Question Number	Scheme	Marks
8(a)	$2xy+5y=\mathrm{e}^x \quad y=\dfrac{\mathrm{e}^x}{(2x+5)}$	
	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{\mathrm{e}^x(2x+5)-2\mathrm{e}^x}{(2x+5)^2}$	M1A1A1
	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{\mathrm{e}^x}{(2x+5)}\times\dfrac{(2x+5-2)}{(2x+5)}=\dfrac{y(2x+3)}{(2x+5)}$ *	M1A1 (5)
(b)	$x=0\Rightarrow \dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{5-2}{5^2}=\dfrac{3}{25}$	M1A1 (2)
ALT	$x=0\Rightarrow y=\dfrac{1}{5},\ \dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{1}{5}\times\dfrac{3}{5}=\dfrac{3}{25}$	
(c)	$x=0\Rightarrow y=\dfrac{\mathrm{e}^0}{(2\times0+5)}=\dfrac{1}{5}$	M1(Award if seen in (b) and **used** in (c))
	$y-\dfrac{1}{5}=-\dfrac{25}{3}x$	M1
	$125x+15y-3=0$	A1 (3)
		[10]

Part	Mark	Notes
(a)		$2xy+5y=\mathrm{e}^x \ \Rightarrow\ y=\dfrac{\mathrm{e}^x}{(2x+5)}$
	M1	For attempting Quotient Rule • Both terms must be differentiated correctly $\mathrm{e}^x\Rightarrow\mathrm{e}^x \quad 2x+5\Rightarrow 2$ • There must be two terms subtracted in the numerator either way around • The denominator must the denominator squared. $\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{\mathrm{e}^x(2x+5)-2\mathrm{e}^x}{(2x+5)^2}$
	A1	For $\mathrm{e}^x(2x+5)$ or $2\mathrm{e}^x$
	A1	For a fully correct differentiated expression. $\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{\mathrm{e}^x(2x+5)-2\mathrm{e}^x}{(2x+5)^2}$

	M1	Subs in $y=\frac{e^x}{(2x+5)}$ as a common factor $\frac{dy}{dx}=\frac{e^x}{(2x+5)}\times\frac{(2x+5-2)}{(2x+5)}=\frac{y(2x+5-2)}{(2x+5)}$	Subs in $e^x=y(2x+5)$ and factorises $\frac{dy}{dx}=\frac{y(2x+5)(2x+5)-2y(2x+5)}{(2x+5)^2}$
	A1	For the correct answer with no errors. **Note this is a given answer.** $\frac{dy}{dx}=\frac{y(2x+3)}{(2x+5)}$	
	ALT – uses implicit differentiation on $2xy+5y=e^x$		
	M1	$2\left(y+x\frac{dy}{dx}\right)+5\frac{dy}{dx}=e^x$	
	A1	Takes out $\frac{dy}{dx}$ as a common factor $\frac{dy}{dx}(2x+5)=e^x-2y$	
	A1	For a fully correct differentiated expression as below. $\frac{dy}{dx}=\frac{e^x-2y}{(2x+5)}$	
	M1	For separating the fraction, taking out y as a common factor and attempting to form a single fraction $\frac{dy}{dx}=\frac{e^x}{(2x+5)}-\frac{2y}{(2x+5)}=\frac{y(2x+5)}{(2x+5)}-\frac{2y}{(2x+5)}=\frac{y(2x+5-2)}{2x+5}$	
	A1	For the correct answer with no errors. $\frac{dy}{dx}=\frac{y(2x+3)}{(2x+5)}$	
(b)	M1	For substituting $x=0$ into $\frac{dy}{dx}=\frac{e^x(2x+5)-2e^x}{(2x+5)^2}=\frac{e^0(2\times0+5)-2e^0}{(2\times0+5)^2}=...$	
	A1	For the correct value of $\frac{dy}{dx}=\frac{3}{25}$	
	ALT		
	M1	When $x=0\Rightarrow y=\frac{1}{5}$, $\frac{dy}{dx}=\frac{1}{5}\times\frac{3}{5}=...$	
	A1	For the correct value of $\frac{dy}{dx}=\frac{3}{25}$	
(c)	M1	$x=0\Rightarrow y=\frac{e^0}{(2\times0+5)}=\frac{1}{5}$ $x=0\Rightarrow y=\frac{1}{5}$ Award if seen in (b) and **used** in (c) **This is a B mark in Epen.**	
	M1	Inverts the gradient found in (b) and forms equation of the normal. ft their value of y $y-\frac{1}{5}=-\frac{25}{3}x$	
	A1	Equation of line is given in the required form. $125x+15y-3=0$	