

Subject: VCE (Mathematical Methods)		
Unit: 3		
Week	Area of Study	Learning Focus
Term 4	Headstart	Functions and Relations: 1A – 1H, 2A, 2B <ul style="list-style-type: none"> Investigate concepts of relations and functions, domain, implied (maximal) domain, restrictions and range. Investigate and sketch graphs for odd and even functions, one-to-one and inverse functions, sums and products and addition of ordinates. Define and use composite functions, strictly increasing and decreasing functions and power functions and their graphs. Apply a knowledge of functions to solve problems.
Term 1 1-3	Functions and Graphs Algebra	Coordinate Geometry and Matrices: 2C – 2G, 3A, 3B. <ul style="list-style-type: none"> Solving linear and literal equations, simultaneous linear equations with two or more variables and interpret the geometry Find the distance between two points, midpoint of a line segment and gradient of a straight line. Recognise different forms of the equation of a straight line and use matrices. Apply a knowledge of linear functions to solve problems.
4-5	Functions and Graphs Algebra	Transformations: 3C – 3I <ul style="list-style-type: none"> Use notation for translations, reflections in an axis and dilations from an axis and determine sequences of transformations given an original and image equation, and use them to sketch graphs. Consider transformations of power functions. Determine function rules from transformations and graphs. Use matrices to define transformations and determine images.
6	Functions and Graphs Algebra	Polynomial Functions: 3J, 4A -4F <ul style="list-style-type: none"> Revise properties of quadratic functions and consider properties of cubic functions and polynomials of higher degree. Add, subtract, multiply and divide polynomials, equate coefficients and use sign diagrams. Use the language of polynomials, the remainder theorem, factor theorem and the rational-root theorem and identify the linear factors of cubic and quartic polynomials. Determine the rules for given polynomial graphs and apply polynomial functions to problem solving.
7	Functions and Graphs Algebra	Exponential and Logarithmic Functions: 4G – 4H, 5A - 5E <ul style="list-style-type: none"> Graph exponential and logarithmic functions and their transformations. Revise the index and logarithm laws and solve exponential and logarithmic equations. Determine rules for graphing exponential and logarithmic functions and find their inverses. Apply exponential functions to modelling growth and decay.
8-9	Functions and Graphs Algebra	Circular Functions: 5F -5I, 6A- 6C Circular Function Graphing: 6D – 6L <ul style="list-style-type: none"> Define the sine, cosine and tangent circular functions, explore their symmetry properties, apply the Pythagorean Identity, find exact values and sketch graphs of circular functions and their transformations. Measure angles in degrees and radians, solve equations and apply circular functions in modelling periodic motion. Use addition of ordinates, determine rules for graphing and find general solutions of trigonometric equations Apply circular functions to problem solving
10	Functions and Graphs Algebra	Further Functions: 7A-7E <ul style="list-style-type: none"> Graph power functions with rational non-integer index.

		<ul style="list-style-type: none"> Revisit sums, differences and products of functions, addition of ordinates, one-to-one functions, strictly increasing and decreasing functions, odd functions and even functions, composite functions, inverse functions and transformations of functions. Use functional equations to describe properties of functions. Use parameters to describe families of functions.
	Calculus	Differentiation: 9A-9C <ul style="list-style-type: none"> Understand limits, the definition of differentiation and the notation for the derivative of a polynomial function. Find the gradient of a tangent to the graph of a polynomial function by calculating its derivative.
Term 2 1-3	Calculus	Differentiation continued: 9D-9M <ul style="list-style-type: none"> Understand and use the chain, product and quotient rules. . Differentiate rational powers, exponential, natural logarithmic and circular functions. Deduce the graph of the derivative from the graph of a function and vice versa, determine continuity and differentiability
4-5	Calculus	Applications of Differentiation: 10A – 10G <ul style="list-style-type: none"> Find the equations of the tangent and the normal at a given point. Find stationary points and state their nature. Use differentiation techniques to sketch graphs and show families of functions Solve maximum and minimum problems, determine absolute maximum and minimum values and apply derivatives to rates of change problems.
6	Calculus	Pre-SAC Review
7-8	Calculus	UNIT 3 FN & CALC SAC: 7 lessons, 350 mins = 5 hrs, 50 mins A function and calculus-based investigation of 4–6 hours over 1–2 weeks.
9-10	Calculus	Integration: 11A – 11E <ul style="list-style-type: none"> Integrate polynomial functions, exponential functions and circular functions. eg: $(ax + b)^r$, e^{kx} Estimate the area under the graph of a function.
Term 3 1-2	Calculus	Applications of Integration: 11F – 11K <ul style="list-style-type: none"> Integrate by Recognition Use the Fundamental Theorem of Calculus to determine definite integrals and find the exact areas above and below the x-axis and between two curves.
3	Probability and Statistics	Discrete Random Variables And Their Probability Distributions: 13A–13D <ul style="list-style-type: none"> Review the basic concepts of probability including conditional probability. Define discrete random variables and their probability distributions Calculate and interpret expected value (mean), variance and standard deviation for a discrete random variable. Understand that for many random variables approximately 95% of the distribution is within two standard deviations of the mean.
4	Probability and Statistics	The Binomial Distribution (Bernoulli Trials): 14A – 14D Finding the Sample Size, Proofs for the Expectation and Variance <ul style="list-style-type: none"> Define a Bernoulli sequence and review the binomial probability distribution. Interpret graphical skewing for different values of the binomial distribution parameters. Calculate and interpret the mean, variance and standard deviation for the binomial probability distribution. Use the binomial probability distribution to solve problems. Find the sample size and proofs for the expectation and variance

5	Probability and Statistics	Pre-SAC Review
6	Probability and Statistics	UNIT 4 'APPLICATIONS OF DIFFERENTIATION' MODELLING OR PROBLEM SOLVING SAC: 3 lessons:150 mins = 2.5 hours The modelling or problem-solving tasks are 2–3 hours each, over 1 week.
7	Probability and Statistics	Continuous Random Variables and Their Probability Distributions: 15A – 15E <ul style="list-style-type: none"> • Introduce continuous random variables and investigate probability density functions. • Relate the probability for an interval to an area under the graph of a probability density function. • Use calculus and technology to find probabilities for intervals from a probability density function. • Calculate and interpret the expectation (mean), median, variance and standard deviation for a continuous random variable.
8	Probability and Statistics	The Normal Distribution: 16A-16E <ul style="list-style-type: none"> • Understand the family of normal distributions as transformations of the standard normal distribution, apply standardisation and the 68-95-99.7% Rule • Investigate the effect of changing the values of the parameters on the graph of the probability density function. • Determine normal probabilities and recognise the mean, median, variance and standard deviation of a normal distribution. • Use procedures and technology to determine probabilities and solve problems and the Normal Approximation to the Binomial Distribution
9	Probability and Statistics	Sampling and Estimation: 17A- 17E <ul style="list-style-type: none"> • Understand random samples and how they are obtained, population proportion and sample proportion. • Investigate the sampling distribution of the sample proportion both exactly (for small samples) and through simulation. • Approximate the sampling distribution of the sample proportion. • Use the sample proportion as a point estimate of the population proportion and find confidence intervals for the population proportion, the margin of error, and illustrate how this varies both with level of confidence and with sample size.
10	Probability and Statistics	UNIT 4 'PROBABILITY & STATISTICS' MODELLING OR PROBLEM SOLVING SAC: 3 lessons: 150 mins = 2.5 hours The modelling or problem-solving tasks are 2–3 hours each, over 1 week.
Term 4 1 - 3	AOS 1, 2, 3 and 4	REVISION AND EXAM PRACTICE