1(a)	–5 –13	B2	condone –13 –5 B1 –5 as first term or ft their first term – 8

2	**Alternative method 1**		
	21 – 17 or 17 – 21 or 17 + 4 or 21 – 4 or (difference is) 4 or (7th term =) 21 + 4 or 25 or (4th term =) 17 – 4 or 13	M1	may be seen as 17 21 4 allow (difference is) –4
	17 + (100 – 5) × 4 or 17 + 95 × 4 or 17 + 380 or 21 + (100 – 6) × 4 or 21 + 94 × 4 or 21 + 376 or 17 – 4 × 4 + 99 × 4 or 1 + 99 × 4 or 1 + 396 or 17 – 5 × 4 + 100 × 4 or –3 + 100 × 4 or –3 + 400	M1dep	must be using 4 oe calculation that would evaluate to 397 5th term + 95 × 4 6th term + 94 × 4 1st term + 99 × 4 0th term + 100 × 4
	397	A1	
	Alternative method 2		
	$4n$	M1	oe eg $n \times 4$
	$4n - 3$	A1	oe
	397	A1	

2 cont	**Additional Guidance**	
	Term to term rule described eg Add on 4 each time	M1
	$a + 5d = 21$, $a + 4d = 17$ only	M0
	Difference shown as 4 then eg $n + 4$	M1
	Only eg $n + 4$ or $3n + 4$	M0
	$4n - 3$ seen even if not subsequently used	M1A1
	$4n$ seen eg $4n + 13$ even if not subsequently used	M1
	Correct list going up in 4s stopping at 397	M1M1A1
	List going up in 4s with an error or not reaching 397	M1M0A0
	No subtraction seen and incorrect difference eg $\begin{matrix}17 & 21\\ & {\scriptstyle +3}\end{matrix}$	M0
	Alt 2 allow $n4$	M1
	$4n - 3 = 100$	M1A1A0
	Allow M1 even if not subsequently used	

3(a)	(2^{nd} term =) 20	B1	may be implied by 12
	(3^{rd} term =) 12	B1ft	ft $\frac{\text{their } 20 + 4}{2}$
	Additional Guidance		
	12 with no incorrect working		B1B1
	20 12 on answer line or in working with answer line blank		B1B1
	(20) 12 8 on answer line or in working with answer line blank		B1B0
	(20) 12 8 with 8 on answer line		B1B0
	Answer 8 without 20 or 12 seen		B0B0
3(b)	60 – 10 or 50	M1	
	150	A1	SC1 170 or 210 or $16.\dot{6}$ oe
	Additional Guidance		
	60 – 10 or 50 scores M1 even if subsequent working is incorrect		
	Accept 16.66(...) or 16.67 for $16.\dot{6}$		
	Embedded answer without 150 on answer line $\frac{150}{3} + 10$ (= 60)		M1A0

Q	Answer	Mark	Comments
4	$p = 11$ and $q = 34$ and $r = 91$	B2	B1 $p = 11$ or $q = 34$ or $r = 91$ or $q + 23 = 57$ oe equation in q
	Additional Guidance		
	For example, 34 written next to q in the sequence and not contradicted implies $q = 34$	B1	

Q	Answer	Mark	Comments
5	15, 11, 7, 3 as the first four terms or $19 - 4 \times 5$ or $19 - 20$ or -1 as the first negative term or 4.75	M1	oe
	5	A1	
	Additional Guidance		
	$5n$ on answer line with 5 in working	M1A0	
	$n = -1$ without correct working for M1	M0	
	$4.75n$ on answer line with no correct M1 values	M0	
	$19 - 4n < 0$ with no correct M1 values	M0	

Q	Answer	Mark	Comments
6(a)	$46 \div 2$ or 23 or $4x = 46$	M1	oe
	their $23 \div 2$ or $46 \div 2 \div 2$ or $46 \div 4$	M1dep	oe may be seen as a fraction eg $\frac{23}{2}$ or $11\frac{1}{2}$ or $\frac{46}{4}$ or $11\frac{2}{4}$
	11.5	A1	SC2 5.75 or 11 remainder 1
	Additional Guidance		
	$46 \div 2 = 25$, $(25 \div 2 =)$ 12.5	M1M1A0	
	$46 \div 2 = 24$, followed by 11	M1M0A0	
	11.5 in working, different answer on answer line (do not ignore further work)	M1M1A0	

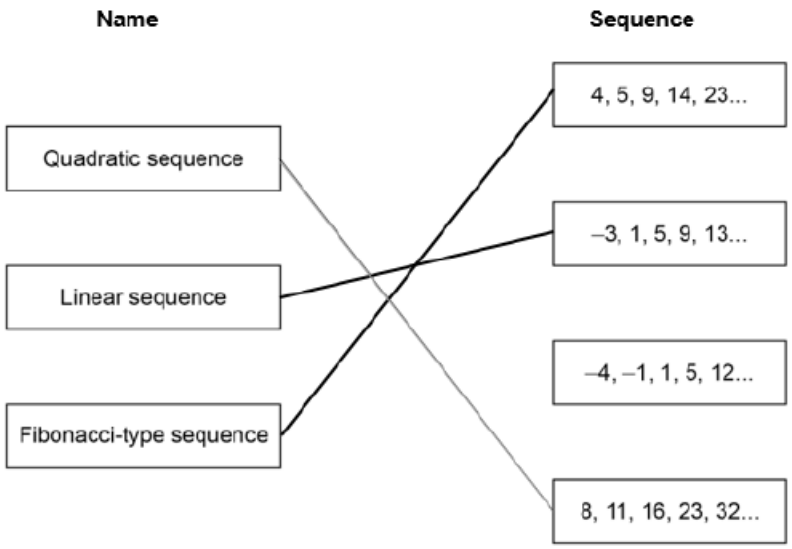
Q	Answer	Mark	Comments
6(b)	**Alternative method 1**		
	$34 - k$ or $34 - 10$ or 24	M1	oe implied by $34 - 2k$ or $34 - 3k$
	$3k = 34 - 10$ or $3k =$ their 24 or $\frac{34-10}{3}$ or $\frac{\text{their } 24}{3}$	M1dep	oe
	8	A1	SC2 –8 or all terms seen 34, 26, 18, 10 SC1 6
	Alternative method 2		
	$10 + k$ or $34 - 10$ or 24	M1	oe implied by $10 + 2k$ or $10 + 3k$
	$10 + 3k = 34$ or $3k =$ their 24 or $\frac{34-10}{3}$ or $\frac{\text{their } 24}{3}$	M1dep	oe
	8	A1	SC2 –8 or all terms seen 34, 26, 18, 10 SC1 6
	Alternative method 3		
	One correct trial	M1	a correct trial is either a subtraction of the same value, exactly three times, from 34 and evaluated correctly or addition of the same value, exactly three times, from 10 and evaluated correctly
	Two or more correct trials	M1dep	
	8	A1	SC2 –8 or all terms seen 34, 26, 18, 10 SC1 6
	Additional Guidance		
	Accept any letter in place of k		

Q	Answer	Mark	Comments
7	(8th term =) 2^8 or 256	M1	oe may be implied
	Common difference of A indicated as 3	M1	may be implied eg $3n$ … or … + $3(n-1)$
	$3n + 10$ = their 256 or (their 256 – 10) ÷ 3 or (their 256 – 13) ÷ 3 or 81	M1dep	oe equation eg $13 + 3(n-1) = 2^8$ dep on 2nd M1 their 256 may be any number and may be in index form
	82	A1	
	Additional Guidance		
	$n + 3$ implies 2nd M1		
	Do not award M1 for 256 if it is in a list of powers of 2 unless it is indicated or it is the highest power evaluated		
	Common difference of 3 may be shown on the progression for the 2nd M1		
	10, (13, 16, 19, 22), 25 without common difference of 3 shown does not imply 2nd M1		
	82 from trial and improvement		M3A1
	Embedded answer $3 \times 82 + 10 = 256$		M3A0
	$3n + 10 = 256$ or $3n + 10 = 2^8$ or $3n = 246$		M1M1M1
	$3n - 10 = 256$		M1M1M0
	$3n + 10 = 16$ (2^8 not seen)		M0M1M1
	$3n + 6 = 2^8$		M1M1M0
	256 – 22 = 234, 234 ÷ 3 (indicating common difference of 3)		M1M1M0
	$3n - 8 = 128$ (2^8 not seen)		M0M1M0

Q	Answer	Mark	Comments
8	$3n + 4$ or $4 + 3n$	B2	oe eg $7 + (3n - 3)$ B1 $3n$ (+ …) or $3n$ (– …)
	Additional Guidance		
	Ignore LHS of formula given eg $T_n = 3n + 4$		B2
	Condone $n = 3n + 4$ or nth term $= 3n + 4$		B2
	Allow a multiplication sign eg $3 \times n + 4$ or $n \times 3 + 4$		B2
	Allow other variables eg $3x + 4$		B2
	$3x$		B1
	$n3$ …		B1
	$n3 + 4$		B1
	$3n$th $+ 4$		B1
	$3n$th		B0
	$3n + 4n$		B0

Q	Answer	Mark	Comments
9(a)	15	B1	implied by 70 or 345
	(3rd term =) 70	B1ft	ft (their 15 – 1) × 5
	Additional Guidance		
	15 70 on answer line		B1B1
	15 and/or 70 seen but not final term eg Answer 345		B1B0
	Answer only 345		B1B0

Q	Answer	Mark	Comments
9(b)	50 × 2 or 100	M1	
	80	A1	SC1 120 or 5 or 60
	Additional Guidance		
	80, 50, … on answer line		M1A1
	80, 50, … in working with answer line blank		M1A1
	80, 50, … in working with 35 on answer line		M1A0
	$80 + 20 \div 2 = 50$ without answer 80 (embedded answer)		M1A0

Q	Answer	Mark	Comments
10	2 correct matches	B2	B1 for 1 correct match
	Additional Guidance		
	Mark intention		
	Matching to more than one box on the right is choice for that match		
			B2

Q	Answer	Mark	Comments
11(a)	$(x =)$ 10 and $(y =)$ 15	B2	B1 $(x =)$ 10 or $(y =)$ 15
	Additional Guidance		
			B2

x	0	2	4	6	8	10
y	3	7	11	15	19	23

Q	Answer	Mark	Comments
12	2015 2011 2007 or 2016 2013 2010 (2007) or 4 × 3 or 12 (years)	M1	12 is implied by an answer $2019 - 12n$ or $2019 + 12n$ where n is a positive integer
	2007	A1	accept 07
	Additional Guidance		
	Allow the years to be written with two digits for M1 eg 15 11 (0)7		
	15 11 (0)7 Answer 07	M1A1	
	15 11 (0)7 Answer 7	M1A0	
	Answer 7 without M1 awarded	M0A0	
	Answer 1995 or 1983 or 2031 or 2043	M1A0	
	Ignore any errors in a list after 2007 eg 2015 2011 2007 2004	M1	
	Ignore any errors in a list after 2010 eg 2016 2013 2010 2006	M1	

Q	Answer	Mark	Comments
13(a)	**Alternative method 1**		
	20	B3	B2 53 or $33+20$ or $73-20$ or $\frac{73-33}{2}$ or $\frac{40}{2}$ B1 $73-33$ or 40
	Alternative method 2		
	$33+x$ or $73-x$	M1	oe
	$x+33+x=73$ or $2x+33=73$ or $\frac{73-33}{2}$ or $\frac{40}{2}$	M1dep	oe eg $33+x=73-x$
	20	A1	
	Additional Guidance		
	$33+x=73$		M1

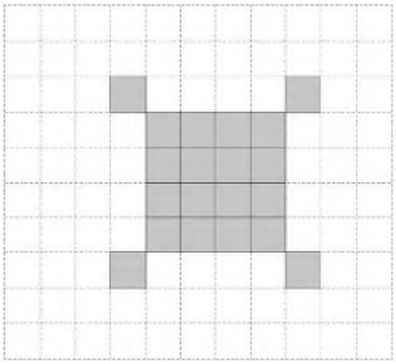
Q	Answer	Mark	Comments
13(b)	No and gives valid reason	B1	eg No and the first term is zero or No and $1 - 1^2 = 0$ or No and all the terms are negative except the first
	Additional Guidance		
	Ignore incorrect or irrelevant statements alongside correct statements		
	Ignore all other statements and evaluations if $1 - 1^2 = 0$ seen		
	Ticks Yes		B0
	No and 0, –2, –6, …		B1
	No and $1 - 1^2 = 0$ with $2 - 1^2 = 1$		B1
	No and $1 = 1^2$		B1
	No and $1 - 1 = 0$ (0 is positive) (condone)		B1
	No and n^2 can be equal to n and $1^2 = 1$		B1
	No and n^2 can be equal to n		B0
	No and n could equal 1 which cannot become bigger when squared		B1
	No and if you put $n = 1$ it's not negative		B1
	No and $n = 1$ and $n^2 = 1$		B1
	No, all the terms are negative except when $n = 1$		B1
	No and if $n = 1$ it creates 0		B1
	No, not when $n = 1$		B0
	No, it doesn't work for the first term		B0
	No and $0.5 - 0.5^2 = 0.25$		B0
	No and when $n = 0$ it won't be negative		B0

Q	Answer	Mark	Comments
14	39 – 10 or 29	M1	oe
	their 29 – 10 or 19 or $19n$	M1dep	oe 39 – 10 – 10 implies M1M1 (3rd term =) 48 implies M1M1 may be implied by the difference, after their 2nd term, consistently being the correct 19 $19n$ may be seen as part of $19n + b$
	their 29 + 3 × their 19 or 10 + 4 × their 19 or substitutes $n = 5$ into expression of the form their $19n + b$	M1dep	oe (4th term =) 67 implies M1M1M1 b must be an integer
	86	A1	SC1 107 or 137 using Fibonacci SC1 126 using difference of 29
	Additional Guidance		
	3rd mark must be a correct method for working out the 5th term		
	Going past the 5th term eg 10, 29, 48, 67, 86, 105, without answer 86		M1M1M1A0
	10 + 19 = 39 10, 39, 58, 77, 96 (not the correct 19 being added)		M0

Q	Answer	Mark	Comments
15	$3n - 1$	B2	oe eg $2 + (3n - 3)$ B1 $3n + c$ where c can be any value
	Additional Guidance		
	Ignore LHS of formula given eg $T_n = 3n - 1$		B2
	Condone $n = 3n - 1$ or nth term $= 3n - 1$		B2
	Allow a multiplication sign eg $3 \times n - 1$ or $n \times 3 - 1$		B2
	Allow other variables eg $3x - 1$		B2
	$3n + - 1$		B1
	$3x$		B1
	$n3$ ...		B1
	$n3 - 1$		B1
	$3n$th $- 1$		B1
	$3n$th		B0
	$n3 - 1n$		B0

Q	Answer	Mark	Comments
16(a)	23	B1	ignore further terms

Q	Answer	Mark	Comments
16(b)	add 6	B1ft	accept $+ 6$ ft their 23 or correct answer
	Additional Guidance		
	20 in part (a) answer $+ 3$		B1ft
	34 in part (a) answer $\times 2$		B1ft

Q	Answer	Mark	Comments
17(a)		B1	
	Additional Guidance		
	Mark intention, condone missing interior lines		
	Shading not required		

Q	Answer	Mark	Comments
17(b)	23	B1	