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FOR EDEXCEL

GCE Examinations
Advanced Subsidiary

Core Mathematics C2

Paper K

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 knowing and using a 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 K – Marking Guide

1.	$= [\frac{1}{3}x^3 - \frac{5}{2}x^2 + 4x]_1^4$		M1 A1	
	$= (\frac{64}{3} - 40 + 16) - (\frac{1}{3} - \frac{5}{2} + 4) = -\frac{9}{2}$		M1 A1	**(4)**

2.

x	1	1.5	2	2.5	3
$\sqrt{4x-1}$	$\sqrt{3}$	$\sqrt{5}$	$\sqrt{7}$	3	$\sqrt{11}$

M1

area $\approx \frac{1}{2} \times 0.5 \times [\sqrt{3} + \sqrt{11} + 2(\sqrt{5} + \sqrt{7} + 3)]$ — B1 M1

$= 5.20$ (3sf) — A1 **(4)**

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3. *(a)* *(i)* $= \log_2 x - \log_2 2 = y - 1$ — M1 A1

(ii) $= \log_2 x^{\frac{1}{2}} = \frac{1}{2}\log_2 x = \frac{1}{2}y$ — M1 A1

(b) $2(y - 1) + \frac{1}{2}y = 8$

$y = 4$ — M1

$\log_2 x = 4, \quad x = 2^4 = 16$ — M1 A1 **(7)**

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4. *(a)* $f'(x) = -1 - 3x^2$ — M1 A1

$x^2 \geq 0$ for all real $x \Rightarrow -1 - 3x^2 \leq -1$ — M1

$\therefore f'(x) < 0 \Rightarrow f(x)$ is decreasing for all values of x — A1

(b) $f(1) = 2 - 1 - 1 = 0 \therefore (1, 0)$ on curve — B1

(c) $= \int_0^1 (2 - x - x^3)\, dx$

$= [2x - \frac{1}{2}x^2 - \frac{1}{4}x^4]_0^1$ — M1 A1

$= (2 - \frac{1}{2} - \frac{1}{4}) - (0) = \frac{5}{4}$ — M1 A1 **(9)**

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5. *(a)* $\cos^2 P = 1 - (\frac{2}{3})^2 = \frac{5}{9}$ — M1

acute $\therefore \cos \angle QPR = \sqrt{\frac{5}{9}} = \frac{1}{3}\sqrt{5}$ — A1

(b) $QR^2 = 7^2 + (3\sqrt{5})^2 - (2 \times 7 \times 3\sqrt{5} \times \frac{1}{3}\sqrt{5})$ — M1 A1

$QR^2 = 49 + 45 - 70 = 24$

$QR = \sqrt{24} = \sqrt{4\times 6} = 2\sqrt{6}$ — M1 A1

(c) $\frac{\sin Q}{3\sqrt{5}} = \frac{\frac{2}{3}}{2\sqrt{6}}$ — M1

$\sin Q = \frac{\sqrt{5}}{\sqrt{6}}$

$\angle PQR = 65.9°$ (1dp) — M1 A1 **(9)**

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6.	*(a)*	p(−2) = 20 ∴ $-16 + 4 - 2a + b = 20$	M1	
		$b = 2a + 32$	A1	
	(b)	p(−3) = 0 ∴ $-54 + 9 - 3a + b = 0$	M1	
		sub. $-45 - 3a + (2a + 32) = 0$	M1	
		$a = -13,\ b = 6$	A2	
	(c)	$$\begin{array}{r|l} & 2x^2 - 5x + 2 \\ \hline x+3 & 2x^3 + x^2 - 13x + 6 \\ & 2x^3 + 6x^2 \\ \hline & -5x^2 - 13x \\ & -5x^2 - 15x \\ \hline & 2x + 6 \\ & 2x + 6 \\ \hline \end{array}$$	M1 A1	
		$p(x) = (x + 3)(2x^2 - 5x + 2)$		
		$p(x) = (x + 3)(2x - 1)(x - 2)$	M1 A1	**(10)**
7.	*(a)*	$x + \frac{\pi}{4} = 1.2490,\ \pi + 1.2490 = 1.2490,\ 4.3906$	B1 M1	
		$x = 0.46,\ 3.61$ (2dp)	M1 A1	
	(b)	$2 \sin y \cos y = \sin y$	M1	
		$\sin y\,(2 \cos y - 1) = 0$	M1	
		$\sin y = 0$ or $\cos y = \frac{1}{2}$	A1	
		$y = 0,\ \pi$ or $\frac{\pi}{3},\ 2\pi - \frac{\pi}{3}$	B1 M1	
		$y = 0,\ \frac{\pi}{3},\ \pi,\ \frac{5\pi}{3}$	A1	**(10)**
8.	*(a)*	centre = (2, 3)	B1	
		radius = $\sqrt{4+9} = \sqrt{13}$	M1	
		∴ $(x - 2)^2 + (y - 3)^2 = (\sqrt{13})^2$	M1	
		$(x - 2)^2 + (y - 3)^2 = 13$	A1	
	(b)	$y = 0$ ∴ $(x - 2)^2 + 9 = 13$	M1	
		$x = 2 \pm \sqrt{4} = 0$ (at O) or 4 ∴ B (4, 0)	A1	
	(c)	grad of radius = $\frac{0-3}{4-2} = -\frac{3}{2}$	M1	
		∴ grad of tangent = $\frac{-1}{-\frac{3}{2}} = \frac{2}{3}$	M1 A1	
		∴ $y - 0 = \frac{2}{3}(x - 4)$	M1	
		$3y = 2x - 8$		
		$2x - 3y = 8$	A1	**(11)**
9.	*(a)*	$r = 1.5$		
		$u_4 = 1 \times (1.5)^3 = 3.375$ mm	M1 A1	
	(b)	$w = 2 \times S_8$; GP, $a = 1,\ r = 1.5$	M1	
		$= 2 \times \frac{1[(1.5)^8 - 1]}{1.5 - 1}$	M1 A1	
		= 98.516 = 98.5 mm (3sf)	A1	
	(c)	areas form GP, $a = \pi \times 1^2 = \pi,\ r = (1.5)^2 = 2.25$	B2	
		total area = $\frac{\pi[(2.25)^{10} - 1]}{2.25 - 1} = 8354.8\ \text{mm}^2$	M1 A1	
		$= \frac{8354.8}{10^2}\ \text{cm}^2 = 83.5\ \text{cm}^2$ (3sf)	A1	**(11)**
			Total	**(75)**

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Performance Record – C2 Paper K

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	integr.	trapezium rule	logs	decreasing function, area by integr.	cosine rule, sine rule	remain. theorem, alg. div.	trig. eqn	circle	GP	
Marks	4	4	7	9	9	10	10	11	11	75
Student										

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