common factor	
To learn how to find the lowest common multiple of two numbers.	• Students will know how to list multiples of a numbers, starting with the number itself. • Students will know how to select the correct number from a list of numbers when given descriptions of a number such as 'a multiple of', 'an odd multiple of', etc. • Students will know how to find the lowest common multiple (LCM) of two numbers by listing. **Opportunity for challenge:** • Students will know how to find the LCM of three numbers.	Multiple – A multiple is a number in the given number's multiplication tables Lowest Common Multiple – the smallest number that is in both numbers' times tables	• Students need to know how to multiply integers or to add repeatedly.	**Steps to Success LCM from lists** **Step 1:** List the first 5-10 multiples of both numbers in the question **Step 2:** Identify the first multiple that is in both multiplication tables, this is the Lowest Common Multiple	
To learn how to find the product of prime factors.	• Students will recognise and recall the first 10 prime numbers. • Students will know how to identify prime numbers from a list by eliminating values known to be non-prime e.g. even numbers (apart from 2) or multiples of 5. • Students will know how to find the product of prime factors for positive integers. • Students will know that the product of prime factors is unique for every number. • Students will know that to check the product of prime factors they multiply their prime factors together and they should get the original number. • Students will know that it doesn't matter which way you break the number down into prime factors the result should be the same. **Opportunity for challenge:** • Students will know how to find the product of prime factors giving their answer in index form.	Prime Number – a number that has exactly 2 factors - 1 and the number itself. Product – in maths, a product is the result of multiplication Product of Primes – a product in which every factor is a prime number	• Students need to know how to divide integers. • Students need to know how to write numbers in index form	**Steps for Success Finding the Product of Prime Factors** **Step 1:** To construct a factor tree, think of 2 numbers which multiply together to make the integer in the question. **Step 2:** Draw two branches coming down from the integer, and at the end of the branches write the two factors that you chose. **Step 3:** If a factor is prime, then circle it. If a factor is not prime, then repeat the process until each number at the end of the branch is prime **Step 4:** Write the prime factors as a calculation, We write this prime factorisation in **index form**, where if there is more than one of the same factor	
Mini-Assessment 2					

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