

# Year 12 Further Maths – Further Pure 1 Option

Topic		Ref	Ex
<b>Further Vectors</b>	<b>The Vector Product</b> <ul style="list-style-type: none"> <li>Find the vector product of two vectors <math>\mathbf{a} \times \mathbf{b}</math></li> <li>Find a vector perpendicular to two other vectors using the vector product</li> </ul>	FP3.1	1A
	<b>Finding Areas</b> <ul style="list-style-type: none"> <li>Use the vector product to find the area of a triangle and the area of a parallelogram</li> </ul>	FP3.2	1B
	<b>Scalar Triple Product</b> <ul style="list-style-type: none"> <li>Find the scalar triple product <math>\mathbf{a} \cdot \mathbf{b} \times \mathbf{c}</math></li> <li>Use the scalar triple product to find the volume of a tetrahedron and the volume of a parallelepiped</li> </ul>	FP3.3	1C
<b>Conic Sections</b>	<b>Parabolas</b> <ul style="list-style-type: none"> <li>Know and use the Cartesian equation for the parabola</li> <li>Know and use the parametric equations for the parabola, including a general point on the curve</li> <li>Understand the focus-directrix property of the parabola – i.e. it is the locus of points equidistant from the focus and directrix.</li> </ul>	FP2.1 FP2.2 FP2.3	2B 2C
	<b>Rectangular Hyperbola</b> <ul style="list-style-type: none"> <li>Know and use the Cartesian equation for the rectangular hyperbola</li> <li>Know and use the parametric equations for the rectangular hyperbola, including a general point on the curve</li> </ul>	FP2.1 FP2.2 FP2.3	2D
	<b>Tangents and Normals</b> <ul style="list-style-type: none"> <li>Find the equations of tangents and normals to parabolas and rectangular hyperbolas.</li> <li>Note: for AS level, the gradient function <math>dy/dx</math> will be provided for a parabola.</li> </ul>	FP2.4	2E 2F
	<b>Loci</b> <ul style="list-style-type: none"> <li>Use the focus-directrix property of a parabola to derive its general equation from a given point (focus) and straight line (directrix)</li> </ul>	FP2.5	2G
<b>The t-formulae</b>	<b>The t-formulae</b> <ul style="list-style-type: none"> <li>Derive and use the t-formulae:                             <math display="block">\sin x = \frac{2t}{1+t^2} \quad \text{and} \quad \cos x = \frac{1-t^2}{1+t^2} \quad \text{and}</math> <math display="block">\tan x = \frac{2t}{1-t^2} \quad \text{where} \quad t = \tan \frac{x}{2}</math> </li> <li>Knowledge of the reciprocal trig functions <math>\sec x</math>, <math>\operatorname{cosec} x</math> and <math>\cot x</math> is required.</li> </ul>	FP1.1	5A
	<b>Applying to Trigonometric Identities</b> <ul style="list-style-type: none"> <li>Use the t-formulae to prove trigonometric identities</li> </ul>	FP1.2	5B
	<b>Applying to Trigonometric Equations</b> <ul style="list-style-type: none"> <li>Use the t-formulae to solve trigonometric equations</li> </ul>	FP1.3	5C

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<b>Inequalities</b>	<p><b>Solving Inequalities</b></p> <ul style="list-style-type: none"> <li>• Solve inequalities involving polynomials and rational functions.</li> <li>• Solve using an algebraic method which considers critical values.</li> <li>• Solve by sketching graphs</li> </ul>	FP5.1	4A 4B
<b>Numerical Methods</b>	<p><b>Solving First Order Differential Equations</b></p> <ul style="list-style-type: none"> <li>• Use the following methods to find numerical solutions to first order Des:                             <ul style="list-style-type: none"> <li>○ Euler’s method</li> <li>○ The midpoint method</li> </ul> </li> </ul>	FP4.1	8A 8B
	<p><b>Solving Second Order Differential Equations</b></p> <ul style="list-style-type: none"> <li>• Find numerical solutions to second order DEs using an extended Euler’s method.</li> </ul>	FP4.1	8C