

MATHEMATICS – MANDATORY

By the end of Stage 4, students use mathematical terminology, algebraic notation, diagrams, text and tables to communicate mathematical ideas, and link concepts and processes within and between mathematical contexts. They apply their mathematical knowledge, skills and understanding in analysing real-life situations and in systematically exploring and solving problems using technology where appropriate. Students develop fluency with a range of algebraic techniques and in the solution of familiar problems. In solving particular problems, they compare the strengths and weaknesses of different strategies and solutions.

Students develop a range of mental strategies to enhance their computational skills. They operate competently with integers, fractions, decimals and percentages, and apply these in a range of practical contexts, including problems related to GST, discounts and profit and loss. Students are familiar with the concepts of ratios and rates, and apply these when solving problems. They investigate divisibility tests, use index notation for numbers with positive integral indices, and explore prime factorisation, squares and cubes, and related square and cube roots, and the concept of irrational numbers.

Extending and generalising number patterns leads students into an understanding of the use of pronumerals and the language of algebra. They simplify algebraic expressions, substitute into algebraic expressions and formulas, and expand and factorise algebraic expressions. Students solve simple linear and quadratic equations. They develop tables of values from linear relationships and illustrate these relationships on the Cartesian plane, with and without the use of digital technologies.

Students calculate the perimeters and areas of a variety of polygons, circles, sectors and simple composite figures, and solve related problems. They calculate the volumes and capacities of right prisms and cylinders, and solve related problems. They convert between units of area and units of volume, and connect units of volume and capacity. Pythagoras' theorem is used to calculate side lengths in right-angled triangles and solve problems in two dimensions. Students calculate time duration and apply their understanding of Australian and world time zones to solve problems.

Knowledge of the properties of two-dimensional geometrical figures, angles, parallel lines, perpendicular lines and congruent figures enables students to apply logical reasoning to solve numerical exercises involving unknown lengths and angles in figures.

Students construct, interpret and compare data displays, including dot plots, stem-and-leaf plots, sector graphs, divided bar graphs, and frequency tables and histograms. In analysing data, they consider both categorical and numerical (discrete and continuous) variables, sampling versus census, and possible misrepresentation of data, and calculate the mean, mode, median and range. Students represent events using Venn diagrams and two-way tables, and calculate the probability of simple and complementary events in single-step chance experiments.