CAMBRIDGE INTERNATIONAL EXAMINATIONS

Pre-U Certificate

MARK SCHEME for the May/June 2013 series

9794 MATHEMATICS

9794/01 Paper 1 (Pure Mathematics 1), maximum raw mark 80

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.

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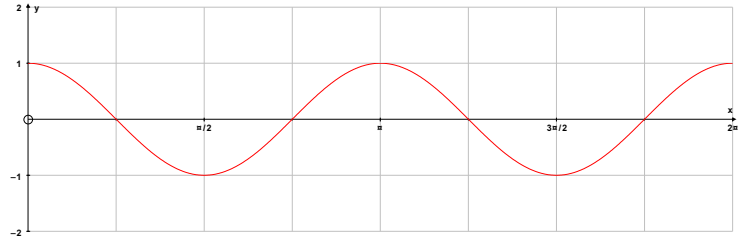
Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, Pre-U, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1		State midpoint as $x = 6$, $y = 4$	B1	
		Attempt Pythagoras on 8 and 6	M1	
		Obtain 10	A1	**[3]**
2		State 10	B1	
		State $(-2)^3$	B1	
		Attempt product of binomial coefficient and power of 2	M1	
		Obtain −80	A1	**[4]**
		Or Attempted expansion of 3 brackets	[M1	
		Obtain $-32x^3 - 48x^3$	A1	
		Obtain −80	A1]	
3	**(i)**	Attempt correct cosine or sine rule	M1 [3]	
		Obtain unsimplified form $PQ^2 = 7^2 + 7^2 - 2(7)(7)\cos 1.7$	A1	
		Obtain 10.5	A1	
	(ii)	Use 7θ	M1 [2]	
		Obtain 22.4	A1	**[5]**
4		Introduce logarithms	M1	
		Use power law	M1	
		Obtain $5x \ln 2 = \ln 15$	A1	
		Obtain $x = 0.781$	A1	**[4]**
5	**(i)**	Attempt integration	M1* [3]	
		Obtain at least $x^3 - 2x^2 + 8x$	A1	
		Obtain $x^3 - 2x^2 + 8x + c$	B1*	
	(ii)	Attempt use of limits	M1 [2]	**[5]**
		Obtain 26	A1	

6	**(i)**	Two 'cos' curves shown in the range	B1		
		+1 and –1 shown on y-axis and x values for at least stationary points indicated on fully correct curve. (For the second B1, curves must show the stationary point at 2π clearly.)  	B1	[2]	
	(ii)	State 'stretch'	B1		
		parallel to the x-axis	B1		
		scale factor 0.5	B1	[3]	
7	**(i)**	Attempt use of Pythagoras	M1		
		Obtain $\|z\| = 29$	A1	[2]	
	(ii)	Attempt fully correct argument for arg z using tan ratio or equivalent.	M1		
		State 134° or 2.33 rad	A1	[2]	
	(iii)	Show or imply multiplication by conjugate or equivalent method	M1		
		Obtain $(-20 - 21i)/841$	A1	[2]	**[6]**
8	**(i)**	Attempt f(1) and f(2)	M1		
		Obtain –1 and 5 and conclude correctly including reference to a root	A1	[2]	
	(ii)	State derivative = $3x^2 - 1$	B1		
		Use correct Newton-Raphson formula	M1*		
		Obtain 1.5 and 1.3478 (or 1.348) 1.5, 1.3478, 1.3252, 1.3247, (1.3247)	A1		
		State 1.325	A1	[4]	**[6]**

9	**(i)**	State or imply use of $R\sin\theta\cos\alpha + R\cos\theta\sin\alpha$	M1		
		Obtain $R\cos\alpha = 1$ and $R\sin\alpha = \sqrt{3}$	A1		
		Obtain $\alpha = \frac{\pi}{3}$ or 60°	A1		
		Obtain $R = 2$	A1	[4]	
	(ii)	State $2\sin(\theta + \pi/3) = 0.8$	B1		
		Attempt to solve (correct order of operations)	M1		
		Obtain either: −0.636 or 1.68	A1		
		Obtain 1.68 only	A1	[4]	**[8]**
10		Attempt to equate at least two of $5 + 4\lambda = 9 - 2\mu$ $11 + 3\lambda = 4 + \mu$ $7 - 5\lambda = -4 + 4\mu$	M1		
		Obtain at least two correct	A1		
		Attempt to solve two eqns	M1*		
		Obtain $\lambda = -1$ $\mu = 4$	A1		
		Attempt to substitute *their* value for λ or μ	M1*		
		Obtain (1, 8, 12)	A1		**[6]**
11	**(i)**	Obtain $dy/d\theta = -2\sin 2\theta$	B1		
		Obtain $dx/d\theta = 2\cos\theta$	B1		
		Use $dy/dx = (dy/d\theta)/(d\theta/dx)$ and use identity for $\sin 2\theta$	M1		
		Obtain $-2\sin\theta$ NIS	A1	[4]	
	(ii)	Obtain $m = -2$, $x = 2$ and $y = -1$	B1		
		Attempt equation of line	M1		
		Obtain $y = 3 - 2x$	A1	[3]	
	(iii)	Attempt $\cos 2\theta = \cos^2\theta - \sin^2\theta$ or equivalent	M1		
		Attempt to eliminate θ	M1		
		Obtain $y = 1 - x^2/2$	A1	[3]	**[10]**

12	**(i)**	Attempt to form LCM and cross multiply	M1	
		Attempt to expand bracket and simplify	M1	
		Obtain given answer	A1 [3]	
	(ii)	State $\frac{1}{h}\left(\frac{1}{(x+h)^2}-\frac{1}{x^2}\right)$ or equivalent form	M1	
		Attempt to substitute the AG and obtain $\frac{-2x-h}{x^2(x+h)^2}$	M1	
		Obtain $-2x^{-3}$ with full and accurate notation in the proof throughout.	A1 [3]	**[6]**
13		Identify a correct factor	B1	
		Attempt division or coefficient matching for their factor	M1	
		Obtain a quadratic quotient	M1	
		Obtain $(x + 3)(x – 1)^2$	A1	
		State partial fractions of form $\frac{A}{x+3}+\frac{B}{x-1}+\frac{C}{(x-1)^2}$	B1	
		Attempt to remove fractions from partial fractions in the form above or as in the SR (see below)	M1*	
		Attempt to find A, B and C	M1*	
		Obtain any two of $A = 1$, $B = 1$ and $C = 1$	A1*	
		Obtain all three values	A1*	
		Obtain $A \ln (x + 3)$	B1	
		$B \ln (x – 1)$	B1	
		$-\frac{c}{x-1}$	B1	
		SR partial fractions may also be of the form $\frac{A}{x+3}+\frac{Bx+c}{(x-1)^2}$		**[12]**