FOR EDEXCEL

GCE Examinations
Advanced Subsidiary

Core Mathematics C2

Paper A

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 A – Marking Guide

1.	*(a)*	$f(-2) = -35 \quad \therefore \quad -24 - 8 - 2k + 9 = -35$	M1	
		$k = 6$	A1	
	(b)	$= f(\frac{2}{3})$	B1	
		$= 3(\frac{8}{27}) - 2(\frac{4}{9}) + 6(\frac{2}{3}) + 9 = \frac{8}{9} - \frac{8}{9} + 4 + 9 = 13$	M1 A1	**(5)**

2.	x	-2	-1	0	1	2	
	2^x	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	B1

area $\approx \frac{1}{2} \times 1 \times [\frac{1}{4} + 4 + 2(\frac{1}{2} + 1 + 2)]$ — B1 M1 A1

$= 5\frac{5}{8}$ or 5.63 (3sf) — A1 **(5)**

3.	$\tan^2\theta = \frac{1}{3}$	M1	
	$\tan\theta = \pm\frac{1}{\sqrt{3}}$	A1	
	$\theta = \frac{\pi}{6}, \frac{\pi}{6} - \pi$ or $\pi - \frac{\pi}{6}, -\frac{\pi}{6}$	B1 M1	
	$\theta = -\frac{5\pi}{6}, -\frac{\pi}{6}, \frac{\pi}{6}, \frac{5\pi}{6}$	A2	**(6)**

4.	*(a)*	$= 1 + 8(3x) + \binom{8}{2}(3x)^2 + \binom{8}{3}(3x)^3 + \ldots$	M1 A1	
		$= 1 + 24x + 252x^2 + 1512x^3 + \ldots$	M1 A1	
	(b)	$x = 0.001$	B1	
		$(1.003)^8 \approx 1 + 0.024 + 0.000\,252 + 0.000\,001\,512$	M1	
		$= 1.024\,253\,5$ (8sf)	A1	**(7)**

5.	*(a)*	*(i)* $= 2\log_3 x = 2t$	M1 A1	
		(ii) $= \frac{\log_3 x}{\log_3 9} = \frac{\log_3 x}{2} = \frac{1}{2}t$	M1 A1	
	(b)	$2t - \frac{1}{2}t = 4$		
		$t = \frac{8}{3}$	M1	
		$\log_3 x = \frac{8}{3}, \quad x = 3^{\frac{8}{3}} = 18.7$	M1 A1	**(7)**

6.	*(a)*	radius $= \sqrt{25+1} = \sqrt{26}$	M1 A1	
		$\therefore \quad (x+3)^2 + (y-2)^2 = (\sqrt{26})^2$	M1	
		$(x+3)^2 + (y-2)^2 = 26$	A1	
	(b)	$(-4, 7)$, LHS $= (-4+3)^2 + (7-2)^2 = 1 + 25 = 26 \quad \therefore$ lies on circle	B1	
	(c)	grad of radius $= \frac{7-2}{-4-(-3)} = -5$	M1	
		$\therefore$ grad of tangent $= \frac{-1}{-5} = \frac{1}{5}$	M1 A1	
		$\therefore \quad y - 7 = \frac{1}{5}(x+4)$	M1	
		$5y - 35 = x + 4$		
		$x - 5y + 39 = 0$	A1	**(10)**

7.	*(a)*	$2x^2 + 6x + 7 = 2x + 13$		
		$x^2 + 2x - 3 = 0$	M1	
		$(x + 3)(x - 1) = 0$	M1	
		$x = -3, 1$	A1	
		$\therefore$ $(-3, 7), (1, 15)$	A1	
	(b)	area under curve $= \int_{-3}^{1} (2x^2 + 6x + 7)\ dx$		
		$= [\frac{2}{3}x^3 + 3x^2 + 7x]_{-3}^{1}$	M1 A2	
		$= (\frac{2}{3} + 3 + 7) - (-18 + 27 - 21) = 22\frac{2}{3}$	M1	
		area of trapezium $= \frac{1}{2} \times (7 + 15) \times 4 = 44$	B1	
		shaded area $= 44 - 22\frac{2}{3} = 21\frac{1}{3}$	M1 A1	**(11)**
8.	*(a)*	$\frac{a(r^4 - 1)}{r - 1} = 10 \times \frac{a(r^2 - 1)}{r - 1}$	B1 M1	
		$r^4 - 1 = 10(r^2 - 1)$		
		$r^4 - 10r^2 + 9 = 0$	A1	
		$(r^2 - 1)(r^2 - 9) = 0$	M1	
		$r^2 = 1, 9$		
		$r = \pm 1, \pm 3$	M1	
		$r > 1$ $\therefore$ $r = 3$	A1	
	(b)	$\frac{a(3^3 - 1)}{3 - 1} = 26$	M1 A1	
		$a = \frac{26}{13} = 2$	A1	
	(c)	$S_6 = \frac{2(3^6 - 1)}{3 - 1} = 728$	M1 A1	**(11)**
9.	*(a)*	area $= 2xy + (\frac{1}{2} \times x^2 \times 0.5) = 2xy + \frac{1}{4}x^2 = 50$	M1	
		$\therefore$ $y = \frac{50 - \frac{1}{4}x^2}{2x} = \frac{25}{x} - \frac{1}{8}x$	A1	
		$P = 2x + 4y + (x \times 0.5) = \frac{5}{2}x + 4y$	M1	
		$= \frac{5}{2}x + 4(\frac{25}{x} - \frac{1}{8}x)$	M1	
		$= \frac{5}{2}x + \frac{100}{x} - \frac{1}{2}x = 2x + \frac{100}{x}$	A1	
	(b)	$\frac{dP}{dx} = 2 - 100x^{-2}$	M1 A1	
		for minimum, $2 - 100x^{-2} = 0$	M1	
		$x^2 = 50$		
		$x = \sqrt{50}$ or $5\sqrt{2}$	A1	
	(c)	$\frac{d^2P}{dx^2} = 200x^{-3}$	M1	
		when $x = 5\sqrt{2}$, $\frac{d^2P}{dx^2} = \frac{2}{5}\sqrt{2}$, $\frac{d^2P}{dx^2} > 0$ $\therefore$ minimum	A1	
	(d)	$= 2(5\sqrt{2}) + \frac{100}{5\sqrt{2}} = 10\sqrt{2} + 10\sqrt{2} = 20\sqrt{2}$	M1 A1	**(13)**
			Total	**(75)**

Performance Record – C2 Paper A

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	remain. theorem	trapezium rule	trig. eqn	binomial	logs	circle	area by integr.	GP	circular sector, max./min. problem	
Marks	5	5	6	7	7	10	11	11	13	75
Student										