FOR EDEXCEL

GCE Examinations
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 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.

Written by Shaun Armstrong

C2 Sample Paper – Marking Guide

1.	*(a)*	$(1 + ax)^5 = 1 + 5 \times (ax) + \ldots$		
		$\therefore\ 5a = -15$	M1	
		$a = -3$	A1	
	(b)	$(1 - 3x)^5 = \ldots + \binom{5}{2} \times (-3x)^2 + \ldots$	M1	
		$\therefore$ coeff. of $x^2 = 10 \times 9 = 90$	A1	**(4)**

2.	*(a)*	$AM = MD = l,\ \angle AMB = \angle CMD = \frac{\pi}{3}$	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	
	(b)	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)**

3.	*(a)*	$f(2) = -9$	M1	
		$\therefore\ 16 - 20 + 2k + 3 = -9$		
		$k = -4$	A1	
	(b)	$$\begin{array}{r|rrrr} & 2x^2 & +\ x & -\ 1 & \\ \hline x-3 & 2x^3 & -\ 5x^2 & -\ 4x & +\ 3 \\ & 2x^3 & -\ 6x^2 & & \\ \hline & & x^2 & -\ 4x & \\ & & x^2 & -\ 3x & \\ \hline & & & -\ x & +\ 3 \\ & & & -\ x & +\ 3 \\ \hline \end{array}$$	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	**(7)**

4.	*(a)*	*(i)* $= \log_3 27 + \log_3 x = 3 + y$	M1 A1	
		(ii) $= \dfrac{\log_3 x}{\log_3 9} = \dfrac{\log_3 x}{2} = \frac{1}{2}y$	M1 A1	
	(b)	$3 + y + \frac{1}{2}y = 0$	M1	
		$y = \log_3 x = -2$	A1	
		$x = 3^{-2} = \frac{1}{9}$	A1	**(7)**

5.		$5\sin^2 x + \sin x - (1 - \sin^2 x) = 0$	M1	
		$6\sin^2 x + \sin x - 1 = 0$	A1	
		$(3\sin x - 1)(2\sin x + 1) = 0$	M1	
		$\sin x = -\frac{1}{2}$ or $\frac{1}{3}$	A1	
		$x = 180 + 30,\ 360 - 30$ or $19.5,\ 180 - 19.5$	B1 M1	
		$x = 19.5°,\ 160.5°,\ 210°,\ 330°$	A2	**(8)**

6. *(a)*

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

(b) 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

(c) under-estimate, the curve is above the top edge of each trapezium B2 **(8)**

---

7. *(a)* $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{3}{2}x^{\frac{1}{2}} - 2$ M1 A1

for minimum, $\frac{3}{2}x^{\frac{1}{2}} - 2 = 0$ M1

$\sqrt{x} = \frac{4}{3}$, $x = \frac{16}{9}$ A1

$y = (\frac{4}{3})^3 - 2(\frac{16}{9}) + 2 = \frac{22}{27}$ $\therefore (\frac{16}{9}, \frac{22}{27})$ A1

(b) area $= \int_1^4 (x^{\frac{3}{2}} - 2x + 2)\ \mathrm{d}x$

$= [\frac{2}{5}x^{\frac{5}{2}} - x^2 + 2x]_1^4$ M1 A2

$= (\frac{64}{5} - 16 + 8) - (\frac{2}{5} - 1 + 2) = \frac{24}{5} - \frac{7}{5} = \frac{17}{5} = 3\frac{2}{5}$ M1 A1 **(10)**

---

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

$rS_n = ar + ar^2 + ar^3 + \ldots + ar^{n-1} + ar^n$ M1

subtracting, $S_n - rS_n = a - ar^n$ M1

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

(b) $S_\infty = \frac{p}{1-r} = 4p$ M1

$1 - r = \frac{1}{4}$, $r = \frac{3}{4}$ M1 A1

(c) GP, $a = p$, $r = \frac{3}{4}$

$S_{10} = \frac{p[1-(\frac{3}{4})^{10}]}{1-\frac{3}{4}} = 4p[1 - (\frac{3}{4})^{10}] = [1 - (\frac{3}{4})^{10}] \times S_\infty$ M1 A1

$\therefore$ S_{10} as % of $S_\infty = [1 - (\frac{3}{4})^{10}] \times 100\% = 94.4\%$ (3sf) M1 A1 **(11)**

---

9. *(a)* grad $PQ = \frac{7-3}{4-(-8)} = \frac{1}{3}$, grad $QR = \frac{1-7}{6-4} = -3$ M1

grad $PQ \times$ grad $QR = \frac{1}{3} \times (-3) = -1$ M1

$\therefore$ PQ perp. to QR, $\therefore \angle PQR = 90°$ A1

(b) $\angle PQR = 90°$ $\therefore$ PR is a diameter M1

$\therefore$ centre = mid-point of $PR = (\frac{-8+6}{2}, \frac{3+1}{2}) = (-1, 2)$ M1 A1

(c) radius = dist. $(-8, 3)$ to $(-1, 2) = \sqrt{49+1} = \sqrt{50}$ B1

$(x + 1)^2 + (y - 2)^2 = (\sqrt{50})^2$ M1

$x^2 + 2x + 1 + y^2 - 4y + 4 = 50$

$x^2 + y^2 + 2x - 4y - 45 = 0$ A1

(d) grad of radius $= \frac{7-2}{4-(-1)} = 1$ M1

$\therefore$ grad of tangent $= \frac{-1}{1} = -1$ A1

$\therefore$ $y - 7 = -1(x - 4)$ M1

$y = 11 - x$ A1 **(13)**

Total **(75)**

Performance Record – C2 Sample Paper

Question no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	Total
Topic(s)	binomial	sector of a circle	remain. theorem, alg. div.	logs	trig. eqn	trapezium rule	SP, area by integr.	GP	circle	
Marks	4	7	7	7	8	8	10	11	13	75
Student										