

# 1 to 5 NUMBER

<b>Numbers and Operations</b> Four operations and numbers Inverse operations Fractions as Operators Fractions and Terminating decimals
<b>Place Value, Rounding and Estimation</b> Ordering decimals Rounding Estimation Using inequality notation
<b>Understanding Products</b> Factors and Multiples Primes and Prime Factorisation Powers and Roots Indices Standard Form

# ALGEBRA

<b>Expressions and Formulae</b> Algebraic Notation Simplifying expressions Substitution Expanding Factorising Understanding expressions as functions
<b>Equations, Inequalities and Identities</b> Understand the difference between equations and identities Solve any linear equation Solve linear inequalities and represent on a number line Solve quadratic by factorising
<b>Linear Graphs</b> Draw straight line graphs Find gradients of straight lines Use gradient and intercepts Find equations of parallel lines Solve linear simultaneous equations
<b>Non-Linear Graphs</b> Draw any graph given its equation Recognise a graph Find roots, intercepts and turning points of quadratics
<b>Sequences</b> Use term-to-term and position to term rules Recognise square, cube, triangular, Fibonacci type, quadratic and geometric sequences Find and use nth terms of linear sequences.

## PROPORTION AND RATES OF CHANGE

<b>Understanding Proportion</b>
Understand proportional relationships as based on multiplying
Write proportions as fractions
Solve proportion problems (inc best buy etc)
Write and use ratio
Write ratios and functions
Understand inverse proportion
<b>Percentages</b>
Understand percentages as how many in 100 parts
Calculate percentages
Write proportions and changes as percentages
Calculate percentage changes
Use percentages over 100%
<b>Units, Scales and Proportions</b>
Convert units
Use compound units
Understand scale pictures as being in proportion
Use maps and scale diagrams

## GEOMETRY AND MENSURATION

<b>Measures</b>
Measure lines
Measure angles
Estimate and use different units of measurement
Use compass directions and bearings
<b>Accurate and Inaccurate Diagrams</b>
Symmetries
Basic Angle properties
Scale Drawing and Bearings
Constructions and Loci
Similarity and Congruence
<b>Triangles</b>
Angles in Triangles
Triangle Congruence
Area of a Triangle
Pythagoras
Basic Trigonometry
<b>Polygons</b>

Properties of quadrilaterals
Area of quadrilaterals
Angles in quadrilaterals
Angle properties of polygons
<b>Polyhedra</b>
Faces, Edges, Vertices
Plans and Elevations
Surface Area and Volume of Cuboids, Prisms and Pyramids
<b>Curved Shapes</b>
Circle Nomenclature
Circle Circumference and Area
Arc Length and Sector Area
Surface Area and Volume of Cylinders, Cones and Spheres
Working with multiples of $\pi$
<b>Transformations and Vectors</b>
Reflections
Rotations
Enlargements (inc fractional s.f.)
Translations
Basic vectors

## PROBABILITY AND STATISTICS

<b>Probability of a single event</b>
Write probabilities
Predict number of outcomes of an event
Mutually exclusive events
Exhaustive lists
Relative Frequency vs Theoretical probability
<b>Probability of two or more events</b>
Systematic listing
Possibility spaces, Venn Diagrams, Tree Diagrams
Find probability of independent and dependent events
<b>Sampling and data collection</b>
Understand the usefulness and limitations of sampling
Judge bias in a sample
Write questionnaires
<b>Categorical data</b>
Understand data types
Represent categorical data using frequency tables, pictograms, bar charts, and pie charts.
Choose and compare categorical data from their diagrams.
<b>Numerical data</b>
Draw vertical line graphs to represent ungrouped numerical data
Draw tables and line graphs for time series data
Calculate mode, median, mean and range
Compare using an average and range
Grouping discrete and continuous data
Find averages from tables
Draw and analyse scatter graphs, and understand their use.

# PROBLEM SOLVING

## **Financial Calculations**

Calculate with bills

Work with debits and credits

Calculate wages

Calculate income tax, VAT etc

## **Forming equations**

Equations from shapes (perimeters, angles etc)

Equations from other situations

## **Graphical Problem Solving**

Use graphs of speed, distance, time, velocity etc

Find and interpret the gradient of distance-time graphs and the area under velocity-time graphs

Find and interpret the gradient of other piecewise linear graphs.

## **Estimates and the Limits of accuracy**

Use estimates in practical situations

Judge appropriate accuracy

## **Number problems**

Set up and solve growth and decay problems (compound percentages)

Compare proportions as percentage, fraction and decimal

Direct and inverse proportion problems

Percentage problems

# 5 to 9 NUMBER

## **Rounding, Estimation and the Limits of Accuracy**

Round to a given accuracy in significant figures

Round to a suitable accuracy

Estimate roots

Use inequalities notations to show the results of rounding

Find and calculate with upper and lower bounds

## **Understanding Products**

Prime Factorisation and index form

Powers and Roots

Indices

Standard Form

Factorials and Multiplicative counting

## **Rational and Irrational numbers**

Convert between fractions and recurring decimals

Calculate with Fractions

Simplify and perform basic calculations with Surds

Work with multiples of  $\pi$

# ALGEBRA

## **Expressions, Formulae and Functions**

Expand products of binomials

Factorise linear and quadratic expressions

Understand an expression as a function and its links to formulae

Find the inverse function (using correct notation) and link to rearranging a formula

Find and evaluate a composite function (using correct notation)

Complete the square for a quadratic expression

Prove algebraic results

## **Equations, Inequalities and Identities**

Understand the difference between equations, inequalities and identities

Solve any linear equation (including those with fractions, unknowns on both sides etc)

Solve quadratics by factorising, using the formula and completing the square

Solve linear and non-linear simultaneous equations

Solve, represent and interpret inequalities in one or two variables, including simple quadratic inequalities

## **Linear Graphs**

Use gradient and intercepts

Find equations of parallel and perpendicular lines

Solve linear simultaneous equations

## **Non-Linear Graphs**

Draw any graph given its equation

Recognise a graph

Find roots, intercepts and turning points of quadratics

Graphically solve non-linear simultaneous equations.

Draw and interpret circle equations

## **Sequences**

Recognise square, cube, triangular, Fibonacci type, quadratic and geometric sequences

Use position to term rules of any sequence (including geometric sequences with irrational values of  $r$ )

Find and use  $n$ th terms of linear and quadratic sequences

#### **Iterative methods**

Apply iterative methods to provide approximate solutions to equations or solve other problems.

## **PROPORTION AND RATES OF CHANGE**

### **Understanding Proportion**

Understand proportional relationships as based on multiplying

Use compound units

Write proportions as fractions

Write and use ratios and functions

Understand inverse proportion

### **Percentages**

Write proportions and changes as percentages

Calculate percentage changes

Use percentages over 100%

Reverse a percentage change

Solve growth and decay problems with percentages

### **Proportion and Graphs**

Understand the shape of a graph of two quantities that are in direct or inverse proportion.

Find the gradient of a straight line graph and interpret that as a rate of change

Understand the gradient of a curve as the instantaneous rate of change

Work with average and instantaneous rates of change and the links to chords and tangents of graphs

### **Algebraic Proportion**

Set up algebraic proportional relationships

Find constants of proportionality

Solve problems involving quantities that are in direct or inverse proportions.

## **GEOMETRY AND MENSURATION**

### **Mensuration**

Area, Surface Area and Volume of shapes

Length, Area and Volumes of similar shapes

### **Accurate and Inaccurate Diagrams**

Loci

Bearings

Proving Congruence

Circle Theorems

### **Transformations and Vectors**

Reflections

Rotations

Enlargements (inc fractional/negative s.f.)

Translations

Understand the changes and invariance under the four transformations.

Vectors

### **Pythagoras and Trigonometry in Right Triangles**

Use Pythagoras Theorem in 2D and 3D

Understand and use trigonometric ratios in right-triangles

Solve problems involving lengths and angles in right triangles (inc right-angled triangles that can be formed from isosceles and equilateral triangles)

Know the exact trig ratios for 0, 30, 45, 60, 90 degrees

#### **Trigonometry in non-right triangles**

Use Sine rule to find lengths and angles in non-right triangles

Use Cosine rule to find lengths and angles in non-right triangles

Use Sine rule and Cosine rule to find lengths and angles in non-right triangles

Find area of any triangle.

## **PROBABILITY AND STATISTICS**

#### **Probability**

Possibility spaces, Venn Diagrams, Tree Diagrams

Find probability of independent and dependent events

#### **Numerical data**

Create a suitable sample from a given population

Draw and analyse scatter graphs, and understand their use

Group discrete and continuous data

Find averages from tables

Draw and analyse cumulative frequency diagrams and link box plots

Draw histograms for data with unequal class widths.

Carry out analysis of histograms.

# PROBLEM SOLVING

## **Number problems**

Upper and lower bounds with measures and formulae (with values given in standard form)

Using factorials and multiplication for counting for practical situations

## **Graphical Problem Solving**

Use graphs of speed, distance, time, velocity etc

Find and interpret the gradient of distance-time graphs and the area under velocity-time graphs

Find and interpret the gradient of other piecewise linear graphs

Solve problems with exponential graphs

## **Iterative Processes**

Solve practical problems requiring iterative processes

## **Coordinate Geometry**

Apply circle theorems, Pythagoras and trigonometry to shapes defined on a Cartesian axes

Transform any graph

## **Algebraic problems**

Add, Subtract, Multiply, Divide and Simplify fractions defined using Algebra

Set up and solve problems involving simultaneous equations

Set up and solve simple linear programming problems