

ABC Links to literacy

We develop mathematical literacy through reading mathematical text aloud (including worded problems) and applying new knowledge to unfamiliar and non-routine problems. We discuss, select and use appropriate concepts and language

AUTUMN - 2

Topic name: **Making generalisations about the number system (2)**

Why study this topic?

To provide opportunities to interpret negative quantities in context and extend existing understanding of calculations with integer values to include negative numbers.

To develop flexibility in expressing relationships algebraically as well as being comfortable substituting constant values for variables, leading to exploration of equalities and inequalities utilising bar models in context of finding perimeter.

SPRING - 2

Topic name: **The Cartesian plane**

Why study this topic?

To develop their understanding of the Cartesian coordinate grid and solve problems in all four quadrants, using knowledge from previous units including negative numbers and geometric properties of triangles and quadrilaterals.

To use the generalised expressions for finding the area of shapes and introduce rearranging formulae.

To consider how different transformations acting on an object produce different images.

SUMMER - 2

Topic name: **Ratio and proportion**

Why study this topic?

To explore ratio notation, language, representations and contexts, using bar models, double number lines, line graphs and other representations in order to develop deeper conceptual understanding.

To work with percentages as another representation of ratios and fractions.

Subject Intent statement

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AUTUMN - 1

Topic name: **Making generalisations about the number system (1)**

Why study this topic?

To experience a range of number and numeral systems to develop understanding of the base 10 place value system from primary years.

To develop understanding of different models for multiplication and division; factors, multiples and important sets of numbers such as prime numbers, square numbers and cube numbers; the order of operations based on the equal priority of addition with subtraction and multiplication with division

SPRING - 1

Topic name: **2-D Geometry**

Why study this topic?

To describe, classify and identify types of angles using clear vocabulary, and measure and draw angles accurately. To understand and begin to generalise basic angle facts.

To analyse the geometric properties of polygons before focusing more closely on triangles and quadrilaterals, including drawing and constructing them.

SUMMER - 1

Topic name: **Fractions**

Why study this topic?

To use the "lots of" representation to find the unique prime factor decomposition of a positive integer. To explore multiple interpretations of fractions and establish useful language and representations to use alongside these. To extend understanding of applying the four operations to non-integer values, including fractions, decimal fractions and mixed numbers.

123 Links to Numeracy

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AUTUMN - 2

Topic name: **Graphs, Accuracy and Estimations**
Why study this topic?

To extend algebra to include geometric interpretations of the equations of graphs using cartesian plane (x, y).
To use linear equation to generate the coordinates of a straight line.
To develop conceptual understanding of graphs as an infinity of individual coordinates.
To use rounding to check accuracy of calculations. This skill is useful when we go shopping.

SPRING - 1

Topic name: **Proportional Reasoning**
Why study this topic?

To extend and formalise knowledge of ratio and proportion in working with measures.
To develop and use formal mathematical knowledge to interpret and solve problems, including in financial mathematics.
To use ratio notation, including reduction to simplest form, dividing into ratio and the associated calculations to the arithmetic of fractions. To use compound units such as speed to solve problems.

SUMMER - 2

Topic name: **Area, volume and surface area**
Why study this topic?

To interpret mathematical relationships both algebraically.
To calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes
To use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D including volume and surface area

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AUTUMN - 1

Topic: **Equations and inequalities**
Why study this topic?

To explore and describe sequences, and develop conceptual understanding of algebra as a generalised arithmetic.
To form and solve equations and inequalities, and in doing so build mathematical reasoning, and problem-solving abilities.
To show and demonstrate the relationship between two values in an algebraic expressions are not equal using greater than, greater or equal to, less than, or less than or equal to.

SPRING - 2

Topic name: **Representations and reasoning with data**
Why study this topic?

To describe, interpret and compare observed distributions through appropriate graphical representation and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers).
To construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms.

SUMMER - 1

Topic name: **Angles**
Why study this topic?

To measure, calculate and describe angles in parallel lines and in polygons.
Understanding what angles are, how they work, and how to measure them are important. They help us build better streets and cities, tell time using the sun and the shadows, and make it possible to measure how far away the planets and stars are from us.

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AUTUMN - 2
 Topic name: **Algebraic expressions and Probability**
 Why study this topic?
 To recognise and solve problems involving linear and non-linear sequences in a variety of contexts.
 Using area and perimeter as a vehicle for exploring expansion of brackets and factorising, including double brackets.
 To explore manipulating equations and formulae in a variety of practical contexts, having an opportunity to consolidate earlier work on linear equations, linear graphs and geometrical formulae that have already been met.
 To record, describe and analyse the frequency of outcomes of simple probability experiments, using appropriate language and representation.

SPRING - 2
 Topic name: **Equations and inequalities**
 Why study this topic?
 To build skills to form and solve equations and inequalities from given contexts.
 Express relationships using simultaneous equations and find solutions.
 To recognise, sketch and produce graphs of linear and quadratic functions of one variable with appropriate scaling
 To find approximate solutions to contextual problems from given graphs of a variety of functions.

SUMMER - 2
 Topic name: **Statistics and Probability**
 Why study this topic?
 To describe, interpret and compare distributions (both continuous and discrete), involving appropriate measures of central tendency and spread (calculate estimated mean and quartiles of grouped data)
 To draw and interpret cumulative frequency graphs and box plots from cumulative frequency tables.

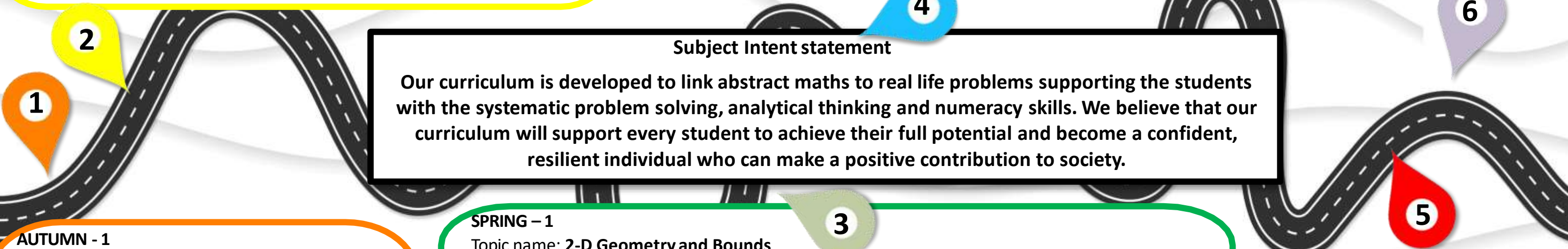
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AUTUMN - 1
 Topic name: **Coordinates, linear graphs, proportion and standard form**
 Why study this topic?
 To interpret direct and inverse proportion relationships both algebraically and graphically.
 To recognise, sketch and produce graphs of linear functions with appropriate scaling; find approximate solutions to contextual problems from given graphs, interpreting gradients and intercepts numerically, graphically and algebraically.
 To interpret and compare numbers in standard form

SPRING - 1
 Topic name: **2-D Geometry and Bounds**
 Why study this topic?
 To derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle).
 To know and use the criteria for congruence of triangles; and construct similar shapes by enlargement; apply these and angle facts to derive results about angles and sides
 To find the error interval or limits of accuracy of numbers that have been rounded to different degrees of accuracy.

SUMMER - 1
 Topic name: **Geometry and Measurement**
 Why study this topic?
 To identify properties of, and describe the results of, translations, rotations and reflections applied to given 2D shapes.
 To use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles.

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AUTUMN - 2

Topic name: **Percentages and probabilities**
Why study this topic?

To convert between FDP, calculate % change, original amount, compound interest and solve problems with growth and decay.
To read and apply set notation
To calculate probability and relative frequency using Venn diagrams, sample space diagrams and tree diagrams and solve complex problems with these (including tree diagrams without replacement and applying algebra to it).

SPRING - 2

Topic name: **Geometry**
Why study this topic?

To calculate upper and lower bounds and solve problems with bounds including % error and suitable degree of accuracy.
To solve problems with area and circumference, solve problems with arc length and sector area, recognise and use equation of a circle, find the equation of a tangent to a circle
To calculate and solve problems with surface area and volume of cuboids, other prisms, cones, spheres and pyramids (converting units).

SUMMER - 2

Topic name: **Data handling**
Why study this topic?

To explore methods of data collection including surveys, questionnaires and the use of secondary data, classify and tabulate data.
To construct and interpret frequency tables, bar graphs, dual bar graphs, pictograms, pie charts, scatter graphs, cumulative frequency graphs and histograms.
To calculate averages and spread from grouped data

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AUTUMN - 1

Topic name: **Number**
Why study this topic?

To calculate with powers, roots and indices (including negative and fractional), applying laws of indices.
To simplify, rationalise and use surds in calculations and solving problems.
To convert recurring decimals to fractions, to and from standard form, and calculate in standard form.
To recognise different types of sequences, find the nth term of arithmetic, geometric and quadratic sequences and solve problems with these.

SPRING - 1

Topic name: **Algebra**
Why study this topic?

To expand (two and more brackets) and factorise quadratics, solve quadratics by factorising, formula or completing the square. To plot and sketch quadratics identifying key features (turning points and intercepts).
To simplify and calculate with algebraic fractions and solve equations with these.
To solve simultaneous equations algebraically and graphically, including one linear and one quadratic.

SUMMER - 1

Topic name: **Similarity**
Why study this topic?

To share into ratio and apply it to solve problems.
To apply the formula for speed, density and pressure. To set up and solve formal problems involving direct and inverse variation (including powers and roots). To solve Pythagoras problems in 2D and 3D, problems with similar shapes involving angle facts and scaled lengths. To use trigonometry to solve non-right angled triangles problems (trig area formula, sine and cosine rule).

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AUTUMN – 2

Topic name: **Number, Statistics and Probability**
Why study this topic?

To recognise equivalent fractions, convert between mixed numbers and improper fractions, calculate with fractions. To find percentage change and reverse percentages, simple and compound interest (using calculator when appropriate) and solve problems with growth and decay. To solve probability problems using Venn diagrams, sample space, tree diagrams and product rule of counting.

SPRING - 2

Topic name: **Geometry**
Why study this topic?

To identify properties of, and describe the results of, translations, rotations, reflections and enlargement applied to given figures.
To calculate perimeter and area of basic and composite shapes (including circles, semicircles and sectors), giving the answer to a degree of accuracy.
To construct and interpret plans and elevations of 3D solids and recognise the vocabulary associated with it. To calculate surface area and volume of 3D prisms and convert units.

SUMMER - 2

Topic name: **Data handling**
Why study this topic?

To calculate averages and spread from ungrouped and grouped data
To explore methods of data collection and types of sampling including stratified sampling.
To construct and interpret pictograms, bar and pie charts, scatter graphs, frequency polygons and solve problems with them.

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AUTUMN - 1

Topic name: **Number**
Why study this topic?

To work with factors, multiples and primes, using prime factor decomposition to find HCF and LCM and apply these in problem solving context.
To understand the meaning of higher powers, roots and indices and know how to calculate with these, using efficiently calculator when appropriate. To apply laws of indices to numbers and algebraic terms
To convert large and small numbers to and from standard form, calculate and solve problems with these. To recognise and work with sequences

SPRING – 1

Topic name: **Applications of Algebra**
Why study this topic?

To simplify, expand and factorise expressions (including quadratics), rearrange and evaluate by substituting into formulae.
To form and solve linear equations (including unknown on both sides) as well as quadratic equations.
To recognise and plot quadratic graphs and find approximate solutions
To apply simultaneous equations to solve worded problems.

SUMMER - 1

Topic name: **Similarity**
Why study this topic?

To write and simplify ratio, relate it to fraction, share into ratio and apply it to solve problems.
To apply the formula for speed, density and pressure. To solve numerical and algebraic direct and inverse proportion problems. To find any side in a right angled triangles using Pythagoras. To identify similarity and congruence and solve problems accordingly. To apply correct trig ratios.

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AUTUMN - 2

Topic name: **Inequalities and Graphs**
Why study this topic?

- To solve single and double linear inequalities as well as quadratic inequalities, both algebraically and graphically (including regions and inequalities with two variables).
- To solve problems with co-ordinates and midpoints.
- To plot straight line graph, understand equation of a straight line graph and its properties, and prove parallel or perpendicular lines.
- To recognise, plot and interpret non-linear graphs, including cubic, reciprocal, exponential, and basic trigonometric graphs.

SPRING - 2

Topic name: **Revision**
Why study this topic?
To revisit, secure and stretch skills and knowledge of covered topics in preparation for exams.

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AUTUMN - 1

Topic name: **Reasoning and Proof**
Why study this topic?

- To use vector notation and calculate resultant vectors.
- To solve problems with ratios and midpoints and prove when two vectors are collinear.
- To follow and form logical arguments applying angle facts and properties of angles in polygons and parallel lines.
- To prove and use circle theorems and solve mixed problems with them.
- To solve problems with bearings and trigs, congruency and constructions and loci

SPRING - 1

Topic name: **Algebra and Graphs**
Why study this topic?
To use Constant acceleration formulae and develop/critique simple mathematical arguments while using algebra to construct proofs
To understand the meaning of iteration and use iterative processes
To understand and use function notation, composite and inverse functions.
To identify and sketch the graphs of translations and reflections of a given graph.
To provide reinforcement of using iteration to find solutions of equations that cannot be found analytically.

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AUTUMN - 2

Topic name: **Inequalities and Graphs**
Why study this topic?

- To form and solve linear inequalities, both algebraically and graphically.
- To solve problems with co-ordinates and midpoints.
- To plot straight line graph, understand equation of a straight line graph and its properties, and prove parallel or perpendicular lines.
- To construct and use conversion and distance-time graphs, to plot polynomials and reciprocal graphs and recognise their sketches

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Topic name: **Reasoning and Proof**
Why study this topic?

- To use vector notation and calculate resultant vectors.
- To solve geometric problems with triangles and quadrilaterals, angles in polygons and on parallel lines.
- To measure and solve problems with bearings.
- To identify pairs of congruent triangles and prove their congruency
- To follow and form logical arguments in both algebra and geometry.
- To construct ASA, SAS and SSS triangles, bisectors and solve real life problems using loci.

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