Question Number	Scheme	Marks
4	$\dfrac{\mathrm{d}y}{\mathrm{d}x} - 3y\tan x = \mathrm{e}^{4x}\sec^3 x$	
(a)	$\mathrm{e}^{-3\int \tan x\,\mathrm{d}x} = \mathrm{e}^{-3\ln\sec x} = \sec^{-3} x$ or $\cos^3 x$	M1A1
	$\cos^3 x\dfrac{\mathrm{d}y}{\mathrm{d}x} - 3y\sin x\cos^2 x = \mathrm{e}^{4x}\cos^3 x\sec^3 x$	
	$\dfrac{\mathrm{d}}{\mathrm{d}x}\left(y\cos^3 x\right) = \mathrm{e}^{4x} \Rightarrow y\cos^3 x = \int \mathrm{e}^{4x}\,\mathrm{d}x$	M1
	$y\cos^3 x = \dfrac{1}{4}\mathrm{e}^{4x} \quad (+c)$	M1
	$y = \left(\dfrac{1}{4}\mathrm{e}^{4x} + c\right)\sec^3 x$ or $\mathrm{y} = \left(\dfrac{1}{4}\mathrm{e}^{4x} + c\right)\cos^{-3} x$ oe	A1
		(5)
(b)	$y = 4,\ x = 0 \quad 4 = \left(\dfrac{1}{4} + c\right)$	
	$c = \dfrac{15}{4}$	M1
	$y = \dfrac{1}{4}\left(\mathrm{e}^{4x} + 15\right)\sec^3 x$ or $\dfrac{1}{4}\left(\mathrm{e}^{4x} + 15\right)\cos^{-3} x$ oe	A1
		(2)
		[7]

(a)

M1 Attempt the integrating factor, including integration of (-3)tan *x*; $\ln\cos$ or $\ln\sec$ seen

A1 Correct simplified integrating factor $\sec^{-3} x$ or $\cos^3 x$

M1 Multiply the equation by the integrating factor and integrate the LHS. Look for

$y \times \text{their IF} = \int \left(\mathrm{e}^{4x}\sec^3 x \times \text{their IF}\right)\mathrm{d}x$ (condone missing d*x*)

M1 Integrate RHS, constant not needed. Must be a function they can integrate and a valid attempt (e.g. allowing coefficient slips).

A1 Correct result in the demanded form, including *y* =.., constant included

(b)

M1 Use the given initial conditions to obtain a value for *c*

A1 Fully correct final answer. Must include *y* = .. but allow A1 if missing and penalised in (a). May be in the form $y\cos^3 x = \ldots$ or $4y\cos^3 x = \ldots$

Notes