



The Sutton Academy

Knowledge Rich Curriculum Plan

Year 8 Support – 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					

