

Question Number	Scheme	Marks
<b>6(a)</b>	$a = S_1 = 1(15 + 2 \times 1) = 17$	B1
	$S_2 = 2(15 + 2 \times 2)(= 38) = 2a + d$	M1A1
	$2 \times 17 + d = 38 \Rightarrow d = 4$	A1 (4)
<b>(b)</b>	20th term $= a + 19d = 17 + 19 \times 4 = 93$	M1A1 (2)
<b>(c)</b>	$S_{2p} - 2S_p = 1 + S_{p-1}$	
	$2p(15 + 4p) - 2p(15 + 2p) = 1 + (p-1)(13 + 2p)$	M1
	$2p^2 - 11p + 12 = 0$	A1
	$(2p-3)(p-4) = 0 \Rightarrow p = 4 \left( p \neq \frac{3}{2}; \text{ may not be seen } \right)$	M1A1 (4)
		[10]

Part	Mark	Notes
(a)	B1	For the first term $a = 17$ $[a = S_1 = 1(15 + 2 \times 1) = 17]$
	M1	For the second term. Uses the given summation formula to form a linear equation in $a$ and $d$ for a minimally acceptable response of $k = 2a + d$ where $k$ is a positive integer.
	A1	For the correct linear equation $38 = 2a + d$
	A1	For the correct value of $d = 4$
	<b>ALT 1</b>	
	B1	For the first term $a = 17$
	M1	For using a correct summation formula $n(15 + 2n) = \frac{n}{2}(2a + [n-1]d) \Rightarrow 30 + 2n = 2a - d + nd$ and equates coefficients
	A1	For equating coefficients of $n$ $4n = dn \Rightarrow d = \dots$ and $30 = 2a - 4 \Rightarrow a = \dots$
		For the correct value of $d = 4$

	<b>ALT 2</b>	
	B1	For the first term $a = 17$
	M1	Uses two values of $n$ to set up a pair of simultaneous equations.e.g. $S_4 = 4(15 + 2 \times 4) = 92 \text{ and } 92 = \frac{4}{2}(2a + 3d) \Rightarrow 46 = 2a + 3d$ $S_5 = 5(15 + 2 \times 5) = 125 \text{ and } 125 = \frac{5}{2}(2a + 4d) \Rightarrow 50 = 2a + 4d$
	A1	Attempts to solve the pair of equations
	A1	$d = 4$
(b)	M1	For using the correct $n$ th term formula with <b>their <math>a</math> and their <math>d</math></b> $U_{20} = '17' + 19 \times '4' = \dots$
	A1	For the correct 20 <sup>th</sup> term = 93
(c)	M1	Uses the given summation formula with the correct substitution $2p(15 + 4p) - 2p(15 + 2p) = 1 + (p - 1)(13 + 2p)$
	A1	For achieving the correct 3TQ $2p^2 - 11p + 12 = 0$
	<b>ALT</b>	
	M1	Uses the summation formula: <b>Follow through their <math>a</math> and <math>d</math></b> $S_{2p} = \frac{2p}{2}(2 \times 17 + (2p - 1)4) = p(30 + 8p)$ $2S_p = 2 \times \frac{p}{2}(2 \times 17 + (p - 1)4) = p(30 + 4p)$ $S_{p-1} = \frac{p-1}{2}(2 \times 17 + (2[p-1] - 1)4) = (p-1)(13 + 2p)$ For a correct substitution into the given expression $p(30 + 8p) - p(30 + 4p) = 1 + (p - 1)(13 + 2p) \text{ oe}$
	A1	For achieving the correct 3TQ $2p^2 - 11p + 12 = 0$
	M1	For attempting to solve their 3TQ (provided it is a 3TQ) by any valid method. $2p^2 - 11p + 12 = (2p - 3)(p - 4) = 0 \Rightarrow p = \dots, \dots$
	A1	For $p = 4$ If they give both roots of their 3TQ as an answer without rejecting $p = 1.5$ A0

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