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**Knowledge Rich Curriculum Plan**

Year 11 Foundation+ Calculations



| **Lesson Objective** | **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 negatives** | * Students will know how to add and subtract positive integers to/from a positive or negative integer * Students will know how to add and subtract negative integers to/from a positive or negative integer * Students will know how to multiply positive and negative integers * Students will know how to divide positive and negative integers * Students will know how to square and cube positive and negative integers * Students will know how to solve real life problems involving calculating with negatives |  | * Students need to know how to order negative and positive integers | Exam Prep 1 |
| **To learn how to multiply decimals** | * Students will know how to multiply decimals. They will know that to do this they need to multiply the decimals by powers of ten to achieve integers which they can then multiply more easily using column multiplication. They will know that they then divide by an appropriate power of 10 at the end to achieve the accurate answer. * Students will know how to solve worded problems involving multiplication of decimals |  | * Students will know how to multiply and divide by 10, 100, 1000 etc. * Students need to know how to multiply integers using the column method. | Exam Prep 1 |
| **To learn how to divide using short and long division** | * Students will know how to divide integers by integers using short division including where the answer is a decimal (they will not use remainders) * Students will know how to divide integers by integers using long division * Students will know how to solve more complex multi-step and/or worded problems involving division |  | * Students should already know how to divide an integer by another integer that is <10 using the bus stop method | Exam Prep 1 |
| **To learn how to divide decimals** | * Students will know how to divide a decimal by an integer * Students will know how to divide a decimal by a decimal. They will know that the easiest way to do this is to write the calculation as a fraction and eliminate the decimal from the denominator by multiplying the numerator and denominator by an appropriate power of 10 before then carrying out the calculation * Students will know how to solve worded problems involving the division of decimals |  | * Students will need to know how to multiply and divide by powers of 10. * Students will need to know how to write equivalent fractions | Exam Prep 1 |
| **To learn how to apply the index laws** | * Students will know how to use the basic index laws for multiplication, division and brackets with integer bases * Students will know how to find the value of a calculation involving the index laws * Students will know how to interpret the power of 0 * Students will know how to evaluate negative powers. They will know that a negative power means that you find the reciprocal. | **Index** **(plural indices)** – 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!  **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 know how to find powers and roots | Exam Prep 1 |
| **To learn how to estimate** | * Students will know how to estimate answers to simple calculations by rounding all of the numbers within a question to one significant figure. * Students will know how to estimate answers to more complex, multi-step calculations by rounding numbers within a question to one significant figure including where there is a decimal in the denominator * Students will know how to estimate roots. | **Estimate –** an approximate calculation or judgement of the value, number, quantity, or extent of something. | * Students will need to know how to round to a given number of significant figures * Students will need to know how to divide by simple decimals | Exam Prep 1 |
| **To learn how to use the order of operations to calculate accurately** | * Students will know how to apply the order of operations using BIDMAS * Students will know that BIDMAS tells us the order of operations. They will know that the Division and Multiplication are done in the order of the question and that Addition and Subtraction are done last, in the order that they appear in the question. **They will not think that division comes before multiplication or addition comes before subtraction.** | **Indices** – (Plural of index) or powers, are the small floating number that goes next to a number or letter | * Students will need to add, subtract, multiply and divide accurately * Students will need to have a good knowledge of their times tables * Students will need to know how to write down the value of a positive integer raised to an integer power * Students will need to know how to calculate real roots of numbers (square root, cube root etc.) | Exam Prep 1 |
| **To learn how to find the Highest Common Factor and Lowest Common Multiple for two or more numbers** | * Students will know what Highest common factor means and how to find the highest common factor (HCF) of two or more numbers by listing * Students will know what lowest common multiple means and how to find the lowest common multiple (LCM) of two or more numbers by listing * Students will know how to solve more complex problems involving HCF or LCM including problems involving real life contexts * 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 Number** – In maths, prime numbers are whole numbers greater than 1, that have only two factors: 1 and the number itself.  **Multiple –** A multiple is a number in the given number’s multiplication tables  **Factor –** A factor is a number that divides into a given number without leaving a remainder  **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 | * Students should already know what factors are and be able to list all factors of a number systematically * Students should already know what multiples are and be able to list multiples of a number systematically * Students should already know at least the first 10 prime numbers and be able to identify prime numbers from a list. | Exam Prep 1 |
| **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 10n where 1 ≤ a < 10 * Students will know how to write large and small numbers in standard form in the form a x 10n 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 10n where a > 10 or a ≤ 0 so that it is written in standard form (in the form a x 10n where 1 ≤ a < 10) * Students will know how to compare numbers written in standard form and how the x10n 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 need to be able to multiply and divide by powers of 10 | Exam Prep 1 |
| **To learn how to add, subtract, multiply and divide numbers written in standard form.** | * 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 know and understand that the quickest way to multiply numbers written in standard form we multiply together the 'a' in both number, multiply the 10n 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 10n and then combine the two answers |  | * Students will need to know how to convert from standard form to ordinary numbers and vice versa. * Students will need to know how to add and subtract integers and decimals. * Students will need to know the index laws for multiplication and division | Exam Prep 1 |