

## 9-3 Geometric Sequences

**Objective:**

- To define, identify, and apply geometric sequences

**Common Core Content Standard:**

**Prepares you for A.SSE.4** Derive the formula for the sum of a geometric series (when the common ratio is not 1), and use the formula to solve problems.

You build a geometric sequence by \_\_\_\_\_ each term by a constant.

**Take note**

**Key Concept Geometric Sequence**

A **geometric sequence** with a starting value  $a$  and a **common ratio**  $r$  is a sequence of the form

$$a, ar, ar^2, ar^3, \dots$$

A recursive definition for the sequence has two parts:

$$a_1 = a \quad \text{initial condition}$$

$$a_n = a_{n-1} \cdot r, \text{ for } n > 1 \quad \text{recursive formula}$$

An explicit definition for this sequence is a single formula:

$$a_n = a_1 \cdot r^{n-1}, \text{ for } n \geq 1$$

**Example 1: Identifying Geometric Sequences**

Is the sequence arithmetic? If it is, what are  $a_1$  and  $r$ ?

a. 5, 10, 50, ...

b. -10, 6, -3.6, ...

**Example 2: Analyzing Geometric Sequences**

What are the indicated terms of the geometric sequence?

- a. the 10<sup>th</sup> term of the geometric sequence 4, 12, 35, ...
  
  
  
  
  
  
  
  
  
  
- b. the 2<sup>nd</sup> and 3<sup>rd</sup> terms of the sequence 2, ?, ?, 128, ...

**Example 3: Using the Geometric Sequence**

You work as a store manager and you need to clear some inventory. You decide to discount each item by 30% of the previous week's price until the entire inventory is sold. The original price of one item was \$60. What will be the cost of the item during the fifth week of the sale?

In a geometric sequence, the middle term or mean of the two positive numbers  $x$  and  $y$  is \_\_\_\_\_.

**Example 4:**

What are the possible values of the missing term of the geometric sequence 28, ?, 7?