

Sequences and Progressions

CBSE Class 9 Maths · Knowledge organiser

KEY DEFINITIONS

Sequence

A list of numbers in a definite order: $a_1, a_2, a_3, \dots$

Arithmetic progression

A sequence that adds the same number d , the common difference, each time.

Recursive rule

Gives the first term and how each term comes from the one before.

YOU SHOULD BE ABLE TO...

- Continue a pattern, spot an AP or a GP and find a term from an explicit or recursive rule.
- Find which term has a given value, find a and d from two terms and add $1 + 2 + \dots + n$.
- Model salaries, seating and growth with APs and GPs and answer every part of a case study.
- Reason about fractals, the Tower of Hanoi and sums with exclusions such as 'not multiples of 5'.

COMMON MISTAKES

- ✗ $a_n = a + nd$ instead of $a + (n - 1)d$; similarly ar^n instead of ar^{n-1} .
- ✗ Calling a sequence an AP from its first two terms only: check that every difference is the same.
- ✗ Ratio taken as $\frac{a_1}{a_2}$ instead of $\frac{a_2}{a_1}$.
- ✗ Accepting a non-integer n when asked "which term": then the number is not a term.

KEY FORMULAS

AP; GP $a_n = a + (n - 1)d$; $a_n = ar^{n-1}$

Sum of naturals; $1 + 2 + \dots + n = \frac{n(n+1)}{2}$;
of odd numbers $1 + 3 + \dots + (2n - 1) = n^2$

Fibonacci; Tower $F_{n+1} = F_n + F_{n-1}$;
of Hanoi $M_n = 2M_{n-1} + 1 = 2^n - 1$

WORKED EXAMPLE

Which term of the AP 4, 11, 18, ... is 144?

$$4 + 7(n - 1) = 144 \Rightarrow n - 1 = 20 \Rightarrow n = 21.$$