Question	Scheme	Marks	AOs
3(a)	$\frac{dy}{dx} + y\tan x = e^{2x}\cos x$ IF $= e^{\int \tan x\, dx} = e^{\ln \sec x} = \sec x \Rightarrow \sec x\frac{dy}{dx} + y\sec x\tan x = e^{2x}$ $\Rightarrow y\sec x = \int e^{2x}\; dx$	M1	3.1a
	$y\sec x = \frac{1}{2}e^{2x}(+c)$	A1	1.1b
	$y = \left(\frac{1}{2}e^{2x} + c\right)\cos x$	A1	1.1b
		(3)	
(b)	$x = 0,\ y = 3 \Rightarrow c = \ldots\{2.5\}$	M1	3.1a
	$y = \left(\frac{1}{2}e^{2x} + \frac{5}{2}\right)\cos x = 0 \Rightarrow \cos x = 0 \Rightarrow x = \ldots$	M1	1.1b
	$x = \frac{\pi}{2}$	A1	1.1b
		(3)	
		(6 marks)	

Notes:

(a)

M1: Finds the integrating factor and attempts the solution of the differential equation.
Look for I.F. $= e^{\int \tan x dx} \Rightarrow y \times$ 'their I.F.' $= \int e^{2x}\cos x \times$ 'their I.F.' dx

A1: Correct solution condone missing + c

A1: Correct general solution, Accept equivalents of the form $y = f(x)$, such as $y = \frac{e^{2x}}{2\sec x} + \frac{c}{\sec x}$

(b)

M1: Uses $x = 0$ $y = 3$ to find the constant of integration. Allow if done as part of part (a) and allow for their answer to (a) as long as it has a constant of integration to find.

M1: Sets $y = 0$ in an equation of the form $y = (Ae^{2x} + c)\cos x$ (oe) where A is 1, 2 or $\frac{1}{2}$, with their c or constant c and makes a valid attempt to solve the equation to find a value for x. (Allow even if the constant of integration has not been found).

A1: Depends on both M's. Awrt 1.57 or $\frac{\pi}{2}$ only. There must have been an attempt to find the constant of integration, but allow from a correct answer to (a) as long as a positive value for c has been found (can be scored from implicit form).