

Geometric Progressions

A **geometric progression** (GP), also called a geometric sequence, is a sequence of numbers which differ from each other by a *common ratio*. For example, the sequence 2, 4, 8, 16, \dots, 2, 4, 8, 16, \dots is a geometric sequence with common ratio 2.

We can find the common ratio of a GP by finding the ratio between any two adjacent terms.

For example, the sequence 1, 2, 4, 8, 16, 32... is a geometric sequence with a common ratio of $r = 2$.

Here the succeeding number in the series is the double of its preceding number. In other words, when 1 is multiplied by 2 it results in 2. When 2 is multiplied by 2 it gives 4. Likewise, when 4 is multiplied by 2 we get 8 and so on.

Partial Sum

A series is a sum of a sequence. We want to find the n^{th} partial sum or the sum of the first n terms of the sequence. We will denote the n^{th} partial sum as S_n .

Infinite Sum

There is another type of geometric series, and infinite geometric series. An infinite geometric series is the sum of an infinite geometric sequence.

When the ratio has a magnitude greater than 1, the terms in the sequence will get larger and larger, and if you add larger and larger numbers forever, you will get infinity for an answer. So, we don't deal with infinite geometric series when the magnitude of the ratio is greater than one.

The magnitude of the ratio can't equal one because that the series wouldn't be geometric and the sum formula would have division by zero.