

The Australian Curriculum Mathematics

Statistics and probability

Measurement and geometry

Number and algebra

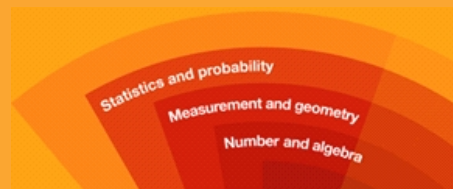


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Year 8

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.

At this year level:





Understanding includes describing patterns involving indices and recurring decimals, identifying commonalities between operations with algebra and arithmetic, connecting rules for linear relations their graphs, explaining the purpose of statistical measures, and explaining measurements of perimeter and area









Fluency includes calculating accurately with simple decimals, indices and integers, recognising equivalence of common decimals and fractions including recurring decimals, factorising and simplifying basic algebraic expressions, and evaluating perimeters, areas of common shapes and their volumes and three dimensional objects

Problem Solving includes formulating, and modelling practical situations involving ratios, profit and loss, areas and perimeters of common shapes, and using two-way tables and Venn diagrams to calculate probabilities

Reasoning includes justifying the result of a calculation or estimation as reasonable, deriving probability from its complement, using congruence to deduce properties of triangles, finding estimates of means and proportions of populations

Number and Algebra

Number and place value	Elaborations
Use index notation with numbers to establish the index laws with positive integral indices and the zero index (ACMNA182) 	<ul style="list-style-type: none"> evaluating numbers expressed as powers of positive integers
Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183) 	<ul style="list-style-type: none"> using patterns to assist in finding rules for the multiplication and division of integers using the number line to develop strategies for adding and subtracting rational numbers
Real numbers	Elaborations
Investigate terminating and recurring decimals (ACMNA184) 	<ul style="list-style-type: none"> recognising terminating, recurring and non-terminating decimals and choosing their appropriate representations
Investigate the concept of irrational numbers, including π (ACMNA186) 	<ul style="list-style-type: none"> understanding that the real number system includes irrational numbers

Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies (ACMNA187)	<ul style="list-style-type: none"> • using percentages to solve problems, including those involving mark-ups, discounts, and GST • using percentages to calculate population increases and decreases
	
Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188)	<ul style="list-style-type: none"> • understanding that rate and ratio problems can be solved using fractions or percentages and choosing the most efficient form to solve a particular problem • calculating population growth rates in Australia and Asia and explaining their difference
	
Money and financial mathematics	Elaborations
Solve problems involving profit and loss, with and without digital technologies (ACMNA189)	<ul style="list-style-type: none"> • expressing profit and loss as a percentage of cost or selling price, comparing the difference • investigating the methods used in retail stores to express discounts
	
Patterns and algebra	Elaborations
Extend and apply the distributive law to the expansion of algebraic expressions (ACMNA190)	<ul style="list-style-type: none"> • applying the distributive law to the expansion of algebraic expressions using strategies such as the area model
	
Factorise algebraic expressions by identifying numerical factors (ACMNA191)	<ul style="list-style-type: none"> • recognising the relationship between factorising and expanding • identifying the greatest common divisor (highest common factor) of numeric and algebraic expressions and using a range of strategies to factorise algebraic expressions
	
Simplify algebraic expressions involving the four operations (ACMNA192)	<ul style="list-style-type: none"> • understanding that the laws used with numbers can also be used with algebra
	
Linear and non-linear relationships	Elaborations
Plot linear relationships on the Cartesian plane with and without the use of digital technologies (ACMNA193)	<ul style="list-style-type: none"> • completing a table of values, plotting the resulting points and determining whether the relationship is linear • finding the rule for a linear relationship
	
Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution (ACMNA194)	<ul style="list-style-type: none"> • solving real life problems by using variables to represent unknowns
	
Measurement and Geometry	
Using units of measurement	Elaborations

Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195)



- choosing units for area including mm², cm², m², hectares, km², and units for volume including mm³, cm³, m³
- recognising that the conversion factors for area units are the squares of those for the corresponding linear units
- recognising that the conversion factors for volume units are the cubes of those for the corresponding linear units

Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites (ACMMG196)



- establishing and using formulas for areas such as trapeziums, rhombuses and kites

Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area (ACMMG197)



- investigating the circumference and area of circles with materials or by measuring, to establish an understanding of formulas
- investigating the area of circles using a square grid or by rearranging a circle divided into sectors

Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (ACMMG198)



- investigating the relationship between volumes of rectangular and triangular prisms

Solve problems involving duration, including using 12- and 24-hour time within a single time zone (ACMMG199)



- identifying regions in Australia and countries in Asia that are in the same time zone

Geometric reasoning

Elaborations

Define congruence of plane shapes using transformations (ACMMG200)



- understanding the properties that determine congruence of triangles and recognising which transformations create congruent figures
- establishing that two figures are congruent if one shape lies exactly on top of the other after one or more transformations (translation, reflection, rotation), and recognising that the matching sides and the matching angles are equal

Develop the conditions for congruence of triangles (ACMMG201)



- investigating the minimal conditions needed for the unique construction of triangles, leading to the establishment of the conditions for congruence (SSS, SAS, ASA and RHS)
- solving problems using the properties of congruent figures
- constructing triangles using the conditions for congruence

Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (ACMMG202)



- establishing the properties of squares, rectangles, parallelograms, rhombuses, trapeziums and kites
- identifying properties related to side lengths, parallel sides, angles, diagonals and symmetry

Statistics and Probability

Chance

Elaborations

Identify complementary events and use the sum of probabilities to solve problems (ACMSP204)



- identifying the complement of familiar events
- understanding that probabilities range between 0 to 1 and that calculating the probability of an event allows the probability of its complement to be found

Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'. (ACMSP205)



- posing 'and', 'or' and 'not' probability questions about objects or people

Represent events in two-way tables and Venn diagrams and solve related problems (ACMSP292)



- using Venn diagrams and two-way tables to calculate probabilities for events, satisfying 'and', 'or' and 'not' conditions
- understanding that representing data in Venn diagrams or two-way tables facilitates the calculation of probabilities
- collecting data to answer the questions using Venn diagrams or two-way tables

Data representation and interpretation

Elaborations

Investigate techniques for collecting data, including census, sampling and observation (ACMSP284)



- identifying situations where data can be collected by census and those where a sample is appropriate

Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (ACMSP206)



- investigating the uses of random sampling to collect data

Explore the variation of means and proportions of random samples drawn from the same population (ACMSP293)



- using sample properties to predict characteristics of the population

Investigate the effect of individual data values, including outliers, on the mean and median (ACMSP207)



- using displays of data to explore and investigate effects

Year 8 achievement standard

By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.

Students use efficient mental and written strategies to carry out the four operations with integers. They simplify a variety of algebraic expressions. They solve linear equations and graph linear relationships on the Cartesian plane. Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine complementary events and calculate the sum of probabilities.

	Foundation Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Number and Algebra	Number and place value	<p>Establish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point</p> <p>Connect number names, numerals and quantities, including zero, initially up to 10 and then beyond</p> <p>Subitise small collections of objects</p> <p>Represent practical situations to model addition and sharing</p> <p>Compare, order and make correspondences between collections, initially to 20, and explain reasoning</p>	<p>Develop confidence with number sequences to and from 100 by ones from any starting point. Skip count by twos, fives and tens starting from zero</p> <p>Recognise, model, read, write and order numbers to at least 100. Locate these numbers on a number line</p> <p>Count collections to 100 by partitioning numbers using place value</p> <p>Represent and solve simple addition and subtraction problems using a range of strategies including counting on, partitioning and rearranging parts</p>	<p>Investigate number sequences, initially those increasing and decreasing by twos, threes, fives and ten from any starting point, then moving to other sequences.</p> <p>Recognise, model, represent and order numbers to at least 1000</p> <p>Group, partition and rearrange collections up to 1000 in hundreds, tens and ones to facilitate more efficient counting</p> <p>Explore the connection between addition and subtraction</p> <p>Solve simple addition and subtraction problems using a range of efficient mental and written strategies</p> <p>Recognise and represent multiplication as repeated addition, groups and arrays</p> <p>Recognise and represent division as grouping into equal sets and solve simple problems using these representations</p>	<p>Investigate the conditions required for a number to be odd or even and identify odd and even numbers</p> <p>Recognise, model, represent and order numbers to at least 10 000</p> <p>Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems</p> <p>Recognise and explain the connection between addition and subtraction</p> <p>Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation</p> <p>Recall multiplication facts of two, three, five and ten and related division facts</p> <p>Represent and solve problems involving multiplication using efficient mental and written strategies and appropriate digital technologies</p>	<p>Recall multiplication facts up to 10×10 and related division facts</p> <p>Investigate and use the properties of odd and even numbers</p> <p>Recognise, represent and order numbers to at least tens of thousands</p> <p>Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems</p> <p>Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9</p> <p>Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder</p>	<p>Identify and describe factors and multiples of whole numbers and use them to solve problems</p> <p>Use estimation and rounding to check the reasonableness of answers to calculations</p> <p>Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies</p> <p>Solve problems involving division by a one digit number, including those that result in a remainder</p> <p>Use efficient mental and written strategies and apply appropriate digital technologies to solve problems</p>	<p>Identify and describe properties of prime, composite, square and triangular numbers</p> <p>Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers</p> <p>Investigate everyday situations that use integers. Locate and represent these numbers on a number line</p>
	Fractions and decimals		<p>Recognise and describe one-half as one of two equal parts of a whole.</p>	<p>Recognise and interpret common uses of halves, quarters and eighths of shapes and collections</p>	<p>Model and represent unit fractions including $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$ and their multiples to a complete whole</p>	<p>Investigate equivalent fractions used in contexts</p> <p>Count by quarters halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line</p> <p>Recognise that the place value system can be extended to tenths and hundredths. Make connections between fractions and decimal notation</p>	<p>Compare and order common unit fractions and locate and represent them on a number line</p> <p>Investigate strategies to solve problems involving addition and subtraction of fractions with the same denominator</p> <p>Recognise that the place value system can be extended beyond hundredths</p> <p>Compare, order and represent decimals</p>	<p>Compare fractions with related denominators and locate and represent them on a number line</p> <p>Solve problems involving addition and subtraction of fractions with the same or related denominators</p> <p>Find a simple fraction of a quantity where the result is a whole number, with and without digital technologies</p> <p>Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers</p> <p>Multiply decimals by whole numbers and perform divisions by non-zero whole numbers where the results are terminating decimals, with and without digital technologies</p> <p>Multiply and divide decimals by powers of 10</p> <p>Make connections between equivalent fractions, decimals and percentages</p>
	Real numbers	This sequence ends at Year 7						

		Year 6	Year 7	Year 8	Year 9	Year 10	Year 10 A	
Number and Algebra	Number and place value	<p>Identify and describe properties of prime, composite, square and triangular numbers</p> <p>Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers</p> <p>Investigate everyday situations that use positive and negative whole numbers and zero. Locate and represent these numbers on a number line</p>	<p>Investigate index notation and represent whole numbers as products of powers of prime numbers</p> <p>Investigate and use square roots of perfect square numbers</p> <p>Apply the associative, commutative and distributive laws to aid mental and written computation</p> <p>Compare, order, add and subtract integers</p>	<p>Use index notation with numbers to establish the index laws with positive integral indices and the zero index</p> <p>Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies</p>	This sequence ends at this year level			
	Fractions and decimals	<p>Compare fractions with related denominators and locate and represent them on a number line</p> <p>Solve problems involving addition and subtraction of fractions with the same or related denominators</p> <p>Find a simple fraction of a quantity where the result is a whole number, with and without digital technologies</p> <p>Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers</p> <p>Multiply decimals by whole numbers and perform divisions that result in terminating decimals, with and without digital technologies</p> <p>Multiply and divide decimals by powers of 10</p> <p>Make connections between equivalent fractions, decimals and percentages</p>	This sequence ends at Year 6					
	Real numbers	This sequence starts at Year 7	<p>Compare fractions using equivalence. Locate and represent positive and negative fractions and mixed numbers on a number line</p> <p>Solve problems involving addition and subtraction of fractions, including those with unrelated denominators</p> <p>Multiply and divide fractions and decimals using efficient written strategies and digital technologies</p> <p>Express one quantity as a fraction of another, with and without the use of digital technologies</p> <p>Round decimals to a specified number of decimal places</p> <p>Connect fractions, decimals and percentages and carry out simple conversions</p> <p>Find percentages of quantities and express one quantity as a percentage of another, with and without digital technologies.</p> <p>Recognise and solve problems involving simple ratios</p>	<p>Investigate terminating and recurring decimals</p> <p>Investigate the concept of irrational numbers, including π</p> <p>Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies</p> <p>Solve a range of problems involving rates and ratios, with and without digital technologies</p>	<p>Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems</p> <p>Apply index laws to numerical expressions with integer indices</p> <p>Express numbers in scientific notation</p>	Define rational and irrational numbers and perform operations with surds and fractional indices		Use the definition of a logarithm to establish and apply the laws of logarithms

		Foundation Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Number and Algebra	Money and financial mathematics		Recognise, describe and order Australian coins according to their value	Count and order small collections of Australian coins and notes according to their value	Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents	Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies	Create simple financial plans	Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies
	Patterns and algebra	Sort and classify familiar objects and explain the basis for these classifications. Copy, continue and create patterns with objects and drawings	Investigate and describe number patterns formed by skip counting and patterns with objects	Describe patterns with numbers and identify missing elements Solve problems by using number sentences for addition or subtraction	Describe, continue, and create number patterns resulting from performing addition or subtraction	Explore and describe number patterns resulting from performing multiplication Solve word problems by using number sentences involving multiplication or division where there is no remainder Use equivalent number sentences involving addition and subtraction to find unknown quantities	Describe, continue and create patterns with fractions, decimals and whole numbers resulting from addition and subtraction Use equivalent number sentences involving multiplication and division to find unknown quantities	Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence Explore the use of brackets and order of operations to write number sentences
	Linear and non-linear relationships							

		Year 6	Year 7	Year 8	Year 9	Year 10	Year 10 A
Number and Algebra	Money and financial mathematics	Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies	Investigate and calculate 'best buys', with and without digital technologies	Solve problems involving profit and loss, with and without digital technologies	Solve problems involving simple interest	Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies	
	Patterns and algebra	Continue and create sequences involving whole numbers, fractions and decimals. Describe the rule used to create the sequence Explore the use of brackets and order of operations to write number sentences	Introduce the concept of variables as a way of representing numbers using letters Create algebraic expressions and evaluate them by substituting a given value for each variable Extend and apply the laws and properties of arithmetic to algebraic terms and expressions	Extend and apply the distributive law to the expansion of algebraic expressions Factorise algebraic expressions by identifying numerical factors Simplify algebraic expressions involving the four operations	Extend and apply the index laws to variables, using positive integer indices and the zero index Apply the distributive law to the expansion of algebraic expressions, including binomials, and collect like terms where appropriate	Factorise algebraic expressions by taking out a common algebraic factor Simplify algebraic products and quotients using index laws Apply the four operations to simple algebraic fractions with numerical denominators Expand binomial products and factorise monic quadratic expressions using a variety of strategies Substitute values into formulas to determine an unknown	Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems
	Linear and non-linear relationships	This sequence starts at Year 7	Given coordinates, plot points on the Cartesian plane, and find coordinates for a given point Solve simple linear equations Investigate, interpret and analyse graphs from authentic data	Plot linear relationships on the Cartesian plane with and without the use of digital technologies Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution	Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software Sketch linear graphs using the coordinates of two points and solve linear equations Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations	Find the distance between two points located on a Cartesian plane using a range of strategies, including graphing software Sketch linear graphs using the coordinates of two points and solve linear equations Find the midpoint and gradient of a line segment (interval) on the Cartesian plane using a range of strategies, including graphing software Graph simple non-linear relations with and without the use of digital technologies and solve simple related equations	Solve problems involving linear equations, including those derived from formulas Solve linear inequalities and graph their solutions on a number line Solve linear simultaneous equations, using algebraic and graphical techniques including using digital technology Solve problems involving parallel and perpendicular lines Explore the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate Solve linear equations involving simple algebraic fractions Solve simple quadratic equations using a range of strategies

	Foundation Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
Measurement and Geometry	Using units of measurement	Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language Compare and order the duration of events using the everyday language of time Connect days of the week to familiar events and actions	Measure and compare the lengths and capacities of pairs of objects using uniform informal units Tell time to the half-hour Describe duration using months, weeks, days and hours	Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units Compare masses of objects using balance scales Tell time to the quarter-hour, using the language of 'past' and 'to' Name and order months and seasons Use a calendar to identify the date and determine the number of days in each month	Measure, order and compare objects using familiar metric units of length, mass and capacity Tell time to the minute and investigate the relationship between units of time	Use scaled instruments to measure and compare lengths, masses, capacities and temperatures Convert between units of time Use am and pm notation and solve simple time problems Compare objects using familiar metric units of area and volume	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	Connect decimal representations to the metric system Convert between common metric units of length, mass and capacity Solve problems involving the comparison of lengths and areas using appropriate units Connect volume and capacity and their units of measurement Interpret and use timetables
	Shape	Sort, describe and name familiar two-dimensional shapes and three-dimensional objects in the environment	Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features	Describe and draw two-dimensional shapes, with and without digital technologies Describe the features of three-dimensional objects	Make models of three-dimensional objects and describe key features	Compare the areas of regular and irregular shapes by informal means Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies	Connect three-dimensional objects with their nets and other two-dimensional representations	Construct simple prisms and pyramids
	Location and transformation	Describe position and movement	Give and follow directions to familiar locations	Interpret simple maps of familiar locations and identify the relative positions of key features Investigate the effect of one-step slides and flips with and without digital technologies Identify and describe half and quarter turns	Create and interpret simple grid maps to show position and pathways Identify symmetry in the environment	Use simple scales, legends and directions to interpret information contained in basic maps Create symmetrical patterns, pictures and shapes with and without digital technologies	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	Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies Introduce the Cartesian coordinate system using all four quadrants
	Geometric reasoning	This sequence starts at Year 3			Identify angles as measures of turn and compare angle sizes in everyday situations	Compare angles and classify them as equal to, greater than or less than a right angle	Estimate, measure and compare angles using degrees. Construct angles using a protractor	Investigate, with and without digital technologies, angles on a straight line, angles at a point and vertically opposite angles. Use results to find unknown angles
	Pythagoras and trigonometry	This sequence starts at Year 9						

		Year 6	Year 7	Year 8	Year 9	Year 10	Year 10 A
Measurement and Geometry	Using units of measurement	Connect decimal representations to the metric system Convert between common metric units of length, mass and capacity Solve problems involving the comparison of lengths and areas using appropriate units Connect volume and capacity and their units of measurement Interpret and use timetables	Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving Calculate volumes of rectangular prisms	Choose appropriate units of measurement for area and volume and convert from one unit to another Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume Solve problems involving duration, including using 12- and 24-hour time within a single time zone	Calculate the areas of composite shapes Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites Solve problems involving the surface area and volume of right prisms Investigate very small and very large time scales and intervals	Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids	Solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids
	Shape	Construct simple prisms and pyramids	Draw different views of prisms and solids formed from combinations of prisms	This sequence ends at Year 7			
	Location and transformation	Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies Introduce the Cartesian coordinate system using all four quadrants	Describe translations, reflections in an axis, and rotations of multiples of 90° on the Cartesian plane using coordinates. Identify line and rotational symmetries	This sequence ends at Year 7			
	Geometric reasoning	Investigate, with and without digital technologies, angles on a straight line, angles at a point and vertically opposite angles. Use results to find unknown angles	Identify corresponding, alternate and co-interior angles when two straight lines are crossed by a transversal Investigate conditions for two lines to be parallel and solve simple numerical problems using reasoning Classify triangles according to their side and angle properties and describe quadrilaterals Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral	Define congruence of plane shapes using transformations Develop the conditions for congruence of triangles Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning	Use the enlargement transformation to explain similarity and develop the conditions for triangles to be similar Solve problems using ratio and scale factors in similar figures	Formulate proofs involving congruent triangles and angle properties Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercises involving plane shapes	Prove and apply angle and chord properties of circles
	Pythagoras and trigonometry	This sequence starts at Year 9			Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles Apply trigonometry to solve right-angled triangle problems	Solve right-angled triangle problems including those involving direction and angles of elevation and depression	Establish the sine, cosine and area rules for any triangle and solve related problems Use the unit circle to define trigonometric functions, and graph them with and without the use of digital technologies Solve simple trigonometric equations Apply Pythagoras' theorem and trigonometry to solving three-dimensional problems in right-angled triangles

		Foundation Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Statistics and Probability	Chance		Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen'	Identify practical activities and everyday events that involve chance. Describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible'	Conduct chance experiments, identify and describe possible outcomes and recognise variation in results	Describe possible everyday events and order their chances of occurring Identify everyday events where one cannot happen if the other happens Identify events where the chance of one will not be affected by the occurrence of the other	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	Describe probabilities using fractions, decimals and percentages Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies Compare observed frequencies across experiments with expected frequencies
	Data representation and interpretation	Answer yes/no questions to collect information	Choose simple questions and gather responses Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays	Identify a question of interest based on one categorical variable. Gather data relevant to the question Collect, check and classify data Create displays of data using lists, table and picture graphs and interpret them	Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies Interpret and compare data displays	Select and trial methods for data collection, including survey questions and recording sheets Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values Evaluate the effectiveness of different displays in illustrating data features including variability	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	Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables Interpret secondary data presented in digital media and elsewhere

		Year 6	Year 7	Year 8	Year 9	Year 10	Year 10 A
Statistics and Probability	Chance	<p>Describe probabilities using fractions, decimals and percentages</p> <p>Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies</p> <p>Compare observed frequencies across experiments with expected frequencies</p>	<p>Construct sample spaces for single-step experiments with equally likely outcomes</p> <p>Assign probabilities to the outcomes of events and determine probabilities for events</p>	<p>Identify complementary events and use the sum of probabilities to solve problems</p> <p>Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'.</p> <p>Represent events in two-way tables and Venn diagrams and solve related problems</p>	<p>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</p> <p>Calculate relative frequencies from given or collected data to estimate probabilities of events involving 'and' or 'or'</p> <p>Investigate reports of surveys in digital media and elsewhere for information on how data were obtained to estimate population means and medians</p>	<p>Describe the results of two- and three-step chance experiments, both with and without replacements, assign probabilities to outcomes and determine probabilities of events. Investigate the concept of independence</p> <p>Use the language of 'if ...then, 'given,' of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language</p>	<p>Investigate reports of studies in digital media and elsewhere for information on their planning and implementation</p>
	Data representation and interpretation	<p>Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables</p> <p>Interpret secondary data presented in digital media and elsewhere</p>	<p>Identify and investigate issues involving numerical data collected from primary and secondary sources</p> <p>Construct and compare a range of data displays including stem-and-leaf plots and dot plots</p> <p>Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data</p> <p>Describe and interpret data displays using median, mean and range</p>	<p>Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes</p> <p>Investigate the effect of individual data values, including outliers, on the mean and median</p> <p>Explore the variation of means and proportions in of random samples drawn from the same population</p> <p>Investigate techniques for collecting data, including census, sampling and observation.</p>	<p>Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly from secondary sources</p> <p>Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal'</p> <p>Compare data displays using mean, median and range to describe and interpret numerical data sets in terms of location (centre) and spread</p> <p>Investigate techniques for collecting data, including census, sampling and observation</p>	<p>Determine quartiles and interquartile range</p> <p>Construct and interpret box plots and use them to compare data sets</p> <p>Compare shapes of box plots to corresponding histograms and dot plots</p> <p>Use scatter plots to investigate and comment on relationships between two numerical variables</p> <p>Investigate and describe bivariate numerical data where the independent variable is time</p> <p>Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data</p>	<p>Calculate and interpret the mean and standard deviation of data and use these to compare data sets</p> <p>Use information technologies to investigate bivariate numerical data sets. Where appropriate use a straight line to describe the relationship allowing for variation</p>