



Mathematics

Essential Learnings by the end of Year 5

Learning and assessment focus

Students use their existing understandings of mathematical concepts and processes to identify mathematics in a range of real-life situations. They understand that mathematics is a way of thinking, reasoning and working, and they construct new knowledge by engaging in a range of purposeful mathematical activities and investigations. They are aware that people of all ages and backgrounds engage in work related to mathematics.

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 activities and investigations, and develop solutions to questions, issues and problems. They reflect on their learning and are able to transfer their thinking and reasoning to a range of everyday situations.

Students select and use tools and technologies, including information and communication technologies (ICTs), in purposeful ways. They use ICTs as an integral component of their learning, 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:

- identify and describe the mathematical concepts, strategies and procedures required to generate solutions
- pose questions and make predictions based on experience in similar situations
- plan activities and investigations to explore concepts, pathways and strategies and solve mathematical questions, issues and problems
- identify and use mental and written computations, estimations, representations and technologies to generate solutions and check for reasonableness of solutions
- make statements, predictions, inferences and decisions based on mathematical interpretations
- evaluate their own thinking and reasoning, in relation to the application of mathematical ideas, strategies and procedures
- communicate and justify thinking and reasoning, using everyday and mathematical language, concrete materials, visual representations and technologies
- reflect on mathematics and identify the contribution of mathematics to personal activities
- reflect on learning to identify new understandings and future applications.

Knowledge and understanding

Number

Whole numbers, simple and decimal fractions and a range of strategies are used to solve problems.

- Whole numbers (to 9999), decimal fractions (to at least hundredths), and common and mixed fractions have positions on a number line.
- Place value of digits in whole numbers and decimal fractions changes when they are multiplied and divided by 10 and 100
e.g. use a calculator to multiply 1.6 repeatedly by 10, record each change on a place value chart and describe the pattern of change.
- Common and mixed fractions involving denominators to tenths can be represented as a collection of objects, on number lines and as parts of measure to solve problems
e.g. if a quarter of a game is 20 minutes long, how long is the game?
- Equivalent fractions have easily related denominators that are used to assist mental calculations
*e.g. $\frac{1}{2} = \frac{2}{4}$
 $\frac{1}{3} = \frac{2}{6}$*
- Whole numbers (to thousands) and decimal fractions (to hundredths) can be calculated using addition and subtraction.
- Whole numbers can be multiplied and divided by whole numbers to 10.
- Whole numbers have factors, prime numbers have only two distinct factors and composite numbers have more than two factors
e.g. 1, 2, 3, 4, 6, 8, 12 and 24 are factors of 24; 1 and 7 are the only factors of 7.
- Problems can be made manageable by using strategies involving estimation, inverse operations, doubles, double doubles and halving
e.g. use 23×7 to check $161 \div 7$.
- Financial records and simple spending and saving plans are ways to check on available money and income
e.g. record incoming and outgoing money to help monitor the budget for a class cooking project.
- Money can be saved and borrowed, and interest and fees may apply
e.g. interest applies to money that is borrowed to purchase a house.

Algebra

Patterns and relationships can be identified, described and applied with the conventions of the four operations.

- Simple relationships are used to predict results of change
e.g. changes in perimeter occur when the length of the sides increases.
- Patterns in space and number, and relationships between quantities, including equivalence, can be represented using concrete and pictorial materials, lists, tables and graphs
e.g. represent the relationship between side and perimeter of squares in tables, pictures and graphs.
- Rules can be developed to interpret a pattern and predict further elements
e.g. identify the relationship between the numbers 0, 1, 1, 2, 3, 5, 8 in order to continue the sequence.
- Generalisations associated with the four operations are built upon commutative, associative and distributive properties and inverse operations
*e.g. commutative: $7 \times 4 \times 5$ is the same as $4 \times 5 \times 7$
 associative: $2 \times (3 \times 4)$ is the same as $(2 \times 3) \times 4$
 distributive: $2(3 + 4)$ is the same as $2 \times 3 + 2 \times 4$
 inverse: 23×7 is used to check $161 \div 7$.*

Measurement

Length, area, volume, mass, time and angles can be estimated, measured and ordered, using standard and non-standard units of measure.

- Analogue and digital clocks can be used to read time to the nearest minute.
- Timelines, clocks, calendars and timetables are used to sequence, schedule and calculate timed events
e.g. use a calendar to calculate the number of school days until holidays.
- Standard units, including centimetre, metre, square centimetre, square metre, gram, kilogram, minute, degree, millilitre and litre, and a range of instruments are used to measure and order attributes of objects, including length, area, volume, mass, time, and angles
e.g. use a protractor to measure the angles within a triangle.
- Links exist between different ways of recording the same measurement
e.g. $100 \text{ cm} = 1 \text{ m}$, $1000 \text{ mm} = 1 \text{ m}$.
- Reasonable estimates can be made using strategies that suit the situation
e.g. stepping out a backyard cricket pitch; applying a 1 cm grid to estimate area of a square.

Chance and data

Chance events have a range of possible outcomes that can be described using predictions. Data can be collected to support or adjust predictions.

- The likelihood of outcomes of events involving chance can be described using terms including “likely”, “more likely”, “most unlikely” and “never”.
- Data collected from experiments or observations can be organised in tables and graphs and used to respond to questions about the likelihood of possible outcomes of events
e.g. record 100 tosses of two dice to predict the likelihood of rolling two sixes to begin a game.
- Collected data can be used to justify statements and predictions
e.g. using data to justify a prediction about children’s views compared with adults’ views on the same television show.
- Sets of data may contain expected or unexpected variation, and this may mean that additional data are needed
e.g. variation in the time it takes to get to school during peak and off-peak times.

Space

Geometric features are used to group shapes and guide the accuracy of representation of 2D shapes and 3D objects. Mapping conventions apply to the structure and use of maps and plans.

- Geometric features, including parallel and perpendicular lines, acute, right, obtuse and reflex angles, and vertex, edge and base, can be used to sort shapes and objects into broad family groups
e.g. group quadrilaterals based on their features.
- Defining features, including edges, angle sizes and parallel lines, are used to make accurate representations of 2D shapes and 3D objects.
- 3D objects can be visualised or constructed using nets
e.g. accurately construct a square-based or triangular-based pyramid, using a base and triangular side (lateral) faces.
- Symmetry and transformations involving flips, slides, turns, enlargements and reductions provide a basis for creating patterns, designs and tessellations
e.g. use of parquetry pattern in tiling.
- Mapping conventions, including symbols, scales, legends and alphanumeric grids, are used to represent and interpret movements and to identify locations on maps and plans
e.g. using the north symbol (↑N) and a scale of 1 cm represents 10 m on a street map.
- Mapping conventions, including the four major compass points, are used to give direction and movement and can be linked to turns
e.g. descriptions for locations of treasures on a "scavenger map" could include the idea that a half-turn from facing north is facing south.