



Class 9 Maths – Chapter 8



Exercise 8.3 – Geometric Progressions (GP)

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Exercise Set 8.3 contains 7 questions.

1. Find the 12th Term

Question: Find the 12th term of a GP with common ratio 2, whose 8th term is 192.



Solution:

For a GP:

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

Given:

$$r = 2$$

$$t_8 = 192$$

Therefore:

$$192 = a \times 2^7$$

$$192 = 128a$$

$$a = 192/128$$

$$a = 3/2$$

Now:

$$t_{12} = (3/2) \times 2^{11}$$

$$= 3 \times 2^{10}$$

$$= 3 \times 1024$$

$$= 3072$$

✓ **Answer:**

$$\text{12th term} = 3072$$

2. Find the 10th and nth Terms

Question: Find the 10th and nth terms of the GP:

5, 25, 125, ...

 **Solution:**

First term:

$$a = 5$$

Common ratio:

$$r = 25/5 = 5$$

Formula:

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

Therefore:

$$t_n = 5 \times 5^{n-1}$$

$$= 5^n$$

10th term:

$$t_{10} = 5^{10}$$

$$= 9,765,625$$

✓ **Answer:**

$$\text{10th term} = 9,765,625$$

$$\text{nth term} = 5^n$$

3. Recursive Sequence

Question: A sequence is given by:

$$t_1 = 2$$

$$t_{n+1} = 3t_n - 2$$

Which term of the sequence is **730**?



Solution:

$$t_1 = 2$$

$$t_2 = 3(2) - 2 = 4$$

$$t_3 = 3(4) - 2 = 10$$

$$t_4 = 3(10) - 2 = 28$$

$$t_5 = 3(28) - 2 = 82$$

$$t_6 = 3(82) - 2 = 244$$

$$t_7 = 3(244) - 2 = 730$$



Answer:

730 is the 7th term.

4. Find the Term of a GP

Question: Which term of the GP

2, 6, 18, ...

is 4374?

Also write the **explicit formula** and **recursive formula**.

 Solution:

First term:

$$a = 2$$

Common ratio:

$$r = 6/2 = 3$$

Explicit formula:

$$t_n = 2 \times 3^{n-1}$$

Put $t_n = 4374$:

$$4374 = 2 \times 3^{n-1}$$

$$3^{n-1} = 2187$$

Since:

$$2187 = 3^7$$

Therefore:

$$n - 1 = 7$$

$$n = 8$$

 Answer:

4374 is the 8th term.

 Explicit formula:

$$t_n = 2 \times 3^{n-1}$$

 Recursive formula:

$$t_1 = 2$$

$$t_n = 3t_{n-1}$$

5. Bouncing Ball

A ball is dropped from a height of **80 m**.

After hitting the ground, it bounces back to **60%** of the height from which it fell.

(i) What height does the ball reach after the 5th bounce?

The bounce heights form a GP:

48, 28.8, 17.28, 10.368, ...

Here:

$$a = 48$$

$$r = 0.6$$

For the 5th bounce:

$$t_5 = 48 \times (0.6)^4$$

$$= 48 \times 0.1296$$

$$= \mathbf{6.2208 \text{ m}}$$

 **Answer:**

Height after 5th bounce = 6.2208 m

(ii) Total vertical distance travelled by the time it hits the ground for the 6th time

Initial downward journey:

80 m

The ball then travels upward and downward for each bounce.

Bounce heights:

1st = 48 m

2nd = 28.8 m

3rd = 17.28 m

$$4\text{th} = 10.368 \text{ m}$$

$$5\text{th} = 6.2208 \text{ m}$$

For the 6th hit, it also rises after the 5th hit and falls again. The required distance is:

$$80 + 2(48 + 28.8 + 17.28 + 10.368 + 6.2208)$$

$$= 80 + 2(110.6688)$$

$$= 301.3376 \text{ m}$$

✓ **Answer:**

Total distance = 301.3376 m

6. ★ Radical GP

Question: Which term of the sequence

$$2\sqrt{2}, 4, 4\sqrt{2}, \dots$$

is **128**?

✎ **Solution:**

First term:

$$a = 2\sqrt{2}$$

Common ratio:

$$r = 4/(2\sqrt{2})$$

$$= \sqrt{2}$$

So:

$$t_n = 2\sqrt{2}(\sqrt{2})^{n-1}$$

We need:

$$2\sqrt{2}(\sqrt{2})^{n-1} = 128$$

This simplifies to:

$$2^{n+1/2} = 2^7$$

Therefore:

$$n + 1/2 = 7$$

$$n = 13/2$$

Since n is not a natural number, **128 is not a term** of this sequence.

 **Important:**

The sequence as extracted from the textbook appears as “ $2\sqrt{2}$, 4, $4\sqrt{2}$, ...”, and the question asks which term is 128.

 **Answer:**

128 is NOT a term of the sequence.

7. Sierpiński Square Carpet

Question: Fig. 8.12 shows Stages 0 to 3 of the Sierpiński square carpet.

At every stage:

- Each square is divided into **9 equal squares**.
- The centre square is removed.
- Therefore, **8 squares remain** from each square.

 **Number of squares:**

Stage 0:

1

Stage 1:

8

Stage 2:

$$8^2 = 64$$

Stage 3:

$$8^3 = 512$$

Therefore, the sequence is:

1, 8, 64, 512, ...

This is a GP with:

$$a = 1$$

$$r = 8$$

nth term:

$$t_n = 8^{n-1}$$

 **Answer:**

Number of squares at Stage n = 8^n

The Sierpiński square carpet is introduced in the textbook immediately after Question 6.



COMPLETE ANSWER KEY

Q.	Answer
1	3072
2	10th = 9,765,625; nth = 5^n
3	730 is the 7th term
4	8th term; explicit: $2 \times 3^{n-1}$; recursive: $t_1=2$, $t_n=3t_{n-1}$
5(i)	6.2208 m
5(ii)	301.3376 m
6	128 is not a term

7 Stage n has 8^n squares

★ Must Remember

📌 GP nth term:

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

📌 Common ratio:

$$r = \text{second term} \div \text{first term}$$

📌 Recursive GP:

$$t_1 = a$$

$$t_n = r \times t_{n-1}$$

📌 AP $\rightarrow$ constant difference

📌 GP $\rightarrow$ constant ratio