

Solomon Press
Core Mathematics C1
Paper I
(Mark Scheme)

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Mr.S.V.Swarnaraja (Marking Examiner, Team Leader & Author)
www.swanash.com, Mobile: +94777304755 , email: swa@swanash.com**

GCE Examinations
Advanced Subsidiary

Core Mathematics C1

Paper 1

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.

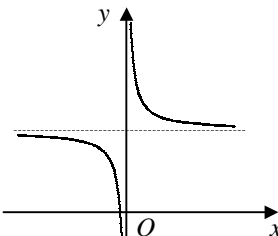


Written by Shaun Armstrong

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C1 Paper I – Marking Guide

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|--|--|-------------------|
| <p>1. $u_k = k^2 - 6k + 11 = 38$ $\therefore k^2 - 6k - 27 = 0$ $(k + 3)(k - 9) = 0$ $k \geq 1 \therefore k = 9$</p> | <p>M1 M1 A1</p> | <p>(3)</p> |
| <hr/> | | |
| <p>2. $= \frac{4}{3}x^3 - \frac{2}{3}x^{\frac{3}{2}} + c$</p> | <p>M1 A2</p> | <p>(3)</p> |
| <hr/> | | |
| <p>3. $4\sqrt{12} - \sqrt{75} = 4(2\sqrt{3}) - 5\sqrt{3} = 3\sqrt{3}$ $= \sqrt{9 \times 3} = \sqrt{27}, \quad n = 27$</p> | <p>M1 A1 M1 A1</p> | <p>(4)</p> |
| <hr/> | | |
| <p>4. (a) $= (6 + \sqrt[4]{16})^{\frac{1}{3}}$ $= (6 + 2)^{\frac{1}{3}} = \sqrt[3]{8} = 2$</p> <p>(b) $\frac{3}{\sqrt{x}} = 4$ $\sqrt{x} = \frac{3}{4}$ $x = \frac{9}{16}$</p> | <p>B1 M1 A1 M1 M1 A1</p> | <p>(6)</p> |
| <hr/> | | |
| <p>5. (a) $f(x) = \int (-\frac{1}{x^2}) dx$ $f(x) = x^{-1} + c$ $(-1, 3) \therefore 3 = -1 + c$ $c = 4$ $f(x) = x^{-1} + 4$</p> <p>(b) </p> <p style="text-align: center;">asymptotes: $x = 0$ and $y = 4$</p> | <p>M1 A1 M1 A1 B2 B1</p> | <p>(7)</p> |
| <hr/> | | |
| <p>6. (a) $f(x) = (x - 5)^2 - 25 + 17$ $f(x) = (x - 5)^2 - 8$</p> <p>(b) $(5, -8)$</p> <p>(c) (i) $(5, -4)$ (ii) $(\frac{5}{2}, -8)$</p> | <p>M1 A2 B1 B2 B2</p> | <p>(8)</p> |
| <hr/> | | |
| <p>7. (a) real roots $\therefore b^2 - 4ac \geq 0$ $(-k)^2 - [4 \times 4 \times (k - 3)] \geq 0$ $k^2 - 16k + 48 \geq 0$</p> <p>(b) $(k - 4)(k - 12) \geq 0$ $k \leq 4$ or $k \geq 12$</p> <p>(c) $k = 4$ $4x^2 - 4x + 1 = 0$ $(2x - 1)^2 = 0$ $x = \frac{1}{2}$</p> | <p>M1 A1 M1 M1 A1 B1 M1 A1</p> | <p>(8)</p> |

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|----|-----|------|--|---------------------------|
| 8. | (a) | (i) | $a = 3, a + 2d = 27$ $2d = 24, d = 12$ | B1 M1 A1 |
| | | (ii) | $= \frac{11}{2} [6 + (10 \times 12)]$ $= \frac{11}{2} \times 126 = 693$ | M1 A1 |
| | (b) | | $a = 56, l = 144$ $56 + 8(n - 1) = 144, n = 12$ $S_{12} = \frac{12}{2} (56 + 144) = 6 \times 200 = 1200$ | B1 M1 A1 M1 A1 (10) |

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|----|-----|-----|--|----------------------------|
| 9. | (a) | | $x^3 - 5x^2 + 7x = 0$ $x(x^2 - 5x + 7) = 0$ $x = 0$ or $x^2 - 5x + 7 = 0$ $b^2 - 4ac = (-5)^2 - (4 \times 1 \times 7) = -3$ $b^2 - 4ac < 0 \therefore$ no real roots \therefore only crosses x -axis at one point | M1 M1 A1 A1 |
| | | (b) | $\frac{dy}{dx} = 3x^2 - 10x + 7$ grad of tangent $= 27 - 30 + 7 = 4$ grad of normal $= \frac{-1}{4} = -\frac{1}{4}$ $\therefore y - 3 = -\frac{1}{4}(x - 3)$ $4y - 12 = -x + 3$ $x + 4y = 15$ | M1 A1 M1 A1 M1 A1 |
| | (c) | | $x = 0 \Rightarrow y = \frac{15}{4}$ $y = 0 \Rightarrow x = 15$ area $= \frac{1}{2} \times \frac{15}{4} \times 15 = \frac{225}{8} = 28\frac{1}{8}$ | M1 M1 A1 (13) |

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|-----|-----|-----|--|-------------------------------|
| 10. | (a) | | grad $= \frac{4-3}{3-(-1)} = \frac{1}{4}$ $\therefore y - 3 = \frac{1}{4}(x + 1)$ $4y - 12 = x + 1$ $x - 4y + 13 = 0$ | M1 A1 M1 A1 |
| | | (b) | perp grad $= \frac{-1}{\frac{1}{4}} = -4$ line through A, perp l_1 : $y - 3 = -4(x + 1)$ $y = -4x - 1$ intersection with l_2 : $x - 4(-4x - 1) - 21 = 0$ $x = 1, \therefore (1, -5)$ dist. A to $(1, -5) = \sqrt{(1+1)^2 + (-5-3)^2} = \sqrt{4+64} = \sqrt{68}$ \therefore dist. between lines $= \sqrt{68} = \sqrt{4 \times 17} = 2\sqrt{17}$ [$k = 2$] | M1 M1 M1 A1 M1 A1 |
| | (c) | | $AB = \sqrt{(3+1)^2 + (4-3)^2} = \sqrt{16+1} = \sqrt{17}$ area $= \sqrt{17} \times 2\sqrt{17} = 34$ | M1 A1 (13) |

Total (75)