Number strand

Students should be able to:

N.1 investigate the representation of numbers and arithmetic operations so that they can:

a. 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

b. 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 $\mathbb{R}\backslash\mathbb{Q}$, including operating on surds**

c. explore numbers written as a^b (in index form) so that they can:

I. flexibly translate between whole numbers and index representation of numbers

II. 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 $p, q \in \mathbb{Q}$

III. 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 $r \in \mathbb{Q}$

IV. generalise numerical relationships involving operations involving numbers written in index form

V. correctly use the order of arithmetic and index operations including the use of brackets

d. calculate and interpret factors (including the highest common factor), multiples (including the lowest common multiple), and prime numbers

e. 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

f. convert the number p in decimal form to the form $a \times 10^n$, where $1 \le a < 10$, $n \in \mathbb{Z}$, $p \in \mathbb{Q}$, and $p \ge 1$ **and $0 < p < 1$**

N.2 investigate equivalent representations of rational numbers so that they can:

a. flexibly convert between fractions, decimals, and percentages

b. use and understand ratio and proportion

c. 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)**