STEINER EDUCATION AUSTRALIA

AUSTRALIAN STEINER CURRICULUM FRAMEWORK 2011

MATHEMATICS
Scope & Sequence

High School

Revisions in this document

ASCF MATHEMATICS SCOPE and SEQUENCE   YEAR 7 to YEAR 10

NUMBER AND ALGEBRA

	Year 7	Year 8	Year 9	Year 10
Number	Discover, develop, select and apply appropriate mental and written strategies to solve moderately demanding problems involving the four operations with whole numbers, decimals and fractions. Understand the equivalence of fractions, decimals and percentages. Perform more challenging conversions. Discover and experience practical situations in which negative numbers occur. Locate and represent negative numbers on a number line, including fractions and mixed numerals. Investigate index notation and encounter powers and roots in problems involving numbers and pronumerals. Discover and experience problems relating to ratio and proportion. Discover and experience problems involving speed, distance and time.	Discover, develop, select and apply appropriate mental and written strategies to solve more challenging problems involving the four operations with whole numbers, decimals and fractions. Develop familiarity with expressing very large and very small numbers in scientific notation. Discover and investigate irrational numbers such as π. Work with terminating and recurring decimals. Review and extend work with index notation and laws. Review and extend experience of problems involving speed, distance and time to include other rates, with and without digital technologies.	Review and extend work with index notation and laws. Investigate irrational numbers and surds through construction, measurement and application of Pythagoras' theorem. Review and extend work on the simplification and solution of problems involving surds and indices.	Review and extend work with irrational numbers, surds and indices. Discover logarithms through the construction of spirals and the progression of musical notes. Establish and apply the laws of logarithms. Discover and investigate the use of the quadratic formula and understand the implications of the value of the discriminant for both the nature of roots and the features of the corresponding parabolic graphs. Discover and investigate number bases other than decimal, including performing the four operations in different number bases.

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Financial mathematics	Review and extend experience and solution of practical problems involving the use of percentages, including profit and loss, discount, mark-up, interest etc. Use ratio and proportion to compare prices of goods etc.	Consolidate and extend experience and solution of practical problems involving the use of percentages, including profit and loss, discount, mark-up, interest etc, with and without digital technologies. Discover, experience and solve practical problems involving compound interest, loans, investments, deposits, hire purchase etc, with and without digital technologies. Discover, experience and solve practical problems based on a range of systems of remuneration, eg. Retainer, commission, income tax etc, with and without digital technologies. Discover, experience and solve practical problems based on ratios, eg. Exchange rates.	Consolidate and extend previous work in financial mathematics, with and without digital technologies.	Review and extend simple and compound interest calculations from the perspective of sequences and series, both with and without the use of digital technologies.
Patterns and algebra	Discover and apply the use of a variable as a representative of a number. Review and extend the use of substitution and order of operations to solve formulae and algebraic expressions. Discover and apply the associative, commutative and distributive laws to algebraic expressions.	Review and extend the application of the associative, commutative and distributive laws to algebraic expressions. Factorise algebraic expressions by seeking a common factor, and by the difference of two squares. Revise and extend the study of indices, applying them to the solution of algebraic expressions	Review and extend the application of the associative, commutative and distributive laws to algebraic expressions. Review and extend the factorization of algebraic expressions to include trinomials. Perform binomial expansions by application of the distributive law, and by the use of Pascal's triangle.	Revise and extend previous work in the expansion, factorization and simplification of algebraic expressions. Become familiar with the substitution of values into formulae, changing the subject of formulae, and apply to practical contexts, both with and without digital technologies. Discover and become familiar with arithmetic, geometric and harmonic

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	Discover and investigate the Fibonacci sequence and the Golden Ratio, and how these are reflected in nature, music, art, architecture, the human body etc.	arising out of practical problems, including surface areas and volumes.	Become familiar with the simplification of algebraic fractions.	sequences and series in both practical and theoretical contexts, with and without the use of digital technologies. Review and extend the understanding of the Fibonacci sequence and the Golden Ratio, and how these are reflected in nature, music, art, architecture, the human body etc.
Linear and non-linear relationships	Discover and become familiar with the use of co-ordinates to describe the location of an object in planar space. Discover and investigate linear relationships by plotting points on a Cartesian Plane. Interpret and describe features of straight line graphs, including those generated from practical activities eg. Pulse rate after increasing bouts of activity etc. Investigate the various methods of plotting straight line graphs, and be able to deduce the equation from the graph. Solve simple linear equations, both graphically and algebraically. Investigate the transformations of linear relations on the Cartesian Plane.	Revise the various methods of plotting linear relations on the Cartesian plane and introduce digital technologies. Solve simple linear equations, both graphically and algebraically, with and without the use of digital technologies. Investigate the relationship between the algebraic and graphical representation of rate problems.	Revise and extend the various methods of plotting linear relations on the Cartesian plane, both with and without digital technologies. Solve simultaneous equations graphically, both with and without the use of digital technologies, and by the methods of substitution and elimination. Construct and sketch non-linear relations such as the conic sections, both with and without digital technologies. Become familiar with the Cartesian equations describing the conic sections.	Revise and extend the solution of simultaneous equations graphically, both with and without the use of digital technologies, and by the methods of substitution and elimination. Discover and investigate Archimedean, Logarithmic and Harmonic spirals, and construct exponential and logarithmic curves. Further extend the understanding of the relationship between the algebraic and graphical representation of rate problems, particularly in the context of displacement, velocity and acceleration. Discover and investigate elements of analytical geometry, such as the distance between two points, midpoint of a line, problems involving parallel and perpendicular lines etc, both with and without digital technologies. Revise and extend the sketching of

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NUMBER AND ALGEBRA

	Year 7	Year 8	Year 9	Year 10
				non-linear relations such as the conic sections and exponentials, both with and without digital technologies. Graph and solve linear and quadratic inequalities. Revise and extend the solution of linear equations to include algebraic fractions etc, including problems derived from formulae and the modeling of practical scenarios. Investigate the solution of quadratic equations using a range of strategies, both with and without digital technologies, eg. Factorization, completing the square, the quadratic formula etc.

MEASUREMENT AND GEOMETRY

	Year 7	Year 8	Year 9	Year 10
Measurement	Review and extend previous work on area and perimeter to include parallelograms, trapeziums, non right angled triangles and compound shapes. Generate data from practical activities and use in speed, distance and time problems.	Review and extend previous work on area and perimeter to include surface areas and volumes of prisms, cones, cylinders, composite forms etc. Discover and investigate the relationship between features of a circle such as radius, diameter,	Review and extend previous work on perimeter, area and volume. Discover and become familiar with the manipulation of surds practically as they arise out of the measurement of squares, triangles, pentagons and other geometric forms.	Review and extend previous work on perimeter, area and volume. Discover and apply the principles of descriptive geometry, such as the six principal views of the orthographic projection, both with and without digital technologies.

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		circumference, area and apply to problems. Discover and investigate very small and very large numbers in the context of distance, time etc.	Discover and apply the division of the circle into radians, degrees, minutes and seconds.	
Shape	Review and extend previous work on the construction of patterns based on circle divisions and stellar polygons. Construct more complex shapes, such as parallelograms, trapeziums, compound shapes etc. Discover and apply the principles of perspective drawing, vanishing points etc.	Construct polygons and measure sides and angles, form patterns such as mosaics by tessellation. Extend to discover the Platonic Solids. Represent both with and without digital technologies. Construct nets for the Platonic solids and model them in card, clay or other materials.	Discover and investigate the properties of the conic sections by modeling in clay, construction with and without digital technologies, loci, their appearance in the natural and created environment etc.	Discover and apply the principles of descriptive geometry, such as the six principal views of the orthographic projection, both with and without digital technologies.
Location and transformation	Investigate the metamorphosis of form through the concepts of ratio and proportion, scale, symmetry, and the transformations of linear relations and simple polygons on the Cartesian Plane.	Investigate the metamorphosis of form through the concepts of ratio and proportion, scale, symmetry, and the transformations of linear relations and more complex polygons and compound shapes.	Discover and investigate the properties of the conic sections by modeling in clay, construction, loci, their appearance in the natural and created environment etc. Investigate the metamorphosis of one conic section into another by construction.	Apply the principles of descriptive geometry, such as the six principal views of the orthographic projection, both with and without digital technologies.
Geometric reasoning	Review and extend previous work on construction and measurement of angles. Investigate, construct and measure angles arising from a transversal	Construct polygons and measure sides and angles. Discover and become familiar with theorems relating to polygons. Form patterns such as mosaics by tessellation. Extend to discover the Platonic	Discover and investigate the properties of similar triangles and other shapes, specifically ratio and proportion of sides. Apply to the solution of problems.	Review and extend previous work on the solution of problems and statement of proofs by the application of sequential logic.

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	cutting parallel lines. Discover theorems relating to alternate, corresponding, co-interior and vertically opposite angles, as well as interior and external angles of triangles. Solve problems based on parallel lines and triangle theorems, including finding unknown angles and proving that lines are parallel. Investigate the properties of quadrilaterals and apply to problems.	Solids and Euler's formula. Discover and apply circle theorems to proofs requiring sequential logic. Discover and apply the conditions for congruence of plane shapes. Solve problems based on quadrilaterals, circle theorems and congruence.	Review and extend previous work on the solution of problems and statement of proofs by the application of sequential logic.	
Pythagoras and trigonometry	Discover various proofs and applications of Pythagoras' Theorem.	Review and extend the application of Pythagoras' theorem to problems involving triangles with a common side, quadrilaterals etc.	Review and extend the application of Pythagoras' theorem to include problems in three dimensions. Discover and investigate the trigonometric ratios through the properties of similar triangles. Apply the trigonometric ratios to solve problems involving unknown angles and side lengths in right-angled triangles in both two and three dimensional contexts. Discover and apply the sine, cosine and area rules to problems involving both unknown sides and angles.	Review the previous work on the trigonometric ratios, sine, cosine and area rules, and apply these to the processing of data generated by surveying an area of ground in order to produce a scale map.

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STATISTICS AND PROBABILITY

	Year 7	Year 8	Year 9	Year 10
Chance	Perform probability experiments and use relative frequencies to calculate probabilities. Perform surveys and analyse the data obtained. Develop awareness of reporting on surveys in the media.	Perform probability experiments and use relative frequencies to calculate probabilities. Identify complementary events. Perform surveys and analyse the data obtained. Develop awareness of reporting on surveys in the media. Represent events using Venn diagrams.	Perform probability experiments and use relative frequencies to calculate probabilities. Determine probabilities for events using the sum of probabilities, identify complementary events and list outcomes of two step experiments, both with and without replacement. Describe events using terminology such as 'at least', 'and' and 'or', and calculate probabilities of these events. Represent events using Venn diagrams and two way tables. Perform surveys and analyse the data obtained, and investigate reports in the media relating to surveys and data collection. Investigate permutations and combinations, and the application of Pascal's triangle to combinatorics. Investigate two and three step experiments, with and without replacement.	Describe two and three step experiments, both with and without replacement. Further investigate the idea of independent events. Perform surveys and analyse the data obtained, and investigate reports in the media relating to surveys and data collection. Further investigate permutations and combinations, and the application of Pascal's triangle to combinatorics. Investigate conditional statements in order to develop statistical literacy.
Data representation and interpretation	Investigate and compare the use of tables and different types of graphs as a means of presenting data visually, and evaluate their effectiveness in different contexts. Investigate the visual	Investigate the visual means of presenting data in the media eg financial information and share prices in the newspaper. Develop algebraic expressions or 'rules' to describe relationships	Investigate and apply various methods of listing, tabulating and graphically representing data such as frequency tables, tallies, stem and leaf plots, histograms, box plots, scatter plots etc, both with and without digital technology. Describe the visual representation of data using terminology such as 'skewed',	Investigate and apply various methods of listing, tabulating and graphically representing data such as frequency tables, tallies, stem and leaf plots, histograms, box plots, scatter plots etc, both with and without digital technology. Calculate and interpret mean, mode and median for data sets. Determine

STATISTICS AND PROBABILITY

	Year 7	Year 8	Year 9	Year 10
	presentation of data in the media.	arising out of experimental data, and apply them to other situations or problems. Calculate and interpret mean, mode and median for data sets.	'symmetric', 'bimodal'. Calculate and interpret mean, mode and median for data sets. Determine quartiles and interquartile range. Investigate and evaluate statistical reports in the media, especially where statistics have been used as persuasive elements. Investigate bivariate data with the independent variable of time.	quartiles and interquartile range. Investigate and evaluate statistical reports in the media, especially where statistics have been used as persuasive elements. Analyse and describe bivariate data with the independent variable of time.