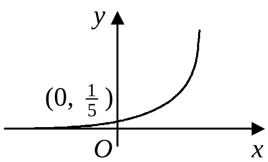
C2 Paper B – Marking Guide

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)**
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)**
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)**
4.	*(a)*		B2	
	(b) *(i)*	$5^{x-1} = 10$		
		$(x - 1) \lg 5 = \lg 10 = 1$	M1	
		$x = \frac{1}{\lg 5} + 1 = 2.43$ (3sf)	M1 A1	
	(ii)	$5^{x-1} = 2^x$		
		$(x - 1) \lg 5 = x \lg 2$	M1	
		$x(\lg 5 - \lg 2) = \lg 5$	M1	
		$x = \frac{\lg 5}{\lg 5 - \lg 2} = 1.76$ (3sf)	A1	**(8)**
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)**
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	
		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)	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)**

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