

$$\text{ii) } 4\frac{1}{2}, 5, 5\frac{1}{2}$$

$$\text{iii) } T_n = \frac{1}{2}n + 2$$

$$\text{iv) } T_{10} = 7$$

$$\text{ii) } -1\frac{3}{4}, -1\frac{1}{2}, -1\frac{1}{4}$$

$$\text{iii) } T_n = \frac{1}{4}n - 3$$

$$\text{iv) } T_{10} = -\frac{1}{2}$$

2. a)

Segment	1	2	3	4	5	6	7
Boards	6	5	5	5	5	5	5
Total Boards	6	11	16	21	26	31	36

b) As the fence increases by 1 segment the number of boards in total increases by 5.

$$T_n = 5n + 1$$

$$\text{c) } T_{20} = 5(20) + 1$$

$$T_{20} = 101$$

$$\text{d) } 136 = 5n + 1$$

$$135 = 5n$$

$$\therefore n = 27$$

e) i) 6 (first segment); 10 (second segment); 14 (third segment); 18 (fourth segment)

$$\text{ii) } T_n = 4n + 2$$

$$\text{iii) } T_{20} = 4(20) + 2$$

$$T_{20} = 82$$

$$\therefore \text{He will save } 101 - 82$$

$$= 19 \text{ boards.}$$

3. a) Add $1\frac{1}{4}$ to the previous term.

$$\text{b) } T_n = 1\frac{1}{4}n - 3$$

$$\text{c) } T_5 = 1\frac{1}{4}(5) - 3$$

$$T_5 = 3\frac{1}{4}$$

$$T_9 = 1\frac{1}{4}(9) - 3$$

$$T_9 = 8\frac{1}{4}$$

$$T_{13} = 1\frac{1}{4}(13) - 3$$

$$T_{13} = 13\frac{1}{4}$$

$$\text{d) } 14\frac{1}{2} = 1\frac{1}{4}n - 3$$

$$17\frac{1}{2} = 1\frac{1}{4}n$$

$$\therefore n = 14$$

e) Let position = $x - 1$ and term = x

$$\therefore x = 1\frac{1}{4}(x - 1) - 3$$

$$\therefore x = 1\frac{1}{4}x - 1\frac{1}{4} - 3$$

$$\therefore x - 1\frac{1}{4}x = -4\frac{1}{4}$$

$$\therefore -\frac{1}{4}x = -4\frac{1}{4}$$

$$\therefore x = 17$$

\therefore Term = 17 and position is 16.

4. a) $T_n = 2^n + 1$
 i) 3, 5, 9
 ii) $T_{11} = 2049$
 iii) not arithmetic
 iv) N/A
- b) $T_{n+1} = 2T_n - n; T_1 = 9$
 i) 9, 16, 29
 ii) not necessary but if tried $-T_{11} = 349$
 iii) not arithmetic
 iv) N/A

- c) $T_n = 3n + 4$
 i) 7, 10, 13
 ii) $T_{11} = 37$
 iii) Arithmetic
 iv) 3
- d) $T_n = n^2 - 2n + 3$
 i) 2, 3, 6
 ii) $T_{11} = 102$
 iii) Not arithmetic
 iv) N/A
- e) $T_n = \frac{1}{2}n - 4$
 i) $-3\frac{1}{2}, -3, -2\frac{1}{2}$
 ii) $T_{11} = 1\frac{1}{2}$
 iii) Arithmetic
 iv) $\frac{1}{2}$

- f) $T_{n+1} = T_n + 3; T_1 = 5$
 i) 5, 8, 11
 ii) $T_{11} = 35$
 iii) Arithmetic
 iv) 3
- g) $T_n = 3^n - 1$
 i) 2, 8, 26
 ii) $T_{11} = 177146$
 iii) not arithmetic
 iv) N/A
- h) $T_n = n(n + 1)$
 i) 2, 6, 12
 ii) $T_{11} = 132$
 iii) not arithmetic
 iv) N/A

- i) $T_{n+1} = T_n - T_{n-1}$ where $T_1 = 3$ and $T_2 = 8$
 i) 3, 8, 5
 ii) not necessary but if tried: $T_{11} = -307$
 iii) Not arithmetic
 iv) N/A

- j) $T_n = 4n - 3$
 i) 1, 5, 9
 ii) $T_{11} = 41$
 iii) Arithmetic
 iv) 4

5. The uneven term is very easy as the uneven term pattern is a repeating 6: 6, even, 6, even, 6...

$$\therefore T_{31} = 6$$

For the even terms the pattern is odd, -4, odd, 1, odd, 6...

Therefore the formula for the pattern is $T_n = 5n - 9$

$$\text{And } \therefore T_{30} = 5(30) - 9$$

$$T_{30} = 141.$$