FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper B

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.

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C2 Paper B – Marking Guide

1. $\log_5 \frac{4x+3}{x-1} = 2$ M1

$\frac{4x+3}{x-1} = 5^2 = 25$ M1

$4x + 3 = 25(x - 1)$ M1

$21x = 28, \quad x = \frac{4}{3}$ A1 **(4)**

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2. $\int_1^3 (x^2 - 2x + k)\ dx = [\frac{1}{3}x^3 - x^2 + kx]_1^3$ M1 A2

$= (9 - 9 + 3k) - (\frac{1}{3} - 1 + k) = 2k + \frac{2}{3}$ M1

$\therefore\ 2k + \frac{2}{3} = 8\frac{2}{3}, \quad k = 4$ M1 A1 **(6)**

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3. *(a)* $= 1 + n(\frac{1}{4}x) + \frac{n(n-1)}{2}(\frac{1}{4}x)^2 + ...$ B1 M1

$= 1 + \frac{1}{4}nx + \frac{1}{32}n(n-1)x^2 + ...$ A1

(b) $\frac{1}{4}n = \frac{1}{32}n(n-1)$ M1

$8n = n(n-1)$

$n[8 - (n-1)] = 0$ M1

$n \neq 0\ \ \therefore n = 9$ A1 **(6)**

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4. $3(1 - \sin^2 x) + \sin^2 x + 5\sin x = 0$ M1

$2\sin^2 x - 5\sin x - 3 = 0$ A1

$(2\sin x + 1)(\sin x - 3) = 0$ M1

$\sin x = 3$ (no solutions) or $-\frac{1}{2}$ A1

$x = 180 + 30, 360 - 30$ B1 M1

$x = 210, 330$ A1 **(7)**

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5. *(a)* $(x + 1)^2 + (y - 6)^2 = (2\sqrt{5})^2$ M1

$(x + 1)^2 + (y - 6)^2 = 20$ A1

(b) sub. $y = 3x - 1$ into eqn of C:

$(x + 1)^2 + [(3x - 1) - 6]^2 = 20$ M1

$(x + 1)^2 + (3x - 7)^2 = 20$ A1

$x^2 - 4x + 3 = 0$

$(x - 1)(x - 3) = 0$ M1

$x = 1, 3$ A1

(c) $x = 1 \Rightarrow y = 2 \quad \therefore (1, 2), \qquad x = 3 \Rightarrow y = 8 \quad \therefore (3, 8)$ B1

$AB = \sqrt{(3-1)^2 + (8-2)^2} = \sqrt{4+36} = \sqrt{40} = \sqrt{4\times10} = 2\sqrt{10}$ M1 A1 **(9)**

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6. *(a)* $\frac{dy}{dx} = 4 - x^{-2}$ M1 A1

for minimum, $4 - x^{-2} = 0$ M1

$x^2 = \frac{1}{4}$

$x > 0\ \ \therefore x = \frac{1}{2} \quad \therefore (\frac{1}{2}, 4)$ A2

(b)

x	1	2	3	4
$4x + x^{-1}$	5	$8\frac{1}{2}$	$12\frac{1}{3}$	$16\frac{1}{4}$

B1

area $\approx \frac{1}{2} \times 1 \times [5 + 16\frac{1}{4} + 2(8\frac{1}{2} + 12\frac{1}{3})]$ B1 M1 A1

$= 31.5$ (3sf) A1 **(10)**

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7. *(a)* $r = \frac{114}{120} = 0.95$ M1

$u_5 = 120 \times (0.95)^4 = 97.74$ M1

$\therefore$ 1 hour 38 minutes A1

(b) $S_8 = \frac{120[1-(0.95)^8]}{1-0.95}$ M1 A1

$= 807.79...$ minutes $\approx$ 13 hours 28 minutes A1

(c) $120 \times (0.95)^{n-1} < 60$ M1

$(n-1)\lg 0.95 < \lg 0.5$ M1

$n > \frac{\lg 0.5}{\lg 0.95} + 1$ A1

$n > 14.51$ $\therefore$ 15 papers A1 **(10)**

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8. *(a)* $BD^2 = 6^2 + 9^2 - (2 \times 6 \times 9 \times \cos 60)$ M1 A1

$BD^2 = 36 + 81 - 54 = 63$

$BD = \sqrt{63} = \sqrt{9 \times 7} = 3\sqrt{7}$ cm M1 A1

(b) $(3\sqrt{7})^2 = 3^2 + 8^2 - (2 \times 3 \times 8 \times \cos C)$ M1

$\cos C = \frac{9+64-63}{48} = \frac{5}{24}$

$\angle BCD = 78.0°$ (1dp) M1 A1

(c) $= (\frac{1}{2} \times 6 \times 9 \times \sin 60) + (\frac{1}{2} \times 3 \times 8 \times \sin 77.975)$ M2

$= 35.1$ cm^2 (3sf) A1 **(10)**

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9. *(a)* $f(1) = 1 - 9 + 24 - 16 = 0$ B1

$\therefore$ $(x-1)$ is a factor of $f(x)$ B1

(b)

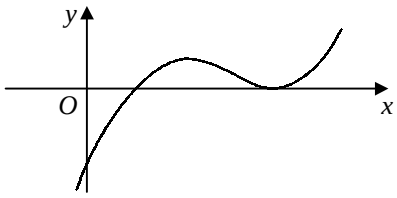
$$\begin{array}{r|l} x-1 & x^2 - 8x + 16 \\ \hline & x^3 - 9x^2 + 24x - 16 \\ & x^3 - x^2 \\ \hline & -8x^2 + 24x \\ & -8x^2 + 8x \\ \hline & 16x - 16 \\ & 16x - 16 \\ \hline \end{array}$$

M1 A1

$f(x) = (x-1)(x^2 - 8x + 16)$

$f(x) = (x-1)(x-4)^2$ [$p = -1$, $q = -4$] M1 A1

(c)



B2

(d) $= \int_1^4 (x^3 - 9x^2 + 24x - 16)\ dx$

$= [\frac{1}{4}x^4 - 3x^3 + 12x^2 - 16x]_1^4$ M1 A2

$= [(64 - 192 + 192 - 64) - (\frac{1}{4} - 3 + 12 - 16)]$ M1

$= 6\frac{3}{4}$ A1 **(13)**

Total **(75)**

Performance Record – C2 Paper B

Question no.	1	2	3	4	5	6	7	8	9	Total
Topic(s)	logs	integr.	binomial	trig. eqn	circle	SP, trapezium rule	GP	cosine rule	factor theorem, area by integr.	
Marks	4	6	6	7	9	10	10	10	13	75
Student										