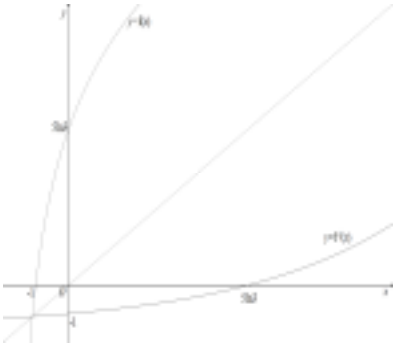
Question	Answer	Marks	Guidance
6(c)	$P:\begin{pmatrix}-50\\70\end{pmatrix}$ $Q:\begin{pmatrix}-30\\210\end{pmatrix}$	**M1**	Using $t=10$ to find position vector of each particle
	$\sqrt{20^2+140^2}$	**M1**	**Dep** on previous M mark, for use of Pythagoras on difference of the 2 position vectors
	$100\sqrt{2}$	**A1**	
7(a)	$\mathrm{f}\in\mathbb{R}$	**B1**	Allow *y* but not *x*
7(b)	$x=5\ln(2y+3)$ $\mathrm{e}^{\frac{x}{5}}=2y+3$	**M1**	For a complete attempt to obtain inverse
	$\mathrm{f}^{-1}(x)=\dfrac{\mathrm{e}^{\frac{x}{5}}-3}{2}$	**A1**	Must be using correct notation
	Domain $x\in\mathbb{R}$	**B1**	**FT** on *their* **(a)**. Must be using correct notation
7(c)		**5**	**B1** for shape of $y=\mathrm{f}(x)$ **B1** for shape of $y=\mathrm{f}^{-1}(x)$ **B1** for $5\ln 3$ or 5.5 and -1 on both axes for $y=\mathrm{f}(x)$ **B1** for $5\ln 3$ or 5.5 and -1 on both axes for $y=\mathrm{f}^{-1}(x)$ **B1** All correct, with apparent symmetry which may be implied be previous 2 B marks or by inclusion of $y=x$, and implied asymptotes, may have one or two points of intersection
8(a)(i)	$\dfrac{1}{\left(1+\dfrac{1}{\sin\theta}\right)\left(\sin\theta-\sin^2\theta\right)}$	**B1**	For use of $\mathrm{cosec}\,\theta=\dfrac{1}{\sin\theta}$, may be implied
	$\dfrac{1}{\sin\theta+1-\sin\theta-\sin^2\theta}$	**M1**	For expansion of brackets
	$\dfrac{1}{\cos^2\theta}$	**M1**	For simplification and use of identity
	$\sec^2\theta$	**A1**	For final result, must see $\dfrac{1}{\cos^2\theta}$

Question	Answer	Marks	Guidance
8(a)(ii)	$\cos^2\theta = \frac{3}{4}$	**B1**	For relating to and making use of **(a)**
	$\cos\theta = \pm\frac{\sqrt{3}}{2}$	**M1**	For attempt to solve, may be implied by one correct solution
	$\theta = -150^\circ,\ -30^\circ,\ 30^\circ,\ 150^\circ$	**2**	**A1** for any correct pair **A1** for a second correct pair and no extra solutions within the range
8(b)	$\tan\left(3\phi + \frac{2\pi}{3}\right) = 1$	**B1**	
	$3\phi + \frac{2\pi}{3} = \frac{\pi}{4},\ \frac{5\pi}{4},\ \frac{9\pi}{4}$ $3\phi = \frac{7\pi}{12},\ \frac{19\pi}{12}$	**M1**	For correct order of operations
	$\phi = \frac{7\pi}{36}$	**A1**	
	$\phi = \frac{19\pi}{36}$	**A1**	
9(a)	$\left[\ln x - \frac{1}{2}\ln(2x+3)\right]_1^a$	**2**	**B1** for $\ln x$ **B1 f**or $\frac{1}{2}\ln(2x+3)$
	$\ln a - \frac{1}{2}\ln(2a+3) + \frac{1}{2}\ln 5$	**M1**	For correct application of limits, must have at least one **B1**
	$\ln a\sqrt{\frac{5}{2a+3}}$	**M1**	**Dep** on previous M mark, for application of log laws
	$5a^2 - 18a - 27 = 0$	**M1**	**Dep** on previous M mark for equating to $\ln 3$ and simplification to a 3 term quadratic = 0
	$a = \frac{9+6\sqrt{6}}{5}$	**A1**	Must have one solution only