



Class 9 Maths – Chapter 8



End-of-Chapter Exercises – Questions with Answer Key

Ganita Manjari | New Syllabus 2026–27

The textbook has **15 End-of-Chapter Exercises**. Questions marked ★ are higher-order-thinking questions.

1. Find the 31st Term of an AP

Question: The 11th term of an AP is 38 and the 16th term is 73. Find the 31st term.



Solution:

$$t_{11} = a + 10d = 38$$

$$t_{16} = a + 15d = 73$$

Subtract:

$$5d = 35$$

$$d = 7$$

Now:

$$a + 10(7) = 38$$

$$a = -32$$

31st term:

$$t_{31} = a + 30d$$

$$= -32 + 30(7)$$

$$= -32 + 210$$

$$= 178$$

✓ **Answer: 178**

2. Determine the AP

Question: The third term of an AP is 16 and its 7th term exceeds its 5th term by 12.

 **Solution:**

$$t_3 = a + 2d = 16$$

Given:

$$t_7 - t_5 = 12$$

$$(a + 6d) - (a + 4d) = 12$$

$$2d = 12$$

$$d = 6$$

Therefore:

$$a + 2(6) = 16$$

$$a = 4$$

✓ **Answer:**

AP = 4, 10, 16, 22, 28, ...

$$a = 4, d = 6$$

3. Three-Digit Numbers Divisible by 7

Question: How many three-digit numbers are divisible by 7?

 **Solution:**

Smallest three-digit multiple of 7:

105

Largest three-digit multiple of 7:

994

This forms an AP:

105, 112, 119, ..., 994

Here:

$$a = 105$$

$$d = 7$$

$$l = 994$$

Using:

$$l = a + (n - 1)d$$

$$994 = 105 + (n - 1)7$$

$$889 = 7(n - 1)$$

$$127 = n - 1$$

$$n = 128$$

 **Answer: 128 three-digit numbers**

4. Multiples of 4

Question: How many multiples of 4 lie between 10 and 250?

 **Solution:**

First multiple of 4 greater than 10:

12

Last multiple less than 250:

248

AP:

12, 16, 20, ..., 248

$$a = 12$$

$$d = 4$$

$$l = 248$$

$$248 = 12 + (n - 1)4$$

$$236 = 4(n - 1)$$

$$59 = n - 1$$

$$n = 60$$

✓ **Answer: 60 multiples**

5. ★ Find a GP

Question: Find a GP for which the sum of the first two terms is -4 and the fifth term is 4 times the third term.

Let first term = a and common ratio = r .

First two terms:

$$a + ar = -4$$

So:

$$a(1 + r) = -4 \dots(1)$$

Given:

$$t_5 = 4t_3$$

$$ar^4 = 4ar^2$$

Therefore:

$$r^2 = 4$$

So:

$$r = 2 \text{ or } r = -2$$

Case 1: $r = 2$

$$a(1 + 2) = -4$$

$$3a = -4$$

$$a = -4/3$$

GP:

$$-4/3, -8/3, -16/3, -32/3, -64/3, \dots$$

Case 2: $r = -2$

$$a(1 - 2) = -4$$

$$-a = -4$$

$$a = 4$$

GP:

$$4, -8, 16, -32, 64, \dots$$

 **Answer:**

Two possible GPs:

$$-4/3, -8/3, -16/3, \dots$$

or

$$4, -8, 16, -32, \dots$$

6. Express 100 as Consecutive Natural Numbers

Question: Find all possible ways of expressing 100 as the sum of consecutive natural numbers.

 **Answer:**

The possible expressions are:

$$100$$

$$18 + 19 + 20 + 21 + 22 = 100$$

$$9 + 10 + 11 + 12 + 13 + 14 + 15 + 16 = 100$$

Therefore:

 **Answers:**

$$100$$

$$18 + 19 + 20 + 21 + 22$$

$$9 + 10 + 11 + 12 + 13 + 14 + 15 + 16$$

7. Bacteria Growth

Question: A culture doubles every hour. Initially there are 30 bacteria. How many bacteria are present at the end of the 2nd hour, 4th hour and nth hour?

The sequence is:

$$30, 60, 120, 240, 480, \dots$$

This is a GP.

$$a = 30$$

$$r = 2$$

2nd hour:

$$30 \times 2^2 = 120$$

4th hour:

$$30 \times 2^4 = 480$$

nth hour:

$$30 \times 2^n$$

✓ **Answers:**

2nd hour = 120 bacteria

4th hour = 480 bacteria

nth hour = 30×2^n bacteria

8. ★ Find the First Three Terms of an AP

Question: The sum of the 4th and 8th terms is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms.

Let the first term be **a** and common difference be **d**.

$$t_4 + t_8 = 24$$

$$(a + 3d) + (a + 7d) = 24$$

$$\mathbf{2a + 10d = 24}$$

Therefore:

$$\mathbf{a + 5d = 12 \dots(1)}$$

Similarly:

$$t_6 + t_{10} = 44$$

$$(a + 5d) + (a + 9d) = 44$$

$$\mathbf{2a + 14d = 44}$$

Therefore:

$$a + 7d = 22 \dots(2)$$

Subtract:

$$2d = 10$$

$$d = 5$$

From (1):

$$a + 25 = 12$$

$$a = -13$$

First three terms:

$$-13, -8, -3$$

✓ **Answer:**

$$-13, -8, -3$$

9. ★ Sum of Natural Numbers

Question: Find the smallest value of n such that the sum of the first n natural numbers is greater than 1000.

Sum:

$$n(n + 1)/2 > 1000$$

Try $n = 44$:

$$44 \times 45 / 2$$

$$= 990$$

Not greater than 1000.

Try $n = 45$:

$$45 \times 46 / 2$$

$$= 1035$$

Therefore:

✓ **Answer:**

$$n = 45$$

10. ★ Find the Term of a GP

Question: Which term of the GP 2, 8, 32, ... is 131072? Write the explicit and recursive formulas.

$$a = 2$$

$$r = 8/2 = 4$$

Explicit formula:

$$t_n = 2 \times 4^{n-1}$$

We need:

$$2 \times 4^{n-1} = 131072$$

Therefore:

$$4^{n-1} = 65536$$

Since:

$$65536 = 4^8$$

$$n - 1 = 8$$

$$n = 9$$

Explicit formula:

$$t_n = 2 \times 4^{n-1}$$

Recursive formula:

$$t_1 = 2$$

$$t_n = 4t_{n-1}$$

✓ **Answer:**

131072 is the 9th term.

11. ★ GP – Sum and Product

Question: The sum of the first three terms of a GP is **13/12** and their product is **-1**. Find the common ratio and the terms.

Let the terms be:

$$a, ar, ar^2$$

Given:

$$a + ar + ar^2 = 13/12$$

and:

$$a \times ar \times ar^2 = -1$$

So:

$$a^3 r^3 = -1$$

Therefore:

$$ar = -1$$

Hence:

$$a = -1/r$$

Substitute in the sum:

$$-1/r - 1 - r = 13/12$$

Solving gives:

$$r = -3/4 \text{ or } -4/3$$

Case 1:

$$r = -3/4$$

$$a = 4/3$$

Terms:

$$4/3, -1, 3/4$$

Case 2:

$$r = -4/3$$

$$a = 3/4$$

Terms:

$$3/4, -1, 4/3$$

✓ **Answer:**

Common ratio = $-3/4$, terms $4/3, -1, 3/4$

or

Common ratio = $-4/3$, terms $3/4, -1, 4/3$

12. ★ Prove Three Terms Are in GP

Question: If the 4th, 10th and 16th terms of a GP are x , y and z respectively, prove that x , y and z are in GP.

Let the first term be a and common ratio be r .

Then:

$$x = ar^3$$

$$y = ar^9$$

$$z = ar^{15}$$

For x, y and z to be in GP:

$$y^2 = xz$$

Now:

$$y^2 = (ar^9)^2$$

$$= a^2r^{18}$$

And:

$$xz = ar^3 \times ar^{15}$$

$$= a^2r^{18}$$

Therefore:

$$y^2 = xz$$

Hence:

✓ **Answer:**

x, y and z are in GP.

13. ★ GP – Sum and Sum of Squares

Question: The sum of the first three terms of a GP is **26**, and the sum of their squares is **364**. Find the terms.

Let the terms be:

$$a, ar, ar^2$$

Their sum:

$$a(1 + r + r^2) = 26$$

Sum of squares:

$$a^2(1 + r^2 + r^4) = 364$$

Solving these equations gives the GP:

✓ **Answer:**

2, 6, 18

Check:

$$2 + 6 + 18 = \mathbf{26}$$

$$2^2 + 6^2 + 18^2$$

$$= 4 + 36 + 324$$

$$= \mathbf{364}$$

So:

$$\mathbf{a = 2, r = 3}$$

14. ★ Recursive Sequence

Given:

$$\mathbf{P_1 = 1}$$

$$\mathbf{P_2 = 2}$$

and for $n > 2$:

$$\mathbf{P_n = P_1 + P_2 + \dots + P_{n-1} + 1}$$

Find P_1 to P_8 , a simpler recursive formula and an explicit formula.

✎ **Terms:**

$$\mathbf{P_1 = 1}$$

$$\mathbf{P_2 = 2}$$

$$\mathbf{P_3 = 1 + 2 + 1 = 4}$$

$$\mathbf{P_4 = 1 + 2 + 4 + 1 = 8}$$

$$\mathbf{P_5 = 16}$$

$$P_6 = 32$$

$$P_7 = 64$$

$$P_8 = 128$$

Sequence:

1, 2, 4, 8, 16, 32, 64, 128

Simpler recursive rule:

$$P_1 = 1$$

$$P_n = 2P_{n-1}$$

Explicit formula:

$$P_n = 2^{n-1}$$



Answer:

P_1 to $P_8 = 1, 2, 4, 8, 16, 32, 64, 128$

Recursive: $P_n = 2P_{n-1}$

Explicit: $P_n = 2^{n-1}$

15. Fibonacci-Type Sequence

Given:

$$W_1 = 1$$

$$W_2 = 2$$

and for $n > 2$:

$$W_n = W_1 + W_2 + \dots + W_{n-2} + 2$$

Find W_1 to W_8 . Do you recognise the sequence?



Terms:

$$W_1 = 1$$

$$W_2 = 2$$

$$W_3 = W_1 + 2 = 3$$

$$W_4 = W_1 + W_2 + 2$$

$$= 1 + 2 + 2$$

$$= 5$$

$$W_5 = 1 + 2 + 3 + 2$$

$$= 8$$

$$W_6 = 1 + 2 + 3 + 5 + 2$$

$$= 13$$

$$W_7 = 21$$

$$W_8 = 34$$

Sequence:

1, 2, 3, 5, 8, 13, 21, 34

This is the **Fibonacci sequence shifted by one starting value** (often called the Fibonacci-type sequence).

It also satisfies the simpler recursive rule:

$$W_n = W_{n-1} + W_{n-2}$$



Answer:

W_1 to $W_8 = 1, 2, 3, 5, 8, 13, 21, 34$

Simpler recursive rule:

$$W_n = W_{n-1} + W_{n-2}$$



COMPLETE ANSWER KEY

Q.	Answer
1	178
2	AP: 4, 10, 16, 22, ...
3	128
4	60
5	$-4/3, -8/3, -16/3, \dots$ OR 4, -8, 16, -32, ...
6	100; $18+19+20+21+22$; $9+10+11+12+13+14+15+16$
7	120, 480, 30×2^n
8	-13, -8, -3
9	45
10	9th term; $t_n = 2 \times 4^{n-1}$
11	$r = -3/4$ or $-4/3$
12	x, y, z are in GP
13	2, 6, 18
14	1, 2, 4, 8, 16, 32, 64, 128; $P_n = 2^{n-1}$
15	1, 2, 3, 5, 8, 13, 21, 34

★ Chapter 8 Final Revision

 AP nth term:

$$t_n = a + (n - 1)d$$

 GP nth term:

$$t_n = ar^{n-1}$$

✚ Sum of first n natural numbers:

$$n(n + 1)/2$$

 AP: Constant difference

 GP: Constant ratio

 **Fibonacci-type sequence:**

$$W_n = W_{n-1} + W_{n-2}$$

The textbook summary distinguishes **explicit formulas** (using n directly) from **recursive formulas** (using previous terms), which is central to Questions 14 and 15.