**Geometric Sequences and Series**

A sequence or series is Geometric if all of its successive terms have the same *common ratio*.

**Example #1**

128, 64, 32, 16, …

What is the common ratio between each of the terms? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

If it helps, draw arrows between each of the terms.

(Answer: ½ )

**Practice Problem #1**

Is the following sequence arithmetic or geometric? If possible, find the common ratio or difference.

8, 12, 18, 27

In order to be 100% sure whether the sequence is arithmetic or geometric you should find both the difference between each term and the ratio between each term.

Differences: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratios: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Arithmetic or Geometric? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Finding the nth term of a Geometric Sequence**

What if I asked you to find the 100th term of a sequence? That would take forever and you would not like it. Thankfully for you we have a general formula that will give us any nth term we want.

 where  is the first term and *r* is the common ratio.

**Example #2**

Find the 9th term of the arithmetic sequence –5, 10, –20, 40, …

*Step 1:* What is the common ratio? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Step 2:* Plug what you know into the formula and solve.

Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Problem #2**

Find the 10th term of the geometric sequence with a5 = 96 and a7 = 384.

(*Use the same formula, but now use what you know, i.e. what you were given.*)

Similar to finding a specific term of a sequence, you will also be asked to find the sum of series up to a certain point. This would also become very difficult if you were asked to find the sum of many consecutive numbers.

Just as before we will have a general formula that will help us solve these types of problems.

 , where 

**Example #3**

Find S8 for the geometric series 3 – 6 + 12 – 24 + …

*Step 1:* Find the common ratio.

Common Ratio = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Step 2:* Plug what you know into the formula and solve. (*Be careful with your negative signs!*)

Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Problem #1**

Find the indicated sum for the geometric series 

Even though it doesn’t look like it, this one is actually a little bit simpler. In order to find the sum we need to find two things, r and a1 . Once we have those we can find the sum.

To find a1 we need to plug 1 in for k.

What is a1? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now to find r, all we have to do is look back at our original formula. The *common* *ratio* “r” will be the thing in parenthesis.

What is r? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now plug all the parts you know into the formula to find the sum.

S6 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Come show your answer to me so I know you’re on the right track!!

You should now be able to say the following:

* I can recognize whether a sequence or series is geometric (**D1**)
* I can use the formula to find the nth term of a geometric sequence (**D2**)
* I can use the formula to calculate the sum of the first “n” terms of a geometric series (**D3**)

**Assignment: Practice B Worksheet + pg 895 #2-10, 14-18**