Class 11 Maths Chapter 8: Sequences and Series - Notes, Important Questions and MCQs (2026-27)

Free PDF notes from Nextoper.in | Session 2026-27 | Read online:
https://nextoper.in/class-11-maths-chapter-8-pdf-notes/

Class 11 Maths Chapter 8, Sequences and Series, studies ordered lists of numbers that follow a pattern and the sums of their terms.

These notes cover sequences and series, arithmetic progression and arithmetic mean, geometric progression, its general term, sum of n terms, infinite GP, geometric mean and the relation between AM and GM.

Use the table of contents below to jump to the part you need, or read top to bottom for a complete revision of the chapter.

Table of Contents

- Chapter Overview
- Important Topics and Concepts
- AP vs GP Formula Sheet
- Important Definitions and Terms
- Short Answer Questions
- Long Answer Questions
- MCQs with Answers
- Quick Revision Points
- Chapter Summary
- Exam Tips and PYQ Pattern
- Frequently Asked Questions
- Conclusion

Want notes for every chapter? Explore the full Class 11 Maths notes on Nextoper, arranged book-wise and chapter-wise.

Chapter Overview

A sequence is an ordered list of numbers a_1, a_2, a_3, ... defined by a rule. The sum $a_1 + a_2 + a_3 + \ldots$ is a series.

Two important sequences are the arithmetic progression (constant difference) and the geometric progression (constant ratio). They model savings, population growth, depreciation and much more.

Important Topics and Concepts

Sequences and Series

- A sequence is a function whose domain is the set of natural numbers (or a subset {1, 2, ..., k}).

- Finite sequences have a limited number of terms; infinite sequences do not end.
- The nth term a_n is the general term; e.g. $a_n = 2n + 1$ gives 3, 5, 7, ...
- The Fibonacci sequence: $a_1 = a_2 = 1$, $a_n = a_{n-1} + a_{n-2}$ for $n > 2$.
- A series is written using sigma notation: Σa_k.

Arithmetic Progression (AP) and Arithmetic Mean

- AP: a, a + d, a + 2d, ...; nth term $a_n = a + (n - 1)d$.
- Sum of n terms: $S_n = n/2 [2a + (n - 1)d] = n/2 (a + l)$.
- Arithmetic mean of a and b: $A = (a + b)/2$.
- To insert n AMs between a and b: $d = (b - a)/(n + 1)$.

Geometric Progression (GP)

- A sequence is a GP if each term after the first is obtained by multiplying the previous term by a constant non-zero number r, the common ratio.
- GP: a, ar, ar^2, ar^3, ...
- General term: $a_n = ar^{n-1}$.
- Examples: 2, 6, 18, 54 ... (r = 3); 1, −1/2, 1/4 ... (r = −1/2).

Sum of n Terms of a GP

- $S_n = a(r^n - 1)/(r - 1)$ when $r > 1$, or $a(1 - r^n)/(1 - r)$ when $r < 1$ ($r \neq 1$).
- If r = 1, $S_n = na$.
- Example: sum of first 6 terms of 2, 6, 18, ... $= 2(3^6 - 1)/(3 - 1) = 728$.

Infinite GP and Its Sum

- If $|r| < 1$, $r^n \to 0$ as $n \to \infty$, so the sum of the infinite GP is $S\infty = a/(1 - r)$.
- Example: $1 + 1/2 + 1/4 + \ldots = 1/(1 - 1/2) = 2$.
- If $|r| \geq 1$, the infinite GP does not have a finite sum.
- Recurring decimals can be written as fractions using infinite GP, e.g. 0.333... = 3/10 + 3/100 + ... = 1/3.

Geometric Mean and AM–GM Relation

- Geometric mean of positive numbers a and b: $G = \sqrt{(ab)}$.
- To insert n GMs between a and b: r = (b/a)^(1/(n+1)).
- $A \geq G$: for positive a and b, $(a + b)/2 \geq \sqrt{(ab)}$, with equality when a = b.
- Proof: $A - G = (a + b)/2 - \sqrt{(ab)} = (\sqrt{a} - \sqrt{b})^2/2 \geq 0$.
- If A and G are AM and GM of two numbers, the numbers are $A \pm \sqrt{((A + G)(A - G))}$.

AP vs GP Formula Sheet

Item	Arithmetic Progression	Geometric Progression
Defining property	Constant difference d	Constant ratio r
General term	$a + (n - 1)d$	ar^{n-1}
Sum of n terms	$n/2 [2a + (n - 1)d]$	$a(r^n - 1)/(r - 1)$, $r \neq 1$
Infinite sum	Not finite ($d \neq 0$)	$a/(1 - r)$, $\|r\| < 1$
Mean of a and b	$(a + b)/2$	$\sqrt{(ab)}$
Inserting n means	$d = (b - a)/(n + 1)$	r = (b/a)^(1/(n+1))

Important Definitions and Terms

Term	Meaning
Sequence	An ordered list of numbers following a rule.
Series	Sum of the terms of a sequence.
AP	Sequence with a constant difference.
GP	Sequence with a constant ratio.
Common ratio	$r = a_{n+1}/a_n$ in a GP.
Arithmetic mean	$(a + b)/2$.
Geometric mean	$\sqrt{(ab)}$.
Infinite GP	GP with infinitely many terms.
Fibonacci sequence	Each term is the sum of the previous two.

Short Answer Questions

Q1. Find the 10th term of the GP 5, 25, 125, ...

$a = 5$, $r = 5$, $a_{10} = 5 \times 5^9 = 5^{10}$.

Q2. Which term of the GP 2, $2\sqrt{2}$, 4, ... is 128?

$2(\sqrt{2})^{n-1} = 128 \Rightarrow (\sqrt{2})^{n-1} = 64 = (\sqrt{2})^{12} \Rightarrow n = 13$.

Q3. Find the sum of the first 7 terms of 1, 3, 9, ...

$(3^7 - 1)/2 = 1093$.

Q4. Find the sum to infinity of $1 - 1/3 + 1/9 - \ldots$

$a = 1$, $r = -1/3$, $S_\infty = 1/(1 + 1/3) = 3/4$.

Q5. Find the GM of 4 and 9.

$\sqrt{36} = 6$.

Q6. Insert 3 AMs between 3 and 19.

$d = (19 - 3)/4 = 4$; AMs are 7, 11, 15.

Q7. Write the first 5 terms of $a_n = n(n + 2)$.

3, 8, 15, 24, 35.

Q8. Express 0.444... as a fraction.

$4/10 + 4/100 + \ldots = (4/10)/(1 - 1/10) = 4/9$.

Long Answer Questions

Q1. Insert two numbers between 3 and 81 so that the sequence is a GP.

Let the GP be 3, G_1, G_2, 81. Then $81 = 3r^3$, so $r^3 = 27$ and $r = 3$.

$G_1 = 3 \times 3 = 9$ and $G_2 = 9 \times 3 = 27$.

The numbers are 9 and 27.

Let a, b > 0 with A = (a + b)/2 and G = √(ab).

A − G = (a + b − 2√(ab))/2 = (√a − √b)²/2.

A square is non-negative, so A − G ≥ 0, i.e. A ≥ G; equality holds when a = b.

Q3. The sum of first three terms of a GP is 39/10 and their product is 1. Find the terms.

Let the terms be a/r, a, ar. Product $a^3 = 1 \Rightarrow a = 1$.

Sum: $1/r + 1 + r = 39/10 \Rightarrow 10r^2 - 29r + 10 = 0 \Rightarrow r = 5/2$ or 2/5.

The terms are 2/5, 1, 5/2 (or 5/2, 1, 2/5).

MCQs with Answers

1. nth term of a GP:(a) a + (n−1)d (b) ar^n (c) ar^{n-1} (d) a/r^nAnswer: (c) ar^{n-1}

2. Sum to infinity exists when:(a) r > 1 (b) |r| < 1 (c) r = 1 (d) r = −1Answer: (b) |r| < 1

3. GM of 2 and 8:(a) 4 (b) 5 (c) 16 (d) 6Answer: (a) 4

4. AM of 2 and 8:(a) 4 (b) 5 (c) 10 (d) 6Answer: (b) 5

5. For positive a ≠ b:(a) A < G (b) A = G (c) A > G (d) No relationAnswer: (c) A > G

6. S∞ of 1 + 1/2 + 1/4 + ...(a) 1 (b) 2 (c) 3 (d) ∞Answer: (b) 2

7. Common ratio of 3, −6, 12, ...(a) 2 (b) −2 (c) 3 (d) −3Answer: (b) −2

8. S_n of GP with r = 1:(a) n (b) na (c) a (d) 0Answer: (b) na

9. Fibonacci 6th term (1,1,...):(a) 5 (b) 8 (c) 13 (d) 6Answer: (b) 8

10. 0.777... =(a) 7/10 (b) 7/9 (c) 77/100 (d) 7/99Answer: (b) 7/9

Quick Revision Points

- Sequence – ordered list; series – sum.
- AP: $a_n = a + (n-1)d$; $S_n = n/2[2a + (n-1)d]$.
- AM = (a + b)/2.
- GP: $a_n = ar^{n-1}$.
- $S_n = a(r^n - 1)/(r - 1)$, r ≠ 1; $S_n = na$ if r = 1.
- $S_\infty = a/(1 - r)$, |r| < 1.
- GM = √(ab).
- n GMs: r = (b/a)^(1/(n+1)).
- A ≥ G; equality when a = b.
- Recurring decimals via infinite GP.

Chapter Summary

Sequences are ordered lists of numbers and series are their sums. In an arithmetic progression terms differ by a constant, and the arithmetic mean of two numbers is their average.

In a geometric progression each term is multiplied by a constant ratio; its nth term is ar^{n-1} and its sum of n terms is $a(r^n - 1)/(r - 1)$. An infinite GP with |r| < 1 sums to $a/(1 - r)$. The geometric mean √(ab) never exceeds the arithmetic mean.

Exam Tips and PYQ Pattern

- Identify AP or GP by checking differences and ratios.
- For three terms in GP, take a/r, a, ar to simplify.
- Check |r| < 1 before using the infinite sum formula.
- Use AM ≥ GM for inequality proofs.
- Learn the AP vs GP formula sheet.
- Express recurring decimals using infinite GP.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the NCERT Class 11 Mathematics textbook, prescribed in the CBSE 2026-27 syllabus.

Can I download these notes as a PDF?

Yes. Use the free PDF link at the top of this page – no signup needed.

What is the formula for the sum of an infinite GP?

$S_\infty = a/(1 - r)$, valid only when $|r| < 1$.

What is the relation between AM and GM?

For positive numbers, AM ≥ GM, with equality when the numbers are equal.

How do you insert geometric means?

Find r = (b/a)^(1/(n+1)) and multiply successively from a.

Conclusion

Sequences and Series is highly scoring with clear formulas. Use the AP vs GP sheet, practise word problems and download the free PDF.

More Notes: Class 11 Maths Chapter 7: Binomial Theorem notes | Class 11 Maths Chapter 9: Straight Lines notes | All Class 11 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE maths educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 11 Maths textbook, Mathematics (Class XI) (NCERT reprint 2026-27, rationalised syllabus), and the CBSE syllabus for the 2026-27 session. Last checked on 28 November 2026.