

Unifying strand

Elements	<i>Students should be able to:</i>
Building blocks	U.1 recall and demonstrate understanding of the fundamental concepts and procedures that underpin each strand
	U.2 apply the procedures associated with each strand accurately, effectively, and appropriately
	U.3 recognise that equality is a relationship in which two mathematical expressions have the same value
Representation	U.4 represent a mathematical situation in a variety of different ways, including: numerically, algebraically, graphically, physically, in words; and to interpret, analyse, and compare such representations
Connections	U.5 make connections within and between strands
	U.6 make connections between mathematics and the real world
Problem solving	U.7 make sense of a given problem, and if necessary mathematise a situation
	U.8 apply their knowledge and skills to solve a problem, including decomposing it into manageable parts and/or simplifying it using appropriate assumptions
	U.9 interpret their solution to a problem in terms of the original question
	U.10 evaluate different possible solutions to a problem, including evaluating the reasonableness of the solutions, and exploring possible improvements and/or limitations of the solutions (if any)
Generalisation and proof	U.11 generate general mathematical statements or conjectures based on specific instances
	U.12 generate and evaluate mathematical arguments and proofs
Communication	U.13 communicate mathematics effectively: justify their reasoning, interpret their results, explain their conclusions, and use the language and notation of mathematics to express mathematical ideas precisely

Number strand

Students should be able to:

- N.1 investigate the representation of numbers and arithmetic operations so that they can:
- represent the operations of addition, subtraction, multiplication, and division in \mathbb{N} , \mathbb{Z} , and \mathbb{Q} using models including the number line, decomposition, and accumulating groups of equal size
 - perform the operations of addition, subtraction, multiplication, and division and understand the relationship between these operations and the properties: commutative, associative and distributive in \mathbb{N} , \mathbb{Z} , and \mathbb{Q} **and in $\mathbb{R}\setminus\mathbb{Q}$, including operating on surds**
 - explore numbers written as a^b (in index form) so that they can:
 - flexibly translate between whole numbers and index representation of numbers
 - use and apply generalisations such as $a^p a^q = a^{p+q}$; $(a^p)/(a^q) = a^{p-q}$; $(a^p)^q = a^{pq}$; and $n^{1/2} = \sqrt{n}$, for $a \in \mathbb{Z}$, and $p, q, p-q, \sqrt{n} \in \mathbb{N}$ **and for $a, b, \sqrt{n} \in \mathbb{R}$, and $p, q \in \mathbb{Q}$**
 - use and apply generalisations such as $a^0 = 1$; $a^{p/q} = \sqrt[q]{a^p} = (\sqrt[q]{a})^p$; $a^{-r} = 1/(a^r)$; $(ab)^r = a^r b^r$; and $(a/b)^r = (a^r)/(b^r)$, for $a, b \in \mathbb{R}$; $p, q \in \mathbb{Z}$; and $r \in \mathbb{Q}$**
 - generalise numerical relationships involving operations involving numbers written in index form
 - correctly use the order of arithmetic and index operations including the use of brackets
 - calculate and interpret factors (including the highest common factor), multiples (including the lowest common multiple), and prime numbers
 - present numerical answers to the degree of accuracy specified, for example, correct to the nearest hundred, to two decimal places, or to three significant figures
 - convert the number p in decimal form to the form $a \times 10^n$, where $1 \leq a < 10$, $n \in \mathbb{Z}$, $p \in \mathbb{Q}$, and $p \geq 1$ **and $0 < p < 1$**
- N.2 investigate equivalent representations of rational numbers so that they can:
- flexibly convert between fractions, decimals, and percentages
 - use and understand ratio and proportion
 - solve money-related problems including those involving bills, VAT, profit or loss, % profit or loss (on the cost price), cost price, selling price, compound interest for not more than 3 years, income tax (standard rate only), net pay (including other deductions of specified amounts), value for money calculations and judgements, **mark up (profit as a % of cost price), margin (profit as a % of selling price), compound interest, income tax and net pay (including other deductions)**

- N.3 investigate situations involving proportionality so that they can:
- use absolute and relative comparison where appropriate
 - solve problems involving proportionality including those involving currency conversion and those involving average speed, distance, and time
- N.4 analyse numerical patterns in different ways, including making out tables and graphs, and continue such patterns
- N.5 explore the concept of a set so that they can:
- understand the concept of a set as a well-defined collection of elements, and that set equality is a relationship where two sets have the same elements
 - define sets by listing their elements, if finite (including in a 2-set or **3-set** Venn diagram), or by generating rules that define them
 - use and understand suitable set notation and terminology, including null set, \emptyset , subset, \subset , complement, element, \in , universal set, cardinal number, #, intersection, \cap , union, \cup , set difference, \setminus , \mathbb{N} , \mathbb{Z} , \mathbb{Q} , \mathbb{R} , and $\mathbb{R}\setminus\mathbb{Q}$
 - perform the operations of intersection and union on 2 sets **and on 3 sets**, set difference, and complement, including the use of brackets to define the order of operations
 - investigate whether the set operations of intersection, union, and difference are commutative and/or associative**