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| **UNIT 1: Number, powers, decimals, HCF and LCM, roots and rounding** |

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**SPECIFICATION REFERENCES**

N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤,≥

N2 apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)

N3 recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals

N4 use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem

N5 apply systematic listing strategies

N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5

N7 calculate with roots and with integer and with integer indices

N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate

N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology

N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures);

**PRIOR KNOWLEDGE**

Students will have an appreciation of place value, and recognise even and odd numbers.

Students will have knowledge of using the four operations with whole numbers.

Students should have knowledge of integer complements to 10 and to 100.

Students should have knowledge of strategies for multiplying and dividing whole numbers by 2, 4, 5, and 10.

Students should be able to read and write decimals in figures and words.

**KEYWORDS**

Integer, number, digit, negative, decimal, addition, subtraction, multiplication, division, remainder, operation, estimate, power, roots, factor, multiple, primes, square, cube, even, odd

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| **1a. Integers and place value**  (N1, N2, N3, N4, N14, N15) | **Teaching time**  3-5 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* 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);
* 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;
* Check answers by rounding and using inverse operations.

**POSSIBLE SUCCESS CRITERIA**

Given 5 digits, what are the 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.

Check answers by rounding to nearest 10, 100, or 1000 as appropriate, e.g. 29 × 31 ≈ 30 × 30

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Missing digits in calculations involving the four operations

Questions such as: Phil states 3.44 × 10 = 34.4 and Chris states 3.44 × 10 = 34.40. Who is correct?

Show me another number with 3, 4, 5, 6, 7 digits that includes a 6 with the same value as the “6” in the following number 36, 754

**COMMON MISCONCEPTIONS**

Stress the importance of knowing the multiplication tables to aid fluency.

Students may write statements such as 150 – 210 = 60.

**NOTES**

Much of this unit will have been encountered by students in previous Key Stages, meaning that teaching time may focus on application or consolidation of prior learning.

Particular emphasis should be given to the importance of students presenting their work clearly.

Formal written methods of addition, subtraction and multiplication work from right to left, whilst formal division works from left to right.

Any correct method of multiplication will still gain full marks, for example, the grid method, the traditional method, Napier’s bones.

Negative numbers in real life can be modelled by interpreting scales on thermometers using   
F and C.

Encourage the exploration of different calculation methods.

Students should be able to write numbers in words and from words as a real-life skill.