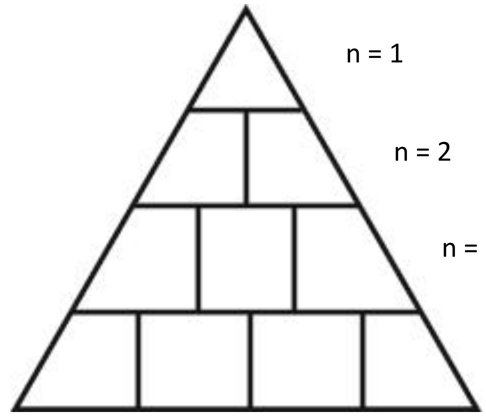
Introduction to Series



Suppose you are building a pyramid:

You can write a sequence for the number of bricks in each level:

$a_{n=}1 + 1(n - 1)$

So if you wanted to make a pyramid that was 10 levels high, you could use your formula to find out how many bricks are on the bottom level.

But what if you wanted to know HOW MANY bricks you needed to make this pyramid?

$$Total = 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55$$

The sum of the terms of a sequence is called a **series**.

EX 1: Suppose you have the following sequence: $a = 1, 3, 9, 27, \ldots,$

This is a **geometric sequence**.

The series that represents adding up these numbers looks like $S = 1 + 3 + 9 + 27 + \cdots$.

This is a **geometric series**.

A series that goes on forever is called an **infinite series**.

A series that stops after a number of terms is called a **finite series**.

A finite series is also called a **partial sum**.

If we want to add up the first 8 terms of a sequence, we use the notation, S_8 to represent this partial sum.

For the above sequence: $S_8 =$ 1 + 3 + 9 + 27 + 81 + 243 + 729 +2187 = 3280

EX 2: Given the sequence $a = 4, 9, 14, 19, \ldots$

Write the explicit formula for this sequence: $artithmetic;\ \ a_{1,} = 4,\ \ d = 5,$ so

$a_n = 4 + 5(n - 1)$

Write out the terms of the partial sum, S_{10}:

$$S_{10} = 4 + 9 + 14 + 19 + 24 + 29 + 34 + 39 + 44 + 49$$

Calculate S_{10} $\qquad S_{10} = 265$