

Solomon Press
Core Mathematics C1
Paper A
(Mark Scheme)

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GCE Examinations
Advanced Subsidiary

Core Mathematics C1

Paper A

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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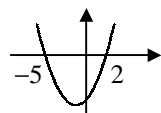
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C1 Paper A – Marking Guide

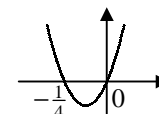
1. (a) $= \frac{21}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = 3\sqrt{7}$ M1 A1
 (b) $= \frac{1}{\sqrt[3]{8}} = \frac{1}{2}$ M1 A1 (4)

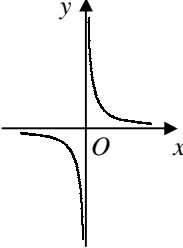
2. AP: $a = 27, l = 67$ B1
 $n = 30 - 9 = 21$ B1
 $S_{21} = \frac{21}{2}(27 + 67)$ M1
 $= \frac{21}{2} \times 94 = 987$ A1 (4)

3. $\frac{6x^2 - 1}{2\sqrt{x}} = 3x^{\frac{3}{2}} - \frac{1}{2}x^{-\frac{1}{2}}$ M1 A1
 $\frac{d}{dx}(3x^{\frac{3}{2}} - \frac{1}{2}x^{-\frac{1}{2}}) = \frac{9}{2}x^{\frac{1}{2}} + \frac{1}{4}x^{-\frac{3}{2}}$ M1 A2 (5)

4. (a) $x^2 + 3x - 10 > 0$
 $(x + 5)(x - 2) > 0$ 
 $x < -5$ or $x > 2$ M1
 (b) $3x - 2 < x + 3 \Rightarrow 2x < 5$ M1
 $x < \frac{5}{2}$ A1
 both satisfied when $x < -5$ or $2 < x < \frac{5}{2}$ A1 (6)

5. (a) $u_2 = k^2 - 1$ B1
 $u_3 = (k^2 - 1)^2 - 1 = k^4 - 2k^2$ M1 A1
 (b) $k^4 - 2k^2 + k^2 - 1 = 11$
 $k^4 - k^2 - 12 = 0$ M1
 $(k^2 + 3)(k^2 - 4) = 0$ M1
 $k^2 = -3$ (no solutions) or 4 A1
 $k = \pm 2$ A1 (7)

6. (a) $(x + 2k)^2 - (2k)^2 - k = 0$ M1
 $(x + 2k)^2 = 4k^2 + k$ A1
 $x + 2k = \pm \sqrt{4k^2 + k}$ M1
 $x = -2k \pm \sqrt{4k^2 + k}$ A1
 (b) no real roots if $4k^2 + k < 0$ M1
 $k(4k + 1) < 0$, critical values: $-\frac{1}{4}, 0$ A1

 $\therefore -\frac{1}{4} < k < 0$ M1
A1 (8)

7.	(a) stretch by factor of 3 in y-direction about x-axis or stretch by factor of 3 in x-direction about y-axis	B2
	(b) asymptotes: $x = 0$ and $y = 0$	B2 B1
		
	(c) $\frac{3}{x} = c - 3x$ $3 = cx - 3x^2$ $3x^2 - cx + 3 = 0$ tangent \therefore equal roots, $b^2 - 4ac = 0$ $(-c)^2 - (4 \times 3 \times 3) = 0$ $c^2 = 36, c = \pm 6$	M1 M1 A1 A1

(9)

8.	(a) $\text{grad} = \frac{7-4}{9-7} = \frac{3}{2}$ $\therefore y - 4 = \frac{3}{2}(x - 7)$ $2y - 8 = 3x - 21$ $3x - 2y - 13 = 0$	M1 A1 M1 A1
	(b) $y = 8x$	B1
	(c) at R, $3x - 2(8x) - 13 = 0$ $x = -1 \therefore R(-1, -8)$ $OP = \sqrt{7^2 + 4^2} = \sqrt{49 + 16} = \sqrt{65}$ $OR = \sqrt{(-1)^2 + (-8)^2} = \sqrt{1 + 64} = \sqrt{65} \therefore OP = OR$	M1 A1 M1 A1 A1

(10)

9.	(a) $y = \int (6 - 4x - 3x^2) dx, y = 6x - 2x^2 - x^3 + c$ $(0, 0) \therefore c = 0$ $y = 6x - 2x^2 - x^3$	M1 A2 M1 A1
	(b) $6x - 2x^2 - x^3 = 0, x(6 - 2x - x^2) = 0$ $x = 0$ (at O) or $6 - 2x - x^2 = 0$ at A, B: $x = \frac{2 \pm \sqrt{4 + 24}}{-2} = \frac{2 \pm 2\sqrt{7}}{-2} = -1 \pm \sqrt{7}$ $A(-1 - \sqrt{7}, 0), B(-1 + \sqrt{7}, 0)$ $\therefore AB = (-1 + \sqrt{7}) - (-1 - \sqrt{7}) = 2\sqrt{7} \quad [k = 2]$	M1 M2 A1 M1 A1

(11)

10.	(a) $\frac{dy}{dx} = 1 - 3x^{-2}$ $\text{grad} = 1 - 3(1)^{-2} = 1 - 3 = -2$	M1 A1 A1
	(b) $x = 1 \therefore y = 4$ $\text{grad} = \frac{-1}{-2} = \frac{1}{2}$ $\therefore y - 4 = \frac{1}{2}(x - 1)$ $y = \frac{1}{2}x + \frac{7}{2}$	M1 A1 M1 A1
	(c) $x + \frac{3}{x} = \frac{1}{2}x + \frac{7}{2}$ $2x^2 + 6 = x^2 + 7x$ $x^2 - 7x + 6 = 0, (x - 1)(x - 6) = 0$ $x = 1$ (at P), 6 $\therefore (6, 6\frac{1}{2})$	M1 M1 A1 A1

(11)

Total (75)