UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge International Level 3 Pre-U Certificate
Principal Subject

Mathematics **9794/02**

Paper 2 **For Examination from 2012**

MARK SCHEME

Maximum Mark : 80

IMPORTANT NOTICE

Mark Schemes have been issued on the basis of **one** copy per Assistant examiner and **two** copies per Team Leader.

1	**(a)(i)**	$\log_a 15$	B1
	(ii)	Use $b\log a = \log a^b$ at least once Use $\log a - \log b = \log \frac{a}{b}$ Obtain $\log_b \frac{1}{2}$	M1 M1 A1
	(b)	$\frac{1}{3}$ $\frac{1}{3a^2}$ o.e.	B1 B1
2		$\frac{1}{2}x(x+2)\sin 30^\circ = 12$ or simplified expression Rearrange to get a quadratic equation including putting $\sin 30^\circ = \frac{1}{2}$ Obtain $x^2 + 2x - 48 = 0$ Solve their quadratic equation Obtain $x = 6$ only	B1 M1 A1 M1 A1
3		Substitute for y Obtain quadratic equation in x Solve their quadratic equation Obtain $x = 2$ and -1 Substitute back to find y or x, into linear or quadratic equation Obtain $y = -1$ and 2	M1 A1 M1 A1 M1 A1ft
4	**(i)**	Obtain integral of the form $k(2x+3)^5$ Obtain $\frac{1}{10}(2x+3)^5$ $+ c$ - this mark may be awarded in either (i) or (ii)	M1 A1 B1
	(ii)	Write $1 + \tan^2 2x = \sec^2 2x$ Obtain $\frac{1}{2}\tan 2x$	M1 A1
5		Complete correct method reaching a remainder and involving subtraction (allow one slip) Obtain at least $x^2 - 3x + k$ Equate remainders $a = -2$, $c = 5$ $b = -3$	M1 A1 M1 A1 A1

6	**(i)**	$z^* = 5 + 3\text{i}$ seen or implied $25 - 21\text{i}$ obtained	B1 B1
	(ii)	Correct $z - \text{i}$ or expansion of $(z - \text{i})^2$ seen $9 - 40\text{i}$ Real part correct Imaginary part correct	B1 B1 ft B1 ft
	(iii)	Multiply by conjugate $\frac{25}{34} + \frac{15}{34}\text{i}$ oe Numerators correct Denominator correct	M1 A1 A1
7		State or imply $\pi\int \frac{1}{5x+3}\,\text{d}x$ or unsimplified version Obtain integral of form $k\ln(5x+3)$ (may or may not include π) Obtain $\frac{1}{5}\pi\ln(5x+3)$ or $\frac{1}{5}\ln(5x+3)$ Show correct use of $\ln a - \ln b$ property Obtain $\frac{1}{5}\pi\ln 6$	B1 M1 M1 M1 A1
8	**(i)**	$3x + 2 = A(x-2) + B$ $A = 3$ $B = 8$	M1 B1 B1
	(ii)	Obtain $k\ln(x-2)$ Obtain $-\frac{P}{x-2}$ Obtain $3\ln\lvert x-2\rvert - \frac{8}{x-2}$ Use limits in correct order Attempt use of log law Obtain $3\ln 2 + 1$	B1 B1 B1 M1 M1 A1
9	**(i)**	Either $\frac{\text{d}y}{\text{d}t} = 2\text{e}^{2t} - 2$ or $\frac{\text{d}x}{\text{d}t} = 2\text{e}^{2t} - 5$ $\frac{\text{d}y}{\text{d}x} = \frac{\text{d}y}{\text{d}t} \div \frac{\text{d}x}{\text{d}t}$ used $= \frac{2\text{e}^{2t} - 2}{2\text{e}^{2t} - 5}$	B1 M1 A1
	(ii)	Set $\frac{\text{d}y}{\text{d}x} = 2$ Correctly rearrange to $\text{e}^{2t} = k$ Obtain $\text{e}^{2t} = 4$ Correct use of logs $t = \ln 2$ (allow $\frac{1}{2}\ln 4$)	M1 M1 A1 M1 A1

10	**(i)**	Indication that relevant vectors are parallel e.g. $L_3 = -\frac{1}{3}L_1$ $c = -3$	M1 A1
	(ii)	Produce 2/3 equations containing t, u (and c) e.g. $2 - 3t = 3 - 2u$, $3 - 8t = -1 + cu$, $6t = 4 + u$ Solve 2 equations not containing 'c' $t = 1$, $u = 2$ Subs their t and u into equation containing c $c = -2$	M1 M1 A1 M1 A1
11	**(i)**	Attempt to use product rule $y' = ae^{ax}\cos bx - be^{ax}\sin bx$ Set $y' = 0$ and rearrange $\tan bx = \frac{a}{b}$ validly obtained	M1 A1 M1 A1
	(ii)	Correct method to solve $\tan 12x = -\frac{1}{12} \Rightarrow x = -0.006928$ Obtain $y = 1.00$ Correct method to solve $x + \frac{\pi}{12} = 0.2549$ Obtain $y = -0.772$ State $y = -0.664$	M1 A1 M1 A1 B1
	(iii)	Obtain $f + g = 1$ Obtain $-f + g = -0.8$ Attempt to solve their equations simultaneously Obtain $f = 0.9$, $g = 0.1$ Obtain $\lambda = 5\pi$	B1 B1 M1ft A1 B1
	(iv)	State $y = 0.1$. This model only differs from the true y value at $x = 0.3$ by 0.06 First model not so good as 0.028 error in calculating the minimum and error of 0.704 in finding the value at $x = 0.3$	B1 B1