

Stage 7

Thinking and Working Mathematically

- **TWM.01** Specialising
- **TWM.02** Generalising
- **TWM.03** Conjecturing
- **TWM.04** Convincing
- **TWM.05** Characterising
- **TWM.06** Classifying
- **TWM.07** Critiquing
- **TWM.08** Improving

Number

Integers, powers and roots

- **7Ni.01** Estimate, add and subtract integers, recognising generalisations.
- **7Ni.02** Understand that brackets, positive indices and operations follow a particular order.
- **7Ni.03** Estimate, multiply and divide integers including where one integer is negative.
- **7Ni.04** Understand lowest common multiple and highest common factor (numbers less than 100).
- **7Ni.05** Use knowledge of tests of divisibility to find factors of numbers greater than 100.
- **7Ni.06** Understand the relationship between squares and corresponding square roots, and cubes and corresponding cube roots.

Place value, ordering and rounding

- **7Np.01** Use knowledge of place value to multiply and divide whole numbers and decimals by any positive power of 10.
- **7Np.02** Round numbers to a given number of decimal places.

Fractions, decimals, percentages, ratio and proportion

- **7Nf.01** Recognise that fractions, terminating decimals and percentages have equivalent values.
- **7Nf.02** Estimate and add mixed numbers, and write the answer as a mixed number in its simplest form.
- **7Nf.03** Estimate, multiply and divide proper fractions.
- **7Nf.04** Use knowledge of common factors, laws of arithmetic and order of operations to simplify calculations containing decimals or fractions.
- **7Nf.05** Recognise percentages of shapes and whole numbers, including percentages less than 1 or greater than 100.
- **7Nf.06** Understand the relative size of quantities to compare and order decimals and fractions, using the symbols $=$, $\neq$, $>$ and $<$.
- **7Nf.07** Estimate, add and subtract positive and negative numbers with the same or different number of decimal places.
- **7Nf.08** Estimate, multiply and divide decimals by whole numbers.
- **7Nf.09** Understand and use the unitary method to solve problems involving ratio and direct proportion in a range of contexts.
- **7Nf.10** Use knowledge of equivalence to simplify and compare ratios (same units).
- **7Nf.11** Understand how ratios are used to compare quantities to divide an amount into a given ratio with two parts.

Algebra

Expressions, equations and formulae

- **7Ae.01** Understand that letters can be used to represent unknown numbers, variables or constants.
- **7Ae.02** Understand that the laws of arithmetic and order of operations apply to algebraic terms and expressions (four operations).
- **7Ae.03** Understand how to manipulate algebraic expressions including:
 - o collecting like terms
 - o applying the distributive law with a constant.
- **7Ae.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 coefficients).
- **7Ae.05** Understand that a situation can be represented either in words or as a formula (single operation), and move between the two representations.
- **7Ae.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 coefficients, unknown on one side).
- **7Ae.07** Understand that letters can represent an open interval (one term).

Sequences, functions and graphs

- **7As.01** Understand term-to-term rules, and generate sequences from numerical and spatial patterns (linear and integers).
- **7As.02** Understand and describe n th term rules algebraically (in the form $n \pm a$, $a \times n$ where a is a whole number).
- **7As.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 (linear and integers).
- **7As.04** Understand that a situation can be represented either in words or as a linear function in two variables (of the form $y = x + c$ or $y = mx$), and move between the two representations.
- **7As.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 ($y = x + c$ or $y = mx$).
- **7As.06** Recognise straight-line graphs parallel to the x - or y -axis.
- **7As.07** Read and interpret graphs related to rates of change. Explain why they have a specific shape.

Geometry and Measure

Geometrical reasoning, shapes and measurements

- **7Gg.01** Identify, describe and sketch regular polygons, including reference to sides, angles and symmetrical properties.
- **7Gg.02** Understand that if two 2D shapes are congruent, corresponding sides and angles are equal.
- **7Gg.03** Know the parts of a circle:
 - o centre
 - o radius
 - o diameter
 - o circumference
 - o chord
 - o tangent.
- **7Gg.04** Understand the relationships and convert between metric units of area, including hectares (ha), square metres (m²), square centimetres (cm²) and square millimetres (mm²).
- **7Gg.05** Derive and know the formula for the area of a triangle. Use the formula to calculate the area of triangles and compound shapes made from rectangles and triangles.
- **7Gg.06** Identify and describe the combination of properties that determine a specific 3D shape.
- **7Gg.07** Derive and use a formula for the volume of a cube or cuboid. Use the formula to calculate the volume of compound shapes made from cuboids, in cubic metres (m³), cubic centimetres (cm³) and cubic millimetres (mm³).
- **7Gg.08** Visualise and represent front, side and top view of 3D shapes.
- **7Gg.09** Use knowledge of area, and properties of cubes and cuboids to calculate their surface area.
- **7Gg.10** Identify reflective symmetry and order of rotational symmetry of 2D shapes and patterns.
- **7Gg.11** Derive the property that the sum of the angles in a quadrilateral is 360°, and use this to calculate missing angles.
- **7Gg.12** Know that the sum of the angles around a point is 360°, and use this to calculate missing angles.
- **7Gg.13** Recognise the properties of angles on:
 - o parallel lines and transversals
 - o perpendicular lines
 - o intersecting lines.
- **7Gg.14** Draw parallel and perpendicular lines, and quadrilaterals.

Position and transformation

- **7Gp.01** Use knowledge of scaling to interpret maps and plans.
- **7Gp.02** Use knowledge of 2D shapes and coordinates to find the distance between two coordinates that have the same x or y coordinate (without the aid of a grid).
- **7Gp.03** Use knowledge of translation of 2D shapes to identify the corresponding points between the original and the translated image, without the use of a grid.
- **7Gp.04** Reflect 2D shapes on coordinate grids, in a given mirror line (x - or y -axis), recognising that the image is congruent to the object after a reflection.
- **7Gp.05** Rotate shapes 90° and 180° around a centre of rotation, recognising that the image is congruent to the object after a rotation.
- **7Gp.06** Understand that the image is mathematically similar to the object after enlargement. Use positive integer scale factors to perform and identify enlargements.

Statistics and Probability

Statistics

- **7Ss.01** Select and trial 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).
- **7Ss.02** Understand the effect of sample size on data collection and analysis.
- **7Ss.03** Record, organise and represent categorical, discrete and continuous data. Choose and explain which representation to use in a given situation:
 - o Venn and Carroll diagrams
 - o tally charts, frequency tables and two-way tables
 - o dual and compound bar charts
 - o waffle diagrams and pie charts
 - o frequency diagrams for continuous data
 - o line graphs
 - o scatter graphs
 - o infographics.
- **7Ss.04** Use knowledge of mode, median, mean and range to describe and summarise large data sets. Choose and explain which one is the most appropriate for the context.
- **7Ss.05** Interpret data, identifying patterns, within and between data sets, to answer statistical questions. Discuss conclusions, considering the sources of variation, including sampling, and check predictions.

Probability

- **7Sp.01** Use the language associated with probability and proportion to describe, compare, order and interpret the likelihood of outcomes.
- **7Sp.02** Understand and explain that probabilities range from 0 to 1, and can be represented as proper fractions, decimals and percentages.
- **7Sp.03** Identify all the possible mutually exclusive outcomes of a single event, and recognise when they are equally likely to happen.
- **7Sp.04** Understand how to find the theoretical probabilities of equally likely outcomes.
- **7Sp.05** Design and conduct chance experiments or simulations, using small and large numbers of trials. Analyse the frequency of outcomes to calculate experimental probabilities.