MATHS BASE MAKER

Class 9 CBSE Mathematics | Ganita Manjari

Chapter 8: Exploring Sequences and Progressions

STUDENT PRACTICE WORKSHEET (concept + questions)

PART 1: MASTER CONCEPTS & PROGRESSION RULES AT A GLANCE

Sequence & Position	• Sequence: An ordered list of numbers formed according to a specific pattern. • Term: Each individual number inside a sequence. • Position (n): Place value of a term (1st position, 2nd position, etc.).
Finite vs. Infinite Sequence	• Finite Sequence: A sequence that has a fixed, countable number of terms (e.g., 2, 4, 6, 8, 10). • Infinite Sequence: A sequence that goes on forever without ending (e.g., 2, 4, 6, 8, ...).
Explicit vs. Recursive Rule	• Explicit Rule: Mathematical formula calculating any term a_n directly from its position n. • Recursive Rule: Rule describing a sequence by relating each new term to its preceding term(s).
Virahanka-Fibonacci Sequence	A sequence where each new term is found by adding the two preceding terms together: 1, 1, 2, 3, 5, 8, 13, 21, ... (where $t_n = t_{n-1} + t_{n-2}$)
Arithmetic Progression (AP)	A sequence where each term changes by a constant addition/subtraction (common difference d): • General form: a, a + d, a + 2d, a + 3d, ... • General n-th term formula: $a_n = a + (n - 1)d$
Sum of First n Natural Numbers	Formula for the sum of consecutive integers from 1 to n: $S_n = [n(n + 1)] / 2$
Sum of Terms in an AP	For an AP with first term 'a', common difference 'd', and last term 'l':

	$S_n = (n / 2) [2a + (n – 1)d]$ or $S_n = (n / 2) [a + l]$
Geometric Progression (GP)	A sequence where each subsequent term is obtained by multiplying the preceding term by a non-zero constant (common ratio r): • General form: a, ar, ar^2, ar^3, ... • General n-th term formula: $a_n = a \cdot r^{n-1}$ (or $t_n = a \cdot r^{n-1}$)

PART 2: PRACTICE QUESTIONS (WITH FINAL ANSWERS)

Watch the Complete Chapter 8 Solutions on YouTube

https://youtu.be/WMLP5pd2AG0

Question 1: Belonging to an Explicit Sequence

Check whether 43 or 90 belongs to the sequence whose general term is given by $a_n = 8n + 3$.

Final Answer: 43 belongs to the sequence (it is the 5th term, n = 5); 90 does not belong (n = 10.875 is not an integer).

Question 2: First Five Terms Using Recursive Rule

The sequence of numbers is defined by the recursive rule: $a_1 = 10$, and $a_n = a_{n-1} – 3$ (for all n > 1). Write down the first five terms of this sequence.

Final Answer: First five terms are: 10, 7, 4, 1, –2

Question 3: Virahanka-Fibonacci Missing Term

In the Virahanka-Fibonacci sequence 1, 1, 2, 3, 5, X, 13, 21, ..., find the value of the missing term X.

Final Answer: X = 8 (3 + 5 = 8)

Question 4: Virahanka-Fibonacci 7th Term

The first two terms of a sequence are given as $t_1 = 1$ and $t_2 = 1$. If the sequence continues as 1, 1, 2, 3, 5, 8, ..., what is the value of the 7th term?

Final Answer: 7th term (t_7) = 13 (5 + 8 = 13)

Question 5: Real-Life Online Learning Platform Model

A student joins an online learning platform. The platform charges a one-time fixed registration fee of ₹500, with a monthly subscription fee of ₹150.

(i) Is this sequence an Arithmetic Progression (AP)?

(ii) What will be the total amount paid for one year (12 months)?
(iii) Represent the total cost in terms of n months.

Final Answer: (i) Yes, it forms an AP (common difference d = ₹150)
(ii) ₹2,300 for one year [500 + 12(150) = 500 + 1800 = 2300]
(iii) C(n) = 500 + 150n

Question 6: Sum of Natural Numbers from 11 to 30

Find the sum of the consecutive natural numbers from 11 to 30 using the sum formula $S_n = [n(n + 1)] / 2$.

Final Answer: Sum = 410 [$S_{30} - S_{10} = (30 \times 31)/2 - (10 \times 11)/2 = 465 - 55 = 410$]

Question 7: Two-Digit Multiples of 7

(i) How many 2-digit numbers are divisible by 7?
(ii) What is the sum of all these 2-digit numbers?

Final Answer: (i) 13 numbers [14 to 98 => 98 = 14 + (n – 1)7 => n = 13]
(ii) Sum = 728 [S = (13/2)(14 + 98) = 13 × 56 = 728]

Question 8: Finding Term Number in an AP

Which term of the Arithmetic Progression 3, 8, 13, ... is 88?

Final Answer: 18th term (n = 18) [88 = 3 + (n – 1)5 => 85 = 5(n – 1) => n = 18]

Question 9: Finding Specific Term of a GP

Find the 6th term of the Geometric Progression: 5, 15, 45, ...

Final Answer: t_6 = 1,215 [a = 5, r = 3 => $t_6 = 5 \times 3^5 = 5 \times 243 = 1215$]

Question 10: Checking Membership in a GP

Check if the number 100 belongs to the Geometric Progression: 2, 6, 18, ...

Final Answer: No, 100 does not belong to this GP ($3^{n-1} = 50$ has no integer solution; $3^3 = 27$, $3^4 = 81$).

Question 11: GP Term & Dual Formulas (Explicit + Recursive)

Which term of the GP: 5, 10, 20, ... is 1280? Also write the explicit formula as well as the recursive formula for this sequence.

Final Answer: Term: 9th term (n = 9) [$1280 = 5 \times 2^{n-1}$ => $256 = 2^8$ => n = 9]
Explicit Formula: $a_n = 5 \cdot 2^{n-1}$
Recursive Formula: $a_1 = 5$, and $a_n = 2 \cdot a_{n-1}$ for n > 1

Video solution on YouTube

https://youtu.be/WMLP5pd2AG0