FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

Core Mathematics C2

Paper H

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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C2 Paper H – Marking Guide

1. *(i)* $f(-2) = -35 \quad \therefore \; -24 - 8 - 2k + 9 = -35$ M1

$k = 6$ A1

(ii) $= f(\frac{2}{3})$ M1

$= 3(\frac{8}{27}) - 2(\frac{4}{9}) + 6(\frac{2}{3}) + 9 = \frac{8}{9} - \frac{8}{9} + 4 + 9 = 13$ A1 **(4)**

2.

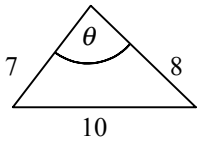
x	1	2	3	4
$4x + x^{-1}$	5	$8\frac{1}{2}$	$12\frac{1}{3}$	$16\frac{1}{4}$

M1

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

$= 31.5$ (3sf) A1 **(4)**

3.



$10^2 = 7^2 + 8^2 - (2 \times 7 \times 8 \times \cos\theta)$ M1

$\cos\theta = \frac{49 + 64 - 100}{112} = \frac{13}{112}$ M1

$\theta = 83.335$ A1

area $= \frac{1}{2} \times 7 \times 8 \times \sin 83.335$ M1

$= 27.8 \text{ cm}^2$ (3sf) A1 **(5)**

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4. $2(1 - \cos^2 x) - 2\cos x - \cos^2 x = 1$ M1

$3\cos^2 x + 2\cos x - 1 = 0$ A1

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

$\cos x = -1$ or $\frac{1}{3}$ A1

$x = 180$ or $70.5, 360 - 70.5$ B2 M1

$x = 70.5°$ (1dp), 180°, 289.5° (1dp) A1 **(8)**

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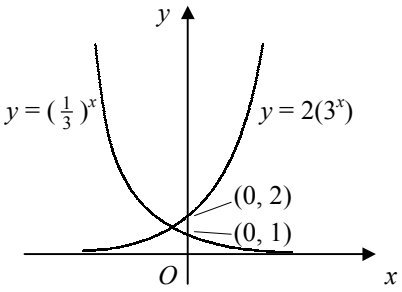
5. *(i)* reflection in the y-axis B1

(ii)



B3

(iii) $(\frac{1}{3})^x = 2(3^x)$

$1 = 2 \times (3^x)^2$ M1

$3^{2x} = \frac{1}{2}, \; 2x = \frac{\lg\frac{1}{2}}{\lg 3}$ M1

$x = \frac{\lg\frac{1}{2}}{2\lg 3} = -0.32$ A1

$3^x = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{1}{2}\sqrt{2}$ M1

$y = 2(3^x) = 2 \times \frac{1}{2}\sqrt{2} = \sqrt{2}$ A1 **(9)**

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6. *(i)* $= [\frac{1}{3}x^3 - \frac{5}{2}x^2 + 4x]_1^4$ M1 A2

$= (\frac{64}{3} - 40 + 16) - (\frac{1}{3} - \frac{5}{2} + 4) = -\frac{9}{2}$ M1 A1

(ii) $= \lim_{k \to -\infty} [-\frac{1}{3}x^{-3}]_k^{-1}$ M2 A1

$= \lim_{k \to -\infty} \{\frac{1}{3} - (-\frac{1}{3k^3})\}$ M1

$= \lim_{k \to -\infty} (\frac{1}{3} + \frac{1}{3k^3}) = \frac{1}{3}$ A1 **(10)**

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7. *(i)* $r = 1.5$

$u_4 = 1 \times (1.5)^3 = 3.375$ mm M1 A1

(ii) $w = 2 \times S_8$; GP, $a = 1$, $r = 1.5$ M1

$= 2 \times \frac{1[(1.5)^8 - 1]}{1.5 - 1}$ M1

$= 98.516 = 98.5$ mm (3sf) A1

(iii) areas form GP, $a = \pi \times 1^2 = \pi$, $r = (1.5)^2 = 2.25$ B2

total area $= \frac{\pi[(2.25)^{10} - 1]}{2.25 - 1} = 8354.8$ mm^2 M1 A1

$= \frac{8354.8}{10^2}$ cm^2 $= 83.5$ cm^2 (3sf) A1 **(10)**

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8. *(i)* $(1 + ax)^n = 1 + n(ax) + \frac{n(n-1)}{2}(ax)^2 + \ldots$ B2

$\therefore\ an = -24$ (1) and $\frac{1}{2}a^2n(n-1) = 270$ (2) M1

(1) $\Rightarrow\ a = \frac{-24}{n}$

sub. (2) $\frac{288}{n}(n - 1) = 270$ M1

$288n - 288 = 270n$ M1

$18n = 288$

$n = \frac{288}{18} = 16,\ a = -\frac{3}{2}$ A2

(ii) $1 - \frac{3}{2}x = 0.9985\ \therefore\ x = 0.001$ B1

$\therefore\ (0.9985)^{16} \approx 1 - 0.024 + 0.000\,270$ M1

$= 0.976\,27$ (5dp) A1 **(10)**

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9. *(i)* $y = \int (4 - 6x - 3x^2)\ dx$

$y = 4x - 3x^2 - x^3 + c$ M1 A2

$(0, 0)\ \therefore\ c = 0$ M1

$y = 4x - 3x^2 - x^3$ A1

(ii) $4x - 3x^2 - x^3 = 0$

$-x(x + 4)(x - 1) = 0$ M1

$x = 0$ (at O), -4, 1

$\therefore\ A\ (-4, 0), B\ (1, 0)$ A1

(iii) $= -\int_{-4}^{0} (4x - 3x^2 - x^3)\ dx + \int_0^1 (4x - 3x^2 - x^3)\ dx$ M1

$= -[2x^2 - x^3 - \frac{1}{4}x^4]_{-4}^{0} + [2x^2 - x^3 - \frac{1}{4}x^4]_0^1$ M1 A1

$= -[(0) - (32 + 64 - 64)] + [(2 - 1 - \frac{1}{4}) - (0)]$ M1

$= 32 + \frac{3}{4} = 32\frac{3}{4}$ A1 **(12)**

Total **(72)**

Performance Record – C2 Paper H

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	remain. theorem	trapezium rule	cosine rule	trig. eqn	logs	integr.	GP	binomial	area by integr.	
Marks	4	4	5	8	9	10	10	10	12	72
Student										