MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

Year	NUMBER & ALGEBRA	MEASUREMENT & GEOMETRY	STATISTICS & PROBABILITY
P	**NUMBER AND PLACE VALUE** • Establish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point • Connect number names, numerals and quantities, including zero, initially up to 10 and then beyond • Subitise small collections of objects • Compare, order and make correspondences between collections, initially to 20, and explain reasoning • Represent practical situations to model addition and subtraction • Represent practical situations to model sharing **MONEY AND FINANCIAL MATHS** • Represent simple, everyday financial situations involving money **PATTERNS AND ALGEBRA** • Sort and classify familiar objects and explain the basis for these classifications, and copy, continue and create patterns with objects and drawings • Follow a short sequence of instructions	**DATA REPRESENTATION AND INTERPRETATION** • Answer yes/no questions to collect information • Organise answers to yes/no questions into simple data displays using objects and drawings • Interpret simple data displays about yes/no questions	**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 **SHAPE** • Sort, describe and name familiar two-dimensional shapes and three-dimensional objects in the environment **LOCATIONS AND TRANSFORMATION** • Describe position and movement

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

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NUMBER AND PLACE VALUE
- 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
- Recognise, model, read, write and order numbers to at least 100. Locate these numbers on a number line
- Count collections to 100 by partitioning numbers using place value
- Represent and solve simple addition and subtraction problems using a range of strategies including counting on, partitioning and rearranging parts
- Represent practical situations that model sharing

MONEY AND FINANCIAL MATHS
- Recognise, describe and order Australian coins according to their value

FRACTIONS AND DECIMALS
- Recognise and describe one-half as one of two equal parts of a whole

PATTERNS AND ALGEBRA
- Investigate and describe number patterns formed by skip counting and patterns with objects
- Recognise the importance of repetition of a process in solving problems

CHANCE
- Identify outcomes of familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen'

DATA REPRESENTATION AND INTERPRETATION
- Choose simple questions and gather responses
- Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays

USING UNITS OF MEASUREMENT
- Measure and compare the lengths, masses and capacities of pairs of objects using uniform informal units
- Tell time to the half-hour
- Describe duration using months, weeks, days and hours

SHAPE
- Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features

LOCATIONS AND TRANSFORMATION
- Give and follow directions to familiar locations

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

2	**NUMBER AND PLACE VALUE** • Investigate number sequences, initially those increasing and decreasing by twos, threes, fives and ten from any starting point, then moving to other sequences • Recognise, model, represent and order numbers to at least 1000 • Group, partition and rearrange collections up to 1000 in hundreds, tens and ones to facilitate more efficient counting • Explore the connection between addition and subtraction • Solve simple addition and subtraction problems using a range of efficient mental and written strategies • Recognise and represent multiplication as repeated addition, groups and arrays • Recognise and represent division as grouping into equal sets and solve simple problems using these representations **MONEY AND FINANCIAL MATHS** • Count and order small collections of Australian coins and notes according to their value **FRACTIONS AND DECIMALS** • Recognise and interpret common uses of halves, quarters and eighths of shapes and collections **PATTERNS AND ALGEBRA** • Describe patterns with numbers and identify missing elements • Solve problems by using number sentences for addition or subtraction • Apply repetition in arithmetic operations, including multiplication as repeated addition and division as repeated subtraction	**CHANCE** • Identify practical activities and everyday events that involve chance. Describe outcomes as 'likely' or 'unlikely' and identify some events as 'certain' or 'impossible' **DATA REPRESENTATION AND INTERPRETATION** • 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	**USING UNITS OF MEASUREMENT** • 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 **SHAPE** • Describe and draw two-dimensional shapes, with and without digital technologies • Describe the features of three-dimensional objects **LOCATIONS AND TRANSFORMATION** • 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

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

| 3 | **NUMBER AND PLACE VALUE**
• Investigate the conditions required for a number to be odd or even and identify odd and even numbers
• Recognise, model, represent and order numbers to at least 10 000
• Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems
• Recognise and explain the connection between addition and subtraction
• Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation
• Recall multiplication facts of two, three, five and ten and related division facts
• Represent and solve problems involving multiplication using efficient mental and written strategies and appropriate digital technologies

MONEY AND FINANCIAL MATHS
• Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents

FRACTIONS AND DECIMALS
• Model and represent unit fractions including 1/2, 1/4, 1/3, 1/5 and their multiples to a complete whole

PATTERNS AND ALGEBRA
• Describe, continue, and create number patterns resulting from performing addition or subtraction
• Use a function machine and the inverse machine as a model to apply mathematical rules to numbers or shapes | **CHANCE**
• Conduct chance experiments, identify and describe possible outcomes and recognise variation in results

DATA REPRESENTATION AND INTERPRETATION
• 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 | **USING UNITS OF MEASUREMENT**
• Measure, order and compare objects using familiar metric units of length, area, mass and capacity
• Tell time to the minute and investigate the relationship between units of time

SHAPE
• Make models of three-dimensional objects and describe key features

LOCATIONS AND TRANSFORMATION
• Create and interpret simple grid maps to show position and pathways
• Identify symmetry in the environment
• Identify and describe slides and turns found in the natural and built environment

GEOMETIRC REASONING
• Identify angles as measures of turn and compare angle sizes in everyday situations |

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

4	**NUMBER AND PLACE VALUE** • Investigate and use the properties of odd and even numbers • Recognise, represent and order numbers to at least tens of thousands • Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems • Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9 • Recall multiplication facts up to 10 × 10 and related division facts • Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder **MONEY AND FINANCIAL MATHS** • Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies **FRACTIONS AND DECIMALS** • Investigate equivalent fractions used in contexts • Count by quarters, halves and thirds, including with mixed numerals. Locate and represent these fractions on a number line • Recognise that the place value system can be extended to tenths and hundredths. Make connections between fractions and decimal notation **PATTERNS AND ALGEBRA** • 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 • Define a simple class of problems and use an effective algorithm that involves a short sequence of steps and decisions to solve them	**CHANCE** • 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 **DATA REPRESENTATION AND INTERPRETATION** • 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	**USING UNITS OF MEASUREMENT** • Use scaled instruments to measure and compare lengths, masses, capacities and temperatures • Compare objects using familiar metric units of area and volume • Convert between units of time • Use am and pm notation and solve simple time problems **SHAPE** • 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 • Explain and compare the geometric properties of two-dimensional shapes and three-dimensional objects **LOCATIONS AND TRANSFORMATION** • Use simple scales, legends and directions to interpret information contained in basic maps • Create symmetrical patterns, pictures and shapes with and without digital technologies **GEOMETIRC REASONING** • Compare angles and classify them as equal to, greater than or less than a right angle	

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

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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
- Recognise, represent and order numbers to at least hundreds of thousands

MONEY AND FINANCIAL MATHS
- Create simple financial plans

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

PATTERNS AND ALGEBRA
- 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
- Follow a mathematical algorithm involving branching and repetition (iteration)

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

USING UNITS OF MEASUREMENT
- Choose appropriate units of measurement for length, area, volume, capacity and mass
- Calculate the perimeter and area of rectangles and the volume and capacity of prisms 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

LOCATIONS 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

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

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

6	**NUMBER AND PLACE VALUE**	**CHANCE**	**USING UNITS OF MEASUREMENT**

NUMBER AND PLACE VALUE
- Identify and describe properties of prime, composite, square and triangular numbers
- Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers and make estimates for these computations
- Investigate everyday situations that use integers. Locate and represent these numbers on a number line

MONEY AND FINANCIAL MATHS
- Investigate and calculate percentage discounts of 10%, 25% and 50% on sale items, with and without digital technologies

FRACTIONS AND DECIMALS
- Compare fractions with related denominators and locate and represent them on a number line
- Solve problems involving addition and subtraction of fractions with the same or related denominators
- Find a simple fraction of a quantity where the result is a whole number, with and without digital technologies
- Add and subtract decimals, with and without digital technologies, and use estimation and rounding to check the reasonableness of answers
- Multiply decimals by whole numbers and perform divisions by non-zero whole numbers where the results are terminating decimals, with and without digital technologies
- Multiply and divide decimals by powers of 10
- Make connections between equivalent fractions, decimals and percentages

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
- Design algorithms involving branching and iteration to solve specific classes of mathematical problems

CHANCE
- Describe probabilities using fractions, decimals and percentages
- Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies
- Conduct chance experiments with both small and large numbers of trials using appropriate digital technologies

DATA REPRESENTATION AND INTERPRETATION
- Construct, 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
- Pose and refine questions to collect categorical or numerical data by observation or survey

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
- Measure, calculate and compare elapsed time

SHAPE
- Construct simple prisms and pyramids

LOCATIONS AND TRANSFORMATION
- Investigate the effect of combinations of transformations on simple and composite shapes, including creating tessellations, with and without the use of digital technologies
- Introduce the Cartesian coordinate system using all four quadrants

GEOMETIRC 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

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7	**NUMBER AND PLACE VALUE** • Investigate index notation • Investigate and use square roots of perfect square numbers • Apply the associative, commutative and distributive laws • Compare, order, add and subtract integers **REAL NUMBERS** • Compare fractions using equivalence. • Solve problems involving addition and subtraction of fractions • Multiply and divide fractions and decimals • Express one quantity as a fraction of another • Round decimals to a specified number of decimal places • Connect fractions, decimals and percentages • Find percentages of quantities • Recognise and solve problems involving simple ratios **MONEY AND FINANCIAL MATHS** • Investigate and calculate 'best buys' **PATTERNS AND ALGEBRA** • Introduce the concept of variables • Create algebraic expressions and evaluate them **LINEAR AND NON-LINEAR RELATIONSHIPS** • Plot points and find coordinates on a Cartesian plane • Solve simple linear equations Investigate, interpret and analyse graphs	

USING UNITS OF MEASUREMENT
- Establish the formulas for areas of rectangles, triangles and parallelograms
- Calculate volumes of rectangular prisms

SHAPE
- Draw different views of prisms and solids formed from combinations of prisms

LOCATIONS AND TRANSFORMATION
- Describe translations, reflections in an axis, and rotations
- Identify line and rotational symmetries

GEOMETIRC REASONING
- Identify corresponding, alternate and cointerior angles
- Investigate conditions for two lines to be parallel
- 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

CHANCE
- Construct sample spaces for single step experiments with equally likely outcomes
- Assign probabilities to the outcomes of events and determine probabilities for events

DATA REPRESENTATION AND INTERPRETATION
- Identify and investigate issues involving numerical data collected from primary and secondary sources
- Construct and compare a range of data displays including stem-and-leaf plots and dot plots
- Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data
Describe and interpret data displays using median, mean and range

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8	**NUMBER AND PLACE VALUE** • Use index notation with numbers to establish the index laws • Carry out the four operations with rational numbers and integers **REAL NUMBERS** • Investigate terminating and recurring decimals • Investigate the concept of irrational numbers, including π • Solve problems involving the use of percentages • Solve a range of problems involving rates and ratios **MONEY AND FINANCIAL MATHS** • Solve problems involving profit and loss **PATTERNS AND ALGEBRA** • Extend and apply the distributive law to the expansion of algebraic expressions • Factorise algebraic expressions • Simplify algebraic expressions involving the four operations **LINEAR AND NON-LINEAR RELATIONSHIPS** • Plot linear relationships on the Cartesian plane • Solve linear equations using algebraic & graphical techniques.

USING UNITS OF MEASUREMENT
- Choose appropriate units of measurement for area and volume and convert from one unit to another
- Find perimeters and areas of parallelograms, rhombuses and kites
- Investigate circles
- Use formulas to solve problems involving circumference and area
- Develop the formulas for volumes of prisms
- Use formulas to solve problems involving volume
- Solve problems involving duration, including using 12- and 24-hour time within a single time zone

GEOMETIRC REASONING
- 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

CHANCE
- Identify complementary events
- Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'.
- Represent events in two-way tables and Venn diagrams and solve related problems

DATA REPRESENTATION AND INTERPRETATION
- Explore the practicalities and implications of obtaining data
- Investigate the effect of individual data values on the mean and median
- Explore the variation of means and proportions in of random samples drawn from the same population
- Investigate techniques for collecting data, including census and sampling

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REAL NUMBERS
- Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems
- Apply index laws to numerical expressions with integer indices
- Express numbers in scientific notation

MONEY AND FINANCIAL MATHS
- Solve problems involving simple interest

PATTERNS AND ALGEBRA
- Extend and apply the index laws to variables
- Apply the distributive law to the expansion of algebraic expressions and collect like terms

LINEAR AND NON-LINEAR RELATIONSHIPS
- Find the distance points located on a Cartesian plane
- Sketch linear graphs using the coordinates of two points and solve linear equations
- Find the midpoint and gradient of a line segment
- Graph simple non-linear relations and solve simple related equations

USING UNITS OF MEASUREMENT
- 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

GEOMETIRC REASONING
- Use the enlargement transformation to explain similarity
- Solve problems using ratio and scale factors in similar figures

PYTHAGORAS AND TRIGONOMETRY
- Investigate Pythagoras' Theorem and its application
- 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

CHANCE
- List all outcomes for two-step chance experiments, with and without replacement
- Assign probabilities to outcomes and determine probabilities for events
- Calculate relative frequencies from data to estimate probabilities of events
- Investigate reports of surveys to estimate population means and medians

DATA REPRESENTATION AND INTERPRETATION
- Identify everyday questions and issues involving at least one numerical and at least one categorical variable
- Construct back-to-back stem-and-leaf plots and histograms and describe data
- Compare data displays using mean, median and range
- Investigate techniques for collecting data

MERBEIN P-10 MATHEMATICS COURSE OUTLINE (Ausvels based)

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	MONEY AND FINANCIAL MATHS • Connect the compound interest formula to repeated applications of simple interest • Patterns and Algebra • 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 **LINEAR AND NON-LINEAR RELATIONSHIPS** • Solve problems involving linear equations • Solve linear inequalities and graph them on a number line • Solve linear simultaneous equations • 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	**USING UNITS OF MEASUREMENT** • Solve problems involving surface area and volume for a range of prisms, cylinders and composite solids **GEOMETIRC REASONING** • 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 **PYTHAGORAS AND TRIGONOMETRY** Solve right-angled triangle problems including those involving direction and angles of elevation and depression	**CHANCE** • Describe the results of two- and three step chance experiments with and without replacements and determine probabilities of events. • Investigate the concept of independence • Use the language of 'if ....then, 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language **DATA REPRESENTATION AND INTERPRETATION** • Determine quartiles and interquartile range • Construct and interpret box plots and use them to compare data sets • Compare shapes of box plots to corresponding histograms and dot plots • Use scatter plots to investigate and comment on relationships between two numerical variables • Investigate and describe bivariate numerical data where the independent variable is time Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data