**Unit 1- Sequences and Series\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Lesson 1.5: Infinite Geometric Series**

Specific Outcome: 1. Analyze geometric sequences and series to solve problems.

 **Introductory Activity:**

Each student will need a blank white sheet of paper. Have students colour one half of the sheet and label it . Students will then colour half of the remaining white space, labeling it . Continue this for , , , and .

1) What kind of sequence have you modelled?

2) What are the first five terms?

3) Can you write the general formula for this sequence?

4) Ignoring physical limitations, could this sequence continue indefinitely?

5) What conclusion can you make about the area of the square that would remain unshaded as the number of terms in the sequence approaches infinity?

**Infinite Geometric Series**

2 + 6 + 18 + 54 + **. . .**

    

Its sequence of partial sums is \_\_\_, \_\_\_\_, \_\_\_, \_\_\_\_, **. . .**

It is rather obvious that the sum of this geometric series gets larger and larger as the number of terms ­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The sequence of partial sums \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The geometric series is therefore **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

****       

Its sequence of partial sums is 

As the number of terms \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the sequence of partial sums approaches a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of 4. This geometric series is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** and its sum is **4**.

A geometric series will be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ whenever **\_\_\_\_\_\_\_ < r < \_\_\_\_\_\_\_\_\_\_\_**

**Recall that the formula for the sum of a geometric series is:**

As *n* gets very large, the value of the *rn* approaches \_\_\_\_\_\_\_\_\_, for values of **r between -1 and 1.**

So, as *n* gets large, the partial sum *Sn*, approaches :

Therefore, the sum of an infinite geometric series is:

Where *t1* is

 *r* is

 S∞  represents

Examples:

 1. State whether the following infinite geometric series are divergent or convergent. State the sum of the series, if it exists

 a. 

 b. 2 + 2.4 + 2.88 + **. . .**

 c. 54 − 36 + 24 + **. . .**

 2. If  Find *t1*.

 3.  Find r.

 4. 2 + 10x + 50x2 + **. . .** has a sum of 8. What is the value of x? r?

**ASSIGNMENT:**

Pages 63 − 65 1 a, b, c 2 a, b, d , 3 a, 5 c, 6- 9, 16.