Question Number	Scheme	Notes	Marks
4.	$I_n = \int x^n \cos x \, \mathrm{d}x$		
(a)	$\int x^n \cos x \, \mathrm{d}x = x^n \sin x - \int nx^{n-1} \sin x \, \mathrm{d}x$ M1: Parts in the correct direction A1: Correct expression		M1A1
	$= x^n \sin x - \left\{ -nx^{n-1} \cos x + \int n(n-1) x^{n-2} \cos x \, \mathrm{d}x \right\}$ Uses integration by parts again (**dependent on the first M**)		dM1
	$= x^n \sin x + nx^{n-1} \cos x - n(n-1) I_{n-2}$ * Fully correct proof with no errors		A1*
			(4)
ALT			
	$I_n = \int x^n \cos x \, \mathrm{d}x = \int x^{n-1} (x \cos x) \, \mathrm{d}x$		
	$= x^n \sin x + x^{n-1} \cos x - (n-1) \int x^{n-2} (x \sin x + \cos x) \, \mathrm{d}x$ M1: Parts in the correct direction A1: Correct expression		M1A1
	$= x^n \sin x + x^{n-1} \cos x - (n-1) \int x^{n-1} \sin x \mathrm{d}x - (n-1) I_{n-2}$		
	$= x^n \sin x + x^{n-1} \cos x - (n-1) \left\{ -x^{n-1} \cos x + (n-1) I_{n-2} \right\} - (n-1) I_{n-2}$ Uses integration by parts again (**dependent on the first M**)		dM1
	$= x^n \sin x + nx^{n-1} \cos x - n(n-1) I_{n-2}$ * Fully correct proof with no errors		A1*
(b)	$I_0 = \sin x \ \ (+k)$		B1
	$I_4 = x^4 \sin x + 4x^3 \cos x - 12 I_2$	Applies the reduction formula once for I_4 or I_2	M1
	$= x^4 \sin x + 4x^3 \cos x - 12 \left(x^2 \sin x + 2x \cos x - 2 I_0 \right)$ Applies the reduction formula again and obtains an expression for I_4 which can include I_0 but not I_2		M1
	$= \left(x^4 - 12x^2 + 24 \right) \sin x + \left(4x^3 - 24x \right) \cos x + c$ Award A1 for either bracket and A1 for the other If the answer is not factorised but is otherwise correct, award A1A0		A1A1
			(5)
			Total 9