

GCE Examinations
Advanced Subsidiary

Core Mathematics C1

Paper E

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

© *Solomon Press*

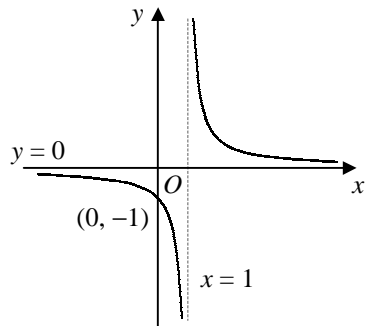
These sheets may be copied for use solely by the purchaser's institute.

C1 Paper E – Marking Guide

1.	(a) $= \frac{18}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 6\sqrt{3}$	M1 A1	
	(b) $= 4 - 2\sqrt{3} - 4\sqrt{3} + 6 = 10 - 6\sqrt{3}$	M1 A1	(4)
2.	$3x^2 - 5 = 2x$ $3x^2 - 2x - 5 = 0$ $(3x - 5)(x + 1) = 0$ $x = -1, \frac{5}{3}$	M1 M1 A2	(4)
3.	$x - 5y = 7 \Rightarrow y = \frac{1}{5}x - \frac{7}{5} \therefore \text{grad} = \frac{1}{5}$ $\text{grad } m = \frac{-1}{\frac{1}{5}} = -5$ $\therefore y - 1 = -5(x + 4)$ $y = -5x - 19$	B1 M1 A1 M1 A1	(5)
4.	(a) 1, 7, 25, 79 (b) $7 = a + b$ $25 = 7a + b$ subtracting, $6a = 18$ $a = 3, b = 4$	B2 M1 A1 M1 A1	(6)
5.	(a) $8x - x^{\frac{5}{2}} = 0$ $x(8 - x^{\frac{3}{2}}) = 0$ $x = 0$ (at O) or $x^{\frac{3}{2}} = 8$ $\therefore x = (\sqrt[3]{8})^2 = 4$ (b) $\frac{dy}{dx} = 8 - \frac{5}{2}x^{\frac{3}{2}}$ $\text{grad} = 8 - (\frac{5}{2} \times 8) = -12$	M1 M1 A1 M1 A1 M1 A1	(7)
6.	(a) $f(x) = 2[x^2 - 2x] + 1$ $= 2[(x - 1)^2 - 1] + 1$ $= 2(x - 1)^2 - 1, \quad a = 2, b = -1, c = -1$ (b) $x = 1$ (c) $2(x - 1)^2 - 1 = 3$ $(x - 1)^2 = 2$ $x = 1 \pm \sqrt{2}$	M1 M1 A2 B1 M1 M1 A1	(8)
7.	(a) $f(x) = \frac{x^2 - 8x + 16}{2x^{\frac{1}{2}}}$ $f(x) = \frac{1}{2}x^{\frac{3}{2}} - 4x^{\frac{1}{2}} + 8x^{-\frac{1}{2}}, \quad A = \frac{1}{2}, B = -4, C = 8$ (b) $f'(x) = \frac{3}{4}x^{\frac{1}{2}} - 2x^{-\frac{1}{2}} - 4x^{-\frac{3}{2}}$ $f'(x) = \frac{1}{4}x^{-\frac{3}{2}}(3x^2 - 8x - 16)$ $f'(x) = \frac{1}{4}x^{-\frac{3}{2}}(3x + 4)(x - 4) = \frac{(3x + 4)(x - 4)}{4x^{\frac{3}{2}}}$	M1 A2 M1 A2 M1 M1 A1	(9)

8. (a) translation by 1 unit in the positive x -direction B2

(b)



B3

(c)
$$\frac{1}{x-1} = 2 + \frac{1}{x}$$

$$x = 2x(x-1) + (x-1)$$

$$2x^2 - 2x - 1 = 0$$

$$x = \frac{2 \pm \sqrt{4+8}}{4}$$

$$x = \frac{2 \pm 2\sqrt{3}}{4}$$

$$x = \frac{1}{2} \pm \frac{1}{2}\sqrt{3}$$

M1

A1

M1

M1

A1 (10)

9. (a) $S_6 = \frac{6}{2} [3000 + (5 \times -x)] = 8100$ M1 A1

$3000 - 5x = 2700, \quad x = 60$ M1 A1

(b) $= 1500 - (7 \times 60) = 1500 - 420 = \text{£}1080$ M1 A1

(c) $S_n = \frac{n}{2} [3000 - 60(n-1)]$ M1

$= n[1500 - 30(n-1)]$ M1 A1

$= 30n[50 - (n-1)] = 30n(51-n) \quad [k=30]$ M1 A1

(d) the value of sales in a month would become negative which is not possible B1 (10)

10. (a) $y = \int (3x^2 + 4x + k) \, dx$
 $y = x^3 + 2x^2 + kx + c$ M1 A2

$(0, -2) \therefore c = -2$ B1

$(2, 18) \therefore 18 = 8 + 8 + 2k - 2$ M1

$k = 2$ A1

$y = x^3 + 2x^2 + 2x - 2$ A1

(b) $x^3 + 2x^2 + 2x - 2 = x - 2$

$x^3 + 2x^2 + x = 0$

$x(x^2 + 2x + 1) = 0$ M1

$x(x+1)^2 = 0$ M1

repeated root \therefore tangent A1

point of contact where $x = -1$ M1

$\therefore (-1, -3)$ A1 (12)

Total (75)

