Question Number	Scheme	Marks
1	$y=(2x+5)\mathrm{e}^{3x}$ $\frac{\mathrm{d}y}{\mathrm{d}x}=2\mathrm{e}^{3x}+(2x+5)3\mathrm{e}^{3x}$ $\frac{\mathrm{d}y}{\mathrm{d}x}=0\Rightarrow 2+3(2x+5)=0\Rightarrow x=-\frac{17}{6}$	M1 A1 dM1A1 **(4)** **(4 marks)**

M1: Attempts the product rule and achieves a form $\left(\frac{\mathrm{d}y}{\mathrm{d}x}\right)=A\mathrm{e}^{3x}+B(2x+5)\mathrm{e}^{3x}$ where A and B are positive constants. Condone missing/poor bracketing

Note that this could be attempted from $y=2x\mathrm{e}^{3x}+5\mathrm{e}^{3x}\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=A\mathrm{e}^{3x}+Bx\mathrm{e}^{3x}+C\mathrm{e}^{3x}$

A1: Correct $\frac{\mathrm{d}y}{\mathrm{d}x}=2\mathrm{e}^{3x}+(2x+5)3\mathrm{e}^{3x}$ o.e. There is no requirement to simplify this

dM1: Dependent upon the previous M, it is for using a correct strategy to find a value for x.

E.g. Sets or implies $\frac{\mathrm{d}y}{\mathrm{d}x}=0$, cancels or factorises out the e^{3x} term and solves a linear equation in x

In most cases where lns are used it will be M0

Example of M0

$\mathrm{e}^{3x}(6x+17)=0\Rightarrow\ln\left(\mathrm{e}^{3x}(6x+17)\right)=\ln(0)\Rightarrow 3x(6x+17)=...$

Example of M1

$\mathrm{e}^{3x}(6x+17)=0\Rightarrow(6x+17)=0,\qquad\left(\mathrm{e}^{3x}=0\right)$

$x=...$

A1: $x=-\frac{17}{6}$ o.e. only. If an extra solution is given, e.g. from $\mathrm{e}^{3x}=0$, it is A0

Condone awrt -2.83 following a correct equation. Ignore any attempt to find y

Question Number	Scheme	Marks
2 (a)	$8\cos\theta = 3\text{cosec}\,\theta$	
	States or uses $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$	B1
	Attempts to use $\sin 2\theta = 2\sin\theta\cos\theta$	M1
	$\sin 2\theta = \dfrac{3}{4}$ cso	A1
		(3)
(b)	Correct order of operations to find θ, Look for $\dfrac{\arcsin\left(\frac{3}{4}\right)}{2}$	M1
	$(\theta =)$awrt $24.3°$	A1
		(2)
		(5 marks)

(a)

B1: States or uses $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$. May be implied by the line $8\sin\theta\cos\theta = 3$.

Also allow with a consistent use of a different variable E.g. $\text{cosec}\,x = \dfrac{1}{\sin x}$ but not $\text{cosec} = \dfrac{1}{\sin}$

unless it has been recovered. Note that $3\text{cosec}\,\theta = \dfrac{1}{3\sin\theta}$ is B0 unless there is an aside that does state $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$

M1: Attempts to use the identity $\sin 2\theta = 2\sin\theta\cos\theta$ and proceeds to $\sin 2\theta = k$ where $|k| \leqslant 1$

Note that an attempt such as $8\sin\theta\cos\theta = 3 \Rightarrow 8\sin 2\theta = 3$ would be M0

A1: Achieves $\sin 2\theta = \dfrac{3}{4}$ o.e. with no errors. Condone the odd notational slip, e.g $\sin\theta \leftrightarrow \sin$

(b)

M1: Uses the correct order of operations to find any value of θ, in degrees or radians that works for their

$\sin 2\theta = k$ follow through on their k with $|k| \leqslant 1$.

In general look for a value of θ found from evaluating $\theta = \dfrac{\arcsin\left(\frac{3}{4}\right)}{2}$.

From a correct equation it is implied by $\theta =$ awrt 0.42 (radians)

A1: $\theta =$ awrt $24.3°$ ONLY