Question			Answer	Marks	AO	Guidance	
12			**Initially differentiating sin3x**				**Condone missing dx signs throughout**
			$\int (e^{2x}\sin 3x)\,dx$ $= \frac{1}{2}e^{2x}\sin 3x - \int \frac{3}{2}e^{2x}\cos 3x\,dx$	**M1***	**1.1**	Attempt integration by parts once	Obtain $\pm\frac{1}{2}e^{2x}\sin 3x \pm \int \frac{3}{2}e^{2x}\cos 3x\,dx$ Condone any sign errors, but coefficients must be correct
				A1	**2.1**	Obtain correct expression	LHS not required
			$\int e^{2x}\cos 3x\,dx$ $= \frac{1}{2}e^{2x}\cos 3x - \int -\frac{3}{2}e^{2x}\sin 3x\,dx$	**M1***	**1.1**	Attempt integration by parts again on integrand Parts must be consistent with first stage, so **M0** if now differentiating e^{2x} Not dependent on previous **M1**	Only need to consider $\int e^{2x}\cos 3x\,dx$ Obtain $\pm\frac{1}{2}e^{2x}\cos 3x \pm \int \frac{3}{2}e^{2x}\sin 3x\,dx$ Condone any sign errors, but coefficients must be correct If using $\int \frac{3}{2}e^{2x}\cos 3x\,dx$ then coefficients must be commensurate Could be embedded within a fuller expression
				A1	**2.1**	Fully correct expression for integration of $\int e^{2x}\cos 3x\,dx$, which could be embedded within a full integration	LHS not required Could still have double negative signs and/or brackets
			$\int (e^{2x}\sin 3x)\,dx$ $= \frac{1}{2}e^{2x}\sin 3x - \frac{3}{4}e^{2x}\cos 3x$ $- \int \frac{9}{4}e^{2x}\sin 3x\,dx$	**A1**	**2.1**	Obtain fully correct expression, with brackets removed and fractions combined	LHS not required Could be implied by subsequent working
			$\frac{13}{4}\int (e^{2x}\sin 3x)\,dx$ $= \frac{1}{2}e^{2x}\sin 3x - \frac{3}{4}e^{2x}\cos 3x$	**M1dep***	**3.1a**	Attempt to gather like terms Dependent on **M1 M1**	Need to have had $\int (e^{2x}\sin 3x)\,dx$ on both sides, and not equal coefficients Could use eg **I** for $\int (e^{2x}\sin 3x)\,dx$ Could instead attempt the sum to infinity of a GP, with $r = -\frac{9}{4}$ (allow **M1 M1 BOD** despite $-\frac{9}{4} < -1$)

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	$\int (e^{2x}\sin 3x)\,dx = \frac{4}{13}e^{2x}\left(\frac{1}{2}\sin 3x - \frac{3}{4}\cos 3x\right)$	**M1**	**2.1**	Attempt to rearrange to required form, having gathered like terms (ie dep **M1 M1 M1)**	ie divide by their coefficient of $\int (e^{2x}\sin 3x)\,dx$ (soi) and take out common factor of e^{2x}
	$\int (e^{2x}\sin 3x)\,dx = \frac{1}{13}e^{2x}(2\sin 3x - 3\cos 3x) + c$	**A1**	**2.1**	Obtain correct values for A and B, possibly embedded in a correct answer Condone no explicit + c	**A0** if from the sum to infinity as $-\frac{9}{4} < -1$
				NB solution space is over 2 pages so **MUST** check both – needs **SEEN** on pg15	Allow partial credit for those who differentiate given answer and equate: **SC B1** for $A = 2$ and/or **B1** for $B = -3$
	Initially differentiating e^{2x} $\int (e^{2x}\sin 3x)\,dx = -\frac{1}{3}e^{2x}\cos 3x - \int -\frac{2}{3}e^{2x}\cos 3x\,dx$	**M1***		Attempt integration by parts once	**Condone missing dx signs throughout** Obtain $\pm\frac{1}{3}e^{2x}\cos 3x \pm \int \frac{2}{3}e^{2x}\cos 3x\,dx$ Condone any sign errors, but coefficients must be correct
		A1		Obtain correct expression Condone the 'double negative'	LHS not required
	$\int e^{2x}\cos 3x\,dx = \frac{1}{3}e^{2x}\sin 3x - \int \frac{2}{3}e^{2x}\sin 3x\,dx$	**M1***		Attempt integration by parts again on integrand Parts must be consistent with first stage, so **M0** if now differentiating cos 3x Not dependent on previous **M1**	Only need to consider $\int e^{2x}\cos 3x\,dx$ Obtain $\pm\frac{1}{3}e^{2x}\sin 3x \pm \int \frac{2}{3}e^{2x}\sin 3x\,dx$ Condone any sign errors, but coefficients must be correct If using $\int \frac{2}{3}e^{2x}\cos 3x\,dx$ then coefficients must be commensurate Could be embedded within a fuller expression
		A1		Fully correct expression for integration of $\int e^{2x}\cos 3x\,dx$, which could be embedded within a full integration	LHS not required Could still have double negative signs and/or brackets

Question	Answer	Marks	AO	Guidance	
	$\int (e^{2x}\sin 3x)\,dx$ $= -\frac{1}{3}e^{2x}\cos 3x + \frac{2}{9}e^{2x}\sin 3x$ $\quad - \int \frac{4}{9}e^{2x}\sin 3x dx$	**A1**		Obtain fully correct expression, with brackets removed and fractions combined	LHS not required Could be implied by subsequent working
	$\frac{13}{9}\int (e^{2x}\sin 3x)\,dx$ $= -\frac{1}{3}e^{2x}\cos 3x + \frac{2}{9}e^{2x}\sin 3x$	**M1dep***		Attempt to gather like terms Dependent on **M1 M1**	Need to have had $\int (e^{2x}\sin 3x)\,dx$ on both sides, and not equal coeffs Could use eg **I** for $\int (e^{2x}\sin 3x)\,dx$ Could instead attempt the sum to infinity of a GP, with $r = -\frac{4}{9}$ (which could gain **M1 M1 A1**)
	$\int (e^{2x}\sin 3x)\,dx$ $= \frac{9}{13}e^{2x}\left(-\frac{1}{3}\cos 3x + \frac{2}{9}\sin 3x\right)$	**M1**	**2.1**	Attempt to rearrange to required form, having gathered like terms (ie dep **M1 M1 M1)**	ie divide by their coefficient of $\int (e^{2x}\sin 3x)\,dx$ (soi) and take out common factor of e^{2x}
	$\int (e^{2x}\sin 3x)\,dx$ $= \frac{1}{13}e^{2x}(2\sin 3x - 3\cos 3x) + c$	**A1**	**2.1**	Obtain correct values for A and B, possibly embedded in a correct answer Condone no explicit + c	
		[8]			Allow partial credit for those who differentiate given answer and equate: **SC B1** for $A = 2$ and/or **B1** for $B = -3$