Mathematics

Number

Integers, powers and roots

8Ni.01 Understand that brackets, indices (square and cube roots) and operations follow a particular order.

8Ni.02 Estimate, multiply and divide integers, recognising generalisations.

8Ni.03 Understand factors, multiples, prime factors, highest common factors and lowest common multiples.

8Ni.04 Understand the hierarchy of natural numbers, integers and rational numbers.

8Ni.05 Use positive and zero indices, and the index laws for multiplication and division.

8Ni.06 Recognise squares of negative and positive numbers, and corresponding square roots.

8Ni.07 Recognise positive and negative cube numbers, and the corresponding cube roots.

Place value, ordering and rounding

8Np.01 Use knowledge of place value to multiply and divide integers and decimals by 0.1 and 0.01.

8Np.02 Round numbers to a given number of significant figures.

Fractions, decimals, percentages, ratio and proportion

8Nf.01 Recognise fractions that are equivalent to recurring decimals.

8Nf.02 Estimate and subtract mixed numbers, and write the answer as a mixed number in its simplest form.

8Nf.03 Estimate and multiply an integer by a mixed number, and divide an integer by a proper fraction.

8Nf.04 Use knowledge of the laws of arithmetic and order of operations (including brackets) to simplify calculations containing decimals or fractions.

8Nf.05 Understand percentage increase and decrease, and absolute change.

8Nf.06 Understand the relative size of quantities to compare and order decimals and fractions (positive and negative), using the symbols =, ≠, >, <, ≤ and ≥.

8Nf.07 Estimate and multiply decimals by integers and decimals.

8Nf.08 Estimate and divide decimals by numbers with one decimal place.

8Nf.09 Understand and use the relationship between ratio and direct proportion.

8Nf.10 Use knowledge of equivalence to simplify and compare ratios (different units).

8Nf.11 Understand how ratios are used to compare quantities to divide an amount into a given ratio with two or more parts.

Algebra

Expressions, equations and formulae

8Ae.01 Understand that letters have different meanings in expressions, formulae and equations.

8Ae.02 Understand that the laws of arithmetic and order of operations apply to algebraic terms and expressions (four operations, squares and cubes).

8Ae.03 Understand how to manipulate algebraic expressions including:
- applying the distributive law with a single term (squares and cubes)
- identifying the highest common factor to factorise.

8Ae.04 Understand that a situation can be represented either in words or as an algebraic expression, and move between the two representations (linear with integer or fractional coefficients).

8Ae.05 Understand that a situation can be represented either in words or as a formula (mixed operations), and manipulate using knowledge of inverse operations to change the subject of a formula.

8Ae.06 Understand that a situation can be represented either in words or as an equation. Move between the two representations and solve the equation (integer or fractional coefficients, unknown on either or both sides).

8Ae.07 Understand that letters can represent open and closed intervals (two terms).

Sequences, functions and graphs

8As.01 Understand term-to-term rules, and generate sequences from numerical and spatial patterns (including fractions).

8As.02 Understand and describe nth term rules algebraically (in the form $n \pm a$, $a \times n$, or $an \pm b$, where a and b are positive or negative integers or fractions).

8As.03 Understand that a function is a relationship where each input has a single output. Generate outputs from a given function and identify inputs from a given output by considering inverse operations (including fractions).

8As.04 Understand that a situation can be represented either in words or as a linear function in two variables (of the form $y = mx + c$), and move between the two representations.

8As.05 Use knowledge of coordinate pairs to construct tables of values and plot the graphs of linear functions, where y is given explicitly in terms of x ($y = mx + c$).

8As.06 Recognise that equations of the form $y = mx + c$ correspond to straight-line graphs, where m is the gradient and c is the y-intercept (integer values of m).

8As.07 Read and interpret graphs with more than one component. Explain why they have a specific shape and the significance of intersections of the graphs.

Geometry and Measure

Geometrical reasoning, shapes and measurements

8Gg.01 Identify and describe the hierarchy of quadrilaterals.

8Gg.02 Understand π as the ratio between a circumference and a diameter. Know and use the formula for the circumference of a circle.

8Gg.03 Know that distances can be measured in miles or kilometres, and that a kilometre is approximately 5/8 of a mile or a mile is 1.6 kilometres.

8Gg.04 Use knowledge of rectangles, squares and triangles to derive the formulae for the area of parallelograms and trapezia. Use the formulae to calculate the area of parallelograms and trapezia.

8Gg.05 Understand and use Euler's formula to connect number of vertices, faces and edges of 3D shapes.

8Gg.06 Use knowledge of area and volume to derive the formula for the volume of a triangular prism. Use the formula to calculate the volume of triangular prisms.

8Gg.07 Represent front, side and top view of 3D shapes to scale.

8Gg.08 Use knowledge of area, and properties of cubes, cuboids, triangular prisms and pyramids to calculate their surface area.

8Gg.09 Understand that the number of sides of a regular polygon is equal to the number of lines of symmetry and the order of rotation.

8Gg.10 Derive and use the fact that the exterior angle of a triangle is equal to the sum of the two interior opposite angles.

8Gg.11 Recognise and describe the properties of angles on parallel and intersecting lines, using geometric vocabulary such as alternate, corresponding and vertically opposite.

8Gg.12 Construct triangles, midpoint and perpendicular bisector of a line segment, and the bisector of an angle.

Position and transformations

8Gp.01 Understand and use bearings as a measure of direction.

8Gp.02 Use knowledge of coordinates to find the midpoint of a line segment.

8Gp.03 Translate points and 2D shapes using vectors, recognising that the image is congruent to the object after a translation.

8Gp.04 Reflect 2D shapes and points in a given mirror line on or parallel to the x- or y-axis, or y = ± x on coordinate grids. Identify a reflection and its mirror line.

8Gp.05 Understand that the centre of rotation, direction of rotation and angle are needed to identify and perform rotations.

8Gp.06 Enlarge 2D shapes, from a centre of enlargement (outside or on the shape) with a positive integer scale factor. Identify an enlargement and scale factor.

Statistics and Probability

Statistics

8Ss.01 Select, trial and justify data collection and sampling methods to investigate predictions for a set of related statistical questions, considering what data to collect (categorical, discrete and continuous data).

8Ss.02 Understand the advantages and disadvantages of different sampling methods.

8Ss.03 Record, organise and represent categorical, discrete and continuous data. Choose and explain which representation to use in a given situation:
- Venn and Carroll diagrams
- tally charts, frequency tables and two-way tables
- dual and compound bar charts
- pie charts
- frequency diagrams for continuous data
- line graphs and time series graphs
- scatter graphs
- stem-and-leaf diagrams
- infographics.

8Ss.04 Use knowledge of mode, median, mean and range to compare two distributions, considering the interrelationship between centrality and spread.

8Ss.05 Interpret data, identifying patterns, trends and relationships, within and between data sets, to answer statistical questions. Discuss conclusions, considering the sources of variation, including sampling, and check predictions.

Probability

8Sp.01 Understand that complementary events are two events that have a total probability of 1.

8Sp.02 Understand that tables, diagrams and lists can be used to identify all mutually exclusive outcomes of combined events (independent events only).

8Sp.03 Understand how to find the theoretical probabilities of equally likely combined events.

8Sp.04 Design and conduct chance experiments or simulations, using small and large numbers of trials. Compare the experimental probabilities with theoretical