

Subject: Mathematical Methods

Unit: 2

Semester: 2

TERM 3

WEEK	TOPIC	LEARNING FOCUS
Weeks 1 – 3	Logarithms CHAPTER 13 (A-H)	<ul style="list-style-type: none"> • Convert between index and log statements • Simplify using \log_{10}, \log_e and other bases • Evaluate logarithmic expressions • Distinguish between exact values and approximate values • Simplify and solve equations using the 5 log laws and other logarithmic methods: eg $a^{\log_a x} = x$ and $\log_a(a^x) = x$ • Recognise the 'change of base' law • Sketch functions of the form $f: R^+ \rightarrow R$, $f(x) = \log_a(x)$, where $a > 1$, and the inverse function of $y = a^x$, • Apply basic graphical transformations of $y = \log_a(x)$ • Apply logarithmic scales
Weeks 4-7	Circular Functions CHAPTER 14 (A – O)	<ul style="list-style-type: none"> • Review Basic Trigonometry and the relationship of $\tan(x) = \sin(x)/\cos(x)$ • Understand unit circle definitions • Determine the exact value of trigonometric special angles • Convert between radians and degrees and determine arc length • Employ CAST, symmetry rules and complementary relations • Solve trigonometric equations including those of worded problems • Determine the amplitude, period or mean value of circular functions • Sketch graphs of circular functions • Apply transformations of sine and cosine graphs; • Employ the identity $\sin^2(x) + \cos^2(x) = 1$ • Calculate $\sin(x) \approx x$ for small values of x • Use inverse functions and transformations to solve equations of the form $Af(bx) + c = k$
Weeks 8-10	Rates of Change CHAPTER 16 (A - E)	<ul style="list-style-type: none"> • Use graphical, numerical and algebraic approaches to estimate or find an exact value for the gradient of a secant or tangent to a curve at a given point • Calculate gradient of a secant or average rates of change • Calculate rates of change of Polynomials and Hybrid Functions • Estimate instantaneous rates of change • Use the gradient of a tangent at a point on a graph to describe and measure instantaneous rate of change • Identify rates of change: constant, variable, average and zero • Interpret graphs with respect to rate of change such as temperature or pollution levels over time, and the height of water in containers of different shapes that are being filled at a constant rate • Relate velocity-time graphs to position-time graphs • Consider rates of change in a variety of practical contexts • Informally consider continuity and smoothness and instantaneous rate of change as a limiting case of the average rate of change

TERM 4		
WEEK	TOPIC	LEARNING FOCUS
Weeks 1-3	Differentiation CHAPTER 17 (A - D)	<ul style="list-style-type: none"> Employ notations for the derivative of a function: $f'(x)$, dy/dx, $d/dx (f(x))$, $D_x(f)$ Differentiate by First Principles Differentiate by rule including power functions and simple polynomial functions Become familiar with increasing and decreasing functions and gradient sign diagrams Determine the gradient of a tangent to a curve at a point, via the derivative Employ differentiation to solve problems Become familiar with the concept of a limit Evaluate limits including for hybrid functions and using CAS technology Determine continuity and differentiability
Weeks 4 - 5	Applications of Differentiation CHAPTER 18 (A – F, H, I) CHAPTER 20 (E)	<ul style="list-style-type: none"> Determine the equation of the tangent and normal at a given point on a curve. Employ the derivative in rate of change problems Apply derivatives to locating stationary points and determining their nature: maxima, minima and point of inflection Sketch graphs employing Calculus Apply derivatives to solving maximum or minimum problems Apply derivatives to kinematics Find a family of derivative functions for a given power or polynomial function Determine the numerical approximation of roots of cubic polynomial functions using Newton's method.
Weeks 6 - 7	Antidifferentiation AND Applications of Antidifferentiation CHAPTER 17 (E) CHAPTER 18 (G) CHAPTER 20 (C) CHAPTER 21(B)	<ul style="list-style-type: none"> Employ notation to determine an antiderivative Antidifferentiate by rule including power functions Applying antidifferentiation to rates of change or kinematics problems involving straight line motion Find a family of derivative functions for a given power or polynomial function Determine a specific antiderivative given a boundary condition
Week 8	CHAPTER 19 CHAPTER 22 CHAPTER 23	<ul style="list-style-type: none"> CHAPTERS 16 – 18 REVISION REVISION CHAPTER 20 - 21 REVISION CHAPTER 1 - 22
Week 9	EXAMS	
	CHAPTER 20 (A,B,D,E)	<ul style="list-style-type: none"> FURTHER CALCULUS.