Geometric Series

A **geometric series** occurs when the terms of a geometric sequence are re-expressed as a sum.

Geometric series can be expressed in an expanded form like 3 + 12 + 36 + 108 or by using sigma notation like PreCalB120_06_13_07i.

Geometric Series Formulas

There are two formulas that will calculate the sum of the first *n* terms of a geometric sequence, *Sn* in which *n ∈ N*:

PreCalB120_06_13_08i

**Note:** *t*1 can be represented as *a*.

A geometric series consisting of an infinite number of terms is called **convergent** if its sum approaches a fixed value. This is true when |*r*| < 1.

In the series PreCalB120_06_13_09i, each successive term is becoming smaller in value. As the terms become smaller, they will have less effect on the sum, and an infinite sum can be determined.

The sum of an infinite number of terms of a convergent geometric series can be determined by PreCalB120_06_13_10i.

A **divergent** series is one in which the sequence of partial sums does not approach a fixed number.

In the series 2+6+10+14+18+…, successive terms are becoming larger. As the terms become larger, they will change the sum by a significant amount.