Geometric Sequences

Algebra Worksheet · Grade 9–11

Name: _____ Date: _____

Learning Objectives

- Identify whether a sequence is geometric by finding a common ratio
- Apply the geometric sequence formula to find specific terms
- Solve for unknown values such as the first term, common ratio, or term number

Problems

1. Find the common ratio of the geometric sequence below.

$2,\ 6,\ 18,\ 54$

2. Determine whether the following sequence is a geometric sequence. Explain why or why not.

$4,\ 8,\ 16,\ 32$

3. Determine whether the following sequence is a geometric sequence. Explain why or why not.

$3,\ 6,\ 10,\ 15$

4. Find the 6th term of the geometric sequence below using the formula a sub n = a sub 1 times r to the power of (n minus 1).

$2,\ 6,\ 18,\ 54,\ \ldots$

5. Find the 8th term of the geometric sequence below.

$5,\ 10,\ 20,\ 40,\ \ldots$

6. Find the 5th term of the geometric sequence with a first term of 64 and a common ratio of one half.

$a_1 = 64,\ r = \frac{1}{2},\ n = 5$

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7. A geometric sequence has a first term of 7 and a common ratio of 3. Find the 7th term.

$a_1 = 7,\ r = 3,\ n = 7$

8. The 1st term of a geometric sequence is 4 and the 4th term is 108. Find the common ratio.

$a_1 = 4,\ a_4 = 108$

9. Which term of the geometric sequence below equals 1458?

$2,\ 6,\ 18,\ 54,\ \ldots$

10. A ball is dropped from a height of 81 meters. Each bounce reaches two thirds of the previous height. Find the height of the 5th bounce.

$a_1 = 81,\ r = \frac{2}{3},\ n = 5$

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Geometric Sequences — Answer Key

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Answer Key

1. Answer: r = 3

- Divide the second term by the first: 6 ÷ 2 = 3
- Verify: 18 ÷ 6 = 3 and 54 ÷ 18 = 3
- The common ratio is r = 3

2. Answer: Yes; r = 2

- Divide consecutive terms: 8 ÷ 4 = 2
- 16 ÷ 8 = 2 and 32 ÷ 16 = 2
- All quotients are equal, so the sequence is geometric with r = 2

3. Answer: No; no common ratio

- Divide consecutive terms: 6 ÷ 3 = 2
- 10 ÷ 6 ≈ 1.67 and 15 ÷ 10 = 1.5
- The ratios are not equal, so this is NOT a geometric sequence

4. Answer: a■ = 1458

- Identify: a■ = 2, r = 3, n = 6
- Apply formula: a■ = 2 × 3^(6–1) = 2 × 3^5
- 3^5 = 243
- a■ = 2 × 243 = 1458

5. Answer: a■ = 640

- Identify: a■ = 5, r = 2, n = 8
- Apply formula: a■ = 5 × 2^(8–1) = 5 × 2^7
- 2^7 = 128
- a■ = 5 × 128 = 640

6. Answer: a■ = 4

- Apply formula: a■ = 64 × (1/2)^(5–1) = 64 × (1/2)^4
- (1/2)^4 = 1/16
- a■ = 64 × (1/16) = 4

7. Answer: a■ = 5103

- Apply formula: a■ = 7 × 3^(7–1) = 7 × 3^6
- 3^6 = 729
- a■ = 7 × 729 = 5103

8. Answer: r = 3

- Use formula: a■ = a■ × r^(4–1)

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- 108 = 4 × r^3
- r^3 = 108 ÷ 4 = 27
- r = ■27 = 3

9. Answer: n = 7 (the 7th term)

- Identify: a■ = 2, r = 3, a■ = 1458
- Set up equation: 1458 = 2 × 3^(n–1)
- Divide both sides by 2: 3^(n–1) = 729
- Since 3^6 = 729, then n – 1 = 6, so n = 7

10. Answer: a■ = 16 meters

- Apply formula: a■ = 81 × (2/3)^(5–1) = 81 × (2/3)^4
- (2/3)^4 = 16/81
- a■ = 81 × (16/81) = 16
- The height of the 5th bounce is 16 meters

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