**7.5 – Arithmetic Series**

An arithmetic series is created by adding the terms of an arithmetic sequence. For the sequence 2, 10, 18, 26, …, the related arithmetic series would be 2 + 10 + 18 + 26 + …

In series notation, Sn, represents the sum of the first n terms of a series.

If you know the value of the first and last term as well as the number of terms, use the following formula to solve for the sum of the series:

Sn = $\frac{n(t\_{1}+ t\_{n})}{2}$

**Example One**

Determine the sum of the following arithmetic series. -31 – 35 – 39 – 43 - … - 403

If you know the first number, the common difference (skip count) and the number of terms then use the following formula to solve for the sum of the series:

Sn = $\frac{n\left[2a+ \left(n-1\right)d\right]}{2}$

**Example Two**

Determine the sum of the first 50 terms of the following series. 3 + 9 + 15 + 21 + 27 + …

**7.6 – Geometric Series**

A geometric series is created by adding the terms of a geometric sequence. For the sequence 3, 6, 12, 24, …, the related geometric series is, 3 + 6 + 12 + 24 + …

The Sum of a Geometric Sequence

If you know the first term (a) and the common ratio (r) use the formula:

 Sn = $\frac{a(r^{n}-1)}{r-1}$

**Example Three**

Determine the sum of the first 20 terms of the following series.

3 + 6 + 12 + 24 + …

If you are not given the number of terms, “n”, use the formula:

Sn = $\frac{t\_{n+1}- t\_{1}}{r-1}$, where tn+1 = r × tn

**Example Four**

Determine the sum of the following series.

7 971 615 + 5 314 410 + 3 542 940 … + 92 160

When the Common Ratio (r) is Between 0 and 1

The sum of the first “n” terms of a geometric sequence, with a common ratio of “r”, where 0 < r < 1, will *approach* the value:

Sn = $\frac{a}{1-r}$

**Example Five**

Estimate the value of the following geometric series as “n” approaches infinity.

2 + $\frac{2}{3}$ + $\frac{2}{9}$ + $\frac{2}{27}$ + …