

Sequences and Series

CBSE Class 11 Maths · Knowledge organiser

KEY DEFINITIONS

Geometric progression

A sequence where each term is the previous one times a fixed ratio r .

Arithmetic mean

The AM of a and b is $(a + b)/2$.

Geometric mean

The GM of positive a and b is $\sqrt{ab}$.

KEY FORMULAS

$$\text{GP} \quad a_n = ar^{n-1}, \quad S_n = \frac{a(r^n - 1)}{r - 1} \quad (r \neq 1)$$

$$\text{Infinite GP, } |r| < 1 \quad S_\infty = \frac{a}{1-r}$$

$$\text{AM, GM; } A \geq G \quad A = \frac{a+b}{2}, \quad G = \sqrt{ab}$$

YOU SHOULD BE ABLE TO...

- Find terms, sums and sums to infinity of GPs and the AM and GM of two numbers.
- Find a GP from two of its terms, insert means and convert recurring decimals.
- Sum series built from GPs and model bouncing balls and savings plans.
- Use $AM \geq GM$ and combine conditions on S_∞ and partial sums.

WORKED EXAMPLE

Find the sum of the first 7 terms of 2, 6, 18, ...

$$S_7 = \frac{2(3^7 - 1)}{3 - 1} = 3^7 - 1 = 2186.$$

COMMON MISTAKES

- ✗ $a_n = ar^n$ instead of ar^{n-1} .
- ✗ Using S_∞ when $|r| \geq 1$: the sum does not exist.
- ✗ Taking the ratio as $\frac{a_1}{a_2}$ instead of $\frac{a_2}{a_1}$, especially with negative ratios.
- ✗ Forgetting that the GM needs positive numbers.