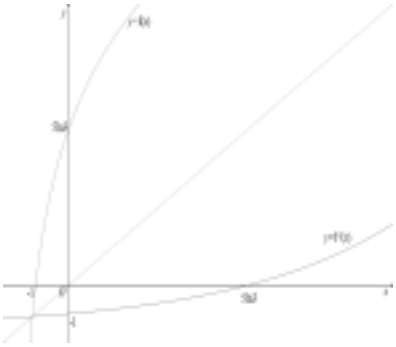
Question	Answer	Marks	Guidance
4(c)	$\frac{dy}{dx}\times\frac{dx}{dt}=\frac{dy}{dt}$ $2\sqrt{3}\times 3=\frac{dy}{dt}$	**M1**	For correct use of rates of change using *their* answer to **(a)**
	$\frac{dy}{dt}=6\sqrt{3}$	**A1**	
5(a)(i)	360	**B1**	
5(a)(ii)	Starts with 6: $1\times4\times3\times1\ \ =12$	**B1**	
	Starts with 7 or 9 : $=2\times4\times3\times2$ $=48$	**B1**	
	Total = 60	**B1**	
	Alternative		
	Ending in 4: $\frac{1}{6}\times360\times\frac{3}{5}=36$	**(B1)**	Allow unsimplified
	Ending in 6: $\frac{1}{6}\times360\times\frac{2}{5}=24$	**(B1)**	Allow unsimplified
	Total = 60	**(B1)**	
5(b)(i)	1287	**B1**	
5(b)(ii)	$1287-{}^{7}C_{5}$ or 1 doctor: 210 2 doctors: 525 3 doctors: 420 4 doctors: 105 5 doctors: 1	**M1**	For *their* **(b)(i)** $-{}^{7}C_{5}$ or listing all the other separate cases which must be evaluated, allow 1 error
	1266	**A1**	
5(b)(iii)	45	**B1**	
6(a)	Velocity vector = $\begin{pmatrix}-8\\6\end{pmatrix}$	**2**	**M1** for obtaining 5
	$\begin{pmatrix}30\\10\end{pmatrix}+\begin{pmatrix}-8\\6\end{pmatrix}t$	**B1**	**FT** for $\begin{pmatrix}30\\10\end{pmatrix}+(\textit{their}\text{ velocity vector})t$
6(b)	13	**B1**	

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 $\dfrac{1}{\cos^2\theta}$