

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**NOVEMBER 2002**

**INTERNATIONAL GCSE**

**MARK SCHEME**

**MAXIMUM MARK : 80**

**SYLLABUS/COMPONENT : 0606/2**

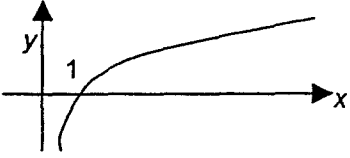
**ADDITIONAL MATHEMATICS**

**(Paper 2)**



Page 1	Mark Scheme	Syllabus	Paper
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1 [4]	$\text{Inverse} = \begin{pmatrix} 6 & -3 \\ -7 & 4 \end{pmatrix} \times \frac{1}{3}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{3} \begin{pmatrix} 6 & -3 \\ -7 & 4 \end{pmatrix} \begin{pmatrix} -7 \\ -16 \end{pmatrix} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$	B1 B1  M1 A1
2 [4]	$2^6 + 6 \times 2^5 \times x + \frac{6 \times 5}{1 \times 2} \times 2^4 \times x^2$ $= 64 + 192x + 240x^2$ <p>Replace <math>x</math> by <math>x - x^2 \Rightarrow</math> coefficient of <math>x^2 = -192 + 240 = 48</math></p>	B2, 1, 0 <i>(-1 each, incorrect or missing term)</i>  M1 A1 <i>C.S.C.</i>
3 [5]	<p>(i) Either <math>\frac{1 + \frac{1}{\sqrt{3}}}{1 - \frac{1}{\sqrt{3}}} \times \frac{1 + \frac{1}{\sqrt{3}}}{1 + \frac{1}{\sqrt{3}}}</math> or <math>\frac{\sqrt{3} + 1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1}</math></p> <p>Simplify <math>\Rightarrow 2 + \sqrt{3}</math></p> <p>(ii) <math>\frac{1}{p} = \frac{1}{2 + \sqrt{3}} \times \frac{2 - \sqrt{3}}{2 - \sqrt{3}} = \frac{2 - \sqrt{3}}{4 - 3}</math></p> $p - \frac{1}{p} = 2 + \sqrt{3} - (2 - \sqrt{3}) = 2\sqrt{3}$ <p>Or <math>p - \frac{1}{p} = 2 + \sqrt{3} - \frac{1}{2 + \sqrt{3}} = \frac{6 + 4\sqrt{3}}{2 + \sqrt{3}}</math></p> <p>Multiply by <math>\frac{2 - \sqrt{3}}{2 - \sqrt{3}} \Rightarrow 2\sqrt{3}</math></p>	M1  A1  M1 A1 ✓  A1  B1 ✓  M1 A1
4 [6]	<p>Solving inequalities:</p> <p>A <math>x &lt; 3.5</math></p> <p>B <math>x^2 - x - 2 = 0 \Rightarrow (x - 2)(x + 1) = 0 \Rightarrow x = -1, 2</math>  <math>x^2 - x - 2 &gt; 0 \Rightarrow x &lt; -1, x &gt; 2</math></p> <p>Required values <math>-5 &lt; x &lt; -1</math>  <math>2 &lt; x &lt; 3.5</math></p>	B1 M1 A1   A1 M1 A1

5 [6]	<p>(a) Either <math>{}_5C_3 = \frac{5 \times 4 \times 3}{1 \times 2 \times 3}</math> or <math>{}_4C_2 = \frac{4 \times 3}{1 \times 2}</math></p> <p>Product = <math>10 \times 6 = 60</math></p> <p>(b) Either, ending in 1 (or 3) <math>\Rightarrow 2 \times 5 \times 4</math> or, ending in 5 (or 7) <math>\Rightarrow 3 \times 5 \times 4</math></p> <p>Adding all 4 cases <math>\Rightarrow 40 + 40 + 60 + 60 = 200</math></p>	<p>B1</p> <p>M1 A1</p> <p>B1</p> <p>M1 A1</p>
6 [6]	<p>(i) <math>f(x) = -(x-1)(x-2)(x-k)</math></p> <p><math>f(3) = -2 \times 1 \times (3-k) = 8 \Rightarrow k = 7</math></p> <p>(ii) <math>f(-3) = -(-4)(-5)(-10) = 200</math></p>	<p>M1 A1</p> <p>M1 A1</p> <p>M1 A1</p>
7 [6]	<p>(i) <math>\frac{d}{dx}(x \sin x) = \sin x + x \cos x</math></p> <p>(ii) <math>\int x \cos x \, dx = x \sin x - \int \sin x \, dx</math></p> <p><math>\int \sin x \, dx = -\cos x</math></p> <p><math>x \sin x + \cos x</math></p> <p><math>\frac{\pi}{2} - 1 \approx 0.571</math></p>	<p>M1 A1</p> <p>M1</p> <p>DM1</p> <p>A1 A1 e.s.o.</p>
8 [6]	<p>(i)  <math>[\rightarrow -\infty \text{ as } x \rightarrow 0; \text{ thro' } (1,0); \rightarrow \infty \text{ as } x \rightarrow \infty]</math></p> <p>(ii) Take logs <math>\ln x^2 + \ln e^{x-2} = \ln 1</math></p> <p><math>\Rightarrow 2 \ln x + x - 2 = 0</math></p> <p>Make <math>\ln x</math> the subject <math>\Rightarrow \ln x = -\frac{1}{2}(x-2) \Rightarrow</math> line is <math>y = 1 - x/2</math></p>	<p>B2,1,0</p> <p>M1</p> <p>A1</p> <p>M1 A1</p>
9 [7]	<p>(a) Correct combination of indices</p> <p>Either <math>(a^{2/3} - a^{1/3}b^{2/3} + b^{4/3}) \times a^{1/3} = a - a^{2/3}b^{2/3} + a^{1/3}b^{4/3}</math></p> <p>Or <math>(a^{2/3} - a^{1/3}b^{2/3} + b^{4/3}) \times b^{2/3} = a^{2/3}b^{2/3} - a^{1/3}b^{4/3} + b^2</math></p> <p>Sum = <math>a + b^2</math></p> <p>(b) <math>2^{2x+2} = 4 \times 2^{2x}</math> or <math>2^2 \times 2^{2x}</math></p> <p><math>5^{x-1} = 5^x \div 5</math></p> <p><math>8^x = 2^{3x}</math></p> <p><math>\therefore 10^x = 4/5</math></p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>B2,1,0 (-1 each incorrect or missing term)</p> <p>M1 A1</p>

