Question	Answer	Marks
1	Apply logarithms to both sides and apply power law at least once	**M1**
	Rearrange to the form $y = \frac{3\ln 9}{\ln 2}x$ OE	**A1**
	Obtain $k = 9.51$	**A1**
		3

Question	Answer	Marks
2	Differentiate using product rule to obtain $ae^{\frac{1}{2}x} + bxe^{\frac{1}{2}x}$	***M1**
	Obtain correct $5e^{\frac{1}{2}x} + \frac{5}{2}xe^{\frac{1}{2}x}$ OE	**A1**
	Equate first derivative to zero and solve for x	**DM1**
	Obtain x-coordinate –2	**A1**
	Obtain y-coordinate $-10e^{-1}$	**A1**
		5

Question	Answer	Marks
3	Differentiate $\cos 3x$ to obtain $-3\sin 3x$	**B1**
	Differentiate $5\sin y$ to obtain $5\cos y \frac{\mathrm{d}y}{\mathrm{d}x}$	**B1**
	Obtain $-3\sin 3x + 5\cos y \frac{\mathrm{d}y}{\mathrm{d}x} = 0$ OE	**B1**
	Substitute x and y values to find value of first derivative	**M1**
	Obtain $\frac{3}{5}$	**A1**
		5

Question	Answer	Marks
4	State or imply equation is $\ln y = \ln A - 2p \ln x$	**B1**
	Equate gradient of line to $-2p$	**M1**
	Obtain $-2p = -2.6$ and hence $p = 1.3$	**A1**
	Substitute appropriate values to find $\ln A$	**M1**
	Obtain $\ln A = 1.252$ and hence $A = 3.5$	**A1**
	Alternative method for question 4	
	State or imply equation is $\ln y = \ln A - 2p \ln x$	**B1**
	Substitute given coordinates to obtain 2 simultaneous equations and solve to obtain $3.5p$	**M1**
	Obtain $3.5p = 4.55$ and hence $p = 1.3$	**A1**
	Substitute appropriate values to find $\ln A$	**M1**
	Obtain $\ln A = 1.252$ and hence $A = 3.5$	**A1**
		5

Question	Answer	Marks
5(a)	Draw V-shaped graph with vertex on positive x-axis	**B1**
	Draw (more or less) correct graph of $y = 3x + 5$	**B1**
		2
5(b)	State equation $3x + 5 = -(2x - 3)$ or corresponding inequality	**B1**
	Attempt solution of linear equation / inequality where signs of $3x$ and $2x$ are different	**M1**
	State answer $x < -\frac{2}{5}$	**A1**
	Alternative method for question 5(b)	
	Square both sides of equation / inequality and attempt solution of 3-term quadratic equation / inequality	**M1**
	Obtain (eventually) only $-\frac{2}{5}$	**A1**
	State answer $x < -\frac{2}{5}$	**A1**
		3

Question	Answer	Marks
6(a)	Substitute $x=-3$, equate to zero and attempt solution for a	**M1**
	Obtain $a=17$	**A1**
		2
6(b)	Divide by $x+3$ at least as far as the x term	**M1**
	Obtain $6x^2-x-1$	**A1**
	Conclude $(x+3)(3x+1)(2x-1)$	**A1**
		3
6(c)	Attempt solution of $\sin\theta=k$ where $-1\leqslant k\leqslant 1$	**M1**
	Obtain 199.5	**A1**
	Obtain 340.5	**A1**
		3

Question	Answer	Marks
7(a)	Integrate to obtain the form $k_1\ln(2x+1)+k_2x^2$	***M1**
	Obtain correct $2\ln(2x+1)+4x^2$	**A1**
	Use limits correctly and attempt rearrangement	**DM1**
	Confirm $a=\sqrt{2.5-0.5\ln(2a+1)}$ AG	**A1**
		4

Question	Answer	Marks
7(b)	Consider sign of $a-\sqrt{2.5-0.5\ln(2a+1)}$ or equivalent for 1 and 2	**M1**
	Obtain $-0.3...$ and $0.6...$ or equivalents and justify conclusion	**A1**
		2
7(c)	Use iteration process correctly at least once	**M1**
	Obtain final answer 1.358	**A1**
	Show sufficient iterations to 6 sf to justify answer or show a sign change in the interval $[1.3575,\ 1.3585]$	**A1**
		3

Question	Answer	Marks
8(a)	Use at least one of $\sin 2\theta = 2\sin\theta\cos\theta$ and $\cot\theta = \dfrac{\cos\theta}{\sin\theta}$	**B1**
	Use both and conclude $6\cos^2\theta$ AG	**B1**
		2
8(b)	Attempt solution of $\cos^2\theta = \dfrac{5}{6}$ to find at least one value	**M1**
	Obtain 0.421	**A1**
	Obtain 2.72	**A1**
		3

Question	Answer	Marks
8(c)	Express integrand in form $a + b\cos x$	**M1**
	Obtain correct integrand $3 + 3\cos x$	**A1**
	Integrate to obtain $px + q\sin x$	***M1**
	Apply limits correctly	**DM1**
	Obtain $\frac{3}{4}\pi + 3 - \frac{3}{\sqrt{2}}$ or exact equivalent	**A1**
		5