The Sutton Academy

Knowledge Rich Curriculum Plan

Year 8 Core – Powers and Roots.

Lesson/Learning Sequence	Intended Knowledge: *Students will know that…*	Tiered Vocabulary	Prior Knowledge: *In order to know this, students need to already know that…*	Assessment
To learn how to use numerical index laws.	• Students will know how to use the basic index law for multiplication with an integer base. • Students will know how to use the basic index law for division with an integer base. • Students will know how to use the basic index law for brackets with an integer base. • Students will know how to interpret the power of 0. **Opportunity for challenge:** • Students will know how to use a mixture of the index laws within the same problem. Show students how it works rather than just using tricks.	**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	• Students should already know how to find powers and roots for integers	Mini-Assessment 2
To learn how to use the order of operations.	• Students will know how to know and identify different aspects of BIDMAS. • Students will know how to use BIDMAS to solve a calculation. • Students will know how to use BIDMAS to solve calculations involving indices. • Students will know how to use BIDMAS to solve calculations involving several steps. • 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. **Opportunity for challenge:** • Students will know how to place brackets in a calculation to obtain a certain answer.	**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 and roots of integer numbers. • Students need to know how to add, subtract, multiply and divide integer numbers.	Mini-Assessment 2
To learn how to convert between standard form and ordinary numbers.	• Students will know that a number written in standard form is written as $a \times 10^n$, where $1 \leq a < 10$. • Students will know how to write large in the form $a \times 10^n$, where $1 \leq a < 10$. • Students will know how to write small numbers in the form $a \times 10^{-n}$, where $1 \leq a < 10$. • Students will know how to convert large numbers written in standard form back into ordinary numbers. • Students will know how to convert small number written in standard form back into ordinary numbers. **Opportunity for challenge:** • Students will know how to order numbers given in standard form by converting to them into ordinary numbers.	**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 $1 \leq a < 10$	• Students need to know how to multiply and divide by powers of 10. • Students need to know how to calculate numbers with integer powers.	Mini-Assessment 2
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. • Students will know how to round to the nearest 100. • Students will know how to round to the nearest 1000. • Students will know how to round to the nearest whole number. • Students will know how to round to one decimal place. • Students will know how to round to two 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. • 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.	**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.	Mini-Assessment 2

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	• 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 that significant figures are the digits in a number that contribute to the degree of accuracy of the value and that we start counting significant figures at the first non-zero digit – the digit with the most value. • Students will know that non-zero digits are always significant. • Students will know that zeros between non-zero digits are always significant. • Students will know that leading zeros are never significant. • Students will know how to round to one significant figure. • Students will know how to round 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.	**Significant –** sufficiently important to be worthy of attention **Significant figures** – the digits in a number that contribute to the degree of accuracy of the value and that we start counting significant figures at the first nonzero digit	• 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. • Students need to know how to round to the nearest decimal place. • Students need to know the basic rules of rounding up and down.	Mini-Assessment 2
To learn how to determine bounds and error intervals.	• Students will know how to find the upper and lowers bounds of numbers given to varying degrees of accuracy. • Students will know that the upper bound is rounded and they would actually everything up to but not including the upper bound. • Students will know how to use inequality notation to specify simple error intervals due to rounding. **Opportunity for challenge:** • Students will know how to use inequality notation to specify simple 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 ≤	• Students need to know how to round to varying degrees of accuracy. • Students need to know how to use inequality notation.	Mini-Assessment 2
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 calculations involving fractions when the denominator rounds to an integer. • Students will know how to estimate calculations involving fractions when the denominator rounds to 0.5.	**Estimate –** an approximate calculation or judgement of the value, number, quantity, or extent of something.	• Students will need to know how to round to one significant figure. • Students will need to know how to carry out calculations using the order of operations. • Students will need to know how to divide integers by decimals.	Mini-Assessment 2

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To learn how to use a calculator.	• Students will know how to use a calculator to solve calculations with all 4 operations. • 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 will know how to rounded their answers to a given degree of accuracy. • Students will know how to convert in and out of standard form using a calculator.		• Students need to know how to round to a given degree of accuracy. • Students need to know how to convert between standard form and ordinary numbers.	Mini-Assessment 2
To learn how to the highest common factor of two numbers.	• Students will know that a factor is a number that divides another number, leaving no remainder. • 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 that the highest common factor of two numbers refers to the highest numbers that both numbers are divisible by. • Students will know how to find the highest common factor (HCF) of two numbers by listing.	**Common –** shared by, coming from, or done by two or more people, groups, or things. **Prime Number** – In maths, prime numbers are whole numbers greater than 1, that have only two factors: 1 and the number itself. **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 multiply and divide integers. • Students will know the difference between odd and even numbers.	Mini-Assessment 2
To learn how to lowest common multiple of two numbers.	• Students will know that a multiple is the product of a number and an integer. • 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 that the lowest common multiple is the lowest product of each number with an integer. • Students will know how to find the lowest common multiple (LCM) of two numbers by listing. **Opportunity for challenge:** • Students will know how to solve a real-life LCM problem.	**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 multiply and divide integers. • Students will know the difference between odd and even numbers.	Mini-Assessment 2
To learn how to find the product of prime factors.	• Students will know that a prime number has exactly two factors – 1 and itself. • 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 eg even numbers (apart from 2) or multiples of 5. • Students will know how to find the product of prime factors of positive integers. • Students will know how to find the product of prime factors giving their answer in index form. • 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.	**Prime Number** – In maths, prime numbers are whole numbers greater than 1, that have only two 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 multiply and divide integers. • Students need to know how to express numbers in index form.	Mini-Assessment 2

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	• Students will know that it doesn't matter which way you break the number down into prime factors the result should be the same.			
To learn how to find the HCF and LCM of two numbers using Venn diagrams.	• Students will know how to find the highest common factor of two numbers by using the product of prime factors and a Venn diagram. • Students will know that to find the highest common factor from a Venn diagram they must find the product of the numbers contained within the overlap. • Students will know that if there is a single integer contained within the overlap of a Venn diagram then that number is the highest common factor of the two numbers. • Students will know that if there are no numbers contained within the overlap then the highest common factor of the two numbers is 1. • Students will know how to find the lowest common multiple of two numbers by using the product of prime factors and a Venn diagram. • Students will know that to find the lowest common multiple from a Venn diagram the must find the product of all the numbers contained within the whole Venn diagram. **Opportunity for challenge:** • Students will know how to find the HCF and LCM of three numbers using a Venn diagram.	**Common –** shared by, coming from, or done by two or more people, groups, or things. **Highest Common Factor** – the largest number that both or all of the numbers can be divided by **Lowest Common Multiple** – the smallest number that is in both numbers' times tables **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 to find the HCF and LCM using lists. • Students need to know how to find the product of prime factors. • Students need to know how to use a Venn diagram.	Mini-Assessment 2