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

[Return to Overview](#Overview)

**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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| **1b. Decimals**  (N1, N2, N3, N13, N14, N15) | **Teaching time**  2-4 hours |

**OBJECTIVES**

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

* 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.

**POSSIBLE SUCCESS CRITERIA**

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.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

Problems involving shopping for multiple items, such as: Rob purchases a magazine costing £2.10, a newspaper costing 82p and two bars of chocolate. He pays with a £10 note and gets £5.40 change. Work out the cost of one bar of chocolate.

When estimating, students should be able to justify whether the answer will be an overestimate or underestimate.

**COMMON MISCONCEPTIONS**

Significant figures and decimal place rounding are often confused.

Some students may think 35 877 = 36 to two significant figures.

**NOTES**

Practise long multiplication and division, use mental maths problems with decimals such as 0.1, 0.001.

Amounts of money should always be rounded to the nearest penny.