

**Rationale**

Learning mathematics creates opportunities for and enriches the lives of all Australians. The Australian Curriculum: Mathematics provides students with essential mathematical skills and knowledge in *Number and Algebra*, *Measurement and Geometry*, and *Statistics and Probability*. It develops the numeracy capabilities that all students need in their personal, work and civic life, and provides the fundamentals on which mathematical specialties and professional applications of mathematics are built.

Mathematics has its own value and beauty and the Australian Curriculum: Mathematics aims to instil in students an appreciation of the elegance and power of mathematical reasoning.

Mathematical ideas have evolved across all cultures over thousands of years, and are constantly developing. Digital technologies are facilitating this expansion of ideas and providing access to new tools for continuing mathematical exploration and invention. The curriculum focuses on developing increasingly sophisticated and refined mathematical understanding, fluency, reasoning and problem-solving skills. These capabilities enable students to respond to familiar and unfamiliar situations by employing mathematical strategies to make informed decisions and solve problems efficiently.

The Australian Curriculum: Mathematics ensures that the links between the various components of mathematics, as well as the relationship between mathematics and other disciplines, are made clear. Mathematics is composed of multiple but interrelated and interdependent concepts and systems which students apply beyond the mathematics classroom. In science, for example, understanding sources of error and their impact on the confidence of conclusions is vital, as is the use of mathematical models in other disciplines. In geography, interpretation of data underpins the study of human populations and their physical environments; in history, students need to be able to imagine timelines and time frames to reconcile related events; and in English, deriving quantitative and spatial information is an important aspect of making meaning of texts.

The curriculum anticipates that schools will ensure all students benefit from access to the power of mathematical reasoning and learn to apply their mathematical understanding creatively and efficiently. The mathematics curriculum provides students with carefully paced, in-depth study of critical skills and concepts. It encourages teachers to help students become self-motivated, confident learners through inquiry and active participation in challenging and engaging experiences.

**Year 5 Achievement Standard**

By the end of Year 5, students solve simple problems involving the four operations using a range of strategies. They check the reasonableness of answers using estimation and rounding. Students identify and describe factors and multiples. They identify and explain strategies for finding unknown quantities in number sentences involving the four operations. They explain plans for simple budgets. Students connect three-dimensional objects with their two-dimensional representations. They describe transformations of two-dimensional shapes and identify line and rotational symmetry. Students interpret different data sets.

Students order decimals and unit fractions and locate them on number lines. They add and subtract fractions with the same denominator. Students continue patterns by adding and subtracting fractions and decimals. They use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles. They convert between 12- and 24-hour time. Students use a grid reference system to locate landmarks. They measure and construct different angles. Students list outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1. Students pose questions to gather data, and construct data displays appropriate for the data.

**Aims**

The Australian Curriculum: Mathematics aims to ensure that students:

- are confident, creative users and communicators of mathematics, able to investigate, represent and interpret situations in their personal and work lives and as active citizens
- develop an increasingly sophisticated understanding of mathematical concepts and fluency with processes, and are able to pose and solve problems and reason in *Number and Algebra*, *Measurement and Geometry*, and *Statistics and Probability*
- recognise connections between the areas of mathematics and other disciplines and appreciate mathematics as an accessible and enjoyable discipline to study.

**Key Ideas**

In Mathematics, the key ideas are the proficiency strands of understanding, fluency, problem-solving and reasoning. The proficiency strands describe the actions in which students can engage when learning and using the content. While not all proficiency strands apply to every content description, they indicate the breadth of mathematical actions that teachers can emphasise.

**Understanding**

Students build a robust knowledge of adaptable and transferable mathematical concepts. They make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they connect related ideas, when they represent concepts in different ways, when they identify commonalities and differences between aspects of content, when they describe their thinking mathematically and when they interpret mathematical information.

**Fluency**

Students develop skills in choosing appropriate procedures, carrying out procedures flexibly, accurately, efficiently and appropriately, and recalling factual knowledge and concepts readily. Students are fluent when they calculate answers efficiently, when they recognise robust ways of answering questions, when they choose appropriate methods and approximations, when they recall definitions and regularly use facts, and when they can manipulate expressions and equations to find solutions.

**Problem Solving**

Students develop the ability to make choices, interpret, formulate, model and investigate problem situations, and communicate solutions effectively. Students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions, and when they verify that their answers are reasonable.

**Reasoning**

Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising. Students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false and when they compare and contrast related ideas and explain their choices.

**Year 5 Level Description**

The proficiency strands **Understanding, Fluency, Problem Solving and Reasoning** are an integral part of mathematics content across the three content strands: **Number and Algebra, Measurement and Geometry, and Statistics and Probability**. The proficiencies reinforce the significance of working mathematically within the content and describe how the content is explored or developed. They provide the language to build in the developmental aspects of the learning of mathematics. The achievement standards reflect the content and encompass the proficiencies.

**At this year level:**

**Understanding** includes making connections between representations of numbers, using fractions to represent probabilities, comparing and ordering fractions and decimals and representing them in various ways, describing transformations and identifying line and rotational symmetry

**Fluency** includes choosing appropriate units of measurement for calculation of perimeter and area, using estimation to check the reasonableness of answers to calculations and using instruments to measure angles

**Problem Solving** includes formulating and solving authentic problems using whole numbers and measurements and creating financial plans

**Reasoning** includes investigating strategies to perform calculations efficiently, continuing patterns involving fractions and decimals, interpreting results of chance experiments, posing appropriate questions for data investigations and interpreting data sets.

**Year 5 Content Descriptions****Number and Algebra****Number and place value**

Identify and describe factors and multiples of whole numbers and use them to solve problems. Use estimation and rounding to check the reasonableness of answers to calculations. Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies. Solve problems involving division by a one digit number, including those that result in a remainder. Use efficient mental and written strategies and apply appropriate digital technologies to solve problems.

**Fractions and decimals**

Compare and order common unit fractions and locate and represent them on a number line. Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator. Recognise that the place value system can be extended beyond hundredths. Compare, order and represent decimals.

**Money and financial mathematics**

Create simple financial plans.

**Patterns and algebra**

Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction.

Find unknown quantities in number sentences involving multiplication and division and identify equivalent number sentences involving multiplication and division.

**Measurement and Geometry****Using units of measurement**

Choose appropriate units of measurement for length, area, volume, capacity and mass.

Calculate the perimeter and area of rectangles using familiar metric units.

Compare 12- and 24-hour time systems and convert between them.

**Shape**

Connect three-dimensional objects with their nets and other two-dimensional representations.

**Location and transformation**

Use a grid reference system to describe locations. Describe routes using landmarks and directional language.

Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries.

Apply the enlargement transformation to familiar two dimensional shapes and explore the properties of the resulting image compared with the original.

**Geometric reasoning**

Estimate, measure and compare angles using degrees. Construct angles using a protractor.

**Statistics and Probability****Chance**

List outcomes of chance experiments involving equally likely outcomes and represent probabilities of those outcomes using fractions. Recognise that probabilities range from 0 to 1.

**Data representation and interpretation**

Pose questions and collect categorical or numerical data by observation or survey.

Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies.

Describe and interpret different data sets in context.