FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

Core Mathematics C1

Paper L

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

C1 Paper L – Marking Guide

1. $4x - 8 < 2x + 5$ M1

$2x < 13, \quad x < 6\frac{1}{2}$ M1 A1 **(3)**

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2. $f'(x) = -1 - 3x^2$ M1 A1

$x^2 \geq 0$ for all real $x \Rightarrow -1 - 3x^2 \leq -1$ M1

$\therefore$ $f'(x) < 0 \Rightarrow f(x)$ is decreasing for all values of x A1 **(4)**

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3. *(i)* $y^2 - 9y + 8 = 0, \quad (y - 1)(y - 8) = 0$ M1

$y = 1, 8$ A1

(ii) let $y = x^{\frac{3}{2}} \Rightarrow y^2 + 8 = 9y \quad \therefore \quad x^{\frac{3}{2}} = 1, 8$ B1

$x = 1$ or $(\sqrt[3]{8})^2$ M1

$x = 1$ or 4 A1 **(5)**

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4. *(i)* $y = \frac{1}{2}x^2 - \frac{3}{2}x^{-2}$ M1 A1

$\frac{dy}{dx} = x + 3x^{-3}$ M1 A1

(ii) $\frac{d^2y}{dx^2} = 1 - 9x^{-4} = \frac{x^4 - 9}{x^4}$ M1 A1 **(6)**

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5. $5x + y = 7 \quad \Rightarrow \quad y = 7 - 5x$ M1

sub. into $3x^2 + y^2 = 21$

$3x^2 + (7 - 5x)^2 = 21$ M1

$2x^2 - 5x + 2 = 0$ A1

$(2x - 1)(x - 2) = 0$ M1

$x = \frac{1}{2}, 2$ A1

$\therefore$ $(\frac{1}{2}, \frac{9}{2})$ and $(2, -3)$ M1 A1 **(7)**

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6. *(i)* $= (\frac{49}{9})^{-\frac{1}{2}} = \sqrt{\frac{9}{49}} = \frac{3}{7}$ M1 A1

(ii) $1 + x = \sqrt{3}\,x, \quad 1 = x(\sqrt{3} - 1)$ M1

$x = \frac{1}{\sqrt{3} - 1}$ A1

$x = \frac{1}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1} = \frac{\sqrt{3} + 1}{3 - 1} = \frac{1}{2} + \frac{1}{2}\sqrt{3}$ M2 A1 **(7)**

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7. *(i)* grad $= \frac{-4 - 6}{1 - (-3)} = -\frac{5}{2}$ M1 A1

$\therefore$ $y - 6 = -\frac{5}{2}(x + 3)$ M1

$2y - 12 = -5x - 15$

$5x + 2y + 3 = 0$ A1

(ii) m: $y = -\frac{2}{k}x - \frac{7}{k} \quad \therefore$ grad $= -\frac{2}{k}$ M1 A1

l and m perp. $\therefore \quad -\frac{5}{2} \times -\frac{2}{k} = -1$ M1

$k = -5$ A1 **(8)**

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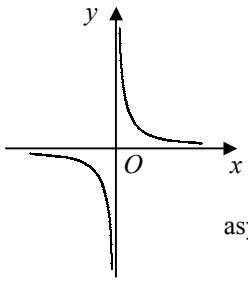
8. *(i)* stretch by factor of 3 in y-direction about x-axis — B2
or stretch by factor of 3 in x-direction about y-axis

(ii)



B2

asymptotes: $x = 0$ and $y = 0$ — B1

(iii) $\frac{3}{x} = c - 3x$

$3 = cx - 3x^2$ — M1

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

tangent $\therefore$ equal roots, $b^2 - 4ac = 0$

$(-c)^2 - (4 \times 3 \times 3) = 0$ — M1 A1

$c^2 = 36$

$c = \pm 6$ — A1 **(9)**

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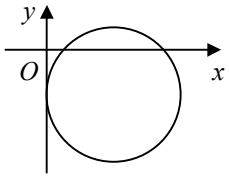
9. *(i)* $(x - 6)^2 - 36 + (y + 4)^2 - 16 + 16 = 0$ — M1

$\therefore$ centre $(6, -4)$ — A1

(ii) $(x - 6)^2 + (y + 4)^2 = 36$ — M1

$\therefore$ radius $= 6$ — A1

(iii)



B2

(iv) $y = 0 \quad \therefore \quad (x - 6)^2 + 16 = 36$ — M1

$x = 6 \pm \sqrt{20} = 6 \pm 2\sqrt{5}$ — A1

$AB = 6 + 2\sqrt{5} - (6 - 2\sqrt{5}) = 4\sqrt{5}$ — M1 A1 **(10)**

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10. *(i)* $x^2 - 3x + 5 = 2x + 1$

$x^2 - 5x + 4 = 0$ — M1

$(x - 1)(x - 4) = 0$ — M1

$x = 1, 4$ — A1

when $x = 1$, $y = 2(1) + 1 = 3$

$\therefore$ $P(1, 3)$, $Q(4, 9)$ — A1

(ii) $\frac{dy}{dx} = 2x - 3$ — M1

grad $= -1$ — A1

$\therefore$ $y - 3 = -(x - 1) \qquad [\, y = 4 - x \,]$ — M1 A1

(iii) grad $= 5$

$\therefore$ $y - 9 = 5(x - 4)$ — M1

$y - 9 = 5x - 20$

$y = 5x - 11$ — A1

(iv) $4 - x = 5x - 11$ — M1

$x = \frac{5}{2}$ — A1

$\therefore$ $(\frac{5}{2}, \frac{3}{2})$ — A1 **(13)**

Total **(72)**

Performance Record – C1 Paper L

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	Total
Topic(s)	inequal.	decreas. function	quad. in function of x	diff.	simul. eqn	indices, surds	straight lines	transform., tangent	circle	diff., tangents	
Marks	3	4	5	6	7	7	8	9	10	13	72
Student											