

C2 Paper K – Marking Guide

1.	$\log_5 \frac{4x+3}{x-1} = 2$ $\frac{4x+3}{x-1} = 5^2 = 25$ $4x + 3 = 25(x - 1)$ $21x = 28$ $x = \frac{4}{3}$	M1 M1 M1 A1	(4)
2.	$(1 - x)^6 = 1 + 6(-x) + \binom{6}{2}(-x)^2 + \dots = 1 - 6x + 15x^2$ $(1 + x)(1 - x)^6 = (1 + x)(1 - 6x + 15x^2 + \dots)$ coeff. of $x^2 = 15 - 6 = 9$	M1 A2 M1 A1	(5)
3.	(i) AP: $a = 77, l = -70$ $S_{50} = \frac{50}{2} [77 + (-70)] = 25 \times 7 = 175$ (ii) AP: $a = 2, d = \frac{1}{2}$ $S_n = \frac{n}{2} [4 + \frac{1}{2}(n - 1)]$ $= \frac{1}{4} n[8 + (n - 1)] = \frac{1}{4} n(n + 7) \quad [k = \frac{1}{4}]$	B1 M1 A1 B2 M1 A1	(7)
4.	(i) $\cos^2 P = 1 - (\frac{2}{3})^2 = \frac{5}{9}$ acute $\therefore \cos \angle QPR = \sqrt{\frac{5}{9}} = \frac{1}{3}\sqrt{5}$ (ii) $QR^2 = 7^2 + (3\sqrt{5})^2 - (2 \times 7 \times 3\sqrt{5} \times \frac{1}{3}\sqrt{5})$ $QR^2 = 49 + 45 - 70 = 24$ $QR = \sqrt{24} = \sqrt{4 \times 6} = 2\sqrt{6}$ (iii) $\frac{\sin Q}{3\sqrt{5}} = \frac{\frac{2}{3}}{2\sqrt{6}}$ $\sin Q = \frac{\sqrt{5}}{\sqrt{6}}$ $\angle PQR = 65.9^\circ$ (1dp)	M1 A1 M1 M1 A1 M1 A1	(7)
5.	(i) $= 4x^2 + x^{-2} + c$ (ii) $(1, 1) \therefore 1 = 4 + 1 + c$ $c = -4$ $y = 4x^2 + x^{-2} - 4$ $y = (2x - \frac{1}{x})^2 \quad [a = 2, b = -1]$	M1 A2 M1 A1 M1 A1	(7)

6.	(i) $-27 + 63 - 3p - 6 = 0$ $p = 10$	M1 A1	
	(ii) remainder = $f(2) = 8 + 28 + 20 - 6 = 50$	M1 A1	
	(iii) $x = -3$ is a solution $\therefore (x + 3)$ is a factor	B1	
	$\begin{array}{r} x^2 + 4x - 2 \\ x + 3 \overline{) x^3 + 7x^2 + 10x - 6} \\ \underline{x^3 + 3x^2} \\ 4x^2 + 10x \\ \underline{4x^2 + 12x} \\ - 2x - 6 \\ \underline{- 2x - 6} \\ 0 \end{array}$	M1 A1	
	$\therefore (x + 3)(x^2 + 4x - 2) = 0$ $x = -3$ or $x^2 + 4x - 2 = 0$ other solutions: $x = \frac{-4 \pm \sqrt{16 + 8}}{2} = -4.45, 0.45$	M1 A1	(9)
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7.	(i) $r = \frac{\log_3 16}{\log_3 4} = \frac{\log_3 4^2}{\log_3 4} = \frac{2 \log_3 4}{\log_3 4} = 2$	M2 A1	
	(ii) $ar = \log_3 4$ $a = \frac{\log_3 4}{2} = \frac{\log_3 2^2}{2} = \frac{2 \log_3 2}{2} = \log_3 2$	M1 A1	
	(iii) $S_6 = \frac{(2^6 - 1) \log_3 2}{2 - 1} = 63 \log_3 2$ let $y = \log_3 2 \therefore 3^y = 2$ $y = \frac{\lg 2}{\lg 3}$ $\therefore S_6 = 63 \times \frac{\lg 2}{\lg 3} = 39.7$ (3sf)	M1 A1 M1 A1 A1	(10)
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8.	(i) $2x = 1.2490, \pi + 1.2490 = 1.2490, 4.3906$ $x = 0.62, 2.20$ (2dp)	B1 M1 M1 A1	
	(ii) $2 \sin y \cos y = \sin y$ $\sin y (2 \cos y - 1) = 0$ $\sin y = 0$ or $\cos y = \frac{1}{2}$ $y = 0, \pi$ or $\frac{\pi}{3}, 2\pi - \frac{\pi}{3}$ $y = 0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$	M1 M1 A1 B2 M1 A1	(11)
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9.	(i) $x = 4 \therefore y = 12 - 8 + 2 = 6$ $\frac{dy}{dx} = 3 - 2x^{-\frac{1}{2}}$ grad = $3 - 1 = 2$ $\therefore y - 6 = 2(x - 4)$ $y - 6 = 2x - 8$ $y = 2x - 2$	B1 M1 A1 M1 M1 A1	
	(ii) area = $\int_0^4 [(3x - 4\sqrt{x} + 2) - (2x - 2)] dx$ $= \int_0^4 (x - 4\sqrt{x} + 4) dx$ $= [\frac{1}{2}x^2 - \frac{8}{3}x^{\frac{3}{2}} + 4x]_0^4$ $= (8 - \frac{64}{3} + 16) - (0) = \frac{8}{3}$	M1 M1 A2 M1 A1	(12)
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	Total		(72)