

# Geometric Sequence Guide Notes

## Definition:

A **geometric progression** is a sequence of numbers in which each term, after the first, is obtained by multiplying the preceding number by a constant called **common ratio**. The element of a sequence is called **terms**.

## Notations for Geometric Sequence:

$a$  = first term

$n$  = number of terms

$S$  = sum of geometric sequence

$r$  = common ratio

$a_n$  =  $n$ th term

## Formula of Geometric Sequence:

$n$ th term of geometric sequence

$$a_n = ar^{n-1}$$

Sum of the first  $n$  term

a) 
$$S = \frac{a(1-r^n)}{1-r}, \quad r \neq 1$$

b) 
$$S = \frac{a-ra_n}{1-r}, \quad r \neq 1$$

Infinite Geometric Sequence

c) 
$$S = \frac{a}{r-1}, \quad r \neq 1$$

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**Sample Problem 1:** The first three terms of a geometric sequences are given. Find the next three terms of the following geometric sequences.

1. 2, 4, 8, ...

2.  $-3, 1, -\frac{1}{3}, \dots$

**Sample Problem 2:** Solve the following problems involving the nth term of geometric sequences.

3. Find the 6th term in the Geometric progression 3, 6, 12,...

4. Find the eight term in the geometric sequence 243, 81, 27,....

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**Sample Problem 3:** Find the fifth term of the following geometric sequence given their first term and the common ratio.

5.  $a = 3; r = 2$

6.  $a = 5; r = -1$

**Sample Problem 4:** Solve problem involving the sum of geometric sequence.

7. Solve for the sum of the first 6 term of a geometric sequence -1, -5, 25,...

8. The third term of a geometric sequence is 20 and the fifth term is 80 what is the second term?

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**Sample Problem 5:** Find the sum of an infinite geometric sequence

**11.** Find the sum of the terms of the infinite geometric sequence 125, 25, 5,.....

**12.** Find the sum of the infinite geometric sequence 64, -4,  $1/4$ ,...