

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C1

Paper I

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.

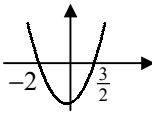


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C1 Paper I – Marking Guide

- | | | | |
|--|---|---|-------------------|
| <p>1. $2x^2 + x - 6 \leq 0$
 $(2x - 3)(x + 2) \leq 0$
 critical values: $-2, \frac{3}{2}$</p> |  | <p>M1
A1
M1
A1</p> | <p>(4)</p> |
| <hr/> | | | |
| <p>2. $= 6x - \frac{1}{2}x^{-\frac{1}{2}} - \frac{1}{2}x^{-2}$</p> | | <p>M1 A3</p> | <p>(4)</p> |
| <hr/> | | | |
| <p>3. $x = 0 \Rightarrow y = -6 \quad \therefore (0, -6)$
 $y = 0 \Rightarrow x = 12 \quad \therefore (12, 0)$
 mid-point = $(\frac{0+12}{2}, \frac{-6+0}{2}) = (6, -3)$
 dist. from $O = \sqrt{6^2 + (-3)^2} = \sqrt{36+9} = \sqrt{45}$
 $= \sqrt{9 \times 5} = 3\sqrt{5}$</p> | | <p>B1
M1 A1
M1
M1 A1</p> | <p>(6)</p> |
| <hr/> | | | |
| <p>4. (i) $(x + k)^2 - k^2 + 4 = 0$
 $(x + k)^2 = k^2 - 4$
 $x + k = \pm \sqrt{k^2 - 4}$
 $x = -k \pm \sqrt{k^2 - 4}$</p> <p>(ii) $k = 3$
 $\therefore x = -3 \pm \sqrt{3^2 - 4}$
 $= -3 \pm \sqrt{5}$</p> | | <p>M1
A1
M1
A1
M1
A1</p> | <p>(6)</p> |
| <hr/> | | | |
| <p>5. $x = 2 \therefore y = \sqrt{16} = 4$
 $y = \sqrt{8}\sqrt{x} = 2\sqrt{2}x^{\frac{1}{2}}$
 $\frac{dy}{dx} = \sqrt{2}x^{-\frac{1}{2}}$
 grad = $\frac{\sqrt{2}}{\sqrt{2}} = 1$
 $\therefore y - 4 = 1(x - 2) \quad [y = x + 2]$</p> | | <p>B1
M1 A1
M1
M1 A1</p> | <p>(6)</p> |
| <hr/> | | | |
| <p>6. (i) $= 3\sqrt{3} - \frac{8}{\sqrt{3}} = 3\sqrt{3} - \frac{8}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$
 $= 3\sqrt{3} - \frac{8}{3}\sqrt{3} = \frac{1}{3}\sqrt{3}$</p> <p>(ii) $x^{\frac{3}{2}} = 8x^{-\frac{1}{2}}$
 $x^2 = 8$
 $x = \pm\sqrt{8} = \pm 2\sqrt{2}$</p> | | <p>B1 M1
A1
M1 A1
M1 A1</p> | <p>(7)</p> |
| <hr/> | | | |
| <p>7. $x - 3y + 7 = 0 \Rightarrow x = 3y - 7$
 sub. into $x^2 + 2xy - y^2 = 7$
 $(3y - 7)^2 + 2y(3y - 7) - y^2 = 7$
 $y^2 - 4y + 3 = 0$
 $(y - 1)(y - 3) = 0$
 $y = 1, 3$
 $\therefore x = -4, y = 1$ or $x = 2, y = 3$</p> | | <p>M1
M1
A1
M1
A1
M1 A1</p> | <p>(7)</p> |

8. (i) $(x-1)^2 - 1 + (y-9)^2 - 81 + 73 = 0$ M1
 $(x-1)^2 + (y-9)^2 = 9$
 \therefore centre (1, 9), radius = 3 A2
- (ii) grad of line = 2
 perp. grad = $-\frac{1}{2} = -\frac{1}{2}$ M1
 eqn of line through centre of circle, perp. to straight line:
 $y - 9 = -\frac{1}{2}(x - 1)$ M1
 $y = \frac{19}{2} - \frac{1}{2}x$ A1
 closest point where lines intersect
 $\therefore 2x - 3 = \frac{19}{2} - \frac{1}{2}x$ M1
 $x = 5$ A1
 $\therefore (5, 7)$ A1 (9)

9. (i) $(2x-1)(x+2) = 0$ M1
 $x = -2, \frac{1}{2}$ A1
- (ii) B2
- (iii) (0, -2),
 (-4, 0), (1, 0) B1
 M1 A1
- (iv) $f(x-1) = 2(x-1)^2 + 3(x-1) - 2$ M1 A1
 $= 2x^2 - x - 3$
 $\therefore a = 2, b = -1, c = -3$ A1 (10)

10. (i) B3
- (ii) $y = (2-x)(9-6x+x^2)$
 $y = 18 - 12x + 2x^2 - 9x + 6x^2 - x^3$ M1
 $y = 18 - 21x + 8x^2 - x^3$ A1
 $\frac{dy}{dx} = -21 + 16x - 3x^2$ M1 A1
 grad = $-21 + 32 - 12 = -1$
 $\therefore y - 0 = -(x - 2)$ M1
 $x + y = 2$ A1
- (iii) $-21 + 16x - 3x^2 = 0$ M1
 $-(3x-7)(x-3) = 0$ M1
 $x = 3$ (at B), $\frac{7}{3}$ A1
 $y = (-\frac{1}{3})(\frac{7}{3})^2 = -\frac{49}{27} \therefore (\frac{7}{3}, -\frac{49}{27})$ A1 (13)

Total (72)

Performance Record – C1 Paper I

Question no.	1	2	3	4	5	6	7	8	9	10	Total
Topic(s)	inequal.	diff.	straight line	compl. square, roots of quad.	surds, diff., tangent	indices	simul. eqn	circle	transform.	cubic, diff., tangent, SP	
Marks	4	4	6	6	6	7	7	9	10	13	72
Student											