

Unit FP3

Further Pure Mathematics 3

Candidates will be expected to be familiar with the knowledge, skills and understanding implicit in Units C1, C2, C3, C4, FP1 and FP2.

Topics	Notes
<p>1. Definition and basic properties of the six hyperbolic functions. The inverse functions \sinh^{-1}, \cosh^{-1} and \tanh^{-1}, including their logarithmic forms.</p> <p>Differentiation and integration of \sinh, \cosh and \tanh.</p> <p>Knowledge and use of the identity $\cosh^2 x - \sinh^2 x \equiv 1$ and its equivalents.</p> <p>Knowledge and use of the formulae for $\sinh(A \pm B)$, $\cosh(A \pm B)$, $\tanh(A \pm B)$, $\sinh 2A$, $\cosh 2A$ and $\tanh 2A$.</p>	<p>Questions aimed solely at proving identities will not be set.</p> <p>Application to integration, for example $\int \sinh^2 x dx$.</p>
<p>2. Further integration.</p> <p>The arc length of a curve and the curved surface area of a solid of revolution (for rotations about the x-axis only).</p> <p>Reduction formulae.</p>	<p>Integration of functions such as $\frac{1}{ax^2 + bx + c}$, $\frac{1}{\sqrt{ax^2 + bx + c}}$, $\sqrt{ax^2 + bx + c}$, $e^{ax} \cos bx$ and $\frac{1}{a + b \cos x}$.</p> <p>Substitutions will not always be given.</p> <p>The equation of the curve will be given in either Cartesian or parametric form.</p>
<p>3. The use of Maclaurin and Taylor series. Applications to approximations.</p>	<p>No consideration of error terms will be required in the examination.</p>

Topics	Notes
<p>4. The approximate solution of equations using graphs and the Intermediate Value Theorem.</p>	<p>Condition for convergence of the iterative sequence for solving $x = f(x)$, i.e. $f'(x) < 1$ in an appropriate interval.</p>
<p>Iterative methods for an equation in the form $x = f(x)$.</p>	
<p>The Newton-Raphson method.</p>	<p>Knowledge and use of the Newton-Raphson formula. Graphical treatment of convergence.</p>
<p>5. Polar coordinates (r, θ).</p>	<p>Where $r \geq 0$ and the value of θ may be taken to be in either $[0, 2\pi)$ or $(-\pi, \pi]$.</p>
<p>The relationship between Cartesian and polar coordinates. The intersection of curves defined by their polar equations.</p>	<p>Candidates will be expected to sketch simple curves such as $r = a(b + c\cos\theta)$ and $r = a\cos n\theta$.</p>
<p>The location of points at which tangents are parallel to, or perpendicular to, the initial line.</p>	
<p>Calculation of area using $\frac{1}{2} \int r^2 d\theta$.</p>	