

Topic Test 1 Mark Scheme

Sequences - Higher

Q	Answer	Mark	Comments
1	$17 - 2n$	B1	
2	152	B1	
3	Two terms from the sequence $10n + 1$ ie two from 11, 21, 31, 41, ...	B2	B1 one correct term or lists at least the first three terms from both sequences ie 5, 7, 9, ... and 1, 6, 11, ...
4(a)	$a \times 1 + b = a + b$ and $b \times 1 + a = a + b$	B1	
4(b)	$2a + b$ or $3b + a$	M1	
	$2a + b = 3b + a$ so $a = 2b$	A1	
5	Substitutes $n = 1, 2, 3$ etc into formula for at least three terms	M1	Values are 11, 5, 1, 0.5, 0.28 for first 5 terms
	0.1 $\dot{6}$	A1	
6(a)	$3^2(3 + 1) = 9 \times 4$	B1	
6(b)	$10^2(10 + 1)$ or 100×11	M1	
	1100	A1	

Q	Answer	Mark	Comments
6(c)	<p>Full explanation</p> <p>If n is odd then n^2 is odd and $n + 1$ is even</p> <p>and</p> <p>If n is even then n^2 is even and $n + 1$ is odd</p> <p>and</p> <p>odd \times even = even</p>	B2	<p>oe</p> <p>eg If n is odd then $n^2(n + 1)$ is odd \times odd \times even = even</p> <p>and</p> <p>If n is even then $n^2(n + 1)$ is even \times even \times odd = even</p> <p>B1 Partial explanation</p> <p>eg If n is odd then n^2 is odd and $n + 1$ is even</p> <p>or</p> <p>If n is even then $n^2(n + 1)$ is even \times even \times odd = even</p>

Q	Answer	Mark	Comments																								
7(a)	113 and 159	B2	B1 one correct term																								
7(b)	Alternative method 1																										
	First and second differences correct	M1	14 22 30 8 8																								
	Correctly subtracts $\frac{\text{their } 8}{2}n^2$ from the given sequence	M1	5 7 9 (11 13 15)																								
	$2n$	M1dep																									
	$4n^2 + 2n + 3$	A1	oe																								
	Alternative method 2																										
	Any three of $a + b + c = 9$ $4a + 2b + c = 23$ $9a + 3b + c = 45$ $16a + 4b + c = 75$	M1	Allow one error but all equations must be in a, b and c																								
	Eliminates one variable to obtain a pair of equations in two variables eg $3a + b = 14$ and $5a + b = 22$	M1																									
	Eliminates one variable correctly eg $a = 4$	M1dep	Allow one error																								
	$4n^2 + 2n + 3$	A1	oe																								
	Alternative method 3																										
	Sets up table of differences <table border="1" style="margin-left: 20px;"> <tr><td>n</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>c</td><td>3</td><td>9</td><td>23</td><td>45</td><td>75</td></tr> <tr><td>$a + b$</td><td></td><td>6</td><td>14</td><td>22</td><td>30</td></tr> <tr><td>$2a$</td><td></td><td>8</td><td>8</td><td>8</td><td></td></tr> </table>	n	0	1	2	3	4	c	3	9	23	45	75	$a + b$		6	14	22	30	$2a$		8	8	8		M1	
	n	0	1	2	3	4																					
	c	3	9	23	45	75																					
$a + b$		6	14	22	30																						
$2a$		8	8	8																							
Extends table back to $n = 0$	M1																										
Identifies rows as $2a, a + b$ and c	A1																										
$4n^2 + 2n + 3$	A1	oe																									