1(a)		a=13 b=21 or 8+ their (i)				
b		z=x+y oe				
2	**(a)**	$p = 11$ $q = 30$ $r = 60$ $s = 6$	all four	**B2**	2	sc1 for 2 or 3 correct
	(b)	$x = 2n + 1$ oe $y = n(n + 1)$ oe $z = 2n(n + 1)$ oe √ $2 \times y$		**B1** **B1** **B1**	3	In **(b)**, accept any unsimplified form but –1, once, if not given explicitly
	(c)	102		**B1**	1 **[6]**	

3a)	24 35	**1**	
3b)	$n(n+2)$ oe	**2**	**B1** for quadratic expression in n
3c)(i)	35	**3**	**B2** for 35×37 or 35.8 to 35.9 OR **M1** for *their* $n(n + 2) = 1358$ **M1** for solution of *their* quadratic $\frac{-2 \pm \sqrt{2^2 - 4 \times 1 \times (-1358)}}{2 \times 1}$
3c)(ii)	7	**2**	**M1FT** for 1358–*their* **(c)(i)** × (*their* **(c)(i)** + 2)

4(a)	14 17	**1**	
4(b)	$3n + 2$ oe final answer	**2**	**B1** for $3n + k$ oe seen or for $jn + 2$ oe seen $j \neq 0$
4(c)	12	**3**	**M1** for substitution of 20 into *their* $(3n + 2)$ or for 62 seen or for 38 seen **M1** for *their* $(3k + 2) = 100$ – *their* 62

5(a)(i)	20 24	**1**	Both correct
5(a)(ii)	$4n + 4$ oe final answer	**2**	**B1** for $4n + k$ oe seen
5(a)(iii)	36	**2**	**M1** for *their* $(4p + 4) = 150$ soi
5(b)(i)	44	**2**	**M1** for $\frac{26 - 2}{4}$ or difference = [–]6
5(b)(ii)	$50 – 6n$ oe final answer	**2**	**B1** for $–6n + k$ oe seen

6	$\frac{5n+7}{(n+3)^2}$ oe final answer	**4**	**B2** for nth term for numerator sequence $5n + 7$ oe final answer or **B1** for $5n + k$ oe seen AND **B2** for nth term for denominator sequence $(n + 3)^2$ oe final answer or **B1** for quadratic expression in n seen for denominator sequence **Maximum 3 marks if final answer incorrect**
7(a)	48	**1**	
7(b)	$n^2 + 5n - 2$ oe final answer	**3**	**B2** for answer $n^2 + 5n + k$ oe or for $5n - 2$ oe seen or **B1** for answer $n^2 + an + b$ or for $5n + k$ oe seen
8(a)	9 12 15 12 17 22	**2**	**B1** for one row correct
8(b)	5 $n - 3$ oe final answer	**2**	**B1** for $5n + k$ oe seen
8(c)	57	**2**	**M1** for *their* $(5n - 3) = 92$ or **B1** for $n = 19$ soi or for answer 19
9(a)	$\frac{23}{24}$ $\frac{27}{28}$	**1**	
9(b)	300	**1**	
9(c)	$\frac{4n-1}{4n}$ oe	**2**	**B1** for $\frac{\ldots}{4n}$, or for $4n - 1$ oe
10(a)	71	**1**	
10(b)	[p =] 2 [q =] 1	**1**	Both correct
10(c)	$A = 2$ $B = 4$ $C = 1$	**2**	**B1** for two correct or for $(n + 1)^2 = n^2 + 2n + 1$ or for $(n + \textit{their } q)^2 = n^2 + 2n(\textit{their } q) + (\textit{their } q)^2$ $A + B + C = 7$ or **M1** for $4A + 2B + C = 17$ $9A + 3B + C = 31$
11(a)	49, 19, 30	**1**	
11(b)(i)	$3n + 4$ oe and isw	**1**	
11(b)(ii)	$(n + 2)^2$ oe	**1**	
11(c)	$n^2 + n$; or $n(n + 1)$	**2**	**M1** for attempt at *their*(bii) – *their*(bi), provided both parts are different expressions in n, and the answer space also contains an expression in n, or is empty: or for a valid method.

12(a)	Correct pattern drawn		
12(b)	15 21 10 15	**B1** for 2 or 3 correct	
12(c)	n^2 oe final answer	e.g. $\left(\frac{1}{2}n^2+\frac{1}{2}n\right)+\left(\frac{1}{2}n^2-\frac{1}{2}n\right)$	
12(d)	465		
12(e)	$n^2-\left(\frac{1}{2}n^2+\frac{1}{2}n\right)$ or $\left(\frac{1}{2}(n-1)^2+\frac{1}{2}(n-1)\right)$ or $\left(\frac{1}{2}n^2+\frac{1}{2}n\right)-n$ leading to $\left(\frac{1}{2}n^2-\frac{1}{2}n\right)$ without error **AG**		
12(f)	$m = 9$ cao **3**	**M1** for $\frac{1}{2}m^2+\frac{1}{2}m=5m$ **A1** for $m^2 - 9m = 0$ or $m^2 = 9m$ or $m - 9 = 0$ or $m + 1 = 10$ or **B2** for [$m = 9$] $5m = 45$ and crosses = 45 or **B1** for values for $5m$ and the number of crosses seen for at least $m = 7$ and 8 After 0, **SC1** for answer 11	

13	**(a)** **(i)**	$2n - 1$ oe	1	
	(ii)	421	1	
	(b) **(i)**	8	1	
	(ii)	14	1	

14	**(a)** **(i)**	–6	1	
	(ii)	15	2*	**C1** for $15^2 - 5 \times 15$ or for 15, –10 OR **M1** for $(p + 10)(p - 15)$ [= 0]
	(b)	4	2*	**B1** for $3 \times 5^2 - 5k = 55$ oe

15	**(a)**	43 47 cao	1
	(b)		
	(c)	(–)10	1
	(d)		
	(e)		

16	$95 - 6n$ oe isw	2	**B1** for $-6n$ seen
(ii)	16 cao	1	
(b) (i)	$2n - 3$	2	**M1** for $(n+1)^2 - 4(n+1)$ seen
(ii)	39 cao	1	

17 (a)	1	**1**	
(b)	41 40 81 (all three)	**1**	
(c)	$(2n+1)^2$ oe	**1**	

18 (a)	$23 - 6n$ cao	2	**B1** for $-6n$ soi
(b) (i)	4, 10, 18, 28	2	**B1** for 3 correct terms seen
(ii)	3 and 24	4	**M1** for $\frac{n^2+3n}{5n-12} = 6$ or better **M1** for $n^2 - 27n + 72 = 0$ **B1** for either 3 or 24

19 (a)	$15^2 - 1^2 = 8 \times (1+2+3+4+5+6+7)$	1	
(b)	$(2n+1)^2 - 1^2$ oe	1	
(c)	$(2n+1)^2 = 4n^2 + 4n + 1$ or $(2n+1)^2 - 1^2 = 4n^2 + 4n$, or $(2n)(2n+2)$	**B1**	
	Division of both sides by 8 and result obtained correctly	**M1**	

20 (a)	25, 21, 45	2	B1 for 2 correct
(b)	n^2	1	
(c)	32	2	B1 for $(T=)$ 1024 seen
(d)	$\frac{3}{2}n(n+1)$ oe	1	
(e)	360	1ft	
(f)	$\frac{1}{2}(n+1)(n+2)$ oe	2	or C1 for $\frac{1}{2}(n-1)(n-2)$ oe

21(a)	128	**1**	
21(b)(i)	$2^{n+1} - 3$ final answer	**1**	
21(b)(ii)	$2^{n+1} + 5n + 1$ oe final answer	**2**	**B1** for $2^{n+1} + 5n + k$ oe or **M1** for 6 11 16 21 [26]

22	**(a)**	7, 21	1	
	(b)	$2n - 1$ oe	1	
	(c)	FT 3 × *their* (b) provided this is a function of n; or $6n - 3$ oe	1 √	
	(d) **(i)**	48	1	
	(ii)	$3n^2$	2 *	**M1** for a sensible method, e.g. writing terms as 3×1, 3×4, 3×9, ... or **B1** for $An^2 + Bn + C$, $A \neq 0$ from a valid method.
23	**(a)**	2011	**2**	**B1** for (n =) 223 seen
	(b)	36	**1**	
	(c) **(i)**	$9x - 9y$, or $9y - 9x$, or any equiv.	**1**	
	(ii)	"123 is not a multiple of 9" oe	**1**	
24	**(a)**	132	**1**	Condone -87
		87 f.t.	**1**	
	(b)	219 **or** $\{\lvert\text{their}132\rvert + \lvert\text{their}87\rvert\}$	**1**	