Mathematics scope and sequence – Levels 7–10A

## Strand: Number

| **Level 7** | **Level 8** | **Level 9** | **Level 10** | **Level 10A** |
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| **Content descriptions** | | | | |
| describe the relationship between perfect square numbers and square roots, and use squares of numbers and square roots of perfect square numbers to solve problems  VC2M7N01 | recognise irrational numbers in applied contexts, including and numbers that develop from the square root of positive real numbers that are not perfect squares, and recognise that irrational numbers cannot develop from the division of integer values by natural numbers  VC2M8N01 | recognise that the real number system includes the rational numbers and the irrational numbers, and solve problems involving real numbers with and without using digital tools  VC2M9N01 |  | use the definition of a logarithm to establish and apply the laws of logarithms and investigate logarithmic scales in measurement  VC2M10AN03 |
| represent natural numbers in expanded notation using powers of 10, and as products of powers of prime numbers using exponent notation  VC2M7N02 | establish and apply the exponent laws with integer exponents and the zero exponent, using exponent notation with numbers  VC2M8N02 |  |  |  |
| find equivalent representations of rational numbers and represent positive and negative rational numbers and mixed numbers on a number line  VC2M7N03 | convert between fractions and terminating or recurring decimals, using digital tools as appropriate  VC2M8N03 |  |  |  |
| round decimals to a given accuracy appropriate to the context and use appropriate rounding and estimation to check the reasonableness of computations  VC2M7N04 |  |  |  |  |
| multiply and divide fractions and decimals using efficient mental and written strategies, and digital tools  VC2M7N05 | use the 4 operations with integers and with rational numbers, choosing and using efficient mental and written strategies, and digital tools where appropriate, and making estimates for these computations  VC2M8N04 |  | recognise the effect of using approximations of real numbers in repeated calculations and compare the results when using exact representations  VC2M10N01 | define rational and irrational numbers and perform operations with surds and fractional indices  VC2M10AN01 |
| use the 4 operations with positive rational numbers, including fractions and decimals, to solve problems using efficient mental and written calculation strategies  VC2M7N06 | solve problems involving the use of percentages, including percentage increases and decreases and percentage error, with and without digital tools  VC2M8N05 |  |  | perform operations on numbers involving fractional exponents and surds  VC2M10AN02 |
| find percentages of quantities and express one quantity as a percentage of another, with and without digital tools  VC2M7N07 |  |  |  |  |
| compare, order and solve problems involving addition and subtraction of integers  VC2M7N08 |  |  |  |  |
| recognise, represent and solve problems involving ratios  VC2M7N09 |  |  |  |  |
| use mathematical modelling to solve practical problems involving rational numbers and percentages, including financial contexts such as ‘best buys’; formulate problems, choosing representations and efficient calculation strategies, designing algorithms and using digital tools as appropriate; interpret and communicate solutions in terms of the situation, justifying choices made about the representation  VC2M7N10 | use mathematical modelling to solve practical problems involving rational numbers and percentages, including financial contexts involving profit and loss; formulate problems, choosing efficient mental and written calculation strategies and using digital tools where appropriate; interpret and communicate solutions in terms of the context, reviewing the appropriateness of the model  VC2M8N06 |  |  |  |
| **Achievement standards** | | | | |
| By the end of Level 7, students represent natural numbers in expanded form and as products of prime factors, using exponent notation. They solve problems involving squares of numbers and square roots of perfect square numbers. Students solve problems involving addition and subtraction of integers. They use all 4 operations in calculations involving positive fractions and decimals, choosing efficient mental and written calculation strategies. Students choose between equivalent representations of rational numbers and percentages to assist in calculations and make simple estimates to judge the reasonableness of results. They use mathematical modelling to solve practical problems involving rational numbers, percentages and ratios in spatial, financial and other applied contexts, justifying choices of representation. | By the end of Level 8, students recognise irrational numbers as numbers that cannot develop from the division of integer values by natural numbers and terminating or recurring decimals. They apply the exponent laws to calculations with numbers involving positive integer exponents. Students solve problems involving the 4 operations with integers and positive rational numbers. They use mathematical modelling to solve practical problems involving ratios, percentages and rates in measurement and financial contexts. | By the end of Level 9, students recognise and use rational and irrational numbers to solve problems. | By the end of Level 10, students recognise the effect of approximations of real numbers in repeated calculations. | No achievement standard for Level 10A. |

## Strand: Algebra

| **Level 7** | **Level 8** | **Level 9** | **Level 10** | **Level 10A** |
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| **Content descriptions** | | | | |
| recognise and use variables to represent everyday formulas algebraically and substitute values into formulas to determine an unknown  VC2M7A01 | create, expand, factorise, rearrange and simplify linear expressions, applying the associative, commutative, identity, distributive and inverse properties  VC2M8A01 | apply the exponent laws to numerical expressions with positive integer exponents and the zero exponent, and extend to variables  VC2M9A01 | factorise algebraic expressions by taking out a common algebraic factor  VC2M10A01 | investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems  VC2M10AA01 |
| apply the associative, commutative and distributive laws to aid mental and written computation, and formulate algebraic expressions using constants, variables, operations and brackets  VC2M7A02 |  | simplify algebraic expressions, apply the distributive law to expand algebraic expressions including binomial products, and factorise monic quadratic expressions  VC2M9A02 | simplify algebraic products and quotients using exponent laws  VC2M10A02 | devise and use algorithms and simulations to solve mathematical problems  VC2M10AA02 |
|  |  |  | apply the 4 operations to simple algebraic fractions with numerical or single variable denominators  VC2M10A03 |  |
|  |  |  | expand binomial products and factorise monic quadratic expressions using a variety of strategies  VC2M10A04 |  |
|  |  |  | substitute values into formulas to determine an unknown and rearrange formulas to solve for a particular term  VC2M10A05 |  |
|  |  |  | implement algorithms that use data structures using pseudocode or a general purpose programming language  VC2M10A06 |  |
|  | use algorithms and related testing procedures to identify and correct errors  VC2M8A04 |  |  |  |
| solve one-variable linear equations of increasing complexity with natural number solutions; verify equation solutions by substitution  VC2M7A03 | graph linear relations on the Cartesian plane using digital tools where appropriate; solve linear equations and one-variable inequalities using graphical and algebraic techniques; verify solutions by substitution  VC2M8A02 | sketch linear graphs of equations in various algebraic forms, using the coordinates of 2 points, and solve linear equations  VC2M9A03 | solve problems involving linear equations, including those derived from formulas  VC2M10A07 | simplify combinations of linear expressions with rational coefficients and the solution of related equations  VC2M10AA03 |
| investigate, interpret and describe relationships between variables represented in graphs of functions developed from authentic data  VC2M7A04 |  | find the gradient of a line segment, the midpoint of the line interval and the distance between 2 distinct points on the Cartesian plane  VC2M9A04 | solve linear inequalities and graph their solutions on a number line  VC2M10A08 | explore the inverse relationship between exponential functions and logarithmic functions and the solution of related equations  VC2M10AA04 |
| generate tables of values from visually changing patterns or the rule of a function; describe and plot these relationships on the Cartesian plane  VC2M7A05 |  | identify and graph quadratic functions, solve quadratic equations graphically and numerically, and use null factor law to solve monic quadratic equations with integer roots algebraically, using graphing software and digital tools as appropriate  VC2M9A05 | solve simultaneous linear equations, using algebraic and graphical techniques including using digital tools  VC2M10A09 | describe, interpret, and sketch parabolas, hyperbolas, circles and exponential functions and their transformations  VC2M10AA05 |
| manipulate formulas involving several variables using digital tools, and describe the effect of systematic variation in the values of the variables  VC2M7A06 |  |  | solve problems involving gradients of parallel and perpendicular lines  VC2M10A10 | apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation  VC2M10AA06 |
|  |  |  | explore the connection between algebraic and graphical representations of relations such as simple quadratic, reciprocal, circle and exponential, using digital tools as appropriate  VC2M10A11 | factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts  VC2M10AA07 |
|  |  |  | solve linear equations involving simple algebraic fractions  VC2M10A12 | use function notation to describe the relationship between dependent and independent variables in modelling contexts  VC2M10AA08 |
|  |  |  | solve simple quadratic equations using a range of strategies, including null factor law  VC2M10A13 | solve linear and non-linear simultaneous equations using graphing or systematic guess-check-and-refine with digital tools  VC2M10AA09 |
|  |  |  | solve simple exponential equations  VC2M10A14 |  |
|  | experiment with linear functions and relations using digital tools, making and testing conjectures and generalising emerging patterns  VC2M8A05 | experiment with the effects of the variation of parameters on graphs of related functions, using digital tools, making connections between graphical and algebraic representations, and generalising emerging patterns  VC2M9A07 |  | experiment with functions and relations using digital tools, making and testing conjectures and generalising emerging patterns  VC2M10AA10 |
|  | use mathematical modelling to solve applied problems involving linear relations, including financial contexts involving profit and loss; formulate problems with linear functions, and choose a representation; interpret and communicate solutions in terms of the context, and review the appropriateness of the model  VC2M8A03 | use mathematical modelling to solve applied problems involving change, including financial contexts involving simple interest; formulate problems, choosing to use either linear or quadratic functions or other simple variations; interpret solutions in terms of the context; evaluate the model and report methods and findings  VC2M9A06 | use mathematical modelling to solve applied problems involving inverse proportion, growth and decay, including in financial contexts to establish the compound interest formula as repeated applications of simple interest; formulate problems, choosing to apply linear, quadratic or exponential models; interpret solutions in terms of the situation; evaluate and modify models as necessary and report assumptions, methods and findings  VC2M10A15 |  |
|  |  |  | solve equations graphically or using systematic numerical guess-check-and-refine with digital tools, with consideration of whether all solutions have been found  VC2M10A16 |  |
| **Achievement standards** | | | | |
| Students use algebraic expressions to represent situations, describe the relationships between variables from authentic data and substitute values into formulas to determine unknown values. They solve linear equations with natural number solutions and verify their solutions through substitution. Students create tables of values relating to algebraic expressions and formulas, and describe how the values change. | Students apply algebraic properties to simplify, rearrange, expand and factorise linear expressions. They graph linear relations and solve linear equations with rational solutions and one-variable inequalities, graphically and algebraically. Students plot linear and non-linear relations on the Cartesian plane, with and without the use of digital tools. Students use mathematical modelling to solve problems using linear relations, interpreting and reviewing the model in context. They make and test conjectures involving linear relations by developing algorithms and using digital tools. | Students extend and apply the exponent laws with positive integers and the zero exponent to variables. They expand binomial products and factorise monic quadratic expressions. They find the distance between 2 points on the Cartesian plane, sketch linear graphs and find the gradient and midpoint of a line segment. Students use mathematical modelling to solve problems involving change, including simple interest in financial contexts and change in other applied contexts, choosing to use linear and quadratic functions. They graph quadratic functions and use null factor law to solve monic quadratic equations with integer roots algebraically. Students investigate and describe the effects of variation of parameters on functions and relations, using digital tools where appropriate, and make connections between their graphical and algebraic representations. | Students use mathematical modelling to solve problems involving growth and decay in financial and other applied situations, applying linear, quadratic and exponential functions as appropriate, and solve related equations, numerically and graphically. They make and test conjectures involving functions and relations using digital tools. Students substitute into formulas, find unknown values, manipulate linear and quadratic algebraic expressions, expand binomial expressions and factorise monic and simple non-monic quadratic expressions, with and without the use of digital tools. They solve problems involving linear equations and inequalities, quadratic equations and pairs of simultaneous linear equations and related graphs, algebraically and graphically, with and without the use of digital tools, and justify solutions. They represent linear, quadratic and exponential functions numerically, graphically and algebraically, and use them to model situations and solve practical problems. Students can design and implement simple algorithms using pseudocode or other general purpose programming language. | No achievement standard for Level 10A. |

## Strand: Measurement

| **Level 7** | **Level 8** | **Level 9** | **Level 10** | **Level 10A** |
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| **Content descriptions** | | | | |
| establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem-solving  VC2M7M01 | solve problems involving the area and perimeter of irregular and composite shapes using appropriate units  VC2M8M01 | solve problems involving the volume and surface area of right prisms, cylinders and composite objects using appropriate units  VC2M9M01 | solve problems involving the surface area and volume of composite objects using appropriate units  VC2M10M01 | solve problems involving surface area and volume of right pyramids, right cones, spheres and related composite solids  VC2M10AM01 |
| solve problems involving the volume of right prisms including rectangular and triangular prisms, using established formulas and appropriate units  VC2M7M02 | solve problems involving the volume and capacity of right prisms using appropriate units  VC2M8M02 | solve problems involving very small and very large measurements, timescales and intervals expressed in scientific notation  VC2M9M02 | interpret and use logarithmic scales in applied contexts involving small and large quantities and change  VC2M10M02 | explore the effect of increasingly small changes in the value of variables on the average rate of change and in relation to limiting values  VC2M10AM02 |
| describe the relationship between and the circumference, radius and diameter of a circle  VC2M7M03 | solve problems involving the circumference and area of a circle using formulas and appropriate units  VC2M8M03 |  |  |  |
|  | solve problems involving time and duration, including using 12- and 24-hour time across multiple time zones  VC2M8M04 | calculate and interpret absolute, relative and percentage errors in measurements  VC2M9M04 |  |  |
|  | recognise and use rates to solve problems involving the comparison of 2 related quantities of different units of measure  VC2M8M05 |  |  |  |
| identify corresponding, alternate and co-interior relationships between angles formed when parallel lines are crossed by a transversal; use them to solve problems and explain reasons  VC2M7M04 |  |  |  |  |
| demonstrate that the interior angle sum of a triangle in the plane is 180° and apply this to determine the interior angle sum of other shapes and the size of unknown angles  VC2M7M05 | use Pythagoras’ theorem to solve problems involving the side lengths of right-angled triangles  VC2M8M06 | solve spatial problems, applying angle properties, scale, similarity, ratio, Pythagoras’ theorem and trigonometry in right-angled triangles  VC2M9M03 | solve practical problems by applying Pythagoras’ theorem and trigonometry to right-angled triangles, including problems involving direction and angles of elevation and depression  VC2M10M03 |  |
| use mathematical modelling to solve practical problems involving ratios of lengths, areas and volumes; formulate problems, interpret and communicate solutions in terms of the situation, justifying choices made about the representation  VC2M7M06 | use mathematical modelling to solve practical problems involving ratios and rates, including distance-time problems for travel at a constant speed and financial contexts; formulate problems; interpret and communicate solutions in terms of the situation, reviewing the appropriateness of the model  VC2M8M07 | use mathematical modelling to solve practical problems involving direct proportion, rates, ratio and scale, including financial contexts; formulate the problems and interpret solutions in terms of the situation; evaluate the model and report methods and findings  VC2M9M05 | use mathematical modelling to solve practical problems involving direct and inverse proportion and scaling of objects; formulate problems and interpret solutions in terms of the situation, including the impact of measurement errors on the accuracy of results; evaluate and modify models as necessary, and report assumptions, methods and findings  VC2M10M04 |  |
| **Achievement standards** | | | | |
| Students apply knowledge of angle relationships and the sum of angles in a triangle to solve problems, giving reasons. They establish and use formulas for the areas of triangles and parallelograms and the volumes of rectangular and triangular prisms to solve problems. They describe the relationships between the radius, diameter and circumference of a circle. | Students use appropriate metric units when solving measurement problems involving the perimeter and area of composite shapes, and volume of right prisms. They use Pythagoras’ theorem to solve measurement problems involving unknown lengths of right-angled triangles. Students use formulas to solve problems involving the area and circumference of circles. They solve problems of duration involving 12- and 24-hour cycles across multiple time zones. | Students apply formulas to solve problems involving the surface area and volume of right prisms, cylinders and composite shapes. They solve problems involving ratio, similarity and scale in two-dimensional situations. They determine percentage errors in measurements. Students apply Pythagoras’ theorem and use trigonometric ratios to solve problems involving right-angled triangles. They use mathematical modelling to solve practical problems involving direct and indirect proportion, ratio and scale, evaluating the model and communicating their methods and findings. Students express small and large numbers in scientific notation. | Students solve measurement problems involving surface area and volume of composite objects. They interpret and use logarithmic scales representing small or large quantities or change in applied contexts. Students apply Pythagoras’ theorem and trigonometry to solve practical problems involving right-angled triangles. They identify the impact of measurement errors on the accuracy of results. Students use mathematical modelling to solve practical problems involving direct and inverse proportion and scaling, evaluating and modifying models, and reporting assumptions, methods and findings. | No achievement standard for Level 10A. |

## Strand: Space

| **Level 7** | **Level 8** | **Level 9** | **Level 10** | **Level 10A** |
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| **Content descriptions** | | | | |
| represent three-dimensional objects in 2 dimensions; discuss and reason about the advantages and disadvantages of different representations  VC2M7SP01 | identify the conditions for congruence and similarity of triangles and explain the conditions for other sets of common shapes to be congruent or similar, including those formed by transformations  VC2M8SP01 | recognise the constancy of the sine, cosine and tangent ratios for a given angle in right-angled triangles using properties of similarity  VC2M9SP01 |  | prove and apply relationships between angles and various lines associated with circles (radii, diameters, chords, tangents)  VC2M10ASP01 |
|  |  |  | interpret networks and network diagrams used to represent relationships in practical situations and describe connectedness  VC2M10SP02 |  |
| classify triangles, quadrilaterals and other polygons according to their side and angle properties; identify and reason about relationships  VC2M7SP02 | establish properties of quadrilaterals using congruent triangles and angle properties, and solve related problems explaining reasoning  VC2M8SP02 |  |  |  |
| describe the effect of transformations of a set of points using coordinates in the Cartesian plane, including translations, reflections in an axis, and rotations about the origin  VC2M7SP03 | describe in different ways the position and location of three-dimensional objects in 3 dimensions, including using a three-dimensional Cartesian coordinate system with the use of dynamic geometry software or other digital tools  VC2M8SP03 | apply the enlargement transformation to shapes and objects using dynamic geometry software as appropriate; identify and explain, using language of similarity, ratio and scale, aspects that remain the same and those that change  VC2M9SP02 |  |  |
|  |  |  |  | establish the sine, cosine and area rules for any triangle and solve related problems  VC2M10ASP02 |
|  |  |  |  | use the unit circle to define the simple trigonometric functions of , and as functions of a real variable, and graph them with and without the use of digital tools  VC2M10ASP03 |
|  |  |  |  | solve simple trigonometric equations  VC2M10ASP04 |
|  |  |  |  | apply Pythagoras’ theorem and trigonometry to solving three-dimensional problems in right-angled triangles  VC2M10ASP05 |
| design algorithms involving a sequence of steps and decisions that will sort and classify sets of shapes according to their attributes, and describe how the algorithms work  VC2M7SP04 | design and test algorithms involving a sequence of steps and decisions that identify congruency or similarity of shapes, and describe how the algorithm works  VC2M8SP04 | design, test and refine algorithms involving a sequence of steps and decisions based on geometric constructions and theorems; discuss and evaluate refinements  VC2M9SP03 | apply deductive reasoning to formulate proofs involving shapes in the plane and use theorems to solve spatial problems  VC2M10SP01 | design, test and refine solutions to spatial problems using algorithms and digital tools; communicate and justify solutions  VC2M10ASP06 |
| **Achievement standards** | | | | |
| Students classify polygons according to their features and design an algorithm to sort and classify shapes. They represent objects two-dimensionally in different ways, describing the usefulness of these representations. They use coordinates to describe transformations of points in the plane. | Students use 3 dimensions to locate and describe position. They identify conditions for congruency and similarity in triangles and other common shapes, and design and test algorithms to test for congruency and similarity. Students apply the properties of quadrilaterals to solve problems. | Students apply the enlargement transformation to images of shapes and objects, and interpret results. They design, use and test algorithms based on geometric constructions or theorems. | Students use deductive reasoning, theorems and algorithms to solve spatial problems. They interpret networks used to represent practical situations and describe connectedness. | No achievement standard for Level 10A. |

## Strand: Statistics

| **Level 7** | **Level 8** | **Level 9** | **Level 10** | **Level 10A** |
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| **Content descriptions** | | | | |
| acquire data sets for discrete and continuous numerical variables and calculate the range, median, mean and mode; make and justify decisions about which measures of central tendency provide useful insights into the nature of the distribution of data  VC2M7ST01 | distinguish between a population and a sample, and investigate techniques for data collection including census, sampling, experiment and observation, and explain the practicalities and implications of obtaining data through these techniques  VC2M8ST01 | analyse reports of surveys in digital media and elsewhere for information on how data was obtained around everyday questions and issues involving at least one numerical and at least one categorical variable, to estimate population means and medians  VC2M9ST01 | compare data distributions for continuous numerical variables using quartiles and interquartile range and appropriate data displays including boxplots, histograms and dot plots; discuss the shapes of these distributions in terms of centre, spread, shape and outliers in the context of the data  VC2M10ST01 | calculate and interpret the mean and standard deviation of data and use these to compare data sets; investigate the effect of individual data values, including outliers, on the standard deviation  VC2M10AST01 |
| create different types of displays of numerical data, including dot plots and stem-and-leaf plots, using software where appropriate; describe and compare the distribution of data, commenting on the shape, centre and spread including outliers and determining the range, median, mean and mode  VC2M7ST02 | analyse and report on the distribution of data from primary and secondary sources using random and non-random sampling techniques  VC2M8ST02 | analyse how different sampling methods, and different samples using the same method, can affect the results of surveys and how choice of representation can be used to support a particular point of view  VC2M9ST02 | construct scatterplots and consider a line of good fit; comment on the association between the 2 numerical variables in terms of strength, direction and linearity  VC2M10ST02 | identify measures of spread, and understand their interpretation and usefulness with respect to different data distributions  VC2M10AST02 |
|  | compare variations in distributions and proportions obtained from random samples of the same size drawn from a population and recognise the effect of sample size on this variation  VC2M8ST03 | represent the distribution of multiple data sets for numerical variables using comparative representations such as back-to-back stem-and-leaf plots and histograms; describe data, using terms including ‘skewed’, ‘symmetric’ and ‘bi-modal’; compare data distributions using mean, median and range to describe and interpret numerical data sets with consideration of centre, spread and shape, and the effect of outliers on these measures  VC2M9ST03 | construct two-way tables and discuss possible relationship between categorical variables  VC2M10ST03 |  |
|  |  | choose appropriate forms of display or visualisation for a given type of data; justify selections and interpret displays for a given context  VC2M9ST04 | analyse claims, inferences and conclusions of statistical reports in the media and other places, by linking claims to displays, statistics and representative data, including ethical considerations and identification of potential sources of bias  VC2M10ST04 |  |
| plan and conduct statistical investigations for issues involving discrete and continuous numerical data, and data collected from primary and secondary sources; analyse and interpret distributions of data and report findings in terms of shape and summary statistics  VC2M7ST03 | plan and conduct statistical investigations involving samples of a population; use ethical and fair methods to make inferences about the population and report findings, acknowledging uncertainty  VC2M8ST04 | plan and conduct statistical investigations involving the collection and analysis of different kinds of data; report findings and discuss the strength of evidence to support any conclusions  VC2M9ST05 | plan and conduct statistical investigations of situations that involve bivariate data, including where the independent variable is time; evaluate and report findings with consideration of limitations of any inferences  VC2M10ST05 | use digital tools to investigate bivariate numerical data sets; where appropriate use a straight line to describe the relationship allowing for variation, make predictions based on this straight line and discuss limitations  VC2M10AST03 |
| **Achievement standards** | | | | |
| Students plan and conduct statistical investigations involving discrete and continuous numerical data, using appropriate displays. They interpret data in terms of the shape of distribution and summary statistics, identifying possible outliers. They decide which measure of central tendency is most suitable and explain their reasoning. | Students conduct statistical investigations and explain the implications of obtaining data through sampling. Students analyse and describe the distribution of data. They compare the variation in distributions of random samples of the same and different size from a given population with respect to shape, measures of central tendency and range. | Students compare and analyse the distributions of multiple numerical data sets, choose representations, describe features of these data sets using summary statistics and the shape of distributions, and consider the effect of outliers. They explain how sampling techniques and representation can be used to support or question conclusions or to promote a point of view. | Students compare univariate data sets by referring to summary statistics and the shape of their displays. They plan and conduct statistical investigations involving bivariate data, including where the independent variable is time. They represent the distribution of data involving 2 variables, using tables and scatterplots, and comment on possible association. They analyse inferences and conclusions in the media, noting potential sources of bias. Students compare the distribution of continuous numerical data, using various displays, and discuss distributions in terms of centre, spread, shape and outliers. | No achievement standard for Level 10A. |

## Strand: Probability

| **Level 7** | **Level 8** | **Level 9** | **Level 10** | **Level 10A** |
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| **Content descriptions** | | | | |
| identify the sample space for single-stage experiments; assign probabilities to the possible outcomes and predict relative frequencies for related experiments.  VC2M7P01 | recognise that complementary events have a combined probability of one; use this relationship to calculate probabilities in applied contexts  VC2M8P01 | list all outcomes for two-step chance experiments both with and without replacement, using lists, tree diagrams, tables or arrays; assign probabilities to outcomes and events  VC2M9P01 | use the language of ‘if … then …’, ‘given’, ‘of’ and ‘knowing that’ to investigate conditional statements and identify common mistakes in interpreting such language, and describe and interpret situations involving conditional probability; design and conduct simulations using digital tools to model conditional probability and interpret results  VC2M10P01 | explore counting principles, and factorial notation as a representation that provides efficient counting in multiplicative contexts, including calculations of probabilities  VC2M10AP01 |
|  | determine all possible outcome combinations for 2 events, using two-way tables, tree diagrams and Venn diagrams, and use these to determine probabilities of specific events in practical situations  VC2M8P02 | calculate relative frequencies from given or collected data to estimate probabilities of events involving ‘and’, inclusive ‘or’ and exclusive ‘or’  VC2M9P02 |  |  |
| conduct repeated chance experiments and run simulations with a large number of trials using digital tools; compare predicted with observed results, explaining the differences and the effect of sample size on the outcomes  VC2M7P02 | conduct repeated chance experiments and simulations, using digital tools to determine probabilities for compound events, and describe results  VC2M8P03 | design and conduct repeated chance experiments and simulations using digital tools to estimate probabilities that cannot be determined exactly  VC2M9P03 | 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  VC2M10P02 | investigate reports of studies in digital media and elsewhere for information on their planning and implementation  VC2M10AP02 |
| **Achievement standards** | | | | |
| Students list sample spaces for single-step experiments, assign probabilities to outcomes of events and predict relative frequencies for related events. They conduct repeated single-step chance experiments and run simulations using digital tools, giving reasons for differences between predicted and observed results. | Students represent the possible combinations of 2 events with tables and diagrams, and determine related probabilities to solve practical problems. They conduct experiments or simulations using digital tools to determine related probabilities of compound events. | Students determine sets of outcomes for two-step chance experiments and represent these in various ways. They assign probabilities to the outcomes of two-step chance experiments. They design and conduct experiments or simulations for combined events using digital tools. | Students apply conditional probability to solve problems involving compound events. They design and conduct simulations involving conditional probability, using digital tools. | No achievement standard for Level 10A. |