

Topic 16 Sequences and functions (Pre-TT) [48] MARKSCHEME

1.

(a) $4n + 1$ B2

oe

Accept $n \times 4 + 1$

$4n + 1$ B1 for any of these:

$n^4 + 1$

$4n \pm c$ with $c \neq 0$

(b) 81 or 85 seen B1

$T_{20} = 81$, next term is 85 B1

oe

alternative

$4n + 1 = 83$ B1

82 not divisible by 4 (oe) B1

SCI for: $4n \pm c = 83 \Rightarrow n$ not a whole number

or T_{20} and T_{21} from their $4n \pm c$

[4]

2.

(a) $\frac{5}{11}, \frac{10}{15}, \frac{15}{9}$ B2

- lee.oo

(b) 7th M1,A1

M1 for $5n = 4n + 7$

A1 cao

[4]

3.

(a) Second differences = 2 so coefficient of n^2 is 1 [B1]

Attempt to find the rest of the formula: [M1]

E.g. $1 + b + c = 5$ gives $b + c = 4$

$4 + 2b + c = 11$ gives $2b + c = 7$

Either $b = 3$ or $c = 1$ [A1]

Formula is $n^2 + 3n + 1$ [A1]

(b)

$n^2 + 3n + 1 = 341$

Rearrange to put equal to zero: $n^2 + 3n - 340 = 0$ [M1]

Attempt to solve the quadratic or trial and error (at least 2 values) [M1]

Yes, it does lie in the sequence (17th term in the sequence) [A1]

4.

(a)	1 nfw 10 nfw	2 1 AO1.2 1 AO1.3a	B1 for each	FT their ' u_2 ' for u_3
(b)	5 nfw 2 nfw 5 nfw	3 1 AO1.2 1 AO1.3a 1 AO2.1a	B1 for each	FT their ' u_2 ' for u_3

5.

Lists at least three terms from first sequence between 20 and 40	M1	eg 21, 23, 25, ...
Lists at least three terms from second sequence between 20 and 40	M1	eg 20, 23, 26,...
23 29 35	A1	SC2 for any two correct with at most one incorrect SC1 for any one correct with at most two incorrect

6.

(a)	(i)	-1	2 1 A01.3a 1 A03.1a	M1 for use of - 5 and + 2 soi Or M1 for answer 3	
	(ii)	-5	3 1 A01.3a 2 A03.1a	M1 for $2x + 5$ M1 for $x = \textit{their}$ ' $2x + 5$ ' and solve	
(b)		5, 10	3 1 A01.3a 2 A03.1a	M1 for $3a + b = 5$ and $7a + b = 25$ M1 for attempt to solve Or M1 input increases by 4; output increases by 20 M1 so one box must have $\times 5$ for the arithmetic sequence	Condone $\frac{x^2+1}{2}$ across the two boxes for 3 marks

7.

- (a) $13 + 4$ or diagram 4 drawn M1
oe
- (b) $4n + 1$ A1
B1 for $4n + c$ or $n4 + 1$
B0 for $n4 + c$
unless notation already penalised in 11(c)
fw ignore if numerical term
fw deduct B1 if incorrect algebra
B2
- (c) $4n + 1 = 201$ or $(201 - 1)$ M1
ft their (a) for M marks (not $n + 4$)
- $4n = 200$ or $201 \div 4$ M1
Accept reasonable attempt at complete build up method for M2
- 50 A1

[7]

8.

(a)	8, 13, 21,	34	B1 cao
(b)	$a, b, a + b, a + 2b, 2a + 3b$	Shown	M1 Method to show by adding pairs of successive terms $a + 2b, 2a + 3b$ shown C1
(c)	$3a + 5b = 29$ $a + b = 7$ $3a + 3b = 21$ $b = 4, a = 3$	$a = 3$ $b = 4$	P1 Process to set up two equations P1 Process to solve equations A1

9.

Second differences = 4 so coefficient of n^2 is 2 [B1]

Attempt to find the rest of the formula: [M1]

E.g. $2 + b + c = -8$ gives $b + c = -10$

$8 + 2b + c = 2$ gives $2b + c = -6$

Either $b = 4$ or $c = -14$ [A1]

Formula is $2n^2 + 4n - 14$ [A1]