Year 13 Further Maths – Further Pure 1Option

Topic		Ref	Ex
Inequalities	**Solving Inequalities** • Solve inequalities involving modulus signs	FP7.1	4C
Conic Sections 2	**Ellipses** • Know and use the Cartesian equation for the ellipse • Know and use the parametric equations for the ellipse, including a general point on the curve • Understand the focus-directrix property of the ellipse – i.e. it is the locus of points equidistant from the focus and directrix.	FP4.1 FP4.2 FP4.3	3A 3C
	Hyperbolas • Know and use the Cartesian equation for a standard hyperbola • Know and use the parametric equations for a standard hyperbola, including a general point on the curve • Understand the focus-directrix property of the hyperbola – i.e. it is the locus of points equidistant from the focus and directrix.	FP4.1 FP4.2 FP4.3	3B
	Eccentricity • Understand the eccentricity as the ratio of the distance from a fixed point (focus) and a fixed line (directrix) for a conic section. • Be able to calculate the eccentricity • Know the value to expect for the eccentricity of an ellipse, parabola or hyperbola.	FP4.2	3C
	Tangents and Normals • Find the equations of tangents and normals to ellipses and hyperbolas. • Note: for AS level, the gradient function dy/dx will be provided for a parabola.	FP4.3	3D 3E
	Loci • Use the focus-directrix property of an ellipse or hyperbola to derive its general equation from a given point (focus) and straight line (directrix)	FP4.4	3F
Numerical Methods	**Simpson's rule** • Use Simpson's rule to find an approximation for a given definite integral	FP6.2	8D
Reducible Differential Equations	**First Order DEs** • Use a given substitution to transform a first order DE equation into one that can be solved	FP3.2	9A
	Second Order DEs • Use a given substitution to transform a second order DE equation into one that can be solved	FP3.2	9B
	Modelling with DEs • Solve modelling problems involving reducible DEs	FP3.2	9C

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Taylor series	**Derive Taylor series** • Derive Taylor series for functions • Understand that the Taylor series f(x + a) allows you to approximate the value of f(x) close to x = a.	FP2.1	6A
	Use Taylor series • Use series expansions to evaluate limits • Use the Taylor series method to find a series solution to a Differential Equation	FP2.2 FP3.1	6B 6C
Further calculus	**Leibnitz's theorem** • Apply Leibnitz's theorem for differentiating products • Use it to find an expression for the nth derivative of a product of functions	FP2.3	7A
	L'Hospital's rule • Understand the use of derivatives to evaluate limits of indeterminate forms.	FP2.4	7B
	Weierstrass substitution • Use tangent half-angle substitutions to find definite and indefinite integrals using Weierstrass substitution $\boldsymbol{t = \tan\frac{x}{2}}$	FP2.5	7C
Vectors	**Straight lines** • Write the vector equation of a straight line in the form $(\mathbf{r} - \mathbf{a}) \times \mathbf{b} = \mathbf{0}$ • Find the direction ratios and direction cosines of a line	FP5.3	1D
	3D geometry problems • Use vectors involving points, lines and planes to solve 3D geometry problems	FP5.3	1E