

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Pre-U Certificate**

**MARK SCHEME for the May/June 2014 series**

**9795 FURTHER MATHEMATICS**

**9795/01**

Paper 1 (Further Pure Mathematics),  
maximum raw mark 120

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, Pre-U, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

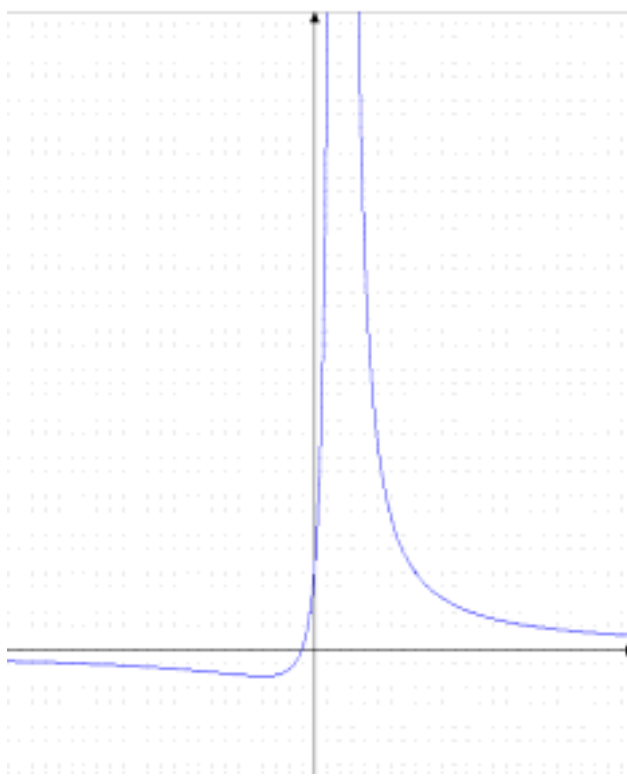
Page 2	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

1	<p>(i) <math>S = N^2 + (N+1)^2 + (N+2)^2 + \dots + (2N-2)^2 + (2N-1)^2 + (2N)^2</math></p> <p>(ii) <math display="block">= \sum_{r=1}^{2N} r^2 - \sum_{r=1}^{N-1} r^2</math></p> $= \frac{2N}{6}(2N+1)(4N+1) - \frac{(N-1)}{6}(N)(2N-1)$ $= \frac{N}{6}(16N^2 + 12N + 2 - [2N^2 - 3N + 1]) = \frac{N}{6}(14N^2 + 15N + 1)$ $= \frac{N}{6}(N+1)(14N+1)$ <p><b>ALTERNATIVE</b></p> $S = \sum_{r=0}^N (N^2 + 2Nr + r^2) \quad \text{Splitting into three parts}$ $= (N+1)N^2 + 2N \cdot \frac{N}{2}(N+1) + \frac{N}{6}(N+1)(2N+1)$ <p>B1 M1 Use of both these standard results</p> $= \frac{(N+1)}{6}(6N^2 + 6N^2 + 2N^2 + N)$ $= \frac{N}{6}(N+1)(14N+1)$	<p>B1 [1]</p> <p>M1</p> <p>A1 A1</p> <p>A1 [4]</p> <p>M1</p> <p>B1 M1</p> <p>A1</p>
2	<p>(i) <math display="block">\mathbf{AB} = \begin{bmatrix} 1 &amp; 2 &amp; 1 \\ t &amp; 1 &amp; -t \\ 3 &amp; 2 &amp; 1 \end{bmatrix} \begin{bmatrix} t-2 &amp; 0 &amp; 5 \\ 12 &amp; -2 &amp; -6 \\ 3t &amp; 4 &amp; 7 \end{bmatrix} = \begin{bmatrix} 4t+22 &amp; 0 &amp; 0 \\ 12-2t-2t^2 &amp; -2-4t &amp; -2t-6 \\ 6t+18 &amp; 0 &amp; 10 \end{bmatrix}</math></p> <p>M1 good effort; A1 all correct</p> <p>Give M0 (A0) B1 B1 for <b>BA</b> found (<math>k, t \checkmark</math>) or <math>k, t</math> found from 1 or 2 elements of <b>AB</b> only Give M1 (A0) B1 B1 for <math>k, t</math> found from most (but not all) elements of <b>AB</b></p> $= 10 \mathbf{I} \quad \text{when } t = -3 \quad \text{Allow these correct from most of } \mathbf{AB} \text{ correct}$ <p>(ii) <math display="block">\begin{bmatrix} -5 &amp; 0 &amp; 5 \\ 12 &amp; -2 &amp; -6 \\ -9 &amp; 4 &amp; 7 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 12 \\ 22 \end{bmatrix}</math></p> <p>(iii) <math display="block">\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{10} \begin{bmatrix} 1 &amp; 2 &amp; 1 \\ -3 &amp; 1 &amp; 3 \\ 3 &amp; 2 &amp; 1 \end{bmatrix} \begin{bmatrix} 8 \\ 12 \\ 22 \end{bmatrix} \quad \text{M1 for } \mathbf{x} = C^{-1} \mathbf{u} \quad \text{B1 for } C^{-1} \text{ correct}</math></p> <p><math>x = 5.4, y = 5.4, z = 7</math></p> <p><b>B1</b> SC for correct <math>x, y, z</math> without inverse matrix method seen</p>	<p>M1</p> <p>A1</p> <p>A1 A1 [4]</p> <p>B1 [1]</p> <p>M1 B1</p> <p>A1 [3]</p>

Page 3	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

3	(i)	$ z + 2  = 3$	Circle	Centre $-2 + 0i$ , radius 3	M1 A1
		$\arg(z - i) = -\frac{1}{4}\pi$	Half-line	From $0 + i$ at $45^\circ$ downwards [Allow full line through $i$ for M1 A0]	M1 A1 [4]
	(ii)	$1 (+ 0i)$			B1 [1]
4		$I_n = \left[ x^n \cdot \frac{1}{3} (2x + 1)^{\frac{3}{2}} \right]_0^4 - \int_0^4 nx^{n-1} \cdot \frac{1}{3} (2x + 1)^{\frac{3}{2}} dx$		Use of parts	M1
				For $\int \sqrt{2x + 1} = \frac{1}{3} (2x + 1)^{\frac{3}{2}}$ at any stage	B1
		$3 I_n = (4^n \cdot 27 - 0) - n \int_0^4 x^{n-1} (2x + 1) \sqrt{2x + 1} dx$		Splitting the power of $2x + 1$	M1
		$-n(2I_n + I_{n-1})$			A1
		$\Rightarrow (2n + 3)I_n = 27 \times 4^n - n I_{n-1}$		Legitimately (Answer Given)	A1 [5]

Page 4	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

5	<p>(i) <math>y = \frac{12(x+1)}{(x-2)^2} \Rightarrow \frac{dy}{dx} = 12 \left\{ \frac{(x-2)^2 - (x+1) \cdot 2(x-2)}{(x-2)^4} \right\}</math></p> <p style="text-align: center;"><math>= 0</math> when <math>x-2 = 2x+2</math> i.e. <math>x = -4</math>, <math>y = -1</math></p> <p>(ii) VA <math>x = 2</math>    HA <math>y = 0</math>    Stated or clearly shown on diagram</p> <p>Intercepts <math>(0, 3)</math> and <math>(-1, 0)</math>    Stated or clearly shown on diagram</p>  <p style="text-align: right;">Basic shape correct</p> <p style="text-align: right;">All details correct</p> <p style="text-align: right;">(Allow <b>ft</b> on min. point provided it doesn't ruin overall shape or position)</p>	<p>M1 A1</p> <p>A1 A1 [4]</p> <p>B1 B1</p> <p>B1 B1</p> <p>B1</p> <p>B1 [6]</p>
6	<p><math>\frac{dy}{dx} + \frac{2}{x}y = \frac{4 \ln x}{x}</math>    I.F. is <math>\exp \left\{ \int \frac{2}{x} dx \right\} = x^2</math></p> <p><math>x^2 \frac{dy}{dx} + 2xy = 4x \ln x \Rightarrow x^2 y =</math>    LHS correct</p> <p>RHS = <math>4 \ln x \cdot \frac{1}{2} x^2 - \int \frac{1}{2} x^2 \cdot \frac{4}{x} dx</math>    M1 Use of parts, right way round</p> <p style="text-align: center;"><math>= 2x^2 \ln x - x^2 + C</math>    Ignore the "+ C" here</p> <p><math>y = 2 \ln x - 1 + \frac{C}{x^2}</math></p> <p>Use of <math>x = 1, y = 1</math> to find C    <math>C = 2</math> i.e. <math>y = 2 \ln x - 1 + \frac{2}{x^2}</math> (any correct form)</p>	<p>M1 A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>M1 A1 [8]</p>

Page 5	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

7	<p>For <math>n = 1</math>, <math>f(1) = 39 (= 3 \times 13)</math> which is divisible by 13 (so result true for <math>n = 1</math>)</p> <p>Assume that <math>f(k) = 13m</math> (for some (positive) integer <math>m</math>)</p> <p>Considering <math>f(k + 1) = 11^{2k+1} + 7 \times 4^{k+1}</math> (must be simplified powers)</p> <p>Expressing <math>f(k + 1)</math> in terms of <math>f(k)</math></p> <p><math>f(k + 1) = 121 f(k) - 819 \times 4^k</math> or <math>f(k + 1) = 4 f(k) + 117 \times 11^{2k-1}</math> etc.</p> <p><math>= 13\{121m - 63 \times 4^k\}</math> or <math>= 13\{4m + 9 \times 11^{2k-1}\}</math> etc.</p> <p>Explanation that <math>13 \mid f(k) \Rightarrow 13 \mid f(k + 1)</math> and <math>13 \mid f(1) \Rightarrow</math> general result</p>	<p>B1</p> <p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>E1 [6]</p>
8	<p>(i) <math>\begin{bmatrix} 2 + 5\lambda \\ -5 - 2\lambda \\ 7 + 3\lambda \end{bmatrix}</math> substd. into <math>x + 4y + z + 11 = 0</math></p> <p><math>\Rightarrow 2 + 5\lambda - 20 - 8\lambda + 7 + 3\lambda + 11 = 0</math> (for all <math>\lambda</math>) Shown correct</p> <p><b>ALTs.</b> 2 points of <math>l</math> shown to be in <math>\Pi</math> or <math>\Pi</math>'s nml. perpr. to <math>l</math> and 1 point of <math>l</math> in <math>\Pi</math></p> <p>(ii) <math>\vec{PR} = \begin{bmatrix} 1 + 5\lambda \\ -7 - 2\lambda \\ 7 + 3\lambda - k \end{bmatrix}</math> Setting their <math>\vec{PR} = m \begin{bmatrix} 1 \\ 4 \\ 1 \end{bmatrix}</math></p> <p>Solving for <math>\lambda</math> in <b>i</b> &amp; <b>j</b> components: <math>4(1 + 5\lambda) = -7 - 2\lambda \Rightarrow \lambda = -\frac{1}{2}</math></p> <p>Substituting back into <b>i</b> &amp; <b>k</b> components to find <math>k</math>: <math>1 + 5\left(-\frac{1}{2}\right) = 7 + 3\left(-\frac{1}{2}\right) - k \Rightarrow k = 7</math></p> <p><b>ALTERNATIVE</b></p> <p><math>\begin{bmatrix} 1 \\ -7 \\ 7 - k \end{bmatrix} \bullet \begin{bmatrix} 5 \\ -2 \\ 3 \end{bmatrix} \times \begin{bmatrix} 1 \\ 4 \\ 1 \end{bmatrix} = 0 \Rightarrow \begin{bmatrix} 1 \\ -7 \\ 7 - k \end{bmatrix} \bullet \begin{bmatrix} -14 \\ -2 \\ 22 \end{bmatrix} = 0 \Rightarrow -14 + 14 + 22(7 - k) = 0</math></p> <p><math>\Rightarrow k = 7</math></p>	<p>M1</p> <p>A1 [2]</p> <p>B1</p> <p>M1</p> <p>M1 A1</p> <p>M1 A1 [6]</p> <p>M2</p> <p>M1 A1</p> <p>A1</p> <p>A1</p>

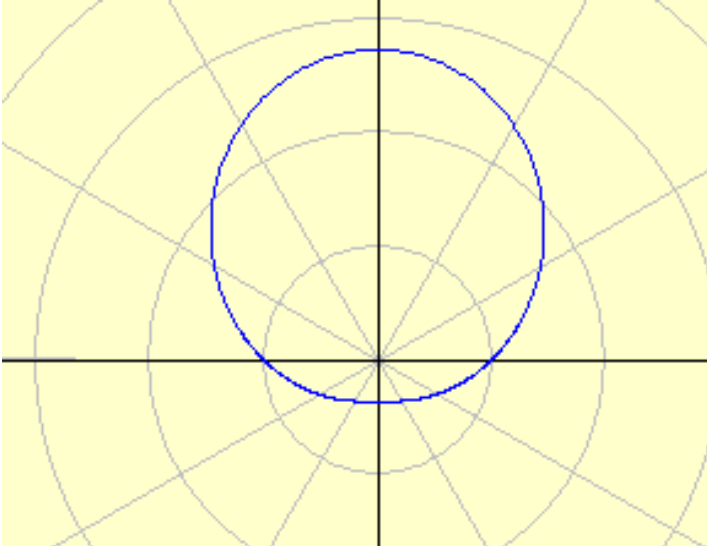
Page 6	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

<b>9</b>	<b>(i)</b> All non-identity elements pair up with their inverses. If $ G  = 2k$ , then there are $2k - 1$ elements to pair up $\Rightarrow$ at least one element “pairs up” with itself.	M1 A1 [2]
	<b>(ii)</b> $ab = (ab)^{-1} = b^{-1} a^{-1} = ba$  <b>ALT.</b> $(ab)^2 = i \Rightarrow abab = i \Rightarrow aba = b$ (post-multiplying by $b = b^{-1}$ ) $\Rightarrow ab = ba$ (post-multiplying by $a = a^{-1}$ )	M1 A1 [2]
	<b>(iii)</b> E.g. Let $x = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{pmatrix}$ and $y = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$ , each of order 2	B1
	Then $xy = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \\ 2 & 3 & 1 \end{pmatrix}$ (transforming) OR $\begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \\ 3 & 1 & 2 \end{pmatrix}$ (transposing) of order 3	B1 [2]
<b>(iv)</b> <b>(a)</b> $H$ closed since $x(yx) = x(xy) = x^2y = y$ and $y(xy) = y(yx) = y^2x = x$ using result of <b>(ii)</b> [Associativity follows from that of $G$ ] The identity is in $H$ and each element has its own inverse (itself) in $H$ Hence $H$ a subgroup of $G$  However, Lagrange’s Theorem states that $o(H) \mid o(G)$ and $4 \nmid 4n + 2$ contradicting the assumption that $G$ can contain all self-inverse elements.	M1 A1  B1 B1  E1 [5]	

Page 7	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

<b>10</b>	<b>(i)</b> $\cos 6\theta = \operatorname{Re}(c + is)^6$	M1	
	Use of Binomial expansion for $(c + is)^6$ Re terms only required	M1	
	$= c^6 - 15c^4s^2 + 15c^2s^4 - s^6$	A1	
	Use of $s^2 = 1 - c^2$ (and powers)	M1	
	$\Rightarrow \cos 6\theta = c^6 - 15c^4(1 - c^2) + 15c^2(1 - 2c^2 + c^4) - (1 - 3c^2 + 3c^4 - c^6)$		
	$\Rightarrow 2\cos 6\theta = 64c^6 - 96c^4 + 36c^2 - 2$ <b>Answer Given</b>	A1	[5]
	<b>(ii)</b> Setting $x = 2 \cos \theta$ in given eqn.	M1	
	$\Rightarrow (2c)^6 - 6(2c)^4 + 9(2c)^2 - 3 = 2 \cos 6\theta - 1 = 0$	A1	
	$\cos 6\theta = \frac{1}{2} \Rightarrow 6\theta = \frac{\pi}{3}, \frac{5\pi}{3}, \frac{7\pi}{3}, \frac{11\pi}{3}, \frac{13\pi}{3}, \frac{17\pi}{3}$	M1	
	$\Rightarrow \theta = \frac{\pi}{18}, \frac{5\pi}{18}, \frac{7\pi}{18}, \frac{11\pi}{18}, \frac{13\pi}{18}, \frac{17\pi}{18}$	A1	
$x = 2 \cos \theta$ for each $\theta$ Must be 6 distinct $\theta$ 's	B1	[5]	
<b>OR</b> $x = \pm 2 \cos \theta$ for $\theta = \frac{\pi}{18}, \frac{5\pi}{18}, \frac{7\pi}{18}$			
<b>(iii)</b> Product of SIX roots $= -3 = \left(-4 \cos^2 \frac{\pi}{18}\right) \left(-4 \cos^2 \frac{5\pi}{18}\right) \left(-4 \cos^2 \frac{7\pi}{18}\right)$	M1		
Signs justified; e.g. via $\cos(\pi - \theta) = -\cos \theta$	M1		
$\Rightarrow \cos \frac{\pi}{18} \cos \frac{5\pi}{18} \cos \frac{7\pi}{18} = \frac{\sqrt{3}}{8}$ [+ve $\sqrt{\quad}$ taken as read, since all angles acute]	A1	[3]	

Page 8	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

11 (i)	$(r, \theta) = (1, 0)$ Condone $(r, \theta)$ given as $(\theta, r)$ throughout	B1 [1]
(ii)	$e^{\sin \theta}$ min./max. when $\sin \theta$ min./max. giving min. at $(r, \theta) = \left(e^{-1}, -\frac{\pi}{2}\right)$ and max. at $(r, \theta) = \left(e, \frac{\pi}{2}\right)$	B1 B1 [2]
(iii)	 <p>Symmetry in <math>y</math>-axis</p> <p>Closed curve</p> <p>Shape essentially correct – don't penalise kinks. ft from (ii) where suitable</p>	B1 B1 B1 [3]
(iv)	$A = \int_0^{0.3} \frac{1}{2} e^{2\sin \theta} d\theta$ <p>Use of formula; correct</p> $f(\theta) = e^{2\sin \theta} \Rightarrow f'(\theta) = e^{2\sin \theta} \cdot 2\cos \theta \quad \text{and} \quad f''(\theta) = e^{2\sin \theta} (4\cos^2 \theta - 2\sin \theta)$ $f(0) = 1, f'(0) = 2, f''(0) = 4$ $\Rightarrow f(\theta) = 1 + 2\theta + 2\theta^2 \dots$ $A = \frac{1}{2} \left[ \theta + \theta^2 + \frac{2}{3} \theta^3 \right]_0^{0.3} = 0.204 \quad \text{or} \quad \frac{51}{250} \quad \text{1st A1 for correct } \int^{\text{th}} \text{ of a 3-term quadratic}$ <p>Accept 0.205 from correct <math>\int^{\text{th}}</math> of quartic <math>(1 + 2\theta + 2\theta^2 + \theta^3 + \frac{1}{4}\theta^4)</math></p> <p><b>NB</b> Correct answer is 0.204 98 ...</p> <p><b>ALTERNATIVES</b> (middle 5 marks)</p> <p><b>Alt. I</b> Ignoring terms in <math>\theta^3</math> and above, <math>\sin \theta \approx \theta \dots</math></p> $e^{\sin \theta} \approx 1 + \theta + \frac{1}{2} \theta^2 \dots$ $\Rightarrow (e^{\sin \theta})^2 \approx 1 + 2\theta + \theta^2 \dots + 2 \times \frac{1}{2} \theta^2 \dots = 1 + 2\theta + 2\theta^2 \dots$ <p><b>Alt. II</b> <math>f(\theta) = e^{\sin \theta} \dots f'(\theta) = \cos \theta e^{\sin \theta}</math> and <math>f''(\theta) = (\cos^2 \theta - \sin \theta) e^{\sin \theta}</math>  <math>f(0) = f'(0) = f''(0) = 1</math>  <math>\Rightarrow f(\theta) = 1 + \theta + \frac{1}{2} \theta^2 + \dots</math> Maclaurin attempt at as a function of <math>\theta</math>  <math>\Rightarrow [f(\theta)]^2 = 1 + 2\theta + 2\theta^2 + \dots</math> Ignore higher power terms</p>	M1 A1 B1 B1 B1 M1 A1 A1 A1 [9] B1 B1 M1 A1



Page 9	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

12 (i)	(a) $\tanh x = \frac{\sinh x}{\cosh x} = \frac{\frac{1}{2}(e^x - e^{-x})}{\frac{1}{2}(e^x + e^{-x})} \times \frac{e^x}{e^x} = \frac{e^{2x} - 1}{e^{2x} + 1}$	M1	
	<b>Answer Given</b> so MUST justify final answer	A1	[2]
(b)	$\tanh x = \frac{e^{2x} - 1}{e^{2x} + 1} = \frac{1}{k} \Rightarrow ke^{2x} - k = e^{2x} + 1$ Equated for $k$	M1	
	$\Rightarrow (k-1)e^{2x} = k+1 \Rightarrow x = \frac{1}{2} \ln\left(\frac{k+1}{k-1}\right)$ <b>Answer Given</b>	A1	
	$\sinh 2x = \frac{1}{2}(e^{2x} - e^{-2x}) = \frac{1}{2}\left(\frac{k+1}{k-1} - \frac{k-1}{k+1}\right)$	M1	
	or via $t = \tanh\left(\frac{1}{2}\text{“angle”}\right)$ identity $= \frac{1}{2}\left(\frac{(k^2 + 2k + 1) - (k^2 - 2k + 1)}{k^2 - 1}\right) = \frac{2k}{k^2 - 1}$	A1	[4]
(ii)	$y = \frac{1}{2} \ln(\tanh x) \Rightarrow \frac{dy}{dx} = \frac{1}{2} \cdot \frac{1}{\tanh x} \cdot \operatorname{sech}^2 x$	M1	
	$= \frac{1}{\sinh 2x}$ Here or later (or equivalent)	A1	
	$1 + \left(\frac{dy}{dx}\right)^2 = 1 + \frac{1}{\sinh^2 2x} = \frac{\cosh^2 2x}{\sinh^2 2x}$	M1	
	M0 if no progress towards an integrable form	A1	
	$L = \int_{\alpha}^{\beta} \frac{\cosh 2x}{\sinh 2x} dx = \left[\frac{1}{2} \ln(\sinh 2x)\right]_{\alpha}^{\beta}$ For the integration	M1	
	M1 A1		
<b>NB</b> Alternative approaches lead to $\frac{1}{2} \int (\tanh x + \coth x) dx = \frac{1}{2} [\ln(\cosh x) + \ln(\sinh x)]$			
For $\beta, k = 2 \Rightarrow \sinh 2x = \frac{4}{3}$ ; for $\alpha, k = 3 \Rightarrow \sinh 2x = \frac{3}{4}$			
$\Rightarrow L = \frac{1}{2} \ln \frac{4}{3} - \frac{1}{2} \ln \frac{3}{4} = \ln \frac{4}{3}$			
		A1	[10]

Page 10	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

13 (i)	If $w$ is a root with $ z  = 1$ , then $w = \cos\theta + i \sin\theta$	Modelling	M1
	Then $\cos 2\theta + i \sin 2\theta - 2(\cos\theta - i \sin\theta) + ki = 0$	Use of de Moivre's theorem	M1
	$\cos 2\theta - 2\cos\theta = 0$	Considering real parts	M1
	$2c^2 - 2c - 1 = 0$	Solving	M1
	$ c  \leq 1 \Rightarrow \cos\theta = \frac{1}{2}(1 - \sqrt{3})$		A1
	$\sin\theta = \pm \sqrt{1 - \frac{1}{4}(4 - 2\sqrt{3})} = \pm \sqrt{\frac{1}{2}\sqrt{3}}$		A1
	$k = -2\sin\theta - 2\sin\theta \cos\theta$ or $-2\sin\theta(1 + \cos\theta)$	Considering imaginary parts	M1
	$= \mp 2 \times \sqrt{\frac{1}{2}\sqrt{3}} \times \frac{1}{2}(3 - \sqrt{3}) = (3 - \sqrt{3})\sqrt{\frac{1}{2}\sqrt{3}}$	<b>Answer Given</b>	A1 [8]
	<b>ALTERNATIVE I</b>		
	Let $w = a + ib$ where $a^2 + b^2 = 1$		B1 B1
	Then $w^2 = a^2 - b^2 + i.2ab$ and $\frac{1}{w} = \frac{a - ib}{a^2 + b^2} = a - ib$ (since $ w  = 1$ )		
	giving $(a^2 - 2a - b^2) + i(2ab + 2b + k) = 0$		
	$\Rightarrow a^2 - 2a - b^2 = 0$ and $2ab + 2b + k = 0$		M1
Using $b^2 = 1 - a^2$ in Real part = 0 and solving a quadratic in $a$ : $2a^2 - 2a - 1 = 0$		M1	
$\Rightarrow a = \frac{1}{2}(1 \pm \sqrt{3})$			
However, $ a  < 1 \Rightarrow a = \frac{1}{2}(1 - \sqrt{3})$ or similar argument from $a^2 = 1 - \frac{\sqrt{3}}{2}$		A1	
Thus $b^2 = \frac{\sqrt{3}}{2}$ and $b = \pm \sqrt{\frac{\sqrt{3}}{2}}$		A1	
Substituting for $a$ and $b$ in Im part = 0		M1	
$\Rightarrow k = -2b(a + 1) = \mp 2 \cdot \sqrt{\frac{1}{2}\sqrt{3}} \cdot \frac{1}{2}(3 - \sqrt{3})$			
$= (3 - \sqrt{3})\sqrt{\frac{1}{2}\sqrt{3}}$ (since told $k > 0$ ) <b>Answer Given</b>		A1	
<b>ALTERNATIVE II</b>			
Using the form $w^3 - 2 + kw = 0$ with $w = x + iy$ where $x^2 + y^2 = 1$		M1	
$\Rightarrow (x^3 - 3xy^2 - 2 - ky = 0) + i(3x^2y - y^3 + kx = 0)$		B1 B1	
Equating for $k$ and eliminating $y$ using $x^2 + y^2 = 1 \Rightarrow 2x^2 - 2x - 1 = 0$ etc.		M1	

Page 11	Mark Scheme	Syllabus	Paper
	Pre-U – May/June 2014	9795	01

(ii)	If $w^3 + kiw - 2 = 0$ has roots $\alpha, \beta, \gamma$ , then $\alpha\beta\gamma = 2$	B1	
	Then $ \alpha  = 1 \Rightarrow  \beta\gamma  = 2$ and at least one of $\beta, \gamma$ has magnitude $> 1$	B1	[2]