Key objectives

Year 5

- Multiply and divide any positive integer up to 10 000 by 10 or 100 and understand the effect.
- Order a given set of positive and negative integers.
- Use decimal notation for tenths and hundredths.
- Round a number with one or two decimal places to the nearest integer.
- Relate fractions to division and to their decimal representations.
- Calculate mentally a difference such as 8006 – 2993.
- Carry out column addition and subtraction of positive integers less than 10 000.
- Know by heart all multiplication facts up to 10×10.
- Carry out short multiplication and division of a three-digit by a single-digit integer.
- Carry out long multiplication of a two-digit by a two-digit integer.
- Understand area measured in square centimetres (cm^2); understand and use the formula in words 'length $\times$ breadth' for the area of a rectangle.
- Recognise parallel and perpendicular lines, and properties of rectangles.
- Use all four operations to solve simple word problems involving numbers and quantities, including time, explaining methods and reasoning.

Year 6

- Multiply and divide decimals mentally by 10 or 100, and integers by 1000, and explain the effect.
- Order a mixed set of numbers with up to three decimal places.
- Reduce a fraction to its simplest form by cancelling common factors.
- Use a fraction as an operator to find fractions of numbers or quantities (e.g. $\frac{5}{8}$ of 32, $\frac{7}{10}$ of 40, $\frac{9}{100}$ of 400 centimetres).
- Understand percentage as the number of parts in every 100, and find simple percentages of small whole-number quantities.
- Solve simple problems involving ratio and proportion.
- Carry out column addition and subtraction of numbers involving decimals.
- Derive quickly division facts corresponding to multiplication tables up to 10×10.
- Carry out short multiplication and division of numbers involving decimals.
- Carry out long multiplication of a three-digit by a two-digit integer.
- Use a protractor to measure acute and obtuse angles to the nearest degree.
- Calculate the perimeter and area of simple compound shapes that can be split into rectangles.
- Read and plot coordinates in all four quadrants.

- Identify and use the appropriate operations (including combinations of operations) to solve word problems involving numbers and quantities, and explain methods and reasoning.
- Solve a problem by extracting and interpreting information presented in tables, graphs and charts.

Year 7

- Simplify fractions by cancelling all common factors; identify equivalent fractions.
- Recognise the equivalence of percentages, fractions and decimals.
- Extend mental methods of calculation to include decimals, fractions and percentages.
- Multiply and divide three-digit by two-digit whole numbers; extend to multiplying and dividing decimals with one or two places by single-digit whole numbers.
- Break a complex calculation into simpler steps, choosing and using appropriate and efficient operations and methods.
- Check a result by considering whether it is of the right order of magnitude.
- Use letter symbols to represent unknown numbers or variables.
- Know and use the order of operations and understand that algebraic operations follow the same conventions and order as arithmetic operations.
- Plot the graphs of simple linear functions.
- Identify parallel and perpendicular lines; know the sum of angles at a point, on a straight line and in a triangle.
- Convert one metric unit to another (e.g. grams to kilograms); read and interpret scales on a range of measuring instruments.
- Compare two simple distributions using the range and one of the mode, median or mean.
- Understand and use the probability scale from 0 to 1; find and justify probabilities based on equally likely outcomes in simple contexts.
- Solve word problems and investigate in a range of contexts, explaining and justifying methods and conclusions.

Year 8

- Add, subtract, multiply and divide integers.
- Use the equivalence of fractions, decimals and percentages to compare proportions; calculate percentages and find the outcome of a given percentage increase or decrease.
- Divide a quantity into two or more parts in a given ratio; use the unitary method to solve simple word problems involving ratio and direct proportion.
- Use standard column procedures for multiplication and division of integers and decimals, including by decimals such as 0.6 or 0.06; understand where to position the decimal point by considering equivalent calculations.
- Simplify or transform linear expressions by collecting like terms; multiply a single term over a bracket.
- Substitute integers into simple formulae.
- Plot the graphs of linear functions, where y is given explicitly in terms of x; recognise that equations of the form $y = mx + c$ correspond to straight-line graphs.
- Identify alternate and corresponding angles; understand a proof that the sum of the angles of a triangle is 180° and of a quadrilateral is 360°.
- Enlarge 2-D shapes, given a centre of enlargement and a positive whole-number scale factor.
- Use straight edge and compasses to do standard constructions.
- Deduce and use formulae for the area of a triangle and parallelogram, and the volume of a cuboid; calculate volumes and surface areas of cuboids.
- Construct, on paper and using ICT, a range of graphs and charts; identify which are most useful in the context of a problem.
- Find and record all possible mutually exclusive outcomes for single events and two successive events in a systematic way.
- Identify the necessary information to solve a problem; represent problems and interpret solutions in algebraic, geometric or graphical form.
- Use logical argument to establish the truth of a statement.

Year 9

- Add, subtract, multiply and divide fractions.
- Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole.
- Make and justify estimates and approximations of calculations.
- Construct and solve linear equations with integer coefficients, using an appropriate method.
- Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence, on paper and using ICT; write an expression to describe the nth term of an arithmetic sequence.
- Given values for m and c, find the gradient of lines given by equations of the form $y = mx + c$.
- Construct functions arising from real-life problems and plot their corresponding graphs; interpret graphs arising from real situations.

- Solve geometrical problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons.
- Know that translations, rotations and reflections preserve length and angle and map objects on to congruent images.
- Know and use the formulae for the circumference and area of a circle.
- Design a survey or experiment to capture the necessary data from one or more sources; determine the sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets.
- Communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams in support.
- Know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems.
- Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT; give solutions to an appropriate degree of accuracy.
- Present a concise, reasoned argument, using symbols, diagrams, graphs and related explanatory text.

Year 9 objectives for able pupils

- Know and use the index laws for multiplication and division of positive integer powers.
- Understand and use proportionality and calculate the result of any proportional change using multiplicative methods.
- Square a linear expression and expand the product of two linear expressions of the form $x \pm n$; establish identities.
- Solve a pair of simultaneous linear equations by eliminating one variable; link a graphical representation of an equation or a pair of equations to the algebraic solution.
- Change the subject of a formula.
- Know that if two 2-D shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio.
- Understand and apply Pythagoras' theorem.
- Know from experience of constructing them that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not; apply these conditions to establish the congruence of triangles.
- Use measures of speed and other compound measures to solve problems.
- Identify possible sources of bias in a statistical enquiry and plan how to minimise it.
- Examine critically the results of a statistical enquiry and justify choice of statistical representation in written presentations.
- Generate fuller solutions to mathematical problems.
- Recognise limitations on the accuracy of data and measurements.