FOR EDEXCEL

GCE Examinations

Advanced Subsidiary

Core Mathematics C2

Paper D

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 D – Marking Guide

1. $= 3^4 + 4(3^3)(-2x) + 6(3^2)(-2x)^2 + 4(3)(-2x)^3 + (-2x)^4$ — M1 A1
$= 81 - 216x + 216x^2 - 96x^3 + 16x^4$ — B1 A1 **(4)**

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2. $(7-x)^2 = x^2 + (x+1)^2 - [2 \times x \times (x+1) \times \cos 60]$ — M1 A1
$49 - 14x + x^2 = x^2 + x^2 + 2x + 1 - x^2 - x$
$15x = 48, \quad x = \frac{16}{5}$ — M1 A1 **(4)**

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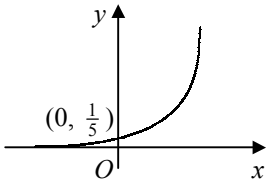
3. $\frac{dy}{dx} = 1 - 8x^{-3}$ — M1 A1
for SP, $1 - 8x^{-3} = 0$ — M1
$x^3 = 8$
$x = 2 \ \therefore (2, 3)$ — M1 A2 **(6)**

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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. *(a)*



B2

(b) *(i)* $5^{x-1} = 10$
$(x-1)\lg 5 = \lg 10 = 1$ — M1
$x = \frac{1}{\lg 5} + 1 = 2.43$ — M1 A1

(ii) $5^{x-1} = 2^x$
$(x-1)\lg 5 = x \lg 2$ — M1
$x(\lg 5 - \lg 2) = \lg 5$ — M1
$x = \frac{\lg 5}{\lg 5 - \lg 2} = 1.76$ — A1 **(8)**

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6. *(a)* $= f(\frac{1}{2}) = \frac{1}{4} + \frac{3}{4} - 3 + 1 = -1$ — M1 A1

(b) *(i)* $= f(-2) = -16 + 12 + 12 + 1 = 9$ — B1

(ii) $x = -2$ is a solution to $f(x) = 9$ i.e. $2x^3 + 3x^2 - 6x - 8 = 0$ — M1 A1

$$\begin{array}{r|l} & 2x^2 - x - 4 \\ \hline x + 2 & 2x^3 + 3x^2 - 6x - 8 \\ & \underline{2x^3 + 4x^2} \\ & \quad -x^2 - 6x \\ & \quad \underline{-x^2 - 2x} \\ & \quad\quad -4x - 8 \\ & \quad\quad \underline{-4x - 8} \end{array}$$

M1 A1

$\therefore (x+2)(2x^2 - x - 4) = 0$
$x = -2$ or $\frac{1 \pm \sqrt{1+32}}{4}$ — M1
$x = -2, -1.19$ (2dp), 1.69 (2dp) — A1 **(9)**

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7. *(a)* $S_n = a + ar + ar^2 + \ldots + ar^{n-1}$ B1

$rS_n = ar + ar^2 + ar^3 + \ldots + ar^n$ M1

subtracting, $S_n - rS_n = a - ar^n$

$(1-r)S_n = a(1-r^n)$ M1

$S_n = \frac{a(1-r^n)}{1-r}$ A1

(b) GP: $a = 10$, $r = 2$ B2

$S_{12} = \frac{10(2^{12}-1)}{2-1}$ M1 A1

$= 40\,950$ A1 **(9)**

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8. *(a)* $\frac{dy}{dx} = 1 - 2x$ M1

grad $= 1 - 2 = -1$ A1

grad of normal $= \frac{-1}{-1} = 1$ M1

$y - 5 = 1(x - 1)$ M1

$y = x + 4$ A1

(b) $5 + x - x^2 = x + 4$

$x^2 - 1 = 0$ M1

$x = 1$ (at P) or -1 $\therefore Q(-1, 3)$ A1

(c) area under curve $= \int_{-1}^{1} (5 + x - x^2)\, dx$

$= [5x + \frac{1}{2}x^2 - \frac{1}{3}x^3]_{-1}^{1}$ M1 A1

$= (5 + \frac{1}{2} - \frac{1}{3}) - (-5 + \frac{1}{2} + \frac{1}{3}) = 9\frac{1}{3}$ M1

area of trapezium $= \frac{1}{2} \times (3 + 5) \times 2 = 8$ B1

shaded area $= 9\frac{1}{3} - 8 = \frac{4}{3}$ M1 A1 **(13)**

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9. *(a)* $(x-4)^2 - 16 + (y-5)^2 - 25 + 16 = 0$ M1

$(x-4)^2 + (y-5)^2 = 25$

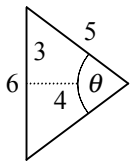
$\therefore$ centre $(4, 5)$, radius $= 5$ A2

(b) $x = 0$ $\therefore$ $y^2 - 10y + 16 = 0$ M1

$(y-2)(y-8) = 0$ M1

$y = 2, 8$ $\therefore (0, 2), (0, 8)$ A1

(c)



$6^2 = 5^2 + 5^2 - (2 \times 5 \times 5 \times \cos\theta)$ M2 A1

$\cos\theta = \frac{25+25-36}{50} = \frac{7}{25}$ A1

(d) $\theta = \cos^{-1}\frac{7}{25} = 1.287$, $\sin\theta = 0.96$

area $= \frac{1}{2} \times 5^2 \times \theta - \frac{1}{2} \times 5^2 \times \sin\theta = \frac{25}{2}(1.287 - 0.96)$ M2 A1

$= 4.09$ (3sf) A1 **(14)**

Total **(75)**

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Performance Record – C2 Paper D

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	binomial	cosine rule	SP	trig. eqn	exponential graph, logs	remain. theorem, alg. div.	GP	area by integr.	circle, sector of a circle	
Marks	4	4	6	8	8	9	9	13	14	75
Student										

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