Leaving cert Ordinary Maths paper 1

Arithmetic and Geometric Progressions (AP'S and GP's).

This is a nice easy topic, very small amount of information required to answer the question.

Main Points: **A sequence** is an array of numbers or letters whose pattern is based on some rule. Example 1,3,5,7,9… or 2,4,6,8,10,……..these are sequences the elements of the sequence are called the **terms** of the sequence $1 = T_1, 3 = T_2, 5 = T_3$,

A **series** is the sum of a sequence (in English an **array of terms separated by plus signs**) Example 1+3+5+7+9+…….
General Term T_n this is an expression in n which represents every term of the sequence or series, to find a particular term **just replace n by the number of the term**.

Example the general term T_n of the sequence 1,3,5,7,9…. is 2n-1, try it out! For n = 1 $T_1 = 2(1) - 1 = 1$, n = 2 we get 2(2) - 1 = 3.

S_n The sum of the first n terms of a series. This is what you get when you add up n terms
Example Given the Series 1+3+7+9. $S_4 = 16$. The $S_n = n^2$

Progression this word is used to describe a sequence or a series.

Arithmetic Progression (**AP**) this is a series/sequence where a constant is **added** to each term to give the next term. The name of this constant is the **common difference**; the symbol for this constant is **d.**
If $T_1 = a, T_2 = a + d, T_3 = a + 2d, T_4 = a + 3d$, etc.
The following bits of information are required to answer questions **on Arithmetic Progressions.**

(1) $T_2 - T_1 = T_3 - T_2 = d$ (2) $T_n = a + (n-1)d$ (3) $S_n = \frac{n}{2}\{2a + (n-1)d\}$

Geometric Progressions (GP): this is a series/sequence where each term is **multiplied** by a constant to give the next term. This constant is called the **common ratio**; the symbol for the common ratio is **r**.

If $T_1 = a, T_2 = ar, T_3 = ar^2$

The following bits of information are required to answer questions on **Geometric Progressions.**

(1) $\frac{T_2}{T_1} = \frac{T_3}{T_2} = r,. \Rightarrow (T_2)^2 = T_1 T_3$ **(2)** $T_n = ar^{n-1}$

(3) $S_n = \frac{a(1-r^n)}{1-r}, r < 1,.. S_n = \frac{a(r^n - 1)}{r-1}, r > 1$