FOR OCR

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C2

Paper B

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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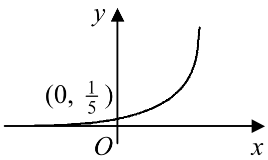
C2 Paper B – Marking Guide

1.	*(i)*	$u_4 = \frac{5+1}{3} = 2$	B1	
	(ii)	$5 = \frac{u_2+1}{3}$, $u_2 = 14$	M1 A1	
		$14 = \frac{u_1+1}{3}$, $u_1 = 41$	A1	**(4)**
2.		$= \int_1^9 (\sqrt{x} + \frac{8}{x^2})\ dx = [\frac{2}{3}x^{\frac{3}{2}} - 8x^{-1}]_1^9$	M1 A2	
		$= (18 - \frac{8}{9}) - (\frac{2}{3} - 8) = 24\frac{4}{9}$	M1 A1	**(5)**
3.	*(i)*	$3(1 - \sin^2 x) + \sin^2 x + 5 \sin x = 0$	M1	
		$2 \sin^2 x - 5 \sin x - 3 = 0$	A1	
	(ii)	$(2 \sin x + 1)(\sin x - 3) = 0$	M1	
		$\sin x = 3$ (no solutions) or $-\frac{1}{2}$	A1	
		$x = 180 + 30, 360 - 30$	B1 M1	
		$x = 210, 330$	A1	**(7)**
4.	*(a)*		B2	
	(b) *(i)*	$5^{x-1} = 10$		
		$(x - 1) \lg 5 = \lg 10 = 1$	M1	
		$x = \frac{1}{\lg 5} + 1 = 2.43$ (3sf)	M1 A1	
	(ii)	$5^{x-1} = 2^x$		
		$(x - 1) \lg 5 = x \lg 2$	M1	
		$x(\lg 5 - \lg 2) = \lg 5$	M1	
		$x = \frac{\lg 5}{\lg 5 - \lg 2} = 1.76$ (3sf)	A1	**(8)**
5.	*(i)*	$a = 20 \times 7 = 140$, $d = 2 \times 7 = 14$	B1	
		$u_5 = 140 + (4 \times 14) = 196$	M1 A1	
	(ii)	$S_8 = \frac{8}{2}[280 + (7 \times 14)] = 4 \times 378 = 1512$	M1 A1	
	(iii)	$140 + 14(n - 1) > 300$	M1	
		$n > \frac{160}{14} + 1$	M1	
		$n > 12\frac{3}{7}$ $\therefore n = 13$	A1	**(8)**
6.	*(i)*	$\frac{1}{2}\sqrt{3}$	B1	
	(ii)	x: 0, $\frac{\pi}{6}$, $\frac{\pi}{3}$		
		$\cos^2 x$: 1, $\frac{3}{4}$, $\frac{1}{4}$	M1	
		area $\approx \frac{1}{2} \times \frac{\pi}{6} \times [1 + \frac{1}{4} + 2(\frac{3}{4})]$	B1 M1	
		$= 0.720$ (3sf)	A1	
	(iii)	area of $S = \int_0^{\frac{\pi}{3}} \sin^2 x\ dx = \int_0^{\frac{\pi}{3}} (1 - \cos^2 x)\ dx$	M1	
		$= \frac{\pi}{3} - 0.71995 = 0.327$ (3sf)	M1 A1	**(8)**

7. *(i)* $BD^2 = 6^2 + 9^2 - (2 \times 6 \times 9 \times \cos 60)$ — M1

$BD^2 = 36 + 81 - 54 = 63$

$BD = \sqrt{63} = \sqrt{9 \times 7} = 3\sqrt{7}$ cm — M1 A1

(ii) $(3\sqrt{7})^2 = 3^2 + 8^2 - (2 \times 3 \times 8 \times \cos C)$ — M1

$\cos C = \frac{9 + 64 - 63}{48} = \frac{5}{24}$ — M1

$\angle BCD = 78.0°$ (1dp) — A1

(iii) $= (\frac{1}{2} \times 6 \times 9 \times \sin 60) + (\frac{1}{2} \times 3 \times 8 \times \sin 77.975)$ — M2

$= 35.1$ cm^2 (3sf) — A1 **(9)**

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8. *(i)* $p(1) = 1^4 - (1 - 2)^4 = 1 - 1 = 0 \;\therefore\; (x - 1)$ is a factor — M1 A1

(ii) $p(x) = x^4 - [x^4 + 4x^3(-2) + 6x^2(-2)^2 + 4x(-2)^3 + (-2)^4]$ — M1 A1

$= x^4 - [x^4 - 8x^3 + 24x^2 - 32x + 16]$ — M1

$= 8x^3 - 24x^2 + 32x - 16$ — A1

(iii)

$$\begin{array}{r|rrrr} & 8x^2 & -\,32x & +\,64 & \\ \hline x+1 & 8x^3 & -\,24x^2 & +\,32x & -\,16 \\ & 8x^3 & +\,8x^2 & & \\ \hline & & -\,32x^2 & +\,32x & \\ & & -\,32x^2 & -\,32x & \\ \hline & & & 64x & -\,16 \\ & & & 64x & +\,64 \\ \hline & & & & -\,80 \end{array}$$

— M2

quotient $= 8x^2 - 32x + 64$ — A1

remainder $= -80$ — A1 **(10)**

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9. *(i)* 2 — B1

(ii) $1 + \frac{2}{\sqrt{x}} = 2$ — M1

$\sqrt{x} = 2$ — M1

$x = 4$ — A1

(iii) $x = 4 \;\therefore\; y = 2(4) - 1 = 7$ — B1

$y = \int (1 + \frac{2}{\sqrt{x}})\, dx$

$y = x + 4x^{\frac{1}{2}} + c$ — M1 A2

$(4, 7) \;\therefore\; 7 = 4 + 8 + c$

$c = -5$ — M1

$y = x + 4x^{\frac{1}{2}} - 5$ — A1

(iv) $x + 4x^{\frac{1}{2}} - 5 = 0$

$(x^{\frac{1}{2}} + 5)(x^{\frac{1}{2}} - 1) = 0$ — M1

$x^{\frac{1}{2}} = -5$ (no real solutions), 1 — A1

$x = 1 \;\therefore\; (1, 0)$ and no other point — A1 **(13)**

Total **(72)**

Performance Record – C2 Paper B

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	sequence	area by integr.	trig. eqn	logs	AP	trapezium rule	cosine rule	factor theorem, binomial, alg. div.	integr.	
Marks	4	5	7	8	8	8	9	10	13	72
Student										