Years 12 & 13 Curriculum
A Level: Further Mathematics

	Further Maths			
Topic	**Complex Numbers**	**Matrices**	**Further Algebra**	**Further Calculus**
Key Concepts	• Argand diagrams, including loci • Roots of unity • De Moivre's theorem • Complex plane transformations	• Matrix manipulation • Inverse matrices • Transformations • Matrix equations	• Roots of polynomials • Method of differences • Series sums • Maclaurin series	• Volumes of revolution • Improper integrals • Mean value of a function • Differentiate and integrate inverse trig functions

Topic	**Further Vectors**	**Polar Co-ordinates**	**Hyperbolic Functions**	**Differential Equations**
Key Concepts	• Equations of lines and planes • Scalar product • Intersection of lines and planes	• Conversion between polar and Cartesian forms • Areas of curves • Sketching polar curves	• Exponential form • Differentiation and integration • Solving hyperbolic equations	• First order equations using integrating factor • Separation of variables • Second order equations • Related differential equations

	Further Statistics					
Topic	**Discrete Probability**	**Poisson & Normal Distributions**	**Negative Binomial Distribution**	**Hypothesis Testing**	**Central Limit Theorem**	**Chi Squared Tests**
Key Concepts	• Use of discrete probability • Pdf and pgf Modelling	• Use and limitations of distributions Modelling and interpretation	• Use and interpretation Modelling using distribution	• One and two tailed tests • P values Confidence limits	• Distribution of sample mean Link to population mean	• Test between observed and expected frequencies Testing of hypotheses

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Years 12 & 13 Curriculum *(continued)*
A Level: Further Mathematics

	Further Mechanics			
Topic	**Momentum & Impulse**	**Work, Energy & Power**	**Elastic Strings**	**Elastic Collisions**
Key Concepts	• Conservation of momentum • Impulse-change in momentum laws • Angles of separation	• Work-energy principle • Power equations • Power = rate of work	• Hooke's law • Modulus of elasticity • Simple harmonic motion	• 2 and 3 dimensions • Loss of energy • Momentum

	Decision Maths			
Topic	**Algorithms & Graph Theory**	**Algorithms on Graphs**	**Critical Path Analysis**	**Linear Programming**
Key Concepts	• Nature of algorithms • Definitions of networks and graphs • Sorting algorithms	• Dijkstra's and Prim's methods • Bin packing • Chinese postman and travelling salesman problems	• Event dependency • Forward and backward pass • Float and criticality • Scheduling and resourcing	• Formulation of inequalities • Objective functions • Critical regions • Resource allocation • Simplex Algorithm

Years 12 & 13 Assessment
A Level: Further Mathematics

All students will sit an assessment and a mock examination in Year 12 and two mock examinations in Year 13.

	Year 12		Year 13			
	Assessment	**Mock Exam**	**Mock Exam**	**Mock Exam**		**Revision Resources**
	Autumn Term	**Summer Term**	**Autumn Term**	**Spring Term**		
Style of Assessment	**Paper 1:** Pure Maths **Paper 2:** Applied Maths **Paper 3:** Applied Maths	**Paper 1:** Pure Maths **Paper 2:** Pure Maths	**Paper 1:** Pure Core paper **Paper 2:** Applied paper **Paper 3**: Further maths core paper	***Single A Level:*** **Paper 1:** Pure paper 1 **Paper 2:** Pure paper 2, **Paper 3:** Applied paper	***Further A Level:*** **Paper 1:** Core paper 1 **Paper 2:** Core paper 2 **Paper 3:** Applied paper 1 **Paper 4:** Applied paper 2	*Kennet Resources* • Core Questions • Knowledge Organisers • Learning Habits *External Resources* • www.mymaths.co.uk • www.amsp.org.uk • www.integralmaths.org
Topics Assessed	**Paper 1:** Pure content – all single A Level topics **Paper 2:** Statistics & Mechanics – all single A Level topics	**Paper 1:** Complete Pure paper **Paper 2:** Pure A Level material taught up to this point **Paper 3:** Complete Applied paper on statistics & mechanics, plus all topics taught to this point	**Paper 1:** All single maths pure content **Paper 2:** All single maths applied topics **Paper 3:** Further Maths core topics *(from Year 12):* • Complex numbers • Series • Roots of polynomials • Volumes of revolution • Matrix manipulation • Proof by induction • Matrices – inverses, linear transformations, solving equations • Vectors	• Single Pure & Applied – all topics in A Level • Further Core – all Pure Core topics • Further Applied – all topics for each of the Applied options		

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