



Mathematics

Essential Learnings by the end of **Year 7**

Learning and assessment focus

Students develop and use their existing understandings of mathematical concepts and processes to solve real-life and abstract problems and issues. They understand that mathematics is a way of thinking, reasoning and working that can be applied to solve problems in a range of real-life and abstract investigations. They recognise the different applications of mathematics in work situations and a range of occupations.

Students use the essential processes of **Ways of working** to develop and demonstrate their **Knowledge and understanding**. They individually and collaboratively plan and conduct mathematical investigations, develop solutions to questions, problems and issues, and challenge the thinking and reasoning of others. They reflect on their learning and transfer their thinking and reasoning to a range of real-life situations.

Students select and use tools and technologies, including information and communication technologies (ICTs), in purposeful ways. They make use of the potential that ICTs provide to inquire, create and communicate within mathematical contexts.

Students demonstrate evidence of their learning over time in relation to the following assessable elements:

- knowledge and understanding
- thinking and reasoning
- communicating
- reflecting.

Ways of working

Students are able to:

- analyse situations to identify mathematical concepts and the relationships between key features and conditions necessary to generate solutions
- pose questions that draw on familiar examples to clarify thinking and support predictions
- plan activities and investigations to explore concepts through selected pathways, and plan strategies to solve mathematical questions, problems and issues
- select and use suitable mental and written computations, estimations, representations and technologies to generate solutions and to check for reasonableness
- develop arguments to justify predictions, inferences, decisions and generalisations from solutions
- evaluate thinking and reasoning, to determine whether mathematical ideas, strategies and procedures have been applied effectively
- communicate thinking and justify reasoning and generalisations, using mathematical language, representations and technologies
- reflect on and identify the contribution of mathematics to their life
- reflect on learning, apply new understandings and identify future applications.

Knowledge and understanding

Number

Numbers, key percentages, common and decimal fractions and a range of strategies are used to generate and solve problems.

- Whole numbers, including positive and negative numbers, and common and decimal fractions can be ordered and compared using a number line.
- Common fractions can be represented as equivalent fractions, decimals and percentages for different purposes
e.g. $\frac{2}{5} = \frac{4}{10} = 0.4 = 40\%$.
- Percentages, rate, ratio and proportion can be used to describe relationships between quantities and to solve problems in practical situations involving money, time and other measures
e.g. if a breakfast drink contains 10% mango juice, 20% pineapple juice, 30% orange juice and the rest is water, how many millilitres of each juice is there in a 2-litre container of the breakfast drink?; find the number of girls in a school as a proportion of the total number of students in the school; for two similar products such as breakfast cereal, determine which is better value by comparing the mass of cereal in each package and the cost.
- Estimation strategies including rounding, and estimates based on powers of 10, assist in checking for reasonableness of calculations involving whole numbers and common and decimal fractions
e.g. 38.25×52.88 rounds to 40×50 , so the answer will be approximately 2000.
- Problems can be interpreted and solved by selecting from the four operations and mental, written and technology-assisted strategies
e.g. find the price of a \$68.00 shirt with 25% discount.
- Financial decisions and transactions are influenced by a range of factors, including value for money, discounts, method of payment, and available income or savings
e.g. interest earned is reduced when savings are spent.
- Budgets and financial records are used to monitor income, savings and spending
e.g. using bank statements and ATM slips to review and manage a personal budget.
- Cashless transactions include the use of cheques, EFTPOS, credit and debit cards, and money orders.

Algebra

Algebraic expressions and equations can be applied to describe equivalence and solve problems.

- Expressions and relationships, including formulas and simple equations, can be demonstrated using words, diagrams, materials and symbols to represent variables
e.g. relate the expression "the perimeter of a rectangle is equal to twice its length plus twice its width" to the corresponding diagram and the formulas $\text{perimeter} = 2 \times \text{length} + 2 \times \text{width}$ or $p = 2 \times l + 2 \times w$; find the perimeter of a rectangle with length 8 cm and width 5 cm.
- Equations and expressions involving addition, subtraction and multiplication can be solved to establish equivalence
e.g. use materials, diagrams and number examples to explain why $(2 \times 6) + (3 \times 6) = 5 \times 6$ and generalises to $(2 \times n) + (3 \times n) = 5 \times n$.
- The order of operations identifies the appropriate sequence of operations used in calculations to obtain solutions
e.g. the order of operations is applied to solve $5 + 4 \times 6 = 29$.
- Tables of values for functions using input–output rules can be constructed and the resulting ordered pairs graphed
e.g. use a rule that explains the relationship between pairs of terms in a sequence to calculate the value of the 12th term of the sequence.

Measurement

Relationships between units of measure and the attributes of length, area, volume, mass, time and angles are used to calculate measures that may contain some error.

- Timetables and duration of events involving both 12- and 24-hour time cycles and Australian time zones can be calculated
e.g. calculate the length of a flight between the east and west coast of Australia, taking into account the time difference.
- Appropriate instruments, technologies and scale are used when exploring measurement of length, area, volume, mass, time and angles where not all of the graduations are numbered
e.g. reading a speedometer between 60 km/h and 70 km/h.
- Relationships exist within the International System (SI) of measures, including between mm, cm, m and km; kg and t; cm^2 and m^2 ; cm^3 and m^3
e.g. a load of mulch has a mass of $2500 \text{ kg} = 2.5 \text{ t}$.
- Relationships between attributes of regular 2D shapes and 3D objects can be used to develop rules that allow perimeter, area and volume to be calculated
e.g. using base area height to find the volume of a triangular prism.
- Measurement involves error, which can be reduced through the selection and use of appropriate instruments and technologies
e.g. if several students use a stopwatch to time a 100 m race, the winner's time is only likely to be accurate to the nearest one-tenth of a second because of different reaction times.
- Estimation strategies are used to identify a reasonable range of values for a measurement
e.g. the liquid left in a partially full 1 L bottle is estimated to the nearest 50 ml.

Chance and data

Probability of events can be calculated from experimental data. Data can be summarised and represented to support inferences and conclusions.

- Events have different likelihoods of occurrence and estimates of probability can be expressed as percentages, common fractions or decimal fractions between 0 and 1
e.g. the likelihood of drawing a red card from a 52-card pack can be represented as 50%, $\frac{1}{2}$ or 0.5.
- Experimental data for chance events can be compared with theoretical probability
e.g. comparing the data gathered from tossing a six-sided dice 50 times with the theoretical probability of how many times the dice would land on a 6.
- Data may be discrete and can be allocated to categories or numbered
e.g. gender is a discrete variable; the numbers of male and female students in a class.
- Data may be continuous and described as distributions of quantities
e.g. growth of a plant; time elapsed.
- Sample data drawn from a given population can be summarised, compared and represented in a variety of ways
e.g. two-way tables; pie charts; bar or line graphs.
- Measures of location such as mean, median and mode, and frequency and relative frequency, can be used to explore distributions of sample data
e.g. the mean is the averaged daily water consumption for the school across a period of days; the median is the middle value of the ordered daily water consumption; the mode is the most common daily water consumption level; relative frequency is the chance of landing on red when using a spinner with four equal sectors that are coloured differently.
- Variation and possible causes of bias can be identified in data collections
e.g. the method of collection may exclude possible participants; the personal opinions of participants may obscure data collection.

Space

Geometric conventions can be used to classify, represent and manipulate geometric shapes.

Mapping conventions can be applied in the construction and use of maps and plans.

- Geometric conventions, including length, angle size and relationships between faces, are used to classify 2D shapes and 3D objects, including part and composite shapes
e.g. isosceles triangles have two equal sides and two equal base angles.
- 2D shapes can be sketched or accurately represented, using drawing instruments and software, to reflect their geometric properties
e.g. using a pair of compasses and a straight edge, or geometry software, to draw a plan for a kite.
- 3D objects can be constructed from plans, nets and isometric diagrams
e.g. constructing a model of the buildings in a street using multi-link cubes.
- Congruent shapes are the same shape and size and can be superimposed on one another through a sequence of transformations, involving reflections, rotations and translations
e.g. constructing a mosaic pattern from a plan drawn to scale.
- Points, lines and planes of symmetry can be identified in shapes and objects and can be related to transformations and tessellations of suitable shapes in the plane
e.g. the plane containing the Equator on a globe of the Earth; the application of symmetry in the construction of an origami design.
- Maps and plans can be constructed and interpreted to identify a specific location, to plan movement from one location to another, and to calculate distance between locations
e.g. planning a holiday route to travel from one city to another.
- Mapping conventions, including coordinates, compass points and scale, are used to specify and identify locations on maps and plans
e.g. applying coordinates, compass points and scale when orienteering.