Question Number	Scheme	Notes	Marks
4.	$(\cos x)\dfrac{\mathrm{d}y}{\mathrm{d}x}+(\sin x)y=2\cos^3 x\sin x-3$		
(a)	$\dfrac{\mathrm{d}y}{\mathrm{d}x}+(\tan x)y=2\cos^2 x\sin x-3\sec x$	Attempt to divide through by cos *x*. If the intention is not clear must see at least 2 terms divided by cos *x*.	M1
	Integrating Factor: $I=\mathrm{e}^{\int \tan x\,\mathrm{d}x}$	$I=\mathrm{e}^{\int \pm\text{their P}(x)\,(\mathrm{d}x)}$ from $\dfrac{\mathrm{d}y}{\mathrm{d}x}+Py=...$ **Dependent on the first method mark.** May be implied by use of sec *x* as the integrating factor.	**d**M1
	$I=\sec x$	$\dfrac{1}{\cos x}$ or $(\cos x)^{-1}$ or $\sec x$	A1
	$y\sec x=\int \sec x\left(2\cos^2 x\sin x-3\sec x\right)(\mathrm{d}x)$ or $\dfrac{\mathrm{d}}{\mathrm{d}x}(y\sec x)=\sec x\left(2\cos^2 x\sin x-3\sec x\right)$ $y\times \textit{their } I=\int Q(x)\times \textit{their } I\,(\mathrm{d}x)$ or $\dfrac{\mathrm{d}}{\mathrm{d}x}(y\times \textit{their } I)=Q(x)\times \textit{their } I$ If there is any doubt, must multiply at least one of their $Q(x)$ terms by I		M1
	$\int 2\cos x\sin x\,\mathrm{d}x=\sin^2 x$ or $-\cos^2 x$ or $-\dfrac{1}{2}\cos 2x$ **Must follow the previous method mark**		A1 **M1 on ePEN**
	$\int -3\sec^2 x\,\mathrm{d}x=-3\tan x$ **Must follow the previous method mark**		A1
	Examples of a correct answer: $y=\cos x\sin^2 x-3\sin x+k\cos x$ or $y=-\dfrac{1}{2}\cos x\cos 2x-3\sin x+k\cos x$ or $y=-\cos^3 x-3\sin x+k\cos x$ **Follow through their integration and their integrating factor but must be *y* = … with the constant dealt with correctly and depends on the third method mark.**		A1**ft**
			(7)

(b)	$3\sqrt{3}=\frac{1}{2}.\left(\frac{\sqrt{3}}{2}\right)^2-3\frac{\sqrt{3}}{2}+k\frac{1}{2}\Rightarrow k=\left(9\sqrt{3}-\frac{3}{4}\right)$ $3\sqrt{3}=-\frac{1}{2}.\frac{1}{2}\left(-\frac{1}{2}\right)-3\frac{\sqrt{3}}{2}+k\frac{1}{2}\Rightarrow k=\left(9\sqrt{3}-\frac{1}{4}\right)$ $3\sqrt{3}=\left(-\frac{1}{2}\right)^3-3\frac{\sqrt{3}}{2}+k\frac{1}{2}\Rightarrow k=\left(9\sqrt{3}+\frac{1}{4}\right)$ Substitutes the given conditions into their $y = f(x)$ and attempts to find their constant		M1
	$k=9\sqrt{3}-\frac{3}{4}$ or $9\sqrt{3}-\frac{1}{4}$ or $9\sqrt{3}+\frac{1}{4}$	Correct constant for their method	A1
	$y=\cos x\sin^2 x-3\sin x+\left(9\sqrt{3}-\frac{3}{4}\right)\cos x$ or $y=-\frac{1}{2}\cos x\cos 2x-3\sin x+\left(9\sqrt{3}-\frac{1}{4}\right)\cos x$ or $y=-\cos^3 x-3\sin x+\left(9\sqrt{3}+\frac{1}{4}\right)\cos x$ Or equivalent correct answer. Must be $y = \ldots$		A1
			(3)
			Total 10