Review - Geometric Sequences

Part A — Understanding Geometric Sequences

1. What is a geometric sequence?

2. What is the common ratio? How do you find it?

3. The general term is $t_n = ar^{n-1}$. Define each variable.

4. What happens when the common ratio is:

   a) $r = 0$ b) $r = 1$ c) $r = -1$

Part B — Identifying and Extending Sequences

5. For each sequence, determine the common ratio and write the next **three terms**:

   a) 1, 5, 25, 125, … b) $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$ c) 1, −2, 4, −8, 16, …

6. Identify the first term and common ratio:

   a) 3, 12, 48, … b) 16, 8, 4, … c) $\frac{5}{3}, -\frac{10}{27}, \frac{20}{243}, \ldots$

7. Determine whether each sequence is geometric. If yes, state the common ratio:

   a) 2, 4, 6, 8, 10

   b) 0.25, 0.5, 1, 2, 4

   c) 0.75, −0.75, 0.75, −0.75

   d) $\frac{2}{3}, -\frac{1}{3}, \frac{1}{6}, -\frac{1}{12}, \frac{1}{24}$

   e) $\frac{27}{32}, \frac{9}{16}, \frac{3}{8}, \frac{1}{4}, \frac{1}{6}$

   f) 3, 6, 12, 24

Part C — Finding Terms

8. Find the 8th term: 3, 12, 48, 192, …

9. Given $a = -3, r = 5$, find t_4.

10. Given $t_3 = 12, t_5 = 48$, find t_4.

11. If the 4th term is 125 and the 9th term is $\frac{125}{32}$, find the 13th term.

12. If you multiply the 5th term by the common ratio 8 times, which term do you get?

Part D — Solving with Formulas

13. Find the number of terms in each sequence:

a) 6, 12, 24, … , 3072

b) 24, 12, 6, … , $\frac{3}{512}$

14. A geometric sequence has first term 19683 and common ratio $\frac{2}{3}$:

a) Find t_2 and t_6
b) Which term is equal to 20480?

15. In a geometric sequence, $t_6 = -160$ and $t_9 = 1280$. Find t_1.

16. In a geometric sequence, $t_5 = 160$ and $t_7 = 1440$:

a) How many possible sequences exist?
b) Find the common ratio(s)
c) Find the first term

Part E — Algebra with Sequences

17. Determine the value of x: $3, \quad 3^x, \quad 3^{x-5}$

18. Determine the value(s) of x: $x, \ \ 2x + 2, \ \ 3x + 3$

19. Insert two geometric values between 12 and 48.

20. If a, b, c are geometric, which of the following are also geometric?

a) $\frac{1}{a}, \ \frac{1}{b}, \ \frac{1}{c}$

b) $c, \ \ -b, \ \ a$

c) $3a, \ \ 3b, \ \ 3c$

21. If $x + 6, \quad 2x + 17, \quad 5x + 50$ are consecutive terms of a geometric sequence, find x.

Part F — Pattern Recognition (Challenge)

22. Determine if the following are geometric. If yes, find the common ratio:

$$\frac{a}{b}, \qquad -\frac{a^2}{b^3}, \qquad \frac{a^3}{b^6}, \ldots$$

23. Determine if the following sequence is geometric. If yes, find the common ratio:

$$a + b, \qquad a + b^2, \qquad a + b^3, \ldots$$

24. Determine if the following are geometric. If yes, find the common ratio:

$$a^2 b, \qquad \frac{b}{a^2}, \qquad a^2 b, \qquad \frac{b}{a^2}, \ldots$$

Part G — Additional Practice (Targeted)

25. Find the common ratio: $-6, -\frac{9}{2}, -\frac{27}{8}, \ldots$

26. In a geometric sequence, $t_3 = 20$, $t_6 = 0.16$. Find r.

27. Insert two geometric means between 12 and 48 and write the full sequence.

28. Explain how you can tell if a sequence is geometric without calculating every ratio.