FOR OCR

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C2

Paper C

MARKING GUIDE

This guide is intended to be as helpful as possible to teachers by providing concise solutions and indicating how marks could be awarded. There are obviously alternative methods that would also gain full marks.

Method marks (M) are awarded for using a valid method.

Accuracy marks (A) can only be awarded when a correct method has been used.

(B) marks are independent of method marks.

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C2 Paper C – Marking Guide

1.		$\tan^2\theta = \frac{1}{3}$	M1	
		$\tan\theta = \pm\frac{1}{\sqrt{3}}$	A1	
		$\theta = \frac{\pi}{6}, \frac{\pi}{6} - \pi$ or $\pi - \frac{\pi}{6}, -\frac{\pi}{6}$	B1 M1	
		$\theta = -\frac{5\pi}{6}, -\frac{\pi}{6}, \frac{\pi}{6}, \frac{5\pi}{6}$	A1	**(5)**
2.	*(i)*	$= \log_2 (3^2 \times 5)$	B1	
		$= 2\log_2 3 + \log_2 5 = 2p + q$	M1 A1	
	(ii)	$= \log_2 \frac{3}{5\times 2} = \log_2 3 - \log_2 5 - \log_2 2$	M1	
		$= p - q - 1$	B1 A1	**(6)**
3.	*(i)*	$= 1 + n(\frac{1}{4}x) + \frac{n(n-1)}{2}(\frac{1}{4}x)^2 + \ldots$	B1 M1	
		$= 1 + \frac{1}{4}nx + \frac{1}{32}n(n-1)x^2 + \ldots$	A1	
	(ii)	$\frac{1}{4}n = \frac{1}{32}n(n-1)$	M1	
		$8n = n(n-1)$		
		$n[8 - (n-1)] = 0$	M1	
		$n \neq 0 \quad \therefore\ n = 9$	A1	**(6)**
4.	*(i)*	$7 - 2x - 3x^2 = \frac{2}{x}$		
		$7x - 2x^2 - 3x^3 = 2$	M1	
		$3x^3 + 2x^2 - 7x + 2 = 0$	A1	
	(ii)	$x = -2$ is a solution $\therefore$ $(x + 2)$ is a factor	B1	
		$$\begin{array}{r|l} & 3x^2 - 4x + 1 \\ \hline x+2 & 3x^3 + 2x^2 - 7x + 2 \\ & 3x^3 + 6x^2 \\ \hline & \quad -4x^2 - 7x \\ & \quad -4x^2 - 8x \\ \hline & \qquad x + 2 \\ & \qquad x + 2 \\ \hline \end{array}$$	M1 A1	
		$\therefore\ (x + 2)(3x^2 - 4x + 1) = 0$		
		$(x + 2)(3x - 1)(x - 1) = 0$	M1	
		$x = -2$ (at P), $\frac{1}{3}$, 1	A1	
		$\therefore\ (\frac{1}{3}, 6), (1, 2)$	A1	**(8)**
5.	*(i)*	$f(x) = \int (-\frac{4}{x^3})\ dx$		
		$f(x) = 2x^{-2} + c$	M1 A1	
		$(-1, 3)\ \therefore\ 3 = 2 + c$		
		$c = 1$	M1	
		$f(x) = 2x^{-2} + 1$	A1	
	(ii)	$= \int_1^4 (2x^{-2} + 1)\ dx$		
		$= [-2x^{-1} + x]_1^4$	M1 A1	
		$= (-\frac{1}{2} + 4) - (-2 + 1) = 4\frac{1}{2}$	M1 A1	**(8)**

6.	*(i)*	$\frac{\sin A}{8} = \frac{\sin 1.7}{14}$	M1	
		$\sin A = \frac{4}{7} \sin 1.7$		
		$\angle BAC = 0.6025$	A1	
		$\angle ACB = \pi - (1.7 + 0.6025) = 0.839$ (3sf)	M1 A1	
	(ii)	$AB^2 = 8^2 + 14^2 - (2 \times 8 \times 14 \times \cos 0.8391)$	M1	
		$AB = 10.50$	A1	
		$P = 10.50 + (14 - 8) + (8 \times 0.8391) = 23.2$ cm (3sf)	M1 A1	**(8)**
7.	*(a)*	*(i)* $= 3^1 \times 3^x = 3y$	M1 A1	
		(ii) $= 3^{-1} \times (3^x)^2 = \frac{1}{3} y^2$	M1 A1	
	(b)	$3y - \frac{1}{3} y^2 = 6$		
		$y^2 - 9y + 18 = 0$		
		$(y - 3)(y - 6) = 0$	M1	
		$y = 3, 6$	A1	
		$3^x = 3, 6$		
		$x = 1, \frac{\lg 6}{\lg 3}$	B1 M1	
		$x = 1, 1.63$ (3sf)	A1	**(9)**
8.	*(i)*	$\int_1^3 (x^2 - 2x + k)\ dx = [\frac{1}{3}x^3 - x^2 + kx]_1^3$	M1 A2	
		$= (9 - 9 + 3k) - (\frac{1}{3} - 1 + k)$	M1	
		$= 2k + \frac{2}{3}$		
		$\therefore\ 2k + \frac{2}{3} = 8\frac{2}{3}$		
		$k = 4$	M1 A1	
	(ii)	$= \lim_{k \to \infty} [-4x^{-\frac{3}{2}}]_2^k$	M2 A1	
		$= \lim_{k \to \infty} \{-\frac{4}{k^{\frac{3}{2}}} - (-\frac{4}{2\sqrt{2}})\}$	M1	
		$= \lim_{k \to \infty} (\sqrt{2} - \frac{4}{k^{\frac{3}{2}}}) = \sqrt{2}$	A1	**(11)**
9.	*(i)*	$ar = -48,\ ar^4 = 6$	B1	
		$r^3 = \frac{6}{-48} = -\frac{1}{8}$	M1	
		$r = \sqrt[3]{-\frac{1}{8}} = -\frac{1}{2}$	A1	
		$a = \frac{-48}{-\frac{1}{2}} = 96$	A1	
	(ii)	$= \frac{96}{1-(-\frac{1}{2})} = 64$	M1 A1	
	(iii)	$S_n = \frac{96[1-(-\frac{1}{2})^n]}{1-(-\frac{1}{2})} = 64[1 - (-\frac{1}{2})^n]$	M1 A1	
		$S_\infty - S_n = 64 - 64[1 - (-\frac{1}{2})^n]$	M1	
		$= 64(-\frac{1}{2})^n = 2^6 \times (-1)^n \times 2^{-n} = (-1)^n \times 2^{6-n}$	M1	
		difference is magnitude, $\therefore = 2^{6-n}$	A1	**(11)**
			Total	**(72)**

Performance Record – C2 Paper C

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	trig. eqn	logs	binomial	factor theorem, alg. div.	area by integr.	sine rule, sector of a circle	logs	integr.	GP	
Marks	5	6	6	8	8	8	9	11	11	72
Student										