MATHEMATICS · GRADES 10-12

Geometric sequences

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how quantities grow when they multiply by the same factor each step, like money earning interest or a social media post being shared again and again. A small change each step turns into a huge change over time, because every step builds on the last one. That is why interest on savings or a loan can grow so fast, why a rumour or a video can reach thousands of people in days, and why a disease can spread quickly once each person passes it on.



Rule

Geometric sequences: each term is the last term times the same fixed number, the common ratio.

A sequence is geometric when dividing any term by the one before it always gives the same number.

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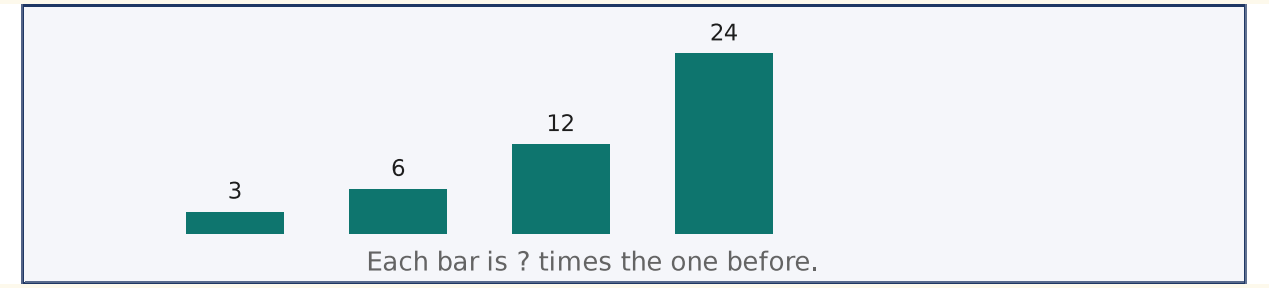
Worked examples

EXAMPLE 1

Q Is 3, 6, 12, 24 geometric?



SOLUTION

Divide neighbours: $\frac{6}{3} = 2$, $\frac{12}{6} = 2$, $\frac{24}{12} = 2$

The ratio is the same every time.

Yes, geometric with common ratio 2.

EXAMPLE 2

Q Find the next two terms of 100, 50, 25.

SOLUTION

The ratio is $\frac{50}{100} = \frac{1}{2}$

Multiply 25 by $\frac{1}{2}$ to get 12.5, then multiply by $\frac{1}{2}$ again to get 6.25.

The next two terms are 12.5 and 6.25.

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Practice questions

1 Is 2, 6, 18, 54 geometric?

A Yes

B No

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2 What is the common ratio of 2, 6, 18, 54?

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3 Find the next term of 5, 10, 20

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4 In the geometric sequence 3, 6, __, 24, what is the missing term?

- A 12
- B 18
- C 9
- D 15

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5 Find the next two terms of 81, 27, 9

- A 3 and 1
- B 1 and 3
- C 3 and 9
- D 27 and 9

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6 **What is the common ratio of 81, 27, 9?**

A 3

B $\frac{1}{3}$

C $\frac{1}{9}$

D 9

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7 **Find the next term of 1, -2, 4**

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8 What stays the same in a geometric sequence?

A The ratio between consecutive terms

B The difference between consecutive terms

C The first term

D The sum of the terms

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9 Find the next two terms of 10, 30, 90

A 810 and 270

B 270 and 810

C 120 and 150

D 180 and 270

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Is 1, 1, 1, 1 geometric?

A Yes, with common ratio 1

B No, because all the terms are the same

C Yes, with common ratio 0

D No, because the ratio is not defined

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ANSWER KEY

1. Yes

2. 3

3. 40

4. 12

5. 3 and 1

6. $\frac{1}{3}$

7. -8

8. The ratio between consecutive terms

9. 270 and 810

10. Yes, with common ratio 1

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