**Infinite Geometric Series**

Take out a sheet of paper. Suppose that the area of that sheet of paper is one unit2.

**Process:**

Cut that paper into three equal strips.

Create a left and right pile by placing one strip to the left and one to the right.

Take the third strip and tear it into 3 equal pieces placing one piece on the left pile and one piece on the right.

Repeat steps 1-3 until the piece “disappears”… i.e. gets too small to tear.

Questions:

What is happening to the middle piece?

Suppose you were to continue this process indefinitely, write down the series that the sum of the area of one pile represents (this should be an infinite sum of numbers)

Write the series above in sigma notation.

What is the sum of the series? (hint: remember that you started off with one unit and now think about how much of the original paper is now in that one pile)

Stop here and do the back of this page, then continue with this page when you are done.

In number 2 above, what is the value of a? What is the value of *r*?

Calculate the sum of this series by using the formula you just came up with on the back of this page.

What is the area of the paper in inches?

Use this area to rewrite the answers to problem #3-5.

*Infinite Geometric Series Formula*

You will now figure out the formula for the sum of a generic geometric series,

*a* + *ar* + *ar*2 + *ar*3 + …

Now let’s get the formula with our own brain power….

1. Suppose that *S =* *a* + *ar* + *ar*2 + *ar*3 + …

2. The sum of the geometric series above equals S. Take the above equation and multiply both sides by r. Write down your result below.

3. Using #1 and #2, write down the right hand side of the following equation.

S – rS =

4. Solve the above equation you wrote for S.

5. Write down your final formula below.

Use this formula to complete the front of the page.

Sum of an infinite geometric sequence: