

GCE Examinations  
Advanced / Advanced Subsidiary

# Core Mathematics C1

Paper H

## 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.

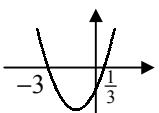
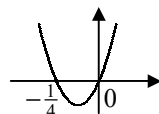


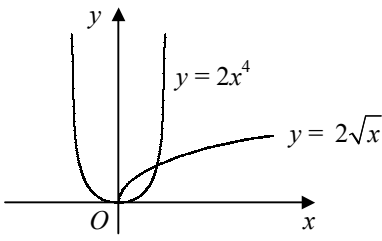
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## C1 Paper H – Marking Guide

1.	$f(x) = x + 6\sqrt{x} + 9 + 1 - 6\sqrt{x} + 9x$ $= 10x + 10, \quad a = 10, b = 10$	M1 A1 A1	<b>(3)</b>
2.	$x^4 - 5x^2 - 14 = 0$ $(x^2 + 2)(x^2 - 7) = 0$ $x^2 = -2$ (no solutions) or 7 $x = \pm\sqrt{7}$	M2 A1 A1	<b>(4)</b>
3.	$f'(x) = 3x^2 + 8x - 3$ increasing when $3x^2 + 8x - 3 \geq 0$ $(3x - 1)(x + 3) \geq 0$ $x \leq -3$ and $x \geq \frac{1}{3}$	 M1 A1 M1 M1 A1	<b>(5)</b>
4.	(i) $= 16 - 24\sqrt{2} + 18 = 34 - 24\sqrt{2}$ (ii) $= \frac{1}{2+\sqrt{2}} \times \frac{2-\sqrt{2}}{2-\sqrt{2}} = \frac{2-\sqrt{2}}{4-2} = 1 - \frac{1}{2}\sqrt{2}$	M1 A1 M2 A1	<b>(5)</b>
5.	(i) no real roots $\therefore b^2 - 4ac < 0$ $(4k)^2 - [4 \times 1 \times (-k)] < 0$ $16k^2 + 4k < 0$ $4k^2 + k < 0$ (ii) $k(4k + 1) < 0$ , critical values: $-\frac{1}{4}, 0$ $\therefore -\frac{1}{4} < k < 0$	 M2 A1 M1 M1 A1	<b>(6)</b>
6.	(i) $\frac{dy}{dx} = 2x + 2$ grad of tangent = 2 grad of normal = $\frac{-1}{2} = -\frac{1}{2}$ $\therefore y = -\frac{1}{2}x$ (ii) $x^2 + 2x = -\frac{1}{2}x$ $2x^2 + 5x = 0$ $x(2x + 5) = 0$ $x = 0$ (at O), $-\frac{5}{2}$ $\therefore (-\frac{5}{2}, \frac{5}{4})$	M1 A1 M1 A1 M1 A1 A1	<b>(7)</b>
7.	(i) $= 2 \times \sqrt{4+1} = 2\sqrt{5}$ (ii) $(x - 5)^2 + (y - 2)^2 = (\sqrt{5})^2$ $(x - 5)^2 + (y - 2)^2 = 5$ (iii) sub. $y = 2x - 3$ into eqn of C: $(x - 5)^2 + [(2x - 3) - 2]^2 = 5$ $(x - 5)^2 + (2x - 5)^2 = 5$ $x^2 - 6x + 9 = 0$ $(x - 3)^2 = 0$ repeated root $\therefore$ tangent point of contact (3, 3)	M1 A1 M1 A1 M1 A1 M1 A1 A1 A1	<b>(9)</b>

8.	(i)		B1
			B1
		intersect at (1, 2)	B2
	(ii)	translation by 3 units in the positive $x$ -direction	B2
	(iii)	$y = 2\left(\frac{x}{2}\right)^4 = \frac{1}{8}x^4$	M1 A2 (9)

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9.	(i)	$\text{grad} = \frac{1-5}{4-(-2)} = -\frac{2}{3}$ $\therefore y - 5 = -\frac{2}{3}(x + 2)$ $3y - 15 = -2x - 4$ $2x + 3y = 11$	M1 A1
			M1
			A1
	(ii)	$\text{grad } l_2 = \frac{-1}{-\frac{2}{3}} = \frac{3}{2}$ $\therefore y - 1 = \frac{3}{2}(x - 4) \quad [3x - 2y = 10]$	M1 A1
			A1
	(iii)	at C, $x = 0 \therefore y = -5 \Rightarrow C(0, -5)$ $AB = \sqrt{(4+2)^2 + (1-5)^2} = \sqrt{36+16} = \sqrt{52}$ $BC = \sqrt{(0-4)^2 + (-5-1)^2} = \sqrt{16+36} = \sqrt{52}$ $AB = BC \therefore \text{triangle } ABC \text{ is isosceles}$	B1
			M1 A1
			A1 (11)

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10.	(i)	$A = \pi r^2 + 2\pi r h = 192\pi$ $\therefore h = \frac{192 - \pi r^2}{2r} = \frac{96}{r} - \frac{r}{2}$ $V = \pi r^2 h = \pi r^2 \left(\frac{96}{r} - \frac{r}{2}\right) = 96\pi r - \frac{1}{2}\pi r^3$	M1
			M1 A1
			M1 A1
	(ii)	$\frac{dV}{dr} = 96\pi - \frac{3}{2}\pi r^2$ for SP, $96\pi - \frac{3}{2}\pi r^2 = 0$ $r^2 = 64$ $r = 8$	M1 A1
			M1
			A1
	(iii)	$= (96\pi \times 8) - \left(\frac{1}{2}\pi \times 8^3\right) = 512\pi$	M1 A1
	(iv)	$\frac{d^2V}{dr^2} = -3\pi r$	M1
		when $r = 8$ , $\frac{d^2V}{dr^2} = -24\pi$ , $\frac{d^2V}{dr^2} < 0 \therefore \text{maximum}$	A1 (13)

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Total (72)

## Performance Record – C1 Paper H

Question no.	1	2	3	4	5	6	7	8	9	10	Total
Topic(s)	algebra	quad. in function of x	increas. function	surds	roots of quad.	diff., normal	circle	transform.,	straight lines	max./min. problem	
Marks	3	4	5	5	6	7	9	9	11	13	72
Student											