Question	Answer	Marks	Guidance
9(b)	Uses linear points to find b = awrt 0.50 soi	**2**	**M1** for $b = \dfrac{2.5-0.5}{3.5+0.5}$ or $b = \dfrac{2.5-2}{3.5-2.5}$ oe OR **M1** for $0.5 = -0.5b + c$ oe **and** $2.5 = 3.5b + c$ oe **and** correctly eliminates c. If 0 scored, **SC1** for b = awrt 0.50 from use of given exponential equation
	Uses linear points to find $A = e^{0.7 \text{ to } 0.8}$ or 2.01 to 2.23 isw soi	**2**	**M1** for $\ln A = 0.75$ If 0 scored, **SC1** for A = 2.12 or 2.117[00…] or $e^{0.75}$ from use of given exponential equation
10(a)	Differentiates $\sqrt{2t^2+100}$: $\frac{1}{2}\left(2t^2+100\right)^{-\frac{1}{2}} \times 4t$ oe or differentiates $(2t^2+100)^{-\frac{1}{2}}$: $\left(-\frac{1}{2}\right)\left(2t^2+100\right)^{-\frac{3}{2}} \times 4t$	**B2**	**B1** for $\frac{1}{2}\left(2t^2+100\right)^{-\frac{1}{2}} \times \mathrm{f}\left(t\right)$ OR for $\left(-\frac{1}{2}\right)\left(2t^2+100\right)^{-\frac{3}{2}} \times \mathrm{f}\left(t\right)$ where f(t) is a function of t
	Correct structure of the quotient rule: $\dfrac{\left(\sqrt{2t^2+100}\right)(10)-(10t+100)\left(\frac{1}{2}\left(2t^2+100\right)^{-\frac{1}{2}} \times 4t\right)}{\left(\sqrt{2t^2+100}\right)^2}$ OR Correct structure of product rule applied to $(10t+100)(2t^2+100)^{-\frac{1}{2}}$: $(10t+100)\left(-\frac{1}{2}\left(2t^2+100\right)^{-\frac{3}{2}} \times 4t\right) + 10\left(2t^2+100\right)^{-\frac{1}{2}}$	**M1**	**FT** *their* $\frac{\mathrm{d}}{\mathrm{d}x}\left(\sqrt{2t^2+100}\right)$ or *their* $\frac{\mathrm{d}}{\mathrm{d}x}\left(\left(2t^2+100\right)^{-\frac{1}{2}}\right)$ as appropriate

Question	Answer	Marks	Guidance
10(a)	Correct $\frac{ds}{dt}$: $\frac{\left(\sqrt{2t^2+100}\right)(10)-(10t+100)\left(\frac{1}{2}\left(2t^2+100\right)^{-\frac{1}{2}}\times 4t\right)}{\left(\sqrt{2t^2+100}\right)^2}$ oe , isw OR $(10t+100)\left(-\frac{1}{2}\left(2t^2+100\right)^{-\frac{3}{2}}\times 4t\right)$ $+\ 10\,(2t^2+100)^{-0.5}$ oe , isw	**A1**	
	Equates *their* $\frac{ds}{dt}$ to 0	**M1**	**Dep** on previous **M1**
	$t = 5$ nfww	**A1**	**Dep** on all previous marks **and** sight of e.g. $10\left(2t^2+100\right)-2t(10t+100)[=0]$ or $1000 - 200t$ [= 0] or $2t^2+100=\frac{1}{5}t(10t+100)$
10(b)(i)	$2\left(\sqrt{150}-10\right)$ oe, isw or 4.49 or 4.494 to 4.495	**B2**	Final answer **B1** for $t = 0$, $s = 10$ **and** $t = 5$, $s = \sqrt{150}$ or $5\sqrt{6}$ or 12.24[74] soi
10(b)(ii)	$\frac{10t+100}{\sqrt{2t^2+100}}$ = *their* 10	**M1**	**FT** *their* 10 providing it is positive and greater than *their* 5
	$(10t+100)^2=(10)^2\left(2t^2+100\right)$	**M1**	**FT** *their*10 **Dep** on previous **M1**
	$T = 20$	**A1**	

Question	Answer	Marks	Guidance
11	Radius: 5 soi	**B1**	Implied by $r^2 = 25$ or 25 used as r^2 in *their* 2nd circle equation
	Centre: $\left(4\sqrt{2}, 4\sqrt{2}\right)$ soi oe	**B2**	**B1** for (5.66, 5.66) or better OR **B1** for distance between centres is 8 soi
	$\left(x-\frac{8}{\sqrt{2}}\right)^2+\left(y-\frac{8}{\sqrt{2}}\right)^2 = 25$ oe or $x^2+y^2-2\left(4\sqrt{2}\right)x-2\left(4\sqrt{2}\right)y+2\left(4\sqrt{2}\right)^2-25=0$ oe	**M1**	**FT** *their*$\left(4\sqrt{2}, 4\sqrt{2}\right)$ in form (k, k) where k is a non-zero constant e.g. $\left(x-\textit{their}\frac{8}{\sqrt{2}}\right)^2+\left(y-\textit{their}\frac{8}{\sqrt{2}}\right)^2 = 25$ or $x^2+y^2-2\textit{their}x-\textit{their}y$ $+2(\textit{their})^2-25=0$ oe
	$x^2+y^2-8\sqrt{2}\,x-8\sqrt{2}\,y+39=0$	**A1**	Must be exact

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