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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:**

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| 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).
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| **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 meaningsQuestion – 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.
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