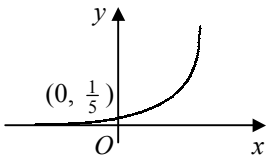


C2 Paper B – Marking Guide

1. (i) $u_4 = \frac{5+1}{3} = 2$ B1
 (ii) $5 = \frac{u_2+1}{3}$, $u_2 = 14$ M1 A1
 $14 = \frac{u_1+1}{3}$, $u_1 = 41$ A1 (4)
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2. $= \int_1^9 (\sqrt{x} + \frac{8}{x^2}) dx = [\frac{2}{3}x^{\frac{3}{2}} - 8x^{-1}]_1^9$ M1 A2
 $= (18 - \frac{8}{9}) - (\frac{2}{3} - 8) = 24\frac{4}{9}$ M1 A1 (5)
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3. (i) $3(1 - \sin^2 x) + \sin^2 x + 5 \sin x = 0$ M1
 $2 \sin^2 x - 5 \sin x - 3 = 0$ A1
 (ii) $(2 \sin x + 1)(\sin x - 3) = 0$ M1
 $\sin x = 3$ (no solutions) or $-\frac{1}{2}$ A1
 $x = 180 + 30, 360 - 30$ B1 M1
 $x = 210, 330$ A1 (7)
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4. (a)  B2
 (b) (i) $5^{x-1} = 10$ M1
 $(x-1) \lg 5 = \lg 10 = 1$ M1 A1
 $x = \frac{1}{\lg 5} + 1 = 2.43$ (3sf)
 (ii) $5^{x-1} = 2^x$ M1
 $(x-1) \lg 5 = x \lg 2$ M1
 $x(\lg 5 - \lg 2) = \lg 5$
 $x = \frac{\lg 5}{\lg 5 - \lg 2} = 1.76$ (3sf) A1 (8)
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5. (i) $a = 20 \times 7 = 140$, $d = 2 \times 7 = 14$ B1
 $u_5 = 140 + (4 \times 14) = 196$ M1 A1
 (ii) $S_8 = \frac{8}{2} [280 + (7 \times 14)] = 4 \times 378 = 1512$ M1 A1
 (iii) $140 + 14(n-1) > 300$ M1
 $n > \frac{160}{14} + 1$ M1
 $n > 12\frac{3}{7} \therefore n = 13$ A1 (8)
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6. (i) $\frac{1}{2}\sqrt{3}$ B1
 (ii)

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	
$\cos^2 x$	1	$\frac{3}{4}$	$\frac{1}{4}$	M1

 $\text{area} \approx \frac{1}{2} \times \frac{\pi}{6} \times [1 + \frac{1}{4} + 2(\frac{3}{4})]$ B1 M1
 $= 0.720$ (3sf) A1
 (iii) $\text{area of } S = \int_0^{\frac{\pi}{3}} \sin^2 x dx = \int_0^{\frac{\pi}{3}} (1 - \cos^2 x) dx$ M1
 $= \frac{\pi}{3} - 0.71995 = 0.327$ (3sf) M1 A1 (8)
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7.	(i) $BD^2 = 6^2 + 9^2 - (2 \times 6 \times 9 \times \cos 60)$ $BD^2 = 36 + 81 - 54 = 63$ $BD = \sqrt{63} = \sqrt{9 \times 7} = 3\sqrt{7}$ cm	M1 M1 A1	
	(ii) $(3\sqrt{7})^2 = 3^2 + 8^2 - (2 \times 3 \times 8 \times \cos C)$ $\cos C = \frac{9+64-63}{48} = \frac{5}{24}$ $\angle BCD = 78.0^\circ$ (1dp)	M1 M1 A1	
	(iii) $= (\frac{1}{2} \times 6 \times 9 \times \sin 60) + (\frac{1}{2} \times 3 \times 8 \times \sin 77.975)$ $= 35.1$ cm ² (3sf)	M2 A1	(9)
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8.	(i) $p(1) = 1^4 - (1-2)^4 = 1 - 1 = 0 \therefore (x-1)$ is a factor	M1 A1	
	(ii) $p(x) = x^4 - [x^4 + 4x^3(-2) + 6x^2(-2)^2 + 4x(-2)^3 + (-2)^4]$ $= x^4 - [x^4 - 8x^3 + 24x^2 - 32x + 16]$ $= 8x^3 - 24x^2 + 32x - 16$	M1 A1 M1 A1	
	(iii) $\begin{array}{r} 8x^2 - 32x + 64 \\ x+1 \overline{) 8x^3 - 24x^2 + 32x - 16} \\ \underline{8x^3 + 8x^2} \\ -32x^2 + 32x \\ \underline{-32x^2 - 32x} \\ 64x - 16 \\ \underline{64x + 64} \\ -80 \end{array}$	M2	
	quotient = $8x^2 - 32x + 64$ remainder = -80	A1 A1	(10)
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9.	(i) 2	B1	
	(ii) $1 + \frac{2}{\sqrt{x}} = 2$ $\sqrt{x} = 2$ $x = 4$	M1 M1 A1	
	(iii) $x = 4 \therefore y = 2(4) - 1 = 7$ $y = \int (1 + \frac{2}{\sqrt{x}}) dx$ $y = x + 4x^{\frac{1}{2}} + c$ $(4, 7) \therefore 7 = 4 + 8 + c$ $c = -5$ $y = x + 4x^{\frac{1}{2}} - 5$	B1 M1 A2 M1 A1	
	(iv) $x + 4x^{\frac{1}{2}} - 5 = 0$ $(x^{\frac{1}{2}} + 5)(x^{\frac{1}{2}} - 1) = 0$ $x^{\frac{1}{2}} = -5$ (no real solutions), 1 $x = 1 \therefore (1, 0)$ and no other point	M1 A1 A1	(13)
			Total (72)