A geometric sequence has a constant ratio, r, between terms.
Example: 3, 6, 12, 24, 48, 96, ,,, is a Geometric Sequence with r = 2.
In general, any geometric sequence has a general term: $a_n = a_1(r - 1)^n$
This gives the n^{th} term of a geometric sequence when the 1^{st} term is a_1.

The formula for the sum of the 1^{st} n terms of a geometric series is: $\frac{a_1(r^n - 1)}{r - 1}$

Geometric Series Sum of an infinite # of terms when $-1 < r < 1$: $\frac{a_1}{1 - r}$

Sigma Notation

$\sum_{i=1}^{n} 3i$ is an example of an Arithmetic Series: $3 + 6 + 9 + 12 + ... + (3n)$ has a constant difference of 3

$\sum_{i=1}^{n} 10\left(2^{i-1}\right)$ is an example of a Geometric Series: $10 + 20 + 40 + 80 + ... + 10(2^{n-1})$ has a constant ratio of 2

Formula for the sum of a Finite Geometric Series: $\frac{a_1(1-r^n)}{1-r}$

$\sum_{n=1}^{8} 6(2^{n-1}) = 6 + 12 + 24 + 48 + 96 + 192 + 384 + 768 = \frac{6\left(1-2^8\right)}{1-2} = 1530$

Formula for the sum of an Infinite Geometric Series where $|r| < 1$: $\frac{a_1}{1-r}$

$\sum_{n=1}^{\infty} 243\left(\frac{1}{3}\right)^{n-1} = 243 + 81 + 27 + 9 + ... = \frac{243}{1-1/3} = \frac{729}{2}$

$7 + 9 + 11 + 13 + 15 + ... + 571$ is a finite arithmetic series

Generator: $7 + (n - 1)2$ or $2n + 5$

Number of Terms: $2n + 5 = 571 \Rightarrow 2n = 566 \Rightarrow n = 283$

Sigma Notation: $\sum_{i=1}^{283} 2n + 5$

Sum: $\frac{283(7 + 571)}{2} = \frac{283(578)}{2} = \frac{163574}{2} = 81787$

Example of a sequence of partial sums:
Given a Series such as: $1 + 2 + 3 + 4 + 5 + 6 + \ldots$
The sequence of partial sums is: 1, 3, 6, 10, 15, 21, ….

Pre-Calculus 2 Assignment 225 Wednesday, March 25, 2015 Hour Name

1. Write the 1st five terms of $a_n = 4n - 7$

2. Write the 1st five terms of $a_n = \frac{2n}{n+1}$

3. Write the 1st five terms and the general term of the geometric sequence, where $a_1 = 6$ and $r = 3$.

4. Write the 1st five terms and the general term of the geometric sequence, where $a_1 = 4$ and $r = 2$.

5. Find the n^{th} term of the geometric sequence where $a_1 = 5$, $a_3 = \frac{45}{4}$, $n = 8$

6. 3, 36, 432, … Write in Sigma form, then find the 7^{th} term.

7. Find the 1st four terms of the sequence of partial sums for the sequence: 8, -4, 2, -1, ½, …

8. $\sum_{n=1}^{\infty} 16\left(\frac{1}{2}\right)^{n-1} =$

9. $\sum_{n=1}^{9} 2^{n-1} =$

10. $\sum_{n=1}^{9} (-2)^{n-1} =$