FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

Core Mathematics C2

Paper L

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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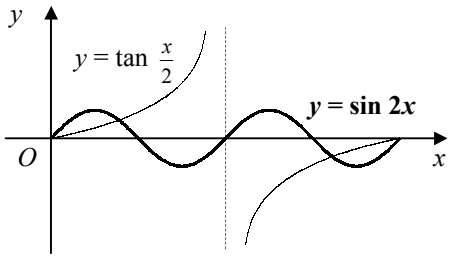
C2 Paper L – Marking Guide

1. *(i)*



B2

B2

(ii) 4 solutions — B1

the graphs intersect at 4 points — B1 **(6)**

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2. area of segment $= (\frac{1}{2} \times r^2 \times \frac{\pi}{3}) - (\frac{1}{2} \times r^2 \times \sin \frac{\pi}{3})$ — B1 M2

$= \frac{1}{6} r^2\pi - \frac{1}{4} r^2\sqrt{3}$ — A1

shaded area $= \frac{1}{6} r^2\pi - 2(\frac{1}{6} r^2\pi - \frac{1}{4} r^2\sqrt{3})$ — M1

$= \frac{1}{6} r^2\pi - \frac{1}{3} r^2\pi + \frac{1}{2} r^2\sqrt{3}$

$= \frac{1}{2} r^2\sqrt{3} - \frac{1}{6} r^2\pi = \frac{1}{6} r^2(3\sqrt{3} - \pi)$ — A1 **(6)**

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3. *(i)* $u_2 = k^2 - 1$ — B1

$u_3 = (k^2 - 1)^2 - 1 = k^4 - 2k^2$ — M1 A1

(ii) $k^4 - 2k^2 + k^2 - 1 = 11$

$k^4 - k^2 - 12 = 0$ — M1

$(k^2 + 3)(k^2 - 4) = 0$ — M1

$k^2 = -3$ (no solutions) or 4 — A1

$k = \pm 2$ — A1 **(7)**

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4. *(i)*

x	0	0.5	1	1.5	2
$\frac{1}{x^2+1}$	1	0.8	0.5	0.3077	0.2

M1 A1

area $\approx \frac{1}{2} \times 0.5 \times [1 + 0.2 + 2(0.8 + 0.5 + 0.3077)]$ — B1 M1

$= 1.10$ (3sf) — A1

(ii) area $= 8^2 \times 1.10385 = 70.6464$ — M1

volume $= 2 \times 70.6464 = 141$ cm^3 (3sf) — A1 **(7)**

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5. *(i)* $\log_a 27 - \log_a 8 = 3$

$\log_a \frac{27}{8} = 3$ — M1

$a^3 = \frac{27}{8}$, $a = \sqrt[3]{\frac{27}{8}} = \frac{3}{2}$ — M1 A1

(ii) $(x + 3) \lg 2 = (x - 1) \lg 6$ — M1

$x(\lg 6 - \lg 2) = 3 \lg 2 + \lg 6$ — M1

$x = \frac{3 \lg 2 + \lg 6}{\lg 6 - \lg 2} = 3.52$ — M1 A1 **(7)**

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6. *(i)* $= [2x + x^{-1}]_2^4$ M1 A1

$= (8 + \frac{1}{4}) - (4 + \frac{1}{2}) = 3\frac{3}{4}$ M1 A1

(ii) $y = \int (2x^3 + 1)\ dx$

$y = \frac{1}{2}x^4 + x + c$ M1 A1

$x = 0, y = 3 \ \therefore \ c = 3$ B1

$y = \frac{1}{2}x^4 + x + 3$

when $x = 2, \ y = 8 + 2 + 3 = 13$ M1 A1 **(9)**

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7. *(i)* $\frac{1-8x^3}{x^2} = 0 \ \Rightarrow \ 1 - 8x^3 = 0$ M1

$x^3 = \frac{1}{8}$ M1

$x = \frac{1}{2}$ A1

(ii) $f(x) = x^{-2} - 8x$

$\int f(x)\ dx = \int (x^{-2} - 8x)\ dx$

$= -x^{-1} - 4x^2 + c$ M1 A2

(iii) $= -[-x^{-1} - 4x^2]_{\frac{1}{2}}^2$ M1

$= -\{(-\frac{1}{2} - 16) - (-2 - 1)\} = 13\frac{1}{2}$ M1 A1 **(9)**

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8. *(i)* $S_6 = \frac{6}{2}[3000 + (5 \times -x)] = 8100$ M1 A1

$3000 - 5x = 2700, \quad x = 60$ M1 A1

(ii) $= 1500 - (7 \times 60) = 1500 - 420 = £1080$ M1 A1

(iii) $S_n = \frac{n}{2}[3000 - 60(n - 1)]$ M1

$= n[1500 - 30(n - 1)]$

$= 30n[50 - (n - 1)] = 30n(51 - n) \qquad [\ k = 30\ ]$ M1 A1

(iv) the value of sales in a month would become negative which is not possible B1 **(10)**

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9. *(i)* $f(2) = 16 - 20 + 2 + 2 = 0 \ \therefore \ (x - 2)$ is a factor M1 A1

(ii)

$$
\begin{array}{r|l}
x - 2 & 2x^2 - x - 1 \\
\hline
 & 2x^3 - 5x^2 + x + 2 \\
 & 2x^3 - 4x^2 \\
\hline
 & \quad -x^2 + x \\
 & \quad -x^2 + 2x \\
\hline
 & \qquad -x + 2 \\
 & \qquad -x + 2 \\
\hline
\end{array}
$$

M1 A1

$f(x) = (x - 2)(2x^2 - x - 1)$

$f(x) = (x - 2)(2x + 1)(x - 1)$ M1 A1

(iii) $x = -\frac{1}{2}, 1, 2$ B1

(iv) $\sin\theta = 2$ (no solutions), $-\frac{1}{2}$ or 1

$\theta = \pi + \frac{\pi}{6}, 2\pi - \frac{\pi}{6}$ or $\frac{\pi}{2}$ M1 B1

$\theta = \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$ A2 **(11)**

Total **(72)**

Performance Record – C2 Paper L

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	trig. graphs	sector of a circle	sequence	trapezium rule	logs	integr.	area by integr.	AP	factor theorem, alg. div., trig. eqn	
Marks	6	6	7	7	7	9	9	10	11	72
Student										