Question	Answer	Marks	Guidance
1(i)	State or imply non-modular equation $(9x-2)^2 = (3x+2)^2$ or pair of linear equations	**B1**	
	Attempt solution of quadratic equation or of 2 linear equations	**M1**	
	Obtain 0 and $\frac{2}{3}$	**A1**	SC: B1 for one correct solution
		3	
1(ii)	Apply logarithms and use power law for $3^y = k$ where $k > 0$	**M1**	Must be using their answers to part **(i)**
	Obtain -0.369	**A1**	
		2	

Question	Answer	Marks	Guidance
2	Integrate to obtain form $k\ln(2x+1)$	**M1**	
	Obtain correct $3\ln(2x+1)$	**A1**	
	Use subtraction law of logarithms correctly	**M1**	Dependent on first M1
	Use power law of logarithms correctly	**M1**	Dependent on first M1
	Confirm $\ln 125$	**A1**	
		5	

Question	Answer	Marks	Guidance
3	State $\frac{1}{\cos^2\theta}=\frac{3}{\sin\theta}$ or $1+\tan^2\theta=\frac{3}{\sin\theta}$	**B1**	
	Produce quadratic equation in $\sin\theta$	**M1**	Dependent on B1
	Solve 3-term quadratic equation to find value between –1 and 1 for $\sin\theta$	**M1**	Dependent on first M1
	Obtain $\sin\theta=\frac{1}{6}(-1+\sqrt{37})$ and hence 57.9	**A1**	
	Obtain 122.1 and no others between 0 and 180	**A1**	
		5	

Question	Answer	Marks	Guidance
4(i)	Substitute –2 and simplify	**M1**	
	Obtain $16-16+8+24-32$ and hence zero and conclude	**A1**	AG; necessary detail needed
		2	
4(ii)	Attempt division by $x+2$ to reach at least partial quotient x^3+kx or use of identity or inspection	**M1**	
	Obtain $x^3+2x-16$	**A1**	
	Equate to zero and obtain $x=\sqrt[3]{16-2x}$	**A1**	
		3	

Question	Answer	Marks	Guidance
4(iii)	Use iteration process correctly at least once	**M1**	
	Obtain final answer 2.256	**A1**	
	Show sufficient iterations to 6 sf to justify answer or show a sign change in the interval $(2.2555, 2.2565)$	**A1**	
		3	

Question	Answer	Marks	Guidance
5(i)	Use product rule to differentiate y obtaining $k_1e^{2t} + k_2te^{2t}$	**M1**	
	Obtain correct $3e^{2t} + 6te^{2t}$	**A1**	
	State derivative of x is $1+\frac{1}{t+1}$	**B1**	
	Use $\frac{dy}{dx} = \frac{dy}{dt} / \frac{dx}{dt}$ with $t = 0$ to find gradient	**M1**	
	Obtain $y = \frac{3}{2}x$ or equivalent	**A1**	
		5	

Question	Answer	Marks	Guidance
5(ii)	Equate $\frac{dy}{dx}$ or $\frac{dy}{dt}$ to zero and solve for t	M1	Allow full marks if correct solution is obtained but $\frac{dx}{dt}$ is incorrect
	Obtain $t = -\frac{1}{2}$	A1	
	Obtain $x = -1.19$	A1	
	Obtain $y = -0.55$	A1	
		4	

Question	Answer	Marks	Guidance
6(i)	Use y values 2, $\sqrt{2.5}$, 1 or equivalents	B1	
	Use correct formula, or equivalent, with $h = \frac{1}{2}\pi$ and three y values	M1	
	Obtain $\frac{1}{2} \times \frac{1}{2}\pi(2 + 2\sqrt{2.5} + 1)$ or equivalent and hence 4.84	A1	
		3	

Question	Answer	Marks	Guidance
6(ii)	State or imply volume is $\int \pi(1+3\cos^2 \frac{1}{2}x)\,dx$	**B1**	Allow if π appears later; condone omission of dx
	Use appropriate identity to express integrand in form $k_1 + k_2 \cos x$	**M1**	
	Obtain $\int \pi(\frac{5}{2}+\frac{3}{2}\cos x)\,dx$ or $\int (\frac{5}{2}+\frac{3}{2}\cos x)\,dx$	**A1**	Condone omission of dx
	Integrate to obtain $\pi(\frac{5}{2}x+\frac{3}{2}\sin x)$ or $\frac{5}{2}x+\frac{3}{2}\sin x$	**A1**	
	Obtain $\frac{5}{2}\pi^2$ with no errors seen	**A1**	
		5	

Question	Answer	Marks	Guidance
7(i)	State expression of form $k_1 \cos 2x + k_2 \sin 2x$	**M1**	
	State correct $2\cos 2x - 6\sin 2x$	**A1**	
		2	

Question	Answer	Marks	Guidance
7(ii)	State $R = \sqrt{40}$ or 6.324…	**B1 FT**	Following their derivative
	Use appropriate trigonometry to find α	**M1**	
	Obtain 1.249…	**A1**	Allow α in degrees at this point
	Equate their $R\cos(2x+\alpha)$ to 3 and find $\cos^{-1}(3 \div R)$	***M1**	
	Carry out correct process to find one value of α	**M1**	Dependent on *M1, allow for -0.086….
	Obtain 1.979	**A1**	
	Carry out correct process to find second value of α within the range	**M1**	Dependent on *M1
	Obtain 3.055	**A1**	Allow 3.056
		8	