

GCE Examinations  
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 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.

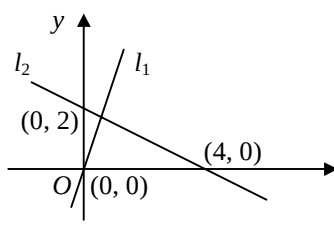
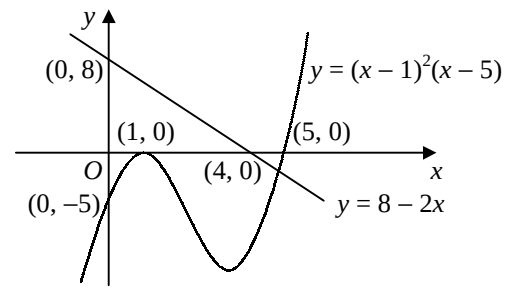


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## C1 Paper H – Marking Guide

|    |                                                                                                                                                                                                                                                                                           |                                           |     |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----|
| 1. | AP: $a = 7, l = 94$<br>$S_{30} = \frac{30}{2}(7 + 94) = 15 \times 101 = 1515$                                                                                                                                                                                                             | B1<br>M1 A1                               | (3) |
| 2. | (a) $= (x + 3)^2 - 9 + 7$<br>$= (x + 3)^2 - 2$<br>(b) $(-3, -2)$                                                                                                                                                                                                                          | M1<br>A2<br>B1                            | (4) |
| 3. | (a) <br>(b) $l_1 \Rightarrow 6x - 2y = 0$<br>$l_2: x + 2y - 4 = 0$<br>adding $7x - 4 = 0, x = \frac{4}{7}$<br>$\therefore$ intersect at $(\frac{4}{7}, \frac{12}{7})$                                    | B2 B1<br>M1 A1<br>A1                      | (6) |
| 4. | $5x + y = 7 \Rightarrow y = 7 - 5x$<br>sub. into $3x^2 + y^2 = 21$<br>$3x^2 + (7 - 5x)^2 = 21$<br>$2x^2 - 5x + 2 = 0$<br>$(2x - 1)(x - 2) = 0$<br>$x = \frac{1}{2}, 2$<br>$\therefore (\frac{1}{2}, \frac{9}{2})$ and $(2, -3)$                                                           | M1<br>M1<br>A1<br>M1<br>A1<br>M1 A1       | (7) |
| 5. | (a) <br>(b) the graphs intersect at exactly one point $\therefore$ one solution<br>(c) $n = 4$                                                                                                         | B3<br>B2<br>B1<br>B1                      | (7) |
| 6. | (a) $\frac{dy}{dx} = 2x + 2$<br>grad of tangent = 2<br>grad of normal = $\frac{-1}{2} = -\frac{1}{2}$<br>$\therefore y = -\frac{1}{2}x$<br>(b) $x^2 + 2x = -\frac{1}{2}x$<br>$2x^2 + 5x = 0, x(2x + 5) = 0$<br>$x = 0$ (at O), $-\frac{5}{2}$<br>$\therefore (-\frac{5}{2}, \frac{5}{4})$ | M1 A1<br>A1<br>M1<br>A1<br>M1<br>A1<br>A1 | (8) |

|     |     |                                                                                                                                                                                                                                                                                                                                     |                                |            |
|-----|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------|
| 7.  | (a) | $\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} + 2x^{-\frac{3}{2}}$                                                                                                                                                                                                                                                                   | M1 A2                          |            |
|     | (b) | $\frac{d^2y}{dx^2} = -\frac{1}{4}x^{-\frac{3}{2}} - 3x^{-\frac{5}{2}}$                                                                                                                                                                                                                                                              | M1 A1                          |            |
|     | (c) | $\begin{aligned} \text{LHS} &= 4x^2(-\frac{1}{4}x^{-\frac{3}{2}} - 3x^{-\frac{5}{2}}) + 4x(\frac{1}{2}x^{-\frac{1}{2}} + 2x^{-\frac{3}{2}}) - (x^{\frac{1}{2}} - 4x^{-\frac{1}{2}}) \\ &= -x^{\frac{1}{2}} - 12x^{-\frac{1}{2}} + 2x^{\frac{1}{2}} + 8x^{-\frac{1}{2}} - x^{\frac{1}{2}} + 4x^{-\frac{1}{2}} \\ &= 0 \end{aligned}$ | M1 A1<br>A1                    | (8)        |
| 8.  | (a) | $\begin{aligned} S_n &= 1 + 2 + 3 + \dots + n \\ S_n &= n + (n-1) + (n-2) + \dots + 1 \\ \text{adding, } 2S_n &= n(n+1) \\ S_n &= \frac{1}{2}n(n+1) \end{aligned}$                                                                                                                                                                  | B1<br>M1<br>M1<br>A1           |            |
|     | (b) | $\begin{aligned} (i) \quad &= S_{200} - S_{99} \\ &= \frac{1}{2} \times 200 \times 201 - \frac{1}{2} \times 99 \times 100 \\ &= 20\,100 - 4950 = 15\,150 \\ (ii) \quad &= 3 \times 15\,150 = 45\,450 \end{aligned}$                                                                                                                 | M1<br>M1<br>A1<br>M1 A1        | (9)        |
| 9.  | (a) | $\begin{aligned} (i) \quad &= 16 - 24\sqrt{2} + 18 = 34 - 24\sqrt{2} \\ (ii) \quad &= \frac{1}{2+\sqrt{2}} \times \frac{2-\sqrt{2}}{2-\sqrt{2}} \\ &= \frac{2-\sqrt{2}}{4-2} = 1 - \frac{1}{2}\sqrt{2} \end{aligned}$                                                                                                               | M1 A1<br>M1<br>M1 A1           |            |
|     | (b) | $\begin{aligned} (i) \quad &y^2 - 9y + 8 = 0 \\ &(y-1)(y-8) = 0 \\ &y = 1, 8 \\ (ii) \quad &\text{let } y = x^{\frac{3}{2}} \Rightarrow y^2 + 8 = 9y \\ &\therefore x^{\frac{3}{2}} = 1, 8 \\ &x = 1 \text{ or } (\sqrt[3]{8})^2 \\ &x = 1 \text{ or } 4 \end{aligned}$                                                             | M1<br>A1<br><br>B1<br>M1<br>A1 | (10)       |
| 10. | (a) | $\begin{aligned} f(x) &= \int (3x^{\frac{1}{2}} - 4x^{-\frac{1}{2}}) dx \\ f(x) &= 2x^{\frac{3}{2}} - 8x^{\frac{1}{2}} + c \\ (0, 0) \therefore c &= 0 \\ f(x) &= 2x^{\frac{3}{2}} - 8x^{\frac{1}{2}} \end{aligned}$                                                                                                                | M1 A2<br>M1<br>A1              |            |
|     | (b) | $\begin{aligned} 2x^{\frac{3}{2}} - 8x^{\frac{1}{2}} &= 0 \\ 2x^{\frac{1}{2}}(x-4) &= 0 \\ x &= 0 \text{ (at } O), 4 \therefore A(4, 0) \end{aligned}$                                                                                                                                                                              | M1<br>A1                       |            |
|     | (c) | $\begin{aligned} x = 2 \therefore y &= 2(2\sqrt{2}) - 8(\sqrt{2}) = -4\sqrt{2} \\ \text{grad} &= 3\sqrt{2} - \frac{4}{\sqrt{2}} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2} \\ \therefore y + 4\sqrt{2} &= \sqrt{2}(x-2) \\ y &= \sqrt{2}x - 6\sqrt{2} \end{aligned}$                                                                        | M1 A1<br>M1 A1<br>M1<br>A1     | (13)       |
|     |     |                                                                                                                                                                                                                                                                                                                                     |                                | Total (75) |

## Performance Record – C1 Paper H

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