Homework: pg 430 # 1, 2ac, 3, 4, 5, 6ace, 7, 8, 9, 11, 20, 22

## Introduction to Geometric Sequences

A ***geometric sequence*** is an ordered list of numbers such that each term is produced by multiplying the previous term by a constant.

The following are examples of geometric sequences:

a) 2, 6, 18, 54, …

b) 96, 48, 24, 12, 6, …

c) –3, 6, -12, 24, -48, …

The constant multiplier used to create subsequent terms is referred to as the ‘\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_’; the letter ‘r’ is used to represent this quantity. We will continue to use the letter ‘a’ to represent the first term.

**Example**

For each geometric sequence described above, determine the first term ‘a’ and the common ratio ‘r’.

a) b) c)

Consider the following geometric sequence:

### 5, 10, 20, 40, 80,….

a =

r =

This sequence can be written out as:

5, 5 x 2, 5 x 2 x 2, 5 x 2 x 2 x 2, 5 x 2 x 2 x 2 x 2, …

or

5 x 20, 5 x 21, 5 x 22, 5 x 23, 5 x 24, …

If we use the variables ‘a’ and ‘r’, we get…

ar0, ar1, ar2, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, …

Observing this sequence, it is possible to create a general formula and recursive formula for the nth term of a geometric sequence as follows.

# The general term of an Geometric Sequence

**tn =**

**where**

* **a is the first term**
* **r is the common ratio. It is found by dividing any two consecutive terms in the sequence ie; .**
* **n is the term number**

### **The recursive formula for a Geometric Sequence**

**t1 = , tn= , where n > 1**

### **Example 1**

Determine the recursive formula, the general term and the 8th term for each geometric sequence:

a) 5, -15, 45,… b) 1536, 768, 384, ….

## Example 2

The first term in a geometric sequence is 3 and the 5th term is 48.

What is the 10th term?

**Example 3**

The ninth term is 1792. The 12th term is 14336. What is the 15th term?