

Geometric Sequence – A sequence of numbers where each term after the first is found by multiplying the previous one by the same number. That number is called the common ratio.

EX: 4, 20, 100, 500, 2500, ... $r = 5$

EX: 80, 40, 20, 10, 5, $5/2$... $r = 1/2$

EX: 3, -9, 27, -81, 243, ... $r = -3$

Determine if the sequence is geometric. If it is find the common ratio.

1. -1, 6, -36, 216, ...

2. -1, 1, 4, 8, ...

3. 4, 16, 36, 64, ...

4. -3, -15, -75, -375, ...

5. -6, -9, $-\frac{27}{2}$, $-\frac{81}{4}$, ...

6. 1, -5, 25, -125, ...

Write the first 5 terms of the geometric sequence.

EX $a_1 = 6, r = 2$

$$a_1 = 6, a_2 = 12, a_3 = 24, a_4 = 48, a_5 = 96$$

7. $a_1 = -2, r = 5$

8. $a_1 = 3, r = -2$

9. $a_1 = \frac{1}{4}, r = \frac{1}{2}$

10. $a_1 = 90, r = -\frac{1}{3}$

Recursive Rule – Using the previous term to find the current term.

$$a_1 = \text{first term} \quad a_{k+1} = r \cdot a_k$$

Use the recursive rule to write the first 5 terms.

EX: $a_1 = 2, a_{k+1} = 3 \cdot a_k$

$a_1 = 2$

$a_{1+1} = 3 \cdot a_1, \quad a_2 = 3 \cdot 2 = 6$

$a_2 = 6$

$a_{2+1} = 3 \cdot a_2, \quad a_3 = 3 \cdot 6 = 18$

$a_3 = 18$

$a_{3+1} = 3 \cdot a_3, \quad a_4 = 3 \cdot 18 = 54$

$a_4 = 54$

$a_{4+1} = 3 \cdot a_4, \quad a_5 = 3 \cdot 54 = 162$

$a_5 = 162$

11. $a_1 = 36, a_{k+1} = \frac{1}{2} \cdot a_k$

12. $a_1 = \frac{2}{3}, a_{k+1} = 3 \cdot a_k$

13. $a_1 = 4, a_{k+1} = -2 \cdot a_k$

14. $a_1 = -100, a_{k+1} = \frac{2}{5} \cdot a_k$

Explicit Rule – Designates the nth term of a sequence, as an expression of n (where n = the terms location).

$a_n = a_1(r)^{n-1}$ or $a_n = a_0(r)^n$ if the first term is a_0 not a_1

Write the explicit rule of the sequence.

EX $a_1 = 5, r = -3$

$a_n = 5(-3)^{n-1}$

$a_0 = 14, r = \frac{1}{2}$

$a_n = 14\left(\frac{1}{2}\right)^n$

$$15. a_1 = 8, r = 3$$

$$16. a_1 = -3, r = \frac{5}{3}$$

$$17. a_0 = \frac{7}{8}, r = 5$$

$$18. a_0 = \frac{1}{2}, r = -\frac{3}{4}$$

Write the explicit rule of each geometric sequence. Find the first terms of the sequence, and then find the 9th term.

$$19. a_1 = 64, r = \frac{1}{2}$$

$$20. a_1 = 3, r = -2$$

$$21. a_1 = -\frac{1}{4}, r = 2$$

$$22. a_1 = -2, r = -4$$

$$23. a_0 = 400, r = \frac{1}{5}$$

$$24. a_0 = 15, r = -2$$