

## STAGE 6 MATHEMATICS 2/3 UNIT TOPICS

TOPIC	2 UNIT COURSE	3 UNIT COURSE
Basic Arithmetic and Algebra	Basic number	Inequalities with unknown in denominator
	Surds	
	Absolute value – evaluation, equations, inequalities	
	Basic algebra	
	Factorising	
	Equations – basic, quadratic, simultaneous	
	Inequalities – linear, quadratic	
Plane Geometry	Angles	
	Parallel lines	
	Triangles	
	Quadrilaterals	
	Congruency	
	Similarity	
	Pythagoras' theorem	
	Areas	
Functions and Relations	Function notation	
	Domain and range	
	Sketching functions	
	Even and odd functions	
	Sketching regions involving inequalities	
Circle Geometry		Arcs and cords
		Angle properties
		Chord properties
		Cyclic Quadrilaterals
		Tangent properties

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Differentiation	Limits	
	First principles	
	$\frac{d}{dx} (x^n)$	
	Product rule	
	Quotient rule	
	Functions of a function rule	
	Gradients of tangents and normals	
	Equations of tangents and normals	
Trigonometry	Right angled trigonometry	Sum and difference formulae
	Reciprocal ratios	Double angle formulae
	Complementary ratios	t-formulae
	Exact values	Complicated equations
	Angles of any magnitude	
	Sine rule	
	Cosine rule	
	Area of a triangle	
	Pythagorean identities	
	Trigonometric ratios	
Quadratic Functions	Sketching quadratics	
	Quadratic functions – by factors, by formula, by completing the square	
	Discriminant	
	Roots of quadratic equations	
	Quadratic identities	
	Equations reducible to quadratics	
Coordinate Geometry	Distance formula	Angle between two lines
	Gradient formula	Dividing interval in given ratio
	Midpoint formula, $m = \tan\theta$	
	Equations of straight lines	
	Parallel and perpendicular lines	

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Polynomials		Definition of polynomial
		Graphing polynomial
		Remainder and factor theorem
		Relationship between coefficients and roots
		Determining roots by halving the interval
		Determining roots by Newton's Method
Parabola	Locus	Parametric form of parabola
	Parts of parabola	Equations of tangents and normals
	$x^2 = 4ay$	Equation of chord of contact
	$(x - h)^2 = 4a(y - k)$	Locus problems
Geometric application of Differentiation	Significance of $f'(x)$ and $f''(x)$	Curve stretching with curves with asymptotes
	Sketching derivative curves	
	Stationary points	
	Increasing and decreasing curves	
	Concavity	
	Inflexion points	
	Curve sketching	
	Maxima and minima problems	
Primitive functions		
Series and their Applications	Indices	Mathematical induction
	Logarithms	
	Definition of term, nth term, sum to n terms, sigma notation	
	AP's	
	GP's	
	Limiting sum	
	Problems with AP's and GP's	
	Repeating decimals	
	Compound interest	
	Superannuation	
	Time payments	

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Integration	Trapezoidal rule	Integration by substitution
	Simpson's rule	
	Indefinite integrals	
	Definite integrals	
	Area under curves	
	Volumes of revolution	
Trigonometric Functions	Radians	Integration
	Arc length	Solving harder trigonometric equations
	Area of sector	Integration involving double angle formula
	Area of minor segment	
	Graphics of trigonometric functions	
	Differentiation of trigonometric functions	
	Integration of trigonometric functions	
	Area of volumes involving trigonometric functions	
	Solving trigonometric functions	
Exponential and Logarithmic Functions	$y = e^x$	
	Graphs of exponential functions	
	Differentiation and integration of exponentials	
	Areas and volumes involving exponentials	
	$y = \log_e x$	
	Graphs of logarithmic functions	
	Differentiation of logarithmic functions	
	Integration of functions resulting in log functions	
	Area and volumes involving log functions	
Inverse Functions		Inverse functions
		Graphs of inverse functions
		Inverse trigonometric functions
		Differentiating inverse trigonometric functions
		Integrals involving inverse trigonometric functions
		Areas and volumes

<b>TOPIC</b>	<b>2 UNIT COURSE</b>	<b>3 UNIT COURSE</b>
Binomial Theorem		Pascal's triangle
		Properties of combinations
		Expanding binomial products
		Relationship between binomial coefficients
Probability	Simple events	Permutations
	Complementary events	Combinations
	Product theorem	Permutations and combinations and probability**
	Addition theorem	Probability using binomial theorem**
Application of Calculus to the Physical World	Rates of change*	Motion as derivatives or integrals relating to x
	Exponential Growth and Decay*	Simple harmonic motion
	Motion as derivatives or integrals relating to time*	Projectiles**
Note: sections with * will be tested in the Extension 1 paper for the trial examination **will not be tested in the trial examination		