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| Year 9 | **Topic: Unit 1 – Number**  **Period:** Autumn 1 |
| **Overview of topic:**  Students will build on their knowledge from year 8 in dealing with numbers of various types – both through mental calculations and written calculations, and by using a calculator correctly.   * Integers and place value * Decimals * Indices, Powers and Roots * Factors, Multiples and Primes   Starting points and topics covered are dependant on prior knowledge and personalised to students’ needs and as a result not all students will study all of the objectives below. | |
| **Key** **knowledge:**   * Given 5 digits, what are the largest or smallest answers when subtracting a two-digit number from a three-digit number? * Given 5 digits, what is the largest even number, largest odd number, or largest or smallest answers when subtracting a two-digit number from a three-digit number? * Use inverse operations to justify answers, e.g. 9 x 23 = 207 so 207 ÷ 9 = 23. * Given 2.6 × 15.8 = 41.08 what is 26 × 0.158? What is 4108 ÷ 26? * Check answers by rounding to nearest 10, 100, or 1000 as appropriate, e.g. 29 × 31 ≈ 30 × 30 * Use mental methods for × and ÷, e.g. 5 × 0.6, 1.8 ÷ 3. * Solve a problem involving division by a decimal (up to 2 decimal places). * Given 2.6 × 15.8 = 41.08, what is 26 × 0.158? What is 4108 ÷ 26? * Calculate, e.g. 5.2 million + 4.3 million * What is the value of 23? * Prove that the square root of 45 lies between 6 and 7. * Evaluate (23 × 25) ÷ 24. * Evaluate , 40, 8−2/3 * Work out the value of 𝑛 in 40 = 5 × 2𝑛. * Given the digits 1, 2 and 3, find how many numbers can be made using all the digits. * Convince me that 8 is not prime. * Understand that every number can be written as a unique product of its prime factors. * Recall prime numbers up to 100. * Understand the meaning of prime factor. * Write a number as a product of its prime factors. * Use a Venn diagram to sort information. * Know how to test if a number up to 120 is prime. * Understand that every number can be written as a unique product of its prime factors. * Write 51080 in standard form. * Write 3.74 x 10−6 as an ordinary number. * Simplify √8. * Convert a ‘near miss’, or any number, into standard form; e.g. 23 × 107.   **Key vocabulary:**   |  |  | | --- | --- | | Tier 2 | Tier 3 | | * Number * Digit * Negative * Addition * Subtraction * Multiplication * Division * Remainder * Operation * Estimate * Power * Roots * Factor * Multiple * Primes * Square * Cube * Even * Odd * Rational * Irrational * Simplify | * Integer * Decimal * Surd * Standard Form | | **Key skills:**   * Use and order positive and negative numbers (integers) and decimals; use the symbols <, > and understand the ≠ symbol; * Add, subtract, multiply and divide positive and negative numbers (integers); * Add, subtract, multiply and divide decimals, whole numbers including any number between 0 and 1; * Recall all multiplication facts to 10 × 10, and use them to derive quickly the corresponding division facts; * Multiply or divide any number by powers of 10; * Use brackets and the hierarchy of operations (not including powers); * Round numbers to a given power of 10; * Round numbers to the nearest 10, 100, 1000, the nearest integer, to a given number of decimal places and to a given number of significant figures; * Put digits in the correct place in a decimal calculation and use one calculation to find the answer to another; * Check answers by rounding and using inverse operations. * Estimate answers to one- or two-step calculations, including use of rounding numbers and formal estimation to 1 significant figure: mainly whole numbers and then decimals * Use the product rule for counting (i.e. if there are 𝑚 ways of doing one task and for each of these, there are 𝑛 ways of doing another task, then the total number of ways the two tasks can be done is 𝑚 × 𝑛 ways); * Use decimal notation and place value; * Identify the value of digits in a decimal or whole number; * Compare and order decimal numbers using the symbols <, >; * Understand the ≠ symbol (not equal); * Write decimal numbers of millions, e.g. 2 300 000 = 2.3 million; * Add, subtract, multiply and divide decimals, including calculations involving money; * Multiply or divide by any number between 0 and 1; * Round to the nearest integer; * Round to a given number of decimal places and significant figures; * Estimate answers to calculations by rounding numbers to 1 significant figure; * Use one calculation to find the answer to another. * Find squares and cubes: * Recall integer squares up to 10 x 10 and the corresponding square roots; * Understand the difference between positive and negative square roots; * Recall the cubes of 1, 2, 3, 4, 5 and 10; * Use index notation for squares and cubes; * Recognise powers of 2, 3, 4, 5; * Evaluate expressions involving squares, cubes and roots: * Add, subtract, multiply and divide numbers in index form; * Cancel to simplify a calculation; * Use index notation for powers of 10, including negative powers; * Use the laws of indices to multiply and divide numbers written in index notation; * Find the value of calculations using indices including positive, fractional and negative indices; * Recall that 𝑛0 = 1 and 𝑛−1 = 1/𝑛 for positive integers 𝑛 as well as, 𝑛1/2 = √n and 𝑛1/3 = 3√n for any positive number 𝑛; * Understand that the inverse operation of raising a positive number to a power 𝑛 is raising the result of this operation to the power 1/𝑛; * Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractional and negative powers, and powers of a power; * Solve problems using index laws; * Use brackets and the hierarchy of operations with powers inside the brackets, or raising brackets to powers; * Use an extended range of calculator functions, including +, -, ×, ÷, 𝑥², √𝑥 , memory, 𝑥𝑦, 𝑥1/𝑦, brackets; * Use calculators for all calculations: positive and negative numbers, brackets, square, cube, powers and roots, and all four operations. * List all three-digit numbers that can be made from three given integers; * Recognise odd, even and prime (two digit) numbers; * Identify factors and multiples and list all factors and multiples of a number systematically; * Find the prime factor decomposition of positive integers and write as a product using index notation; * Find common factors and common multiples of two numbers; * Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors: include finding LCM and HCF given the prime factorisation of two numbers; * Understand 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; * Solve problems using HCF, LCM and prime numbers. * Identify prime numbers; * Understand 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 prime factors. * Convert large and small numbers into standard form and vice versa; * Add, subtract, multiply and divide numbers in standard form; * Interpret a calculator display using standard form and know how to enter numbers in standard form; * Understand surd notation, e.g. calculator gives answer to √8 as 2√2; * Simplify surd expressions involving squares (e.g. √12 = √(4×3) = √4 × √3 = 2√3). |
| **Co-curricular opportunities:** Number skills are a vital key skill across multiple other areas of study including Science, Geography, Technology, PE and many others | **Key reading skills taught and key texts:**  Clarify – identify key vocabulary in questions and be fluent in understanding the meanings  Question – from a worded question, what Maths is required to be done in order to get a solution?  **Wider Reading Opportunities/Links:** |
| **How can I use this information at home?**   * Conversation starters with your children to discuss their learning * Support your child in carrying out independent research around the topic * Visit your local library (or BorrowBox), museums, or other locations to explore the topic * Promote books/other texts that explore this topic (see reading section) * Help your child to learn the key vocabulary * Encourage practice and consolidation through completion of homework, TTRockStars and using other online learning platforms * Encourage them to practice their mathematical skills in a variety of everyday situations wherever the opportunity arises. | |