Question	Answer	Marks	Guidance
5(a)	$\frac{\cos^2 x+(1-\sin x)^2}{(1-\sin x)\cos x}$ or $\frac{\cos^2 x}{(1-\sin x)\cos x}+\frac{(1-\sin x)^2}{(1-\sin x)\cos x}$	**M1**	Correctly takes common denominator
	$\frac{\cos^2 x+1-2\sin x+\sin^2 x}{(1-\sin x)\cos x}$	**A1**	OR $\frac{1-\sin^2 x+(1-\sin x)^2}{(1-\sin x)\cos x}$
	$\frac{1+1-2\sin x}{(1-\sin x)\cos x}$ or $\frac{1-\sin^2 x+1-2\sin x+\sin^2 x}{(1-\sin x)\cos x}$	**A1**	OR $\frac{(1-\sin x)(1+\sin x)+(1-\sin x)^2}{(1-\sin x)\cos x}$
	$\frac{2(1-\sin x)}{(1-\sin x)\cos x}=2\sec x$ or $\frac{2-2\sin x}{(1-\sin x)\cos x}=\frac{2}{\cos x}=2\sec x$ or equivalent	**A1**	All steps correct and final step justified OR $\frac{1+\sin x+1-\sin x}{\cos x}=2\sec x$
	Alternative ***Must work with LHS only***		
	$\frac{(\cos x)(1+\sin x)}{(1-\sin x)(1+\sin x)}+\frac{(1-\sin x)\cos x}{(\cos x)\cos x}$	**(M1)**	Forms fractions with common denominator in different form
	$\frac{(\cos x)(1+\sin x)}{\cos^2 x}+\frac{(1-\sin x)\cos x}{\cos^2 x}$	**(A1)**	Uses difference of two squares and $\sin^2 x+\cos^2 x=1$ to write fractions with a common denominator in the same form
	$\frac{2\cos x}{\cos^2 x}$	**(A1)**	Combine as a single fraction and collects terms
	$\frac{2}{\cos x}=2\sec x$	**(A1)**	All steps correct and final step justified
5(b)	$\cos^3\frac{\theta}{2}=\frac{1}{4}$	**B1**	
	$\cos\frac{\theta}{2}=\sqrt[3]{their\ \frac{1}{4}}$ soi	**M1**	**dep** on starting with $2\sec\frac{\theta}{2}=8\cos^2\frac{\theta}{2}$
	±101.9 awrt	**A2**	and no extras in range **A1** for either, ignoring extras in range If **A0** then **SC1** for ±102 with no extras in range

Question	Answer	Marks	Guidance
6	$81+108ax+54a^2x^2+12a^3x^3$ soi or $12a^3=\frac{3}{2}$ $b=108a$ $c=54a^2$ soi	**M3**	**M2** for any 3 correct terms or 2 correct equations or **M1** for any 2 correct terms, 1 correct equation or for correct but insufficiently simplified expansion e.g. $3^4+4\times3^3\times ax+\frac{4\times3}{2}\times3^2\times(ax)^2$ $+\frac{4\times3\times2}{3\times2}\times3\times(ax)^3$
	$a=\frac{1}{2}$ oe	**A1**	
	$b = 54$	**A1**	**FT** 108 × *their a*, providing at least **M1** awarded
	$c=\frac{27}{2}$ oe	**A1**	**FT** 54 × (*their a*)^2, providing at least **M1** awarded
7	${}^nC_4=\frac{n!}{(n-4)!4!}$ and ${}^nC_2=\frac{n!}{(n-2)!2!}$ soi	**B1**	
	$\frac{n(n-1)(n-2)(n-3)}{24}=\frac{13n(n-1)}{2}$ or $(n-2)(n-3)=\frac{13\times24}{2}$ oe, soi	**M1**	Writes in a correct form, free of factorials
	$n^2-5n-150$ $[=0]$	**A1**	
	$n = 15$ only, nfww	**A1**	**dep** on previous A1
	${}^{15}C_8=6435$ only	**B1**	
8(a)	(Velocity vector =) $\frac{26}{\sqrt{12^2+5^2}}\begin{pmatrix}12\\5\end{pmatrix}$ oe	**M2**	**M1** for $\sqrt{12^2+5^2}$ or 13 or 2 seen
	(Position vector =) $\begin{pmatrix}3\\-2\end{pmatrix}+t\begin{pmatrix}24\\10\end{pmatrix}$ oe	**A1**	