FOR OCR

GCE Examinations

Advanced / Advanced Subsidiary

Core Mathematics C2

Paper F

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

C2 Paper F – Marking Guide

1. GP: $a = 10, r = 2$ — B2

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

$= 40\,950$ — A1 **(4)**

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2. *(i)* $\angle BAC = 180 - (107 + 31) = 42$ — B1

$\frac{BC}{\sin 42} = \frac{12.6}{\sin 31}$ — M1

$BC = \frac{12.6 \sin 42}{\sin 31} = 16.4$ cm (3sf) — A1

(ii) $= \frac{1}{2} \times 12.6 \times 16.37 \times \sin 107 = 98.6$ cm^2 (3sf) — M1 A1 **(5)**

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3. $f(x) = \int (4x^{\frac{1}{3}} - 5)\ dx$

$f(x) = 3x^{\frac{4}{3}} - 5x + c$ — M1 A2

$(8, 7)\ \therefore\ 7 = 3(\sqrt[3]{8})^4 - 40 + c$ — M1

$7 = 48 - 40 + c$

$c = -1$ — A1

$f(x) = 3x^{\frac{4}{3}} - 5x - 1$ — A1 **(6)**

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4. $1 - \cos^2\theta = 4\cos\theta$ — M1

$\cos^2\theta + 4\cos\theta - 1 = 0$ — A1

$\cos\theta = \frac{-4 \pm \sqrt{16+4}}{2}$ — M1

$\cos\theta = -2 - \sqrt{5}$ (no solutions) or $-2 + \sqrt{5}$ — A1

$\theta = 76.3, 360 - 76.3$ — B1 M1

$\theta = 76.3°, 283.7°$ (1dp) — A1 **(7)**

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5. *(i)* $= 3 - \log_8 8^{\frac{2}{3}}$ — B1 M1 A1

$= 3 - \frac{2}{3} = \frac{7}{3}$ — A1

(ii) $(2^2)^x - 3(2 \times 2^x) = 0$ — M1

$(2^x)^2 - 6(2^x) = 0$

$2^x(2^x - 6) = 0$ — M1

$2^x = 0$ (no solutions) or 6 — A1

$x = \frac{\lg 6}{\lg 2} = 2.58$ (3sf) — M1 A1 **(9)**

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6. *(a)* $= 1 + 4x + 6x^2 + 4x^3 + x^4$ — M1 A1

(b) *(i)* $= 1 + 4(\sqrt{2}) + 6(\sqrt{2})^2 + 4(\sqrt{2})^3 + (\sqrt{2})^4$ — M1

$= 1 + 4\sqrt{2} + 6(2) + 4(2\sqrt{2}) + 4$ — M1

$= 17 + 12\sqrt{2}$ — A1

(ii) $(1 - \sqrt{2})^4 = 17 - 12\sqrt{2}$ — B1

$(1 - \sqrt{2})^8 = [(1 - \sqrt{2})^4]^2 = (17 - 12\sqrt{2})^2$ — M1

$= 289 - 408\sqrt{2} + 288$ — M1

$= 577 - 408\sqrt{2}$ — A1 **(9)**

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7. *(i)* $a + d = 26$
$a + 4d = 41$ M1
subtracting, $3d = 15$ M1
$d = 5$ A1

(ii) $a = 21$ B1
$u_{12} = 21 + (11 \times 5) = 76$ M1 A1

(iii) $\frac{n}{2}[42 + 5(n-1)] = \frac{n}{2}[-24 + 7(n-1)]$ M1 A1
$n(5n + 37) = n(7n - 31)$
$2n(n - 34) = 0$ M1
$n > 0 \ \therefore n = 34$ A1 **(10)**

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8. *(i)* $p(-2) = 20 \ \therefore -16 + 4 - 2a + b = 20$ M1
$b = 2a + 32$ A1

(ii) $p(\frac{1}{2}) = 0 \quad \therefore \ \frac{1}{4} + \frac{1}{4} + \frac{1}{2}a + b = 0$ M1
sub. $\frac{1}{2} + \frac{1}{2}a + (2a + 32) = 0$ M1
$a = -13, b = 6$ A2

(iii)

$$\begin{array}{r} x^2 + x - 6 \\ 2x - 1 \overline{)\ 2x^3 + x^2 - 13x + 6} \\ \underline{2x^3 - x^2} \\ 2x^2 - 13x \\ \underline{2x^2 - x} \\ -12x + 6 \\ \underline{-12x + 6} \end{array}$$

M1 A1

$p(x) = (2x - 1)(x^2 + x - 6)$
$p(x) = (2x - 1)(x + 3)(x - 2)$ M1 A1 **(10)**

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9. *(i)* $\frac{dy}{dx} = 1 - 2x$ M1
grad $= 1 - 2 = -1$ A1
grad of normal $= \frac{-1}{-1} = 1$ M1
$y - 5 = 1(x - 1)$ M1
$y = x + 4$ A1

(ii) $5 + x - x^2 = x + 4$
$x^2 - 1 = 0$ M1
$x = 1$ (at P) or $-1 \ \therefore Q(-1, 3)$ A1

(iii) area $= \int_{-1}^{1} [(5 + x - x^2) - (x + 4)] \, dx$ M1
$= \int_{-1}^{1} (1 - x^2) \, dx$
$= [x - \frac{1}{3}x^3]_{-1}^{1}$ M1 A1
$= (1 - \frac{1}{3}) - (-1 + \frac{1}{3}) = \frac{4}{3}$ M1 A1 **(12)**

Total **(72)**

Performance Record – C2 Paper F

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