

COLLINSVILLE STATE HIGH SCHOOL

Mathematics Education Plan

2022



	Term 1	Term 2	Term 3	Term 4
7	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Number and place value — investigate the relationship between index notation, square roots and square numbers, apply the associative, commutative and distributive laws to aid computation, revise prime factors, express numbers as a product of its primes using index notation. • Real numbers — compare fractions using equivalence, locate and represent fractions on a number line, solve problems involving addition and subtraction of fractions, express one quantity as a fraction of another. • Using units of measurement — develop a formula to find the area of a rectangle, calculate the area of rectangles, investigate the relationship between volume, the area of the base and the number of layers, calculate volume, solve problems involving area and volume. • Shape — construct 3D objects, draw 3D objects from different viewpoints. • Geometric reasoning — revise triangles, quadrilaterals and types of angles, classify triangles and quadrilaterals by comparing sides and angles, make generalisations about the sum of angles in triangles and in quadrilaterals. 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Real numbers — add and subtract fractions with unrelated denominators, explore the relationship between fractions, decimals and percentages, express one quantity as a percentage of another, interpret, represent and simplify ratios. • Patterns and algebra — use variables to represent numbers, create algebraic expressions, evaluate algebraic expressions by substitution. • Linear and non-linear relationships — plot points on a Cartesian plane, find coordinates for points on a Cartesian plane, solve simple linear equations and create and analyse graphs from authentic data. • Chance — identify sample spaces for single-step events, conduct one-step chance experiments, record observed frequencies in a table, calculate probabilities from experimental data, compare experimental and theoretical probabilities. 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Number and place value — compare, order, add and subtract integers using written strategies, solve problems involving addition and subtraction of integers, review index notation and standard notation, explore the powers of ten and convert numbers to expanded notation. • Real numbers — Round, multiply and divide decimals in a money context, multiply and divide fractions, add and subtract mixed numbers with unrelated denominators, solve problems involving decimals, fractions and the four operations, solve problems involving ratios, multiply decimals using written strategies, convert between fractions, decimals and percentage and express one quantity as a fraction or percentage of another. • Money and financial mathematics — calculate and compare unit prices, investigate and calculate best buys with and without digital technology. • Patterns and algebra — create and evaluate formulas to model relationships between two variables. 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Location and transformation — describe and create translations, reflections and rotations on the Cartesian plane, use appropriate conventions for naming transformed shapes, identify a combination of transformations on the Cartesian plane, and identify line and rotational symmetry. • Geometric reasoning — develop geometry conventions and angle relationships, explore transversals and angles associated with parallel lines and find unknown angles using angle relationships. • Data representation and interpretation — construct stem-and-leaf plots and dot-plots, calculate mean, median, mode and range, compare a range of data displays, describe and interpret data displays using mean, median and range, identify and examine issues involving numerical data collected from primary and secondary sources.

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8	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Number and place value - apply the four operations to rational numbers and integers and solve problems. • Real numbers - make connections between percentages, fractions and decimals, calculate a percentage of a quantity, percentage increase and decrease, discount, profit, loss and GST, and problem solve in a range of contexts including financial situations, identify terminating and recurring decimals, link fractions to terminating and recurring decimals and explore irrational numbers in relation to pi. • Chance - describe and calculate the probability of 'and', 'or', and 'not' events, represent events in Venn diagrams and two-way tables and solve related problems, identify complementary events and use the sum of probabilities to solve problems. 	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Number and place value - express numbers in index notation, establish the index laws with whole number bases and positive integral indices • Patterns and algebra - expand and factorise algebraic expressions. • Using units of measurement - convert units of measure, revise perimeter and area of parallelograms and triangles, develop formulas for rhombuses, kites, trapeziums and circles, calculate the perimeter and area of rhombuses, kites, trapeziums and circles, problem solve and reason involving perimeter, circumference and area. 	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Linear and non-linear relationships - model situations involving proportional relationships, solve a range of problems involving rates and ratios, interpret, model and formulate patterns and relationships, represent patterns and relationships as rules, functions, tables and graphs and solve linear equations using graphical techniques. • Using units of measurement - solve problems involving time duration, for 12- and 24- time formats, within a single time zone. • Data representation and interpretation - collect, organise and display data, interpret data displayed in tables and graphs, connect samples and populations, explore the effect of sample size, calculate measures of centre, identify outliers and their effect on measures of centre, identify sources of bias and apply this knowledge to make hypotheses and support conclusions. 	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Linear and non-linear relationships - apply number laws to algebraic expressions and equations, expand and factorise algebraic expressions, solve simple linear equations algebraically and graphically, connect patterns, linear functions, tables of values, graphs and worded statements, plot coordinates on the Cartesian plane and solve realistic problems. • Using units of measurement - develop formulas for volume and capacity of rectangular and triangular prisms, solve volume problems involving rectangular and triangular prisms and convert units of measurement. • Geometric reasoning - revise angle properties (co-interior, corresponding, alternate and vertically opposite), explore congruence, establish and apply the congruence tests (SAS, AAS, SSS, RHS), extend congruence of triangles to identify the properties of quadrilaterals and solve problems using the properties of congruent figures, reasoning and generalisations, apply understanding and reasoning of area, congruence and plane shapes to develop properties of quadrilaterals.

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9	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Real numbers — Solving rates problems, simplifying rates, identifying additive and multiplicative patterns in direct proportion, representing rates graphically and algebraically • Linear and non-linear relationships — Calculate gradient, calculate the distance between two points on a Cartesian plane using Pythagoras's theorem, calculate the midpoint of a line segment. • Using units of measurement — calculate the area of composite shapes, calculate the surface area and volume of right prisms and cylinders solve problems involving the surface area and volume of right prisms and cylinders, apply reasoning around volume to design a rainwater collection system for a school. 	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Patterns and algebra — expand and factorise algebraic expressions, expand binomial expressions, sketch non-linear relations and find x- and y- intercepts of parabolic functions • Geometric reasoning — describe the conditions for similarity, draw scaled enlargements, determine scale factors, interpret scale drawings, assess the similarity of triangles using tests, and investigate scale and area. • Pythagoras and trigonometry — apply Pythagoras' Theorem to check if a triangle is acute, right-angled or obtuse, determine unknown side lengths of right-angled triangles, solve problems involving right-angled triangles, apply naming conventions for sides of right-angled triangles, use similarity to investigate the constancy of the sin, cos and tan ratios, investigate patterns in trigonometric ratios, calculate trigonometric ratios using known angle or side length values, calculate unknown side lengths in right-angled triangles, solve problems using trigonometry, & calculate unknown angles in right-angled triangles. 	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Real numbers — understand and use index notation, convert index notation to expanded notation and vice versa, investigate the index laws for multiplication, division, zero index, power of a power, power of a product, power of a quotient, the negative indices and simplify expressions using the index laws, convert numbers from scientific notation to standard decimal form and vice versa, use index laws to solve problems involving scientific notation. • Money and financial mathematics — use the simple interest formula, rearrange the simple interest formula, solve problems using simple interest. • Patterns and algebra — review the distributive law, expand and simplify binomial expressions, apply the index laws to expansion, investigate special cases of binomial expansion (perfect squares, the difference of squares). • Data representation and interpretation — consolidate types of statistical variables, collect primary and secondary data to investigate statistical questions, calculate, interpret and describe statistics from both raw data and data representations using non-digital and digital resources, construct and compare histograms and back-to-back stem-and-leaf plots and use statistical knowledge to draw conclusions. 	<p>Students have opportunities to develop understandings of:</p> <ul style="list-style-type: none"> • Real numbers — express numbers using scientific notation and perform operations using the index laws. • Linear and non-linear relationships — model relationships between variables and link algebraic, graphical and tabular representations of those relationships. • Using units of measurement — investigate very large and very small time scales, express time scales using metric prefixes and scientific notation, convert units of time using the index laws. • Chance —determine outcomes of two-step chance experiments using tree diagrams and arrays, assign probabilities to outcomes, calculate relative frequencies, determine probabilities of events (including those involving 'and' and 'or' criteria), organise data and determine relative frequencies in Venn diagrams and two-way tables, investigate data used in media reports (estimate population means and medians and evaluate the validity of statistics used).

	Term 1	Term 2	Term 3	Term 4
10	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Chance — describe the results of two- and three-step chance experiments, assign and determine probabilities including conditional probability and investigate the concepts of dependence and independence. • Pythagoras and trigonometry — revise Pythagoras' Theorem and solve contextualised problems, apply the trigonometric ratios to solve problems, by substituting into formulas, in two and three dimensions and solve contextualised trigonometric problems including surveying and orienteering. (Taught in term 1 assessed end of semester 1) 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Patterns and algebra — apply the four operations to algebraic fractions, manipulate expressions and equations to solve problems involving algebraic fractions, expand and factorise quadratics, • Linear and non-linear relationships — explore connections between algebraic and graphical representations, make generalisations in relation to parallel and perpendicular lines, identify the solution to two intersecting linear equations, apply graphical and substitution methods to find solutions and solve contextualised problems, formulate & solve real life problems involving monic quadratic expressions and equations, adapt graphing techniques to solve problems involving monic quadratics, make connections between functions and their graphical representations, extend application of graphing techniques from linear functions to parabolas, circles & exponential functions. 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Using units of measurement — recall formulas to calculate area and volume, calculate the surface area and volume of prisms and cylinders, solve problems involving calculating surface area and volume of composite solids • Geometric reasoning — recall angle relationships for straight lines, triangles and quadrilaterals. • Data representation and interpretation — develop an understanding of statistical measures of centre and spread to describe data sets, analyse data displays (box plots, histograms and scatter plots) to make generalisations, calculate statistical measures of data sets, graphically represent relationships, draw a line of best fit, apply known strategies to compare data, manipulate reports and data displays to identify trends, use statistical measures to analyse data and reports. 	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Money and financial mathematics — recall simple and compound interest formulas, calculate simple and compound interest, connect simple and compound interest, substitute into a formula, connect graphical and algebraic representations of functions, solve financial problems involving compound interest and loans. <p>Note: The topic from term 3 not covered in extended modelling and problem solving task will be assessed in end of semester 2 exam.</p>
10 EX	<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Chance — describe the results of two- and three-step chance experiments, assign and determine probabilities including conditional probability and investigate the concepts of dependence and independence. Evaluate media statements and statistical reports. • Pythagoras and trigonometry — revise Pythagoras' Theorem and solve contextualised problems, apply the trigonometric ratios to solve problems, by substituting into formulas, in two and three dimensions and solve contextualised trigonometric problems including surveying and orienteering. Perform operations with surds, apply Pythagoras' theorem and trigonometry to three dimensional problems, establish and apply the sine and cosine rules and solve related problems, define and graph trigonometric functions and solve simple trigonometric equations. • Patterns and algebra — apply the four operations to algebraic fractions, manipulate expressions and equations to solve problems involving algebraic fractions, expand and factorise quadratics. Choose appropriate methods to factorise monic and non-monic quadratic expressions. • Linear and non-linear relationships — explore connections between algebraic and graphical representations, make generalisations in relation to parallel and perpendicular lines, identify the solution to two intersecting linear equations, apply graphical and substitution methods to find solutions and solve contextualised problems, formulate & solve real life problems involving monic quadratic expressions and equations, adapt graphing techniques to solve problems involving monic quadratics, make connections between functions and their graphical representations, extend application of graphing techniques from linear functions to parabolas, circles & exponential functions. Apply the elimination method to find solutions and solve contextualised problems, formulate and solve real life problems involving monic and non-monic quadratic equations, transform relations and functions & simplify expressions involving irrational numbers. 		<p>Students develop understandings of:</p> <ul style="list-style-type: none"> • Using units of measurement — recall formulas to calculate area and volume, calculate the surface area and volume of prisms and cylinders, solve problems involving calculating surface area and volume of composite solids. Solve problems involving calculations of volume and surface area of pyramids, cones and spheres. • Geometric reasoning — recall angle relationships for straight lines, triangles and quadrilaterals. • Data representation and interpretation — develop an understanding of statistical measures of centre and spread to describe data sets, analyse data displays (box plots, histograms and scatter plots) to make generalisations, calculate statistical measures of data sets, graphically represent relationships, draw a line of best fit, apply known strategies to compare data, manipulate reports and data displays to identify trends, use statistical measures to analyse data and reports. Find and use an equation for the line of best fit to describe the relationship between two variables, calculate and use standard deviation to describe the spread of a data set, compare data sets using the mean and SD. • Money and financial mathematics — recall simple and compound interest formulas, calculate simple and compound interest, connect simple and compound interest, substitute into a formula, connect graphical and algebraic representations of functions, solve financial problems involving compound interest and loans. • Linear and non-linear relationships - represent and solve problems involving simple linear equations, represent and solve problems involving simple linear inequalities and solve simultaneous equations graphically. Identify the features of a polynomial, connect a written division algorithm and the factor and remainder theorems and sketch polynomials. • Real numbers - define a logarithm, make connections between exponential and logarithmic expressions, establish and apply the laws of logarithms, simplify expressions using logarithmic laws and solve financial problems involving the use of logarithms. 	

Whole school assessment plan: 7–10 overview

Categories of student products include: **written**, **spoken/signed**, **performance**, **multimodal** and **visual** **Systemic tasks** † denotes supervised conditions
include: NAPLAN,

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7	<p>Exam† <i>Short answer. Calculator.</i></p> <p>Investigating index notation, fractions and integers Students connect whole numbers and index notation, and solve problems involving fractions and integers.</p> <p>Extended Modelling and Problem Solving Task (exam component)</p> <p>Investigating properties of shape and solving an authentic problem Students identify properties of shapes and solve authentic problems using measurements.</p>	<p>NAPLAN †</p> <p>Exam† <i>Short answer. Calculator.</i></p> <p>Solving algebra and chance problems Students model and solve linear representations, construct sample spaces and assign probabilities.</p>	<p>Extended Modelling and Problem Solving Task</p> <p>Making financial decisions Students calculate and use unit pricing to make financial decisions to develop a costed catering plan.</p> <p>Exam† <i>Short answer. Calculator.</i></p> <p>Applying integer and real number concepts Students perform calculations and solve problems involving integers, index notation, fractions, decimals, and percentage.</p>	<p>Exam† <i>Short answer. Calculator.</i></p> <p>Applying data and geometry concepts Students use data displays and measures of centre to make decisions, apply parallel angle relationships and represent transformations.</p>
8	<p>Exam† <i>Short answer. Calculator (2 Lessons).</i></p> <p>Solving problems involving percentages and profit and loss Students use percentage to calculate commission, mark-up, profit and loss and make financial decisions.</p> <p>Investigating the probability of events Students use probability to make and justify informed conclusions.</p>	<p>Exam† <i>Short answer. Calculator.</i></p> <p>Applying index, algebra and measurement concepts Students connect and apply mathematical concepts involving indices, algebra and measurement.</p>	<p>Extended Modelling and Problem Solving Task</p> <p>Investigating relationships between game variables Students collect representative data and interpret the results to find relationships between different game variables.</p> <p>Exam† <i>Short answer. Calculator.</i></p> <p>Applying ratios, linear relationships and time concepts Students solve everyday problems involving rates, ratios, time durations and linear relationships.</p>	<p>Exam† <i>Short answer. Calculator.</i></p> <p>Applying algebra, geometry and measurement understanding Students solve volume of prism problems, identify and apply congruence of triangles and apply algebraic understanding</p>
9	<p>Exam† <i>Short answer. Calculator.</i></p> <p>Solving analytical geometry problems Students calculate and solve analytical geometry problems</p> <p>Investigating area and volume problem situations Students investigate an area and volume problem situation and justify conclusions made.</p>	<p>NAPLAN †</p> <p>Exam† <i>Short answer. Calculator.</i></p> <p>Connecting and applying trigonometry, similarity and algebraic concepts Students connect and apply mathematical concepts involving geometry, algebra and measurement.</p>	<p>Extended Modelling and Problem Solving Task</p> <p>Investigating secondary data Students draw informed conclusions from a data investigation using secondary data.</p> <p>Exam† <i>Short answer. Calculator and Non-Calculator.</i></p> <p>Applying index laws and simple interest formula Students apply the index laws to numbers, express numbers in scientific notation, expand and simplify binomial expressions, and solve problems involving simple interest.</p>	<p>Exam† <i>Short answer. Calculator.</i></p> <p>Calculating probability and using timescales Students solve problems involving scientific notation, timescales, scale factors and the calculation of relative frequencies and probabilities.</p>

10	<p>Extended Modelling and Problem Solving Task</p> <p>Investigating probability in a design situation Students investigate the use of probability in playing and designing target games.</p>	<p>Exam[†] <i>Short answer. Calculator.</i></p> <p>Using trigonometry to calculate unknown angles and distances Students use trigonometry to calculate unknown angles and distances.</p> <p>Applying algebraic concepts to relationships Students use algebraic and graphical methods to solve problems involving linear and non-linear relationships.</p> <p>Note: concepts assessed in the PSMT will NOT be included in the exams.</p>	<p>Extended Modelling and Problem Solving Task</p> <p>Data representation and analysis Students demonstrate understandings of parallel box plots and other data displays. Students will analyse and identify relationship.</p> <p>OR</p> <p>Applying volume, surface area and geometric reasoning Students solve problems involving surface area and volume of composite solids and apply logical reasoning and formulate proofs.</p>	<p>Exam[†] <i>Short answer. Calculator.</i></p> <p>Determining compound interest and geometric reasoning Solve problems involving simple interest, compound interest and inequalities.</p> <p>* The topic from term 3 not covered in extended modelling and problem solving task will be assessed in end of semester 2 exam.</p>
10 EX	<p>ASSESSMENT ITEM 1: Extended Modelling and Problem Solving Task</p> <p>ASSESSMENT ITEM 2: Exam[†] <i>Short answer. Calculator and Non-Calculator</i></p> <p>Investigating probability in a design situation Students solve problems involving probability.</p> <p>Using Pythagoras' theorem and trigonometry to calculate unknown angles and distances Students use Pythagoras' theorem, trigonometry ratios and trigonometry rules to calculate unknown angles and distances.</p> <p>Applying algebraic and transformation concepts to relationships Students solve problems involving linear and non-linear relationships, using algebraic and graphical representations.</p> <p>Note: concepts assessed in the PSMT will NOT be included in the exams.</p>	<p>ASSESSMENT ITEM 3: Extended Modelling and Problem Solving Task</p> <p>ASSESSMENT ITEM 4: Exam[†] <i>Short answer. Calculator and Non-Calculator</i></p> <p>Data representation and analysis Students demonstrate understandings of parallel box plots and bivariate data analysis. Students will analyse and identify relationships.</p> <p>Applying volume, surface area and geometric reasoning Students solve problems involving surface area and volume of composite solids and apply logical reasoning and formulate proofs.</p> <p>Determining compound interest, logarithms, inequalities and polynomials. Students solve problems involving simple interest, compound interest, logarithms, inequalities and polynomials.</p> <p>Note: concepts assessed in the PSMT will be included in the non-calculator exam, they will NOT be included in the calculator exam.</p>		

