FOR OCR

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C1

Paper G

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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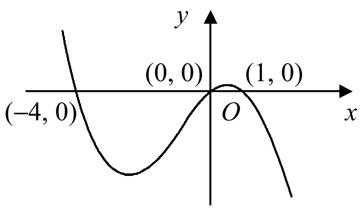
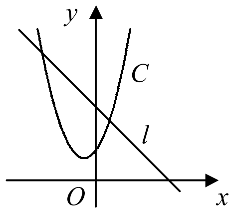
C1 Paper G – Marking Guide

1.		$(2^2)^{y+1} = (2^3)^{2y-1}$	M1	
		$2^{2y+2} = 2^{6y-3}$	A1	
		$2y + 2 = 6y - 3$	M1	
		$y = \frac{5}{4}$	A1	**(4)**
2.		$= \sqrt{\frac{45}{2}} = \frac{3\sqrt{5}}{\sqrt{2}}$	M1 A1	
		$= \frac{3\sqrt{5}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3}{2}\sqrt{10}$	M1 A1	**(4)**
3.	*(i)*	$(x + 4)^2 - 16 + (y - 2)^2 - 4 + k = 0$	M1	
		$\therefore$ centre $(-4, 2)$	A1	
	(ii)	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)**
4.	*(i)*	$= x(4 - 3x - x^2) = x(1 - x)(4 + x)$	M2 A1	
	(ii)		B3	**(6)**
5.	*(i)*	$x^2 - 4x + 2 = 0$		
		$x = \frac{4 \pm \sqrt{16-8}}{2}$	M1	
		$x = \frac{4 \pm 2\sqrt{2}}{2}$	M1	
		$x = 2 \pm \sqrt{2} \quad \therefore\ (2 - \sqrt{2}, 0), (2 + \sqrt{2}, 0)$	A2	
	(ii)	$x^2 - 4x + 2 = 2x + k$		
		$x^2 - 6x + 2 - k = 0$	M1	
		tangent $\therefore$ equal roots, $b^2 - 4ac = 0$		
		$(-6)^2 - [4 \times 1 \times (2 - k)] = 0$	M1 A1	
		$36 - 4(2 - k) = 0$		
		$k = -7$	A1	**(8)**
6.	*(i)*	$t = 0, A = 4 \quad \Rightarrow \quad 4 = p^2$	M1	
		$p > 0 \ \therefore\ p = 2$	A1	
		$t = 5, A = 9 \quad \Rightarrow \quad 9 = (2 + 5q)^2$	M1	
		$2 + 5q = \pm 3$		
		$q = \frac{1}{5}(-2 \pm 3)$	M1	
		$q > 0 \ \therefore\ q = \frac{1}{5}$	A1	
	(ii)	$A = (2 + \frac{1}{5}t)^2 = 4 + \frac{4}{5}t + \frac{1}{25}t^2$	M1	
		$\frac{dA}{dt} = \frac{4}{5} + \frac{2}{25}t$	M1 A1	
	(iii)	$t = 15 \ \therefore\ \frac{dA}{dt} = \frac{4}{5} + \frac{2}{25}(15) = 2 \text{ cm}^2 \text{ s}^{-1}$	M1 A1	**(10)**

7.	*(i)*	$x^2 + 2x + 4 = (x + 1)^2 - 1 + 4$	M1	
		$= (x + 1)^2 + 3$	A1	
		minimum: $(-1, 3)$	B2	
	(ii)		B2 B1	
	(iii)	$x^2 + 2x + 4 = 8 - x$		
		$x^2 + 3x - 4 = 0$		
		$(x + 4)(x - 1) = 0$	M1	
		$x = -4, 1$	A1	
		$\therefore$ $(-4, 12)$ and $(1, 7)$	M1 A1	**(11)**
8.	*(i)*	$\text{f}(x) = \dfrac{x^2 - 8x + 16}{2x^{\frac{1}{2}}}$	M1	
		$\text{f}(x) = \frac{1}{2}x^{\frac{3}{2}} - 4x^{\frac{1}{2}} + 8x^{-\frac{1}{2}}$, $\quad A = \frac{1}{2}, B = -4, C = 8$	A2	
	(ii)	$\text{f}'(x) = \frac{3}{4}x^{\frac{1}{2}} - 2x^{-\frac{1}{2}} - 4x^{-\frac{3}{2}}$	M1 A2	
		$\text{f}'(x) = \frac{1}{4}x^{-\frac{3}{2}}(3x^2 - 8x - 16) = \dfrac{3x^2 - 8x - 16}{4x^{\frac{3}{2}}}$	M1 A1	
	(iii)	$\text{f}'(x) = 0 \Rightarrow 3x^2 - 8x - 16 = 0$	M1	
		$(3x + 4)(x - 4) = 0$	M1	
		$x > 0 \;\therefore x = 4$		
		$\therefore$ $(4, 0)$	A1	**(11)**
9.	*(i)*	$\text{grad} = \dfrac{4-3}{3-(-1)} = \frac{1}{4}$	M1 A1	
		$\therefore\; y - 3 = \frac{1}{4}(x + 1)$	M1	
		$4y - 12 = x + 1$		
		$x - 4y + 13 = 0$	A1	
	(ii)	perp grad $= \dfrac{-1}{\frac{1}{4}} = -4$	M1	
		line through A, perp l_1: $\;y - 3 = -4(x + 1)$	M1	
		$y = -4x - 1$	A1	
		intersection with l_2: $\;x - 4(-4x - 1) - 21 = 0$		
		$x = 1, \;\therefore (1, -5)$	M1 A1	
		dist. A to $(1, -5) = \sqrt{(1+1)^2 + (-5-3)^2} = \sqrt{4+64} = \sqrt{68}$	M1	
		$\therefore$ dist. between lines $= \sqrt{68} = \sqrt{4\times17} = 2\sqrt{17}$ $\quad[\,k = 2\,]$	A1	
	(iii)	$AB = \sqrt{(3+1)^2 + (4-3)^2} = \sqrt{16+1} = \sqrt{17}$	M1	
		area $= \sqrt{17}\times 2\sqrt{17} = 34$	A1	**(13)**
			Total	**(72)**

Performance Record – C1 Paper G

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	indices	surds	circle	cubic	roots of quad., tangent	rate of change	compl. square	SP	straight lines	
Marks	4	4	5	6	8	10	11	11	13	72
Student										