

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C1

Paper F

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.



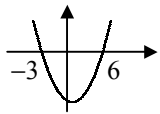
Written by Shaun Armstrong

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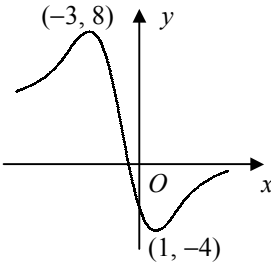
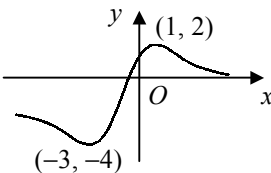
C1 Paper F – Marking Guide

1. (i) $= 8^2 - (4 \times 2 \times 8) = 0$ M1 A1
 (ii) 1 real root A1 **(3)**
-

2. $x^2 - 3x + 2 < 20$
 $x^2 - 3x - 18 < 0$
 $(x + 3)(x - 6) < 0$ 
 $-3 < x < 6$ M1
 M1
 M1
 A1 **(4)**
-

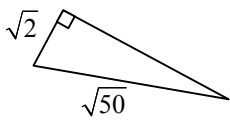
3. (i) $x = (\sqrt[3]{27})^2 = 3^2 = 9$ M1 A1
 (ii) $= (\frac{9}{4})^{-\frac{1}{2}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$ M1 A1 **(4)**
-

4. $\frac{6x^2 - 1}{2\sqrt{x}} = 3x^{\frac{3}{2}} - \frac{1}{2}x^{-\frac{1}{2}}$ 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)**
-

5. (i)  B3
 (ii)  B3 **(6)**
-

6. (i) $f(x) = 2[x^2 - 2x] + 1$ M1
 $= 2[(x - 1)^2 - 1] + 1$ M1
 $= 2(x - 1)^2 - 1, \quad a = 2, b = -1, c = -1$ A2
 (ii) $x = 1$ B1
 (iii) $2(x - 1)^2 - 1 = 3$ M1
 $(x - 1)^2 = 2$
 $x = 1 \pm \sqrt{2}$ M1 A1 **(8)**
-

7. (i) $\frac{dy}{dx} = 3x^2 + 2ax - 15$ M1 A1
 SP when $x = -1 \therefore 3 - 2a - 15 = 0$ M1
 $a = -6$ A1
 $y = x^3 - 6x^2 - 15x + b$
 $(-1, 12)$ on curve $\therefore 12 = -1 - 6 + 15 + b$ M1
 $b = 4$ A1
- (ii) $3x^2 - 12x - 15 = 0$ M1
 $3(x - 5)(x + 1) = 0$ M1
 $x = -1$ [at $(-1, 12)$] or $5 \therefore (5, -96)$ A1 (9)

8. (i) $(-6, 5) \therefore 36 + 25 - 60 - 40 + k = 0$ M1
 $k = 39$ A1
- (ii) $(x + 5)^2 - 25 + (y - 4)^2 - 16 + 39 = 0$ M1
 $(x + 5)^2 + (y - 4)^2 = 2$
 \therefore centre $(-5, 4)$, radius $= \sqrt{2}$ A2
- (iii)  dist. $(2, 3)$ to centre $= \sqrt{49 + 1} = \sqrt{50}$ B1
 $\therefore AB^2 = (\sqrt{50})^2 - (\sqrt{2})^2 = 48$ M1 A1
 $AB = \sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$ M1 A1 (10)

9. (i) $\frac{dy}{dx} = 1 - 3x^{-2}$ M1 A1
 grad $= 1 - 3(1)^{-2} = 1 - 3 = -2$ A1
- (ii) $x = 1 \therefore y = 4$
 grad $= \frac{-1}{-2} = \frac{1}{2}$ M1
 $\therefore y - 4 = \frac{1}{2}(x - 1)$ M1
 $y = \frac{1}{2}x + \frac{7}{2}$ A1
- (iii) $x + \frac{3}{x} = \frac{1}{2}x + \frac{7}{2}$
 $2x^2 + 6 = x^2 + 7x$ M1
 $x^2 - 7x + 6 = 0$
 $(x - 1)(x - 6) = 0$ M1
 $x = 1$ (at P), 6 A1
 $\therefore (6, 6\frac{1}{2})$ A1 (10)

10. (i) $y = 0 \therefore x = 7 \Rightarrow A(7, 0)$ M1 A1
- (ii) $l_1: y = 14 - 2x \therefore$ grad $= -2$ B1
 $l_2: y - 6 = -2(x + 6)$ M1
 $y = -2x - 6$ A1
- (iii) $y = 0 \therefore x = -3 \Rightarrow C(-3, 0)$ B1
- (iv) grad $CD = \frac{-1}{-2} = \frac{1}{2}$ M1
 eqn $CD: y - 0 = \frac{1}{2}(x + 3)$ M1 A1
 intersection with $l_1: \frac{1}{2}(x + 3) = 14 - 2x$
 $x = 5$ M1
 $y = 14 - (2 \times 5) = 4 \therefore D(5, 4)$ A1
- (v) $AC = 7 - (-3) = 10$
 area $= \frac{1}{2} \times 10 \times 4 = 20$ M1 A1 (13)

Total (72)

Performance Record – C1 Paper F

Question no.	1	2	3	4	5	6	7	8	9	10	Total
Topic(s)	discrim.	inequal.	indices	diff.	transform.	compl. square	SP	circle	diff., normal	straight lines	
Marks	3	4	4	5	6	8	9	10	10	13	72
Student											