

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C2

Sample Paper from Solomon Press

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 Sample Paper – Marking Guide

1. (i) $u_2 = 8 + 3k$, $u_3 = 8 + k(8 + 3k) = 3k^2 + 8k + 8$ B1 M1
 $\therefore 3k^2 + 8k + 8 = 11$ A1
 $3k^2 + 8k - 3 = 0$ M1
 $(3k - 1)(k + 3) = 0$ A1
 $k = -3, \frac{1}{3}$
- (ii) $k = -3$ B1
 $\therefore u_4 = 8 - 3(11) = -25$ (6)
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2. (i) $y = 4x^{\frac{3}{2}} - \frac{1}{2}x^2 + c$ M1 A1
- (ii) $y = 4x^{\frac{3}{2}} - \frac{1}{2}x^2 + c$
 $(1, 6\frac{1}{2}) \Rightarrow 6\frac{1}{2} = 4 - \frac{1}{2} + c$ M1
 $c = 3$ A1
 $y = 4x^{\frac{3}{2}} - \frac{1}{2}x^2 + 3$
when $x = 4$, $y = 4(8) - \frac{1}{2}(16) + 3 = 32 - 8 + 3 = 27$ M1
 $\therefore (4, 27)$ lies on $y = f(x)$ A1 (6)
-
3. (i) $AM = MD = l$, $\angle AMB = \angle CMD = \frac{\pi}{3}$ B1
perim. $= l + 2l + 2(l \times \frac{\pi}{3}) = 3l + \frac{2}{3}l\pi = \frac{1}{3}l(9 + 2\pi)$ M1 A1
- (ii) area $= 2(\frac{1}{2} \times l^2 \times \frac{\pi}{3}) + \frac{1}{2} \times l^2 \times \sin \frac{\pi}{3}$ M2
 $= \frac{1}{3}l^2\pi + \frac{1}{2}l^2 \times \frac{\sqrt{3}}{2}$ B1
 $= \frac{1}{3}l^2\pi + \frac{1}{4}l^2\sqrt{3}$
 $= \frac{1}{12}l^2(4\pi + 3\sqrt{3})$ A1 (7)
-
4. $5 \sin^2 x + \sin x - (1 - \sin^2 x) = 0$ M1
 $6 \sin^2 x + \sin x - 1 = 0$
 $(3 \sin x - 1)(2 \sin x + 1) = 0$ M1
 $\sin x = -\frac{1}{2}$ or $\frac{1}{3}$ A1
 $x = 180 + 30, 360 - 30$ or $19.5, 180 - 19.5$ B1 M1
 $x = 19.5^\circ, 160.5^\circ, 210^\circ, 330^\circ$ A2 (7)
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5. (i)

x	0	$\frac{\pi}{8}$	$\frac{\pi}{4}$	$\frac{3\pi}{8}$	$\frac{\pi}{2}$
y	0	0.363	0.555	0.451	0

B2
- (ii) area $\approx \frac{1}{2} \times \frac{\pi}{8} \times [0 + 0 + 2(0.363 + 0.555 + 0.451)]$ B1 M1 A1
 $= 0.538$ (3sf) A1
- (iii) under-estimate, the curve is above the top edge of each trapezium B2 (8)
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6.	(a)	(i) $= \log_3 27 + \log_3 x = 3 + y$	M1 A1
		(ii) $y = \log_3 x \Rightarrow x = 3^y = (9^{\frac{1}{2}})^y = 9^{\frac{1}{2}y}$ $\therefore \log_9 x = \frac{1}{2}y$	M1 A1 A1
	(b)	$3 + y + \frac{1}{2}y = 0$	M1
		$y = \log_3 x = -2$	A1
		$x = 3^{-2} = \frac{1}{9}$	A1 (8)

7.	(i)	$f(2) = -9 \therefore 16 - 20 + 2a + b = -9$	M1 A1
		$2a + b + 5 = 0$ (1)	
		$f(3) = 0 \therefore 54 - 45 + 3a + b = 0$	A1
		$3a + b + 9 = 0$ (2)	
		(2) - (1) $a + 4 = 0$	M1
		$\therefore a = -4, b = 3$	A1
	(ii)	$\begin{array}{r} 2x^2 + x - 1 \\ x-3 \overline{) 2x^3 - 5x^2 - 4x + 3} \\ \underline{2x^3 - 6x^2} \\ x^2 - 4x \\ \underline{x^2 - 3x} \\ -x + 3 \\ \underline{-x + 3} \\ 0 \end{array}$	M1 A1
		$\therefore (x-3)(2x^2 + x - 1) = 0$	M1
		$(x-3)(2x-1)(x+1) = 0$	M1
		$x = -1, \frac{1}{2}, 3$	A1 (10)

8.	(i)	$= 20 + (7 \times 4) = 48$	M1 A1
	(ii)	AP, $a = 20, d = 4$	
		$S_{12} = \frac{12}{2} [40 + (11 \times 4)] = 504$	M1 A1
	(iii)	after n months, membership $= 400 + S_n - 8n$	M1
		$\therefore 400 + \frac{n}{2} [40 + 4(n-1)] - 8n = 1000$	M1 A1
		$n^2 + 5n - 300 = 0$	A1
		$(n+20)(n-15) = 0$	M1
		$n > 0 \therefore n = 15 \therefore 15$ months	A1 (10)

9.	(i)	$x^{\frac{3}{2}} - 2x + 2 = 2$	
		$x(x^{\frac{1}{2}} - 2) = 0$	M1
		$x = 0$ or $x^{\frac{1}{2}} = 2$	M1
		$x = 0, 4 \therefore (0, 2)$ and $(4, 2)$	A2
	(ii)	area $= \int_0^4 [2 - (x^{\frac{3}{2}} - 2x + 2)] dx$	M1
		$= \int_0^4 (2x - x^{\frac{3}{2}}) dx$	A1
		$= [x^2 - \frac{2}{5}x^{\frac{5}{2}}]_0^4$	M1 A1
		$= (16 - \frac{64}{5}) - (0) = \frac{16}{5} = 3\frac{1}{5}$	M1 A1 (10)

Total (72)

