Question number	Scheme	Marks
2 (a)	$S_n = \sum_{r=1}^{n}(4r+1) \Rightarrow a=5 \quad d=4$	B1B1
	$S_n = \frac{n}{2}(2\times5+(n-1)4) \Rightarrow S_n = n(3+2n)$	M1A1 (4)
	ALT	
	$S_n = \sum_{r=1}^{n}(4r+1) \Rightarrow a=5 \quad l=4n+1$	{B1B1}
	$S_n = \frac{n}{2}(5+4n+1) \Rightarrow S_n = n(3+2n)$	{M1A1} {4}
(b)	$S_{n+3} - S_n = 3(5+14\times4) = 183$ $(n+3)(3+2(n+3))-(n)(3+2n) = 183 \Rightarrow 12n+27 = 183$ $\Rightarrow n = 13$	B1 M1M1 A1 (4)
	ALT $S_{n+3} - S_n = t_{n+3} + t_{n+2} + t_{n+1}$ $t_{n+3} + t_{n+2} + t_{n+1} = 3t_{n+2}$ $3t_{n+2} = 3t_{15} \Rightarrow n+2 = 15$ $\Rightarrow n = 13$	{B1 M1 M1 A1} {4}
		[8]

Additional Notes			
Part	**Mark**	**Guidance**	
(a)	B1	Either $a = 5$ **OR** $d = 4$	Can be embedded in their summation formula.
	B1	Both $a = 5$ **AND** $d = 4$	
	M1	Uses the correct summation formula with their values of a and d	
	A1	Simplifies the summation formula to achieve $S_n = n(3+2n)$ **This is a show question**- please check there are no errors in their working.	
ALT 1			
(a)	B1	Either $a = 5$ **OR** $l = 4n+1$	Can be embedded in their summation formula.
	B1	Both $a = 5$ **AND** $l = 4n+1$	
	M1	Uses the correct summation formula (first plus last) with their values of a and l	
	A1	Simplifies the summation formula to achieve $S_n = n(3+2n)$ **This is a show question**- please check there are no errors in their working.	
ALT 2			
(a)	B1	For writing $\sum_{r=1}^{n}(4r+1) = 4\sum_{r=1}^{n} r + \sum_{r=1}^{n} 1$	
	B1	For $\sum_{r=1}^{n}(4r+1) = \frac{4n(n+1)}{2} + n$ Expands $4\sum_{r=1}^{n} r$ and $\sum_{r=1}^{n} 1$	
	M1	For $\sum_{r=1}^{n}(4r+1) = 2n^2 + 2n + n = 2n^2 + 3n$	
	A1	$\sum_{r=1}^{n}(4r+1) = n(2n+3)$ **This is a show question**- please check there are no errors in their working	
(b)	B1	Finds the value of $t_{15} = 61$ or $3t_{15} = 183$	
	M1	Uses the given summation formula from (a) to form an equation in n . They can start from the summation formula $S_n = \frac{n}{2}(2a + [n-1]d)$ but it must be correct with either their, or the correct values of a and d. ft their t_{15} or $3t_{15}$ for this mark.	
	M1	Forms a **linear** equation in n – the correct equation is $12n + 27 = 183$ o.e ft their t_{15} or $3t_{15}$ for this mark.	
	A1	$n = 13$	
ALT			
(b)	B1	Writes down $S_{n+3} - S_n = t_{n+3} + t_{n+2} + t_{n+1}$	
	M1	$t_{n+3} + t_{n+2} + t_{n+1} = 3t_{15}$	
	M1	$t_{n+3} + t_{n+2} + t_{n+1} = 3t_{n+2} \Rightarrow 3t_{n+2} = 3t_{15} \Rightarrow n+2 = 15$ They must reach a **linear** equation in n for this mark	
	A1	$n = 13$	