Topic 2: Patterns/Sequences

1) Arithmetic Sequences/Series:

a) Linear Sequences:

- A list of numbers where the **difference** between **each term** is the **same** every time.
  E.g. 3, 8, 13, 18, ...
- The **general term of a sequence** (T_n) is a formula that can be used to find the value of any term of the sequence.
- We can also find it by observing the sequence and figuring out the pattern.

Example: Find the general term for the sequence 3, 8, 13, 18.....

Common Difference = +5

Term Number	Pattern	Term Value
1	5(1)-2	3
2	5(2)-2	8
3	5(3)-2	13
4	5(4)-2	18
n	5(n)-2	5n-2

=> General Term: T_n = 5n - 2

- Once we have the General Term, we can find ANY term in the sequence.
  E.g. What is 50th term?
  T_{50} = 5(50) - 2
  = 248
- The general term also allows us to work back and find what term number a value would be.
  E.g. What term would 458 be?
  T_n = 458
  5n - 2 = 458
  5n = 458 + 2
  5n = 460
  n = 92 => 92nd term

b) Quadratic Sequences:

- A sequence where the **second difference** is the **same** every time.
  E.g. 4, 7, 12, 19, 28..... (see below)