# The Australian Curriculum

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| **Subjects** | Mathematics |
| **Year levels** | Year 9 |

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# Year 9 Content Descriptions

## Number and Algebra

### Real numbers

Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208 - Scootle)

Elaborations

identifying direct proportion in real-life contexts

Apply index laws to numerical expressions with integer indices (ACMNA209 - Scootle)

Elaborations

simplifying and evaluating numerical expressions, using involving both positive and negative integer indices

Express numbers in scientific notation (ACMNA210 - Scootle)

Elaborations

representing extremely large and small numbers in scientific notation, and numbers expressed in scientific notation as whole numbers or decimals

### Money and financial mathematics

Solve problems involving simple interest (ACMNA211 - Scootle)

Elaborations

understanding that financial decisions can be assisted by mathematical calculations

## Patterns and algebra

Extend and apply the index laws to variables, using positive integer indices and the zero index (ACMNA212 - Scootle)

Elaborations

understanding that index laws apply to variables as well as numbers

Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate (ACMNA213 - Scootle)

Elaborations

understanding that the distributive law can be applied to algebraic expressions as well as numbers

understanding the relationship between expansion and factorisation and identifying algebraic factors in algebraic expressions

## Linear and non-linear relationships

Find the distance between two points located on the Cartesian plane using a range of strategies, including graphing software (ACMNA214 - Scootle)

Elaborations

investigating graphical and algebraic techniques for finding distance between two points

using Pythagoras' theorem to calculate distance between two points

Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software (ACMNA294 - Scootle)

Elaborations

investigating graphical and algebraic techniques for finding midpoint and gradient

recognising that the gradient of a line is the same as the gradient of any line segment on that line

Sketch linear graphs using the coordinates of two points and solve linear equations (ACMNA215 - Scootle)

Elaborations

determining linear rules from suitable diagrams, tables of values and graphs and describing them using both words and algebra

Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations (ACMNA296 - Scootle)

Elaborations

graphing parabolas, and circles connecting x-intercepts of a graph to a related equation

## Measurement and Geometry

### Using units of measurement

Calculate areas of composite shapes (ACMMG216 - Scootle)

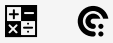
Elaborations

understanding that partitioning composite shapes into rectangles and triangles is a strategy for solving problems involving area

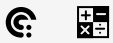
Calculate the surface area and volume of cylinders and solve related problems (ACMMG217 - Scootle)

Elaborations

analysing nets of cylinders to establish formulas for surface area



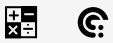
connecting the volume and capacity of a cylinder to solve authentic problems



Solve problems involving the surface area and volume of right prisms (ACMMG218 - Scootle)

Elaborations

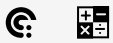
solving practical problems involving surface area and volume of right prisms



Investigate very small and very large time scales and intervals (ACMMG219 - Scootle)

Elaborations

investigating the usefulness of scientific notation in representing very large and very small numbers



**Geometric reasoning**

Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar (ACMMG220 - Scootle)

Elaborations

establishing the conditions for similarity of two triangles and comparing this to the conditions for congruence

using the properties of similarity and ratio, and correct mathematical notation and language, to solve problems involving enlargement (for example, scale diagrams)

using the enlargement transformation to establish similarity, understanding that similarity and congruence help describe relationships between geometrical shapes and are important elements of reasoning and proof

Solve problems using ratio and scale factors in similar figures (ACMMG221 - Scootle)

Elaborations

establishing the relationship between areas of similar figures and the ratio of corresponding sides (scale factor)

## Pythagoras and trigonometry

Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles (ACMMG222 - Scootle)

Elaborations

understanding that Pythagoras' Theorem is a useful tool in determining unknown lengths in right-angled triangles and has widespread applications

recognising that right-angled triangle calculations may generate results that can be integers, fractions or irrational numbers

Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles (ACMMG223 - Scootle)

Elaborations

developing understanding of the relationship between the corresponding sides of similar right-angled triangles

Apply trigonometry to solve right-angled triangle problems (ACMMG224 - Scootle)

Elaborations

understanding the terms 'adjacent' and 'opposite' sides in a right-angled triangle

selecting and accurately using the correct trigonometric ratio to find unknown sides (adjacent, opposite and hypotenuse) and angles in right-angled triangles

## Statistics and Probability

### Chance

List all outcomes for two-step chance experiments, both with and without replacement using tree diagrams or arrays. Assign probabilities to outcomes and determine probabilities for events (ACMSP225 - Scootle)

Elaborations

conducting two-step chance experiments

using systematic methods to list outcomes of experiments and to list outcomes favourable to an event

comparing experiments which differ only by being undertaken with replacement or without replacement

Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or' (ACMSP226 - Scootle)

Elaborations

using Venn diagrams or two-way tables to calculate relative frequencies of events involving ‘and’, ‘or’ questions

using relative frequencies to find an estimate of probabilities of ‘and’, ‘or’ events

Investigate reports of surveys in digital media and elsewhere for information on how data were obtained

to estimate population means and medians (ACMSP227 - Scootle)

Elaborations

investigating a range of data and its sources, for example the age of residents in Australia, Cambodia and Tonga; the number of subjects studied at school in a year by 14-year-old students in Australia, Japan and Timor-Leste

**Data representation and interpretation**

Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources (ACMSP228 - Scootle)

Elaborations

comparing the annual rainfall in various parts of Australia, Pakistan, New Guinea and Malaysia

Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including ‘skewed’, ‘symmetric’ and ‘bi modal’ (ACMSP282 - Scootle)

Elaborations

using stem-and-leaf plots to compare two like sets of data such as the heights of girls and the heights of boys in a class

describing the shape of the distribution of data using terms such as ‘positive skew’, ‘negative skew’ and 'symmetric' and 'bi-modal'

Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread (ACMSP283 - Scootle)

Elaborations

comparing means, medians and ranges of two sets of numerical data which have been displayed using histograms, dot plots, or stem and leaf plots