Question	Scheme	Marks	AOs
6	$\frac{dy}{dx}=2e^{2x}\sinh x+e^{2x}\cosh x=e^{2x}\left(a\sinh x+b\cosh x\right)$	**M1**	2.2a
	$=e^{2x}\left(\frac{3+1}{2}\sinh x+\frac{3-1}{2}\cosh x\right)$ so the result is true for n = 1	**A1**	2.4
	(Assume the result is true for n = k, then) $\frac{d^{k+1}y}{dx^{k+1}}=2e^{2x}\left(\frac{3^k+1}{2}\sinh x+\frac{3^k-1}{2}\cosh x\right)+e^{2x}\left(\frac{3^k+1}{2}\cosh x+\frac{3^k-1}{2}\sinh x\right)$	**M1**	2.1
	$=e^{2x}\left(\left(3^k+1+\frac{3^k-1}{2}\right)\sinh x+\left(3^k-1+\frac{3^k+1}{2}\right)\cosh x\right)$ $=e^{2x}\left(\frac{3\times3^k+1}{2}\sinh x+\frac{3\times3^k-1}{2}\cosh x\right)$	**dM1**	1.1b
	$=e^{2x}\left(\frac{3^{k+1}+1}{2}\sinh x+\frac{3^{k+1}-1}{2}\cosh x\right)$	**A1**	2.1
	Hence the result is also true for n = k +1, so if true for n = k then true for n = k + 1, and as also true for n = 1, so the result is true for all positive integers.	**A1**	2.4
		(6)	
			(6 marks)

Notes:

M1: Attempts the first derivative and factors out the exponential

A1: Correct derivative and reaches appropriate form to deduce the result is true for n = 1

M1: (Makes the inductive assumption and) attempts the (k +1)-th derivative from the k-th derivative. Allow slips in coefficients.

dM1: Factors out the exponential and gathers the sinh x and cosh x terms. Accept either form shown or equivalent.

A1: Reaches the correct form from correct work. Must have the "k+1" showing. Depends on the previous two method marks.

A1: Makes appropriate concluding sentence covering the points indicated in scheme. Depends on all method marks having been scored. Must have reached at least the second line shown in the dM mark, and made an attempt at checking n =1 (though the first A mark need not have been scored if insufficient detail shown).