**Knowledge Rich Curriculum Plan**

Year 10 Higher – Number 1



| **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**  |
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| **To learn how to calculate with negative numbers** | * Students will know how to add and subtract with negative numbers using a number line.
* 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 negative numbers.
* **Avoid using terminology such as 2 negatives make a positive.**
 | **Negative –** Less than zero**Integer –** a whole number | * Students need to know how to order positive and negative numbers.
* Students need to know how to add and subtract positive integers.
* Students need to know how to multiply and divide positive integers.
 | Exam Prep 1 |
| **To learn how to multiply and divide decimals** | * Students will know how to multiply decimals by firstly multiplying the decimals by a power of 10 to produce integer values.
* Students will know how to multiply their new integer values using the column method.
* Students will know how to lastly divide by the same powers of 10 as used in their first step to produce their decimal product.
* Students will know how to solve real life problem involving the multiplication of decimals using the column method- money problems.
* Students will know how to solve multi-step problems involving multiplication of decimals.
* Students will know how to divide a decimal by an integer using short division.
* Students will know how to divide a decimal by an integer using long division.
* Students will know how to divide a decimal by a decimal by firstly multiplying both numbers by a matching power of 10.
* Students will know that the power of 10 needs to at least make that the decimal you are dividing by an integer value.
* Students will know how to divide their resulting values to produce an overall answer to the problem without needing to make any extra adjustments.
* Students will know how to solve multi-step problems involving division 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 powers of 10.
* Students need to know how to multiply integers using column multiplication.
* Students need to know how to divide integers using short division.
 | Exam Prep 1 |
| **To learn how to round to an appropriate degree of accuracy and estimate** | * Students will know how to round to significant figures.
* Students will know how to estimate answers to more calculations by rounding numbers within a question to one significant figure, including where there is a decimal in the denominator
 | **Estimate -** roughly calculate or judge the value, number, quantity, or extent o | * Students should already know how to round to the nearest 10/100/1000 etc. and to decimal places
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| **To learn how to use the index laws** | * Students will know how to use the basic index laws for multiplication, division and brackets with integer base
* Students will know how to interpret the power of 0
 | **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 itselfSquare 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**Index Form** – A way of writing a long calculation more quickly using powers**Square Root** - This is the number that is multiplied by itself to get a square number!**Cube Root** - This is the number that is multiplied by itself three times to get a cube number! | * Students will need to have knowledge of using the four operations with whole numbers.
* Students will need to be able to use negative numbers with the four operations, recall and use the hierarchy of operations and understand inverse operations.
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| **To learn how to interpret fractional and negative indices.**  | * Students will know how to evaluate negative powers
* Students will know how to evaluate fractional powers where the power is a unit fraction (e.g. 1/2, 1/3)
* Students will know how to evaluate more difficult fractional powers where the power is a non-unit fraction (e.g. 2/3)
 | **Indices –** plural of index, in maths, an index, or a power, is the small floating number that goes next to a number or letter | * Students will need to know how to use the basic index laws for multiplication, division and brackets with integer base
* Students will need to be able to calculate with negative numbers
* Students will need to know how to evaluate roots and powers
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| **To learn how to find the Highest Common Factor (HCF) and Lowest Common Multiple (LCM)** | * Students will know how to find the prime factor decomposition of positive integers and write as a product using index notation. They will also understand that the prime decomposition is unique for every number.
* Students will know that the prime factor decomposition of a positive integer is unique – whichever factor pair you start with – and that every number can be written as a product of two factors.
* Students will know how to find the lowest common multiple (LCM) and highest common factor (HCF) of two numbers from their prime factorisation using a Venn diagram
 | **Prime** – 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**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**Venn Diagram** - a diagram representing mathematical or logical sets as circles within an enclosing rectangle (the universal set), common elements of the sets being represented by intersections of the circles. **Intersection** – A point, area or line that is common to two or more things. For a Venn diagram the intersection is the overlap between the two circles | * Students will need to be able to identify prime numbers from a list of numbers.
* Students will need to be able to identify factor pairs, including those containing prime numbers.
* Students will need to know and recognising Highest common factors and lowest common multiples
* Students will need to know how to draw and complete Venn diagrams.
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| **To learn how to calculate HCF and LCM including problem solving** | * Students will know how to solve more complex problems using HCF, LCM and prime numbers including problems involving real life contexts
 |  | * Students will need to be able to identify prime numbers from a list of numbers.
* Students will need to be able to identify factor pairs, including those containing prime numbers.
* Students will need to know and recognising Highest common factors and lowest common multiples
* Students will need to know how to calculate with time.
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| **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 x 10^n where 1 ≤ a < 10
* Students will know how to write large and small numbers in standard form in the form a x 10^n where 1≤ a <10
* Students will know how to convert numbers from being written in standard form back into ordinary numbers
* Students will know when a number is/isn't written in standard form because either a > 10 or a ≤ 0
* Students will know how to adjust a number written in the form a x 10^n where a > 10 or a ≤ 0 so that it is written in standard form (in the form a x 10^n where 1 ≤ a < 10)
* Students will know how to compare numbers written in standard form and how the x10^n affects the size of one number compared with another
 | **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 10n where 1 ≤ a < 10 | * Students will need to be able to multiply and divide by powers of 10
* Students will need to understand place value
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| **To learn how to calculate with numbers written in standard form** | * Students will know and understand that the quickest way to multiply numbers written in standard form we multiply together the 'a' in both number, multiply the 10^n and then combine the two answers
* Students will know and understand that the quickest way to divide numbers written in standard form is to divide the 'a' in both number, divide the 10^n and then combine the two answers
* Students will know that to add and subtract numbers written in standard form they must convert them into ordinary numbers first, add or subtract the numbers and then convert the answer back into standard form (where necessary)
* Students will know how to solve more complex problems with numbers written in standard form both with and without a calculator (as appropriate)
 |  | * Students will need to know how to convert from standard form to ordinary numbers and vice versa.
* Students will need to know basic index laws
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| **To learn how to solve problems involving numbers written in standard form** | * Students will know how to carry out basic calculations with numbers written in standard form using a calculator and interpret a calculator display where answers are given in standard form or as ordinary numbers that need converting to standard form
* Students will know how to solve more complex problems with numbers written in standard form both with and without a calculator (as appropriate)
 |  | * Students will need to know how to convert from standard form to ordinary numbers and vice versa.
* Students will need to know how to use a calculator.
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| **To learn how to simplify and multiply and divide surds** | * Students will know how to simplify surds by breaking it down into two factors, one of which is a square number
* Students will know how to multiply and divide surds
* Students will know that √ab = √a x √b and use it to simplify surd expressions. They will know that to do this they need to find a factor pair where one of the factors is a square number (e.g. √12 = √(4 × 3) = √4 × √3 = 2√3)
* Students will know that √a ÷ √b = √(a÷b)
* Students will know that (√a)² = a
 | **Surd –** a square root which cannot be reduced to a whole number. Surds are irrational numbers.**Irrational Numbers** – Numbers which, when written in decimal form, would go on forever. | * Students will need to know their square numbers and the corresponding roots
 | Exam Prep 1 |
| **To learn how to add and subtract surds** | * Students will know that to add and subtract surds we use similar rules to collecting like terms and that therefore √a + √a = 2√a etc.
* Students will know that to add and subtract surds, the number under the square root has to be the same. They will know that to add and subtract surds they may have to simplify first in order to achieve the same surd.
 |  | * Students will need to know how to simplify surds
* Students will need to know their powers and roots.
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| **To learn how to expand brackets with surds** | * Students will know how to expand single brackets with surds, including where simplification of surds is required
* Students will know how to expand and simplify double brackets with surds including where resulting surds need simplifying. They will know how to do this where the numerator is an integer, single surd or an expression involving surds and/or integers
 | **Expand –** open up or make bigger, in maths, expanding a bracket means we need to multiply each term in the bracket by the expression outside the bracket | * Students will need to know how to simplify surds
* Students will need to know how to expand single brackets with algebra
* Students will need to know how to expand double brackets with algebra
 | Exam Prep 1 |