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FOR EDEXCEL

GCE Examinations
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 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.

Written by Shaun Armstrong

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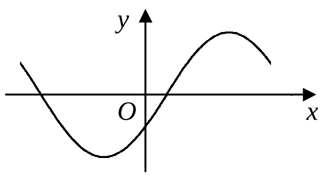
C2 Paper C – Marking Guide

1.		$(1-x)^6 = 1 + 6(-x) + \binom{6}{2}(-x)^2 + \ldots = 1 - 6x + 15x^2$	M1 A1	
		$(1+x)(1-x)^6 = (1+x)(1 - 6x + 15x^2 + \ldots)$		
		coeff. of $x^2 = 15 - 6 = 9$	M1 A1	**(4)**
2.	*(a)*	$\dfrac{a[1-(\frac{1}{3})^4]}{1-\frac{1}{3}} = 200$	M1 A1	
		$a = 200 \times \frac{27}{40} = 135$	A1	
	(b)	$= \dfrac{135}{1-\frac{1}{3}} = 202\frac{1}{2}$	M1 A1	**(5)**
3.	*(a)*	$(-4, 0)$ $\therefore$ $0 = 4 - 20 + 16k + 128$	M1	
		$16k = -112,\ k = -7$	A1	
	(b)	$4 + 5x - 7x^2 - 2x^3 = 0$		
		$x = -4$ is a solution $\therefore$ $(x + 4)$ is a factor	B1	
		$$\begin{array}{r} -2x^2 + x + 1 \\ x+4 \overline{)\,-2x^3 - 7x^2 + 5x + 4} \\ \underline{-2x^3 - 8x^2} \\ x^2 + 5x \\ \underline{x^2 + 4x} \\ x + 4 \\ \underline{x + 4} \end{array}$$	M1 A1	
		$\therefore$ $(x + 4)(1 + x - 2x^2) = 0$		
		$(x + 4)(1 + 2x)(1 - x) = 0$	M1	
		$x = -4$ (at A), $-\frac{1}{2}$, 1		
		$\therefore$ $(-\frac{1}{2}, 0), (1, 0)$	A1	**(7)**
4.	*(a)*	*(i)* 	B2	
		(ii) $(-60, -1), (120, 1)$	B2	
	(b)	$x - 30 = -180 - 20.5, 20.5$	B1 M1	
		$= -200.5, 20.5$		
		$x = -170.5, 50.5$ (1dp)	M1 A1	**(8)**
5.	*(a)*	$= 3 - \log_8 8^{\frac{2}{3}}$	B1 M1 A1	
		$= 3 - \frac{2}{3} = \frac{7}{3}$	A1	
	(b)	$(2^2)^x - 3(2 \times 2^x) = 0$	M1	
		$(2^x)^2 - 6(2^x) = 0$		
		$2^x(2^x - 6) = 0$	M1	
		$2^x = 0$ (no solutions) or 6	A1	
		$x = \dfrac{\lg 6}{\lg 2} = 2.58$ (3sf)	M1 A1	**(9)**

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6.	*(a)*	$f'(x) = -1 + 2x^{-\frac{1}{3}}$	M1 A1	
		$f''(x) = -\frac{2}{3}x^{-\frac{4}{3}}$	A1	
	(b)	for TP, $\quad -1 + 2x^{-\frac{1}{3}} = 0$	M1	
		$x^{\frac{1}{3}} = 2$	M1	
		$x = 8$	A1	
		$\therefore$ (8, 6)	A1	
	(c)	$f''(8) = -\frac{1}{24}$, $f''(x) < 0 \;\therefore$ maximum	M1 A1	**(9)**
7.	*(a)*	grad $PQ = \frac{8-2}{-3-(-5)} = 3$, grad $QR = \frac{4-8}{9-(-3)} = -\frac{1}{3}$	M1 A1	
		grad $PQ \times$ grad $QR = 3 \times (-\frac{1}{3}) = -1$	M1	
		$\therefore$ PQ perp. to QR, $\therefore \angle PQR = 90°$	A1	
	(b)	$\angle PQR = 90° \;\therefore PR$ is a diameter	M1	
		$\therefore$ centre = mid-point of $PR = (\frac{-5+9}{2}, \frac{2+4}{2}) = (2, 3)$	M1 A1	
	(c)	radius = dist. (–5, 2) to (2, 3) = $\sqrt{49+1} = \sqrt{50}$	B1	
		$\therefore (x-2)^2 + (y-3)^2 = (\sqrt{50})^2$	M1	
		$x^2 - 4x + 4 + y^2 - 6y + 9 = 50$		
		$x^2 + y^2 - 4x - 6y = 37 \qquad [\,k = 37\,]$	A1	**(10)**
8.	*(a)*	$= 12 \times (2\pi - \frac{2\pi}{3}) = 16\pi$ cm	M1 A1	
	(b)	chord $= 2 \times 12 \sin\frac{\pi}{3} = 24 \times \frac{\sqrt{3}}{2} = 12\sqrt{3}$	M1 A1	
		$P = (12 \times \frac{2\pi}{3}) + 12\sqrt{3}$	M1	
		$= 8\pi + 12\sqrt{3} = 4(2\pi + 3\sqrt{3})$ cm $\qquad [\,k = 4\,]$	A1	
	(c)	area of segment $= (\frac{1}{2} \times 12^2 \times \frac{2\pi}{3}) - (\frac{1}{2} \times 12^2 \times \sin\frac{2\pi}{3})$	M2	
		$= 72(\frac{2\pi}{3} - \frac{\sqrt{3}}{2}) = 88.443$		
		as % of area of circle $= \frac{88.443}{\pi \times 12^2} \times 100\% = 19.6\%$ (1dp)	M1 A1	**(10)**
9.	*(a)*	x: 2, 4, 6, 8		
		$1 + 3\sqrt{x}$: 5.243, 7, 8.348, 9.485	M1 A1	
		area $\approx \frac{1}{2} \times 2 \times [5.243 + 9.485 + 2(7 + 8.348)]$	B1 M1 A1	
		$= 45.4$ (3sf)	A1	
	(b)	$= \int_2^8 (1 + 3\sqrt{x})\,dx$		
		$= [x + 2x^{\frac{3}{2}}]_2^8$	M1 A1	
		$= [8 + 2(2\sqrt{2})^3] - [2 + 2(2\sqrt{2})]$	M1	
		$= (8 + 32\sqrt{2}) - (2 + 4\sqrt{2})$	M1	
		$= 6 + 28\sqrt{2}$	A1	
	(c)	$= \frac{(6+28\sqrt{2})-45.4}{6+28\sqrt{2}} \times 100\% = 0.43\%$	M1 A1	**(13)**

Total **(75)**

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Performance Record – C2 Paper C

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	binomial	GP	factor theorem, alg. div.	trig. graph, trig. eqn	logs	SP	circle	sector of a circle	trapezium rule, area by integr.	
Marks	4	5	7	8	9	9	10	10	13	75
Student										

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