Question	Answer	Marks	Guidance
4(a)	$e^y = mx^3 + c$ soi	**B1**	
	Correct method to find m e.g. $\frac{13.5-0.5}{1-7.5}$ or $13 = -6.5m$ OR $m = -2$ soi	**M1**	
	Correct method to find c e.g. $13.5 = their(-2)\ [1] + c$ oe or $0.5 = their(-2)\ (7.5) + c$ oe or $0.5 = 7.5(13.5 - c) + c$ oe OR $c = 15.5$ soi	**M1**	
	$y = \ln\left(15.5 - 2x^3\right)$ mark final answer	**A1**	
4(b)	$x < \sqrt[3]{7.75}$ oe, nfww	**2**	**M1 FT** for $15.5 - 2x^3 > 0$ oe, soi; **FT** $a + bx^3 > 0$ from $y = \ln\left(a + bx^3\right)$
5(a)	665 280	**B1**	
5(b)	30 240	**2**	**M1** for $3 \times 10 \times 9 \times 8 \times 7 \times 2$ oe
5(c)	26 880	**2**	**B1** for a final answer of 13 440 or **M1** for $2 \times 3 \times 4 \times 8 \times 7 \times 5 \times 4$ oe
6	All through this question allow correctly written vectors in **i j** form but, incorrectly written column vectors e.g. $\begin{pmatrix} 10\mathbf{i} \\ -24\mathbf{j} \end{pmatrix}$ do not earn full marks unless the correct form is recovered		
6(a)	$\begin{pmatrix} 10 \\ -24 \end{pmatrix}$ oe, isw	**2**	**B1** for the magnitude of the direction vector is 13 soi or **M1** for $\sqrt{5^2 + (-12)^2}$ oe or **M1** for $\begin{pmatrix} 26\cos 1.18 \\ -26\sin 1.18 \end{pmatrix}$ oe
6(b)	$\begin{pmatrix} 3 \\ 6 \end{pmatrix} + t\begin{pmatrix} 10 \\ -24 \end{pmatrix}$ oe, isw	**2**	**M1 FT** for $\begin{pmatrix} 3 \\ 6 \end{pmatrix} + t\left(their\begin{pmatrix} 10 \\ -24 \end{pmatrix}\right)$ **FT** *their* velocity vector

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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** $\textit{their}(-2\sin 2x)$