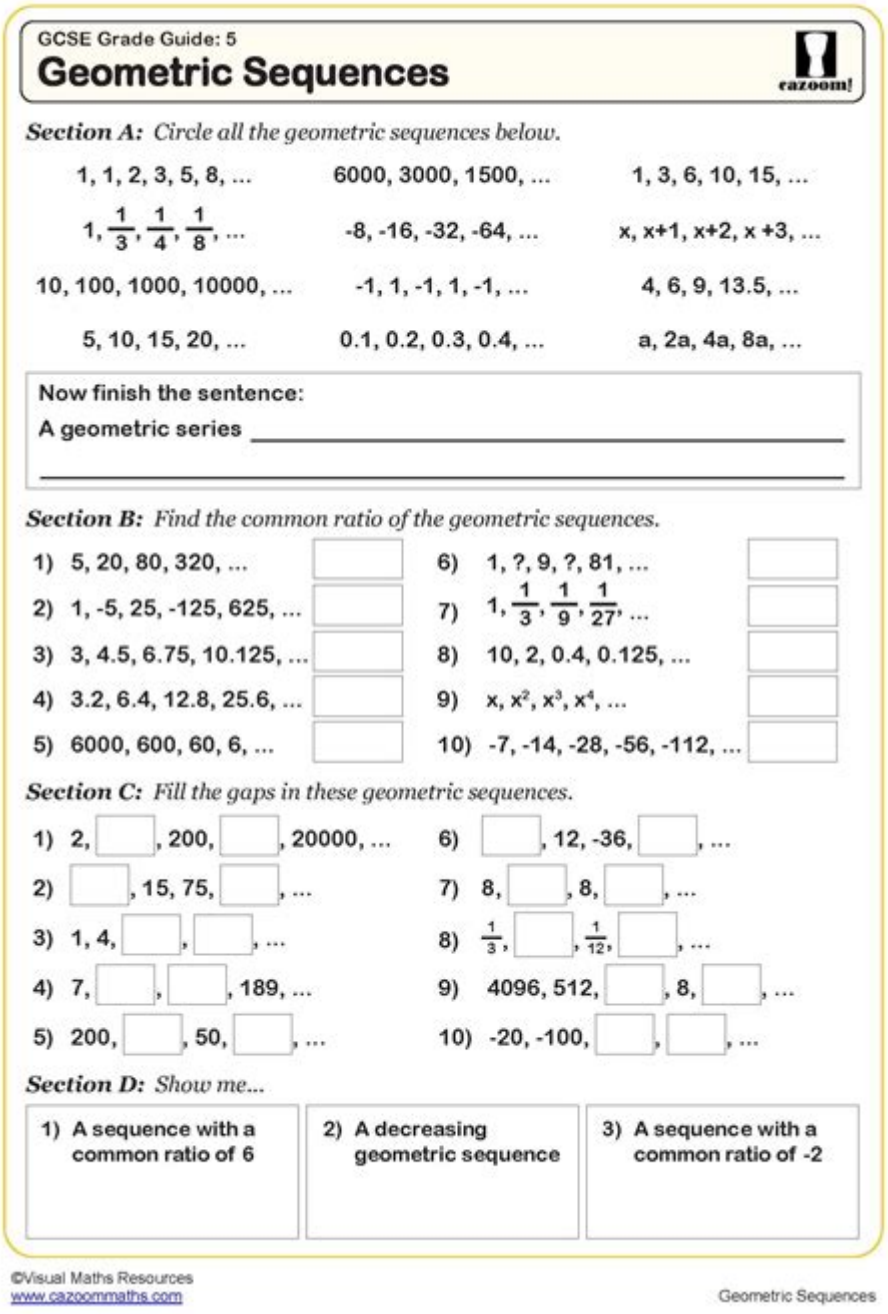
Geometric Sequence Worksheet With Answers



GCSE Grade Guide: 5

Geometric Sequences

cazoom!

Section A: *Circle all the geometric sequences below.*

1, 1, 2, 3, 5, 8, ...	6000, 3000, 1500, ...	1, 3, 6, 10, 15, ...
$1, \frac{1}{3}, \frac{1}{4}, \frac{1}{8}, \ldots$	-8, -16, -32, -64, ...	x, x+1, x+2, x +3, ...
10, 100, 1000, 10000, ...	-1, 1, -1, 1, -1, ...	4, 6, 9, 13.5, ...
5, 10, 15, 20, ...	0.1, 0.2, 0.3, 0.4, ...	a, 2a, 4a, 8a, ...

Now finish the sentence:

A geometric series _____

_____

Section B: *Find the common ratio of the geometric sequences.*

1)	5, 20, 80, 320, ...	6)	1, ?, 9, ?, 81, ...
2)	1, -5, 25, -125, 625, ...	7)	$1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$
3)	3, 4.5, 6.75, 10.125, ...	8)	10, 2, 0.4, 0.125, ...
4)	3.2, 6.4, 12.8, 25.6, ...	9)	$x, x^2, x^3, x^4, \ldots$
5)	6000, 600, 60, 6, ...	10)	-7, -14, -28, -56, -112, ...

Section C: *Fill the gaps in these geometric sequences.*

1)	2, ___, 200, ___, 20000, ...	6)	___, 12, -36, ___, ...
2)	___, 15, 75, ___, ...	7)	8, ___, 8, ___, ...
3)	1, 4, ___, ___, ...	8)	$\frac{1}{3}$, ___, $\frac{1}{12}$, ___, ...
4)	7, ___, ___, 189, ...	9)	4096, 512, ___, 8, ___, ...
5)	200, ___, 50, ___, ...	10)	-20, -100, ___, ___, ...

Section D: *Show me...*

1) A sequence with a common ratio of 6	2) A decreasing geometric sequence	3) A sequence with a common ratio of -2

Geometric Sequence Worksheet with Answers

A geometric sequence is a series of numbers where each term after the first is found by multiplying the previous term by a fixed, non-zero number called the common ratio. This mathematical concept is fundamental in various fields, including finance, biology, and computer science. In this article, we will

explore geometric sequences, provide a comprehensive worksheet with numerous problems, and present answers to enhance understanding.

Understanding Geometric Sequences

Definition

A geometric sequence can be defined mathematically as follows: if a is the first term and r is the common ratio, then the n-th term of a geometric sequence can be expressed as:

$$a_n = a \cdot r^{(n-1)}$$

where:
- a_n is the n-th term,
- a is the first term,
- r is the common ratio,
- n is the term number.

Examples of Geometric Sequences

1. Example 1: First term $a = 2$, common ratio $r = 3$
- Sequence: 2, 6, 18, 54, 162, ...

2. Example 2: First term $a = 5$, common ratio $r = 0.5$
- Sequence: 5, 2.5, 1.25, 0.625, ...

3. Example 3: First term $a = 1$, common ratio $r = -2$
- Sequence: 1, -2, 4, -8, 16, ...

Applications of Geometric Sequences

Geometric sequences have practical applications in a variety of fields:

1. Finance: Used to calculate compound interest.
2. Physics: Describing exponential decay or growth, such as radioactive decay.
3. Computer Science: Analyzing algorithms that have logarithmic time complexity.

Geometric Sequence Worksheet

In this section, we provide a worksheet containing problems related to geometric sequences. The worksheet is intended for students to practice and reinforce their understanding of the topic.

Worksheet Problems

Problem 1: Identify the first term and common ratio of the sequence: 4, 12, 36, 108, ...

Problem 2: Find the 5th term of the geometric sequence where the first term is 7 and the common ratio is 2.

Problem 3: Determine the common ratio and the 6th term of the sequence: 81, 27, 9, 3, ...

Problem 4: If the first term of a geometric sequence is 10, and the 4th term is 80, what is the common ratio?

Problem 5: Calculate the sum of the first 5 terms of the geometric sequence where the first term is 3 and the common ratio is 5.

Problem 6: Write the formula for the n-th term of a geometric sequence that starts with 1 and has a common ratio of -3.

Problem 7: Given the sequence: 1000, 500, 250, ... find the 7th term.

Problem 8: A geometric sequence has a first term of 2 and a common ratio of 1/2. Write the first six terms of the sequence.

Problem 9: If the 3rd term of a geometric sequence is 12 and the common ratio is 3, what is the first term?

Problem 10: Find the 10th term of a geometric sequence with a first term of 5 and a common ratio of 4.

Answers to the Worksheet Problems

Here we provide the answers to the problems listed in the worksheet above.

Answers

Answer 1:

- First term $a = 4$
- Common ratio $r = 3$

Answer 2:

- 5th term $a_5 = 7 \cdot 2^{(5-1)} = 7 \cdot 16 = 112$

Answer 3:

- Common ratio $r = \frac{27}{81} = \frac{1}{3}$

- 6th term $a_6 = 81 \cdot \left(\frac{1}{3}\right)^{(6-1)} = 81 \cdot \frac{1}{243} = \frac{1}{3}$

Answer 4:

- Let r be the common ratio.
- $a_1 = 10$
- $a_4 = 10 \cdot r^{(4-1)} = 80$
- $10r^3 = 80$
- $r^3 = 8$
- $r = 2$

Answer 5:

- Sum of first 5 terms $S_5 = a \frac{(1 - r^n)}{(1 - r)}$
- $S_5 = 3 \frac{(1 - 5^5)}{(1 - 5)} = 3 \frac{(1 - 3125)}{-4} = 3 \cdot 781 = 2343$

Answer 6:

- Formula: $a_n = 1 \cdot (-3)^{(n-1)}$

Answer 7:

- 7th term $a_7 = 1000 \cdot \left(\frac{1}{2}\right)^{(7-1)} = 1000 \cdot \frac{1}{64} = 15.625$

Answer 8:

- Sequence: 2, 1, 0.5, 0.25, 0.125, 0.0625

Answer 9:

- Let a be the first term.
- $a \cdot 3^2 = 12$
- $a \cdot 9 = 12$
- $a = \frac{12}{9} = \frac{4}{3}$

Answer 10:

- 10th term $a_{10} = 5 \cdot 4^{(10-1)} = 5 \cdot 262144 = 1310720$

Conclusion

Geometric sequences are a key concept in mathematics with practical applications across various fields. The worksheet provided in this article serves as a useful tool for students to practice their understanding of geometric sequences. By working through the problems and reviewing the answers, learners can solidify their comprehension and gain confidence in their mathematical abilities. As students engage with these concepts, they will find geometric sequences to be both fascinating and invaluable in their education and beyond.

Frequently Asked Questions

What is a geometric sequence?

A geometric sequence is a sequence of numbers where each term after the first is found by multiplying the previous term by a fixed, non-zero number called the common ratio.

How do you find the nth term of a geometric sequence?

The nth term of a geometric sequence can be found using the formula a_n = a_1 r^(n-1), where a_1 is the first term, r is the common ratio, and n is the term number.

What is the common ratio in a geometric sequence?

The common ratio is the factor by which we multiply each term to get the next term in the sequence. It can be found by dividing any term by the previous term.

What types of problems can be included in a geometric sequence worksheet?

A geometric sequence worksheet can include problems such as finding the nth term, determining the common ratio, solving for unknown terms, and word problems involving real-life applications of

geometric sequences.

Can a geometric sequence have a common ratio of zero?

No, a geometric sequence cannot have a common ratio of zero, as this would result in all terms after the first term being zero, which does not satisfy the definition of a geometric sequence.

How do you sum the first n terms of a geometric sequence?

The sum of the first n terms of a geometric sequence can be calculated using the formula S_n = a_1 (1 - r^n) / (1 - r), where S_n is the sum, a_1 is the first term, r is the common ratio, and n is the number of terms.

What are some common applications of geometric sequences?

Geometric sequences are commonly used in finance for calculating compound interest, in biology for modeling population growth, and in computer science for analyzing algorithm efficiency.

What should I include in the answers section of a geometric sequence worksheet?

The answers section should include step-by-step solutions to problems, explanations of how the answers were derived, and any relevant formulas used in the calculations.

Where can I find geometric sequence worksheets with answers?

Geometric sequence worksheets with answers can be found on educational websites, in math textbooks, or by searching for downloadable resources online that cater to specific grade levels and learning objectives.

Geometric Sequence Worksheet With Answers

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