FOR EDEXCEL

GCE Examinations
Advanced Subsidiary

Core Mathematics C2

Paper I

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 I – Marking Guide

1. *(a)* $\frac{1}{2} \times 9.2^2 \times \angle AOB = 37.4$ — M1

$\angle AOB = 0.884$ radians (3sf) — A1

(b) $= (2 \times 9.2) + (9.2 \times 0.8837) = 26.5$ cm (3sf) — M1 A1 **(4)**

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2. $\frac{2}{p-1} = \frac{2p+5}{2}$ — M1

$(2p + 5)(p - 1) = 4$ — M1

$2p^2 + 3p - 9 = 0$ — A1

$(2p - 3)(p + 3) = 0, \quad p = -3, \frac{3}{2}$ — M1 A1 **(5)**

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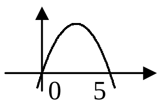
3. $5x - x^2 = 0$

$x(5 - x) = 0$

crosses x-axis at (0, 0) and (5, 0) — B1



area $= \int_0^5 (5x - x^2)\ dx$

$= [\frac{5}{2}x^2 - \frac{1}{3}x^3]_0^5$ — M1 A2

$= (\frac{125}{2} - \frac{125}{3}) - (0) = 20\frac{5}{6}$ — M1 A1 **(6)**

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4. $1 - \cos^2\theta = 4\cos\theta$ — M1

$\cos^2\theta + 4\cos\theta - 1 = 0$ — A1

$\cos\theta = \frac{-4 \pm \sqrt{16+4}}{2} = -2 - \sqrt{5}$ (no solutions) or $-2 + \sqrt{5}$ — M1 A1

$\theta = 76.3, 360 - 76.3$ — B1 M1

$\theta = 76.3°, 283.7°$ (1dp) — A1 **(7)**

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5. *(a)* $-27 + 63 - 3p - 6 = 0, \quad p = 10$ — M1 A1

(b) remainder = f(2) = 8 + 28 + 20 – 6 = 50 — M1 A1

(c) $x = -3$ is a solution $\therefore (x + 3)$ is a factor — B1

$$\begin{array}{r|l} & x^2 + 4x - 2 \\ \hline x+3 & x^3 + 7x^2 + 10x - 6 \\ & x^3 + 3x^2 \\ \hline & \quad 4x^2 + 10x \\ & \quad 4x^2 + 12x \\ \hline & \qquad -2x - 6 \\ & \qquad -2x - 6 \\ \hline \end{array}$$ — M1 A1

$\therefore (x + 3)(x^2 + 4x - 2) = 0$

$x = -3$ or $x^2 + 4x - 2 = 0$

other solutions: $x = \frac{-4 \pm \sqrt{16+8}}{2} = -4.45, 0.45$ — M1 A1 **(9)**

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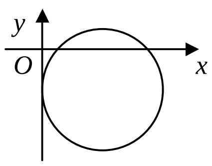
6. *(a)* $(x - 6)^2 - 36 + (y + 4)^2 - 16 + 16 = 0$ — M1

$\therefore$ centre $(6, -4)$ — A1

(b) $(x - 6)^2 + (y + 4)^2 = 36$ — M1

$\therefore$ radius = 6 — A1

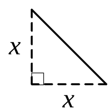
(c) — B2



(d) $y = 0 \quad \therefore (x - 6)^2 + 16 = 36$ — M1

$x = 6 \pm \sqrt{20} = 6 \pm 2\sqrt{5}$ — A1

$AB = 6 + 2\sqrt{5} - (6 - 2\sqrt{5}) = 4\sqrt{5}$ — M1 A1 **(10)**

7.	*(a)*	$(1+ax)^n = 1 + n(ax) + \frac{n(n-1)}{2}(ax)^2 + \ldots$	B2	
		$\therefore\ an = -24 \quad (1) \quad$ and $\quad \frac{1}{2}a^2n(n-1) = 270 \quad (2)$	M1	
		$(1) \Rightarrow a = \frac{-24}{n} \quad$ sub. (2) $\quad \frac{288}{n}(n-1) = 270$	M1	
		$288n - 288 = 270n$	M1	
		$18n = 288$		
		$n = \frac{288}{18} = 16,\ a = -\frac{3}{2}$	A2	
	(b)	$1 - \frac{3}{2}x = 0.9985 \quad \therefore\ x = 0.001$	B1	
		$\therefore\ (0.9985)^{16} \approx 1 - 0.024 + 0.000\,270$	M1	
		$= 0.976\,27$ (5dp)	A1	**(10)**
8.	*(a)*	$\log_2(y-1) - \log_2 x = 1, \quad \log_2 \frac{y-1}{x} = 1$	M1	
		$\frac{y-1}{x} = 2^1 = 2$	M1	
		$y - 1 = 2x, \quad y = 2x + 1$	A1	
	(b)	$2\log_3 y = 2 + \log_3 x \Rightarrow \log_3 y^2 - \log_3 x = 2$	M1	
		$\frac{y^2}{x} = 3^2 = 9$	M1	
		$y^2 = 9x$	A1	
		sub. $y = 2x + 1 \qquad (2x+1)^2 = 9x$	M1	
		$4x^2 + 4x + 1 = 9x$		
		$4x^2 - 5x + 1 = 0$		
		$(4x-1)(x-1) = 0$	M1	
		$x = \frac{1}{4}, 1$	A1	
		$\therefore\ x = \frac{1}{4}, y = \frac{3}{2}$ or $x = 1, y = 3$	A1	**(10)**
9.	*(a)*	area of XS $= \frac{1}{2} \times (8x + 10x) \times x = 9x^2$	M1	
		volume $= 9x^2y = 900$	M1	
		$\therefore\ y = \frac{100}{x^2}$	A1	
	(b)	 width of sloping sides $= \sqrt{2}\,x$	B1	
		$A = 8xy + 2(9x^2) + 2(\sqrt{2}\,xy)$	M1	
		$A = 18x^2 + 2xy(4 + \sqrt{2})$		
		$A = 18x^2 + 2x(4 + \sqrt{2}) \times \frac{100}{x^2}$	M1	
		$A = 18x^2 + \frac{200(4+\sqrt{2})}{x}$	A1	
	(c)	$\frac{dA}{dx} = 36x - 200(4 + \sqrt{2})x^{-2}$	M1 A1	
		for SP, $\quad 36x - 200(4 + \sqrt{2})x^{-2} = 0$	M1	
		$x^3 = \frac{200(4+\sqrt{2})}{36}$		
		$x = \sqrt[3]{\frac{50(4+\sqrt{2})}{9}} = 3.11$	A1	
	(d)	$A = 522$ (3sf)	B1	
		$\frac{d^2A}{dx^2} = 36 + 400(4 + \sqrt{2})x^{-3}$	M1	
		when $x = 3.11$, $\frac{d^2A}{dx^2} = 108$, $\frac{d^2A}{dx^2} > 0 \quad \therefore$ minimum	A1	**(14)**

Total **(75)**

Performance Record – C2 Paper I

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	sector of a circle	GP	area by integr.	trig. eqn	remain. theorem, alg. div.	circle	binomial	logs	max./min. problem	
Marks	4	5	6	7	9	10	10	10	14	75
Student										