FOR EDEXCEL

GCE Examinations
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 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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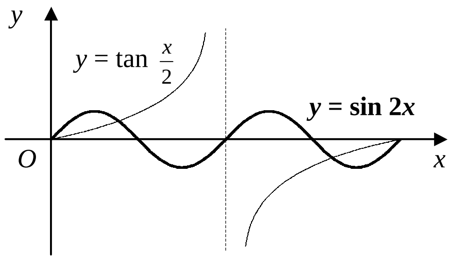
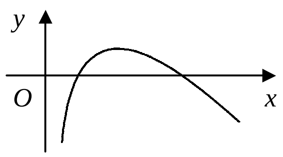
C2 Paper L – Marking Guide

1.	*(a)*	$r = \frac{-15}{75} = -\frac{1}{5}$	M1 A1	
	(b)	$= \frac{75}{1-(-\frac{1}{5})} = 62\frac{1}{2}$	M1 A1	**(4)**
2.	*(a)*	$(x + 4)^2 - 16 + (y - 2)^2 - 4 + k = 0$	M1	
		$\therefore$ centre $(-4, 2)$	A1	
	(b)	for x-axis to be tangent, radius must be 2	B1	
		$(x + 4)^2 + (y - 2)^2 = 20 - k$		
		$\therefore\ 20 - k = 2^2$	M1	
		$k = 16$	A1	**(5)**
3.		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)**
4.	*(a)*		B2 B2	
	(b)	4 solutions	B1	
		the graphs intersect at 4 points	B1	**(6)**
5.	*(a)*	$\log_a 27 - \log_a 8 = 3$		
		$\log_a \frac{27}{8} = 3$	M1	
		$a^3 = \frac{27}{8}$, $a = \sqrt[3]{\frac{27}{8}} = \frac{3}{2}$	M1 A1	
	(b)	$(x + 3) \lg 2 = (x - 1) \lg 6$	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)**
6.	*(a)*	$= 2^4 + 4(2^3)(x) + 6(2^2)(x^2) + 4(2)(x^3) + x^4$	M1 A1	
		$= 16 + 32x + 24x^2 + 8x^3 + x^4$	B1 A1	
	(b)	$(2 - x)^4 = 16 - 32x + 24x^2 - 8x^3 + x^4$	M1	
		$(2 + x)^4 + (2 - x)^4 = 32 + 48x^2 + 2x^4$, $A = 32, B = 48, C = 2$	A1	
	(c)	$32 + 48x^2 + 2x^4 = 136$		
		$x^4 + 24x^2 - 52 = 0$		
		$(x^2 + 26)(x^2 - 2) = 0$	M1	
		$x^2 = -26$ (no real solutions) or 2	A1	
		$x = \pm\sqrt{2}$	A1	**(9)**

7.	*(a)*	$f(2) = 16 - 20 + 2 + 2 = 0 \;\therefore\; (x - 2)$ is a factor	M1 A1	
	(b)	$$\begin{array}{r\|l} & 2x^2 - x - 1 \\ \hline x - 2 & 2x^3 - 5x^2 + x + 2 \\ & 2x^3 - 4x^2 \\ \hline & \quad -x^2 + x \\ & \quad -x^2 + 2x \\ \hline & \qquad -x + 2 \\ & \qquad -x + 2 \\ \hline \end{array}$$	M1 A1	
		$f(x) = (x - 2)(2x^2 - x - 1) = (x - 2)(2x + 1)(x - 1)$	M1 A1	
	(c)	$x = -\frac{1}{2}, 1, 2$	B1	
	(d)	$\sin\theta = 2$ (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)**
8.	*(a)*	$3 - x^{\frac{1}{2}} - 2x^{-\frac{1}{2}} = 0, \qquad 3x^{\frac{1}{2}} - x - 2 = 0$	M1	
		$x - 3x^{\frac{1}{2}} + 2 = 0, \qquad (x^{\frac{1}{2}} - 1)(x^{\frac{1}{2}} - 2) = 0$	M1	
		$x^{\frac{1}{2}} = 1, 2$	A1	
		$x = 1, 4 \;\therefore\; (1, 0), (4, 0)$	A1	
	(b)	$\frac{dy}{dx} = -\frac{1}{2}x^{-\frac{1}{2}} + x^{-\frac{3}{2}}$	M1 A1	
		for minimum, $\quad -\frac{1}{2}x^{-\frac{1}{2}} + x^{-\frac{3}{2}} = 0$	M1	
		$-\frac{1}{2}x^{-\frac{3}{2}}(x - 2) = 0$		
		$x = 2, \; y = 3 - \sqrt{2} - \frac{2}{\sqrt{2}} \;\therefore\; (2, 3 - 2\sqrt{2})$	A2	
	(c)	$\frac{d^2y}{dx^2} = \frac{1}{4}x^{-\frac{3}{2}} - \frac{3}{2}x^{-\frac{5}{2}}$	M1	
		when $x = 2$, $\frac{d^2y}{dx^2} = \frac{1}{8\sqrt{2}} - \frac{3}{8\sqrt{2}} = -\frac{1}{4\sqrt{2}}$, $\frac{d^2y}{dx^2} < 0 \;\therefore$ maximum	A1	
	(d)		B2	
				(13)
9.	*(a)*	$x = 4 \;\therefore\; y = 12 - 8 + 2 = 6$	B1	
		$\frac{dy}{dx} = 3 - 2x^{-\frac{1}{2}}$	M1 A1	
		grad $= 3 - 1 = 2$	M1	
		$\therefore\; y - 6 = 2(x - 4)$	M1	
		$y = 2x - 2$	A1	
	(b)	area under curve $= \int_0^4 (3x - 4\sqrt{x} + 2)\,dx$		
		$= [\frac{3}{2}x^2 - \frac{8}{3}x^{\frac{3}{2}} + 2x]_0^4$	M1 A2	
		$= (24 - \frac{64}{3} + 8) - (0) = 10\frac{2}{3}$	M1	
		tangent meets x-axis when $y = 0 \Rightarrow x = 1$	M1	
		area of triangle $= \frac{1}{2} \times 3 \times 6 = 9$	A1	
		shaded area $= 10\frac{2}{3} - 9 = \frac{5}{3}$	M1 A1	**(14)**
			Total	**(75)**

Performance Record – C2 Paper L

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	GP	circle	sector of a circle	trig. graph	logs	binomial	factor theorem, trig. eqn	SP	area by integr.	
Marks	4	5	6	6	7	9	11	13	14	75
Student										