Question	Answer	Marks	Guidance
6(c)	$\begin{pmatrix}3+10t\\6-24t\end{pmatrix}-\begin{pmatrix}8t-5\\2-25t\end{pmatrix}$ oe or $\begin{pmatrix}8+2t\\4+t\end{pmatrix}$ oe, soi	**B1**	or $\begin{pmatrix}8t-5\\2-25t\end{pmatrix}-\begin{pmatrix}3+10t\\6-24t\end{pmatrix}$ or $\begin{pmatrix}-8-2t\\-4-t\end{pmatrix}$ oe soi
	Finds d^2 or d for $\left(\textit{their}\begin{pmatrix}3+10t\\6-24t\end{pmatrix}\right)-\begin{pmatrix}8t-5\\2-25t\end{pmatrix}$ or $\begin{pmatrix}8t-5\\2-25t\end{pmatrix}-\left(\textit{their}\begin{pmatrix}3+10t\\6-24t\end{pmatrix}\right)$ oe, soi	**M1**	**FT** $\begin{pmatrix}3\\6\end{pmatrix}+t\left(\textit{their}\begin{pmatrix}10\\-24\end{pmatrix}\right)$
	$d^2=5t^2+40t+80$ mark final answer	**A1**	
6(d)	Correct argument including d e.g. When $d=0\rightarrow t=-4$, but $t\geqslant 0$ [so no collision] or When $t=-4\rightarrow d=0$, but $t\geqslant 0$ [so no collision] or $d>0$ when $t\geqslant 0$ so $d\neq 0$ [so no collision]	**B1**	**dep** on part **(c)** being correct
7(a)	[1] $\cos 2x+x(-2\sin 2x)$ oe, isw, nfww	**2**	**M1** for $\frac{\mathrm{d}}{\mathrm{d}x}(\cos 2x)=-2\sin 2x$ soi or **M1 FT** for correct structure of product rule **FT** $\textit{their}(-2\sin 2x)$

Question	Answer	Marks	Guidance
7(b)	$-\frac{1}{2}x\cos 2x+\frac{1}{4}\sin 2x+c$ oe, isw, nfww	**4**	**M3** for $-\frac{1}{2}x\cos 2x+\frac{1}{4}\sin 2x$ or for $-2\int x\sin 2x\ \mathrm{d}x = x\cos 2x-\frac{1}{2}\sin 2x+c$ or for $-\frac{1}{2}x\cos 2x+\ k\sin 2x+c$, where $k>0$ oe, or **M2** for $-2\int x\sin 2x\ \mathrm{d}x = x\cos 2x-\frac{1}{2}\sin 2x$ or for $-\frac{1}{2}x\cos 2x+\ k\sin 2x$, where $k>0$, or for $\int x\sin 2x\ \mathrm{d}x = -\frac{1}{2}x\cos 2x+\int\frac{1}{2}\cos 2x\ \mathrm{d}x$ oe, or **M1** for $-2\int x\sin 2x\ \mathrm{d}x = x\cos 2x-\int\cos 2x\ \mathrm{d}x$ or $2\int x\sin 2x\ \mathrm{d}x = -x\cos 2x+\int\cos 2x\ \mathrm{d}x$ or $x\cos 2x = \int\cos 2x\ \mathrm{d}x+\int -2x\sin 2x\mathrm{d}x$ oe, soi

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Question	Answer	Marks	Guidance
8(a)	At least two correct terms from: $t+4.5$ $t+10.5$ $t+28.5$ soi	**B1**	condone *a* for *t*
	$r=\dfrac{t+10.5}{t+4.5}$ or $r=\dfrac{t+28.5}{t+10.5}$ or $r^2=\dfrac{t+28.5}{t+4.5}$ oe	**M1**	**FT** *their* distinct terms of the form $t + 1.5k$ where *k* is a positive integer
	$\dfrac{t+10.5}{t+4.5}=\dfrac{t+28.5}{t+10.5}$ oe	**A1**	or $(t+4.5)\times\dfrac{t+28.5}{t+10.5}=t+10.5$ oe
	Clears algebraic fractions and expands e.g. $t^2+21t+110.25=t^2+33t+128.25$	**A1**	must be seen
	–1.5 oe nfww	**A1**	and no other values **dep** on all previous marks awarded
	Alternative method		
	At least two correct terms from: $t+4.5$ $t+10.5$ $t+28.5$ soi	**(B1)**	
	One correct equation in *a* and *r* e.g. $a - 4.5 = ar - 10.5$ or $ar - 10.5 = ar^2 - 28.5$ or $a - 4.5 = ar^2 - 28.5$ oe	**(M1)**	**FT** *their* distinct terms of the form $t + 1.5k$ where *k* is a positive integer
	Correct equation in *r* e.g. $\dfrac{6}{r-1}=\dfrac{18}{r(r-1)}$ OR $\dfrac{18}{r^2-r}-4.5=\dfrac{18r}{r^2-r}-10.5$	**(A1)**	OR correct equation in *a* e.g. $a+24=a\left(\dfrac{a+6}{a}\right)^2$
	$[6r=18]\,r=3$ OR $18-4.5(r^2-r)=18r-10.5(r^2-r)$ **and** e.g. $t=\dfrac{18r}{r^2-r}-10.5$ or $a = 3$	**(A1)**	must be seen OR $a^2+24a=a^2+12a+36$ and $a = 3$
	–1.5 oe nfww	**(A1)**	and no other values **dep** on all previous marks awarded
8(b)	3 nfww	**2**	and no other values **M1** for $\dfrac{their(-1.5)+their10.5}{their(-1.5)+their4.5}$ oe or for $\dfrac{their\ a+their10.5-their4.5}{their\ a}$ oe or for $\dfrac{their28.5-their10.5}{their(-1.5)+their10.5}+1$ oe **FT** *their t* providing *their t* ≠ 0 or *their a* providing *their a* ≠ 0 or 1