**SERIES**

A sequence is a list or an array of items. However, a series is the sum of terms or a sum or sequence terms.

The series,

As you can see, the last term is n. Also, you can see that the series is an example of an AP where a = 1 and d = 1. The sum of the first n terms is given by:

Therefore,

**MAKING FORMULAE FOR SUM OF TERMS**

However, generally, in power series (i.e. series of powers of integers):

Also known as the sum of natural numbers

Note that n is the last term. In trying to find the sum of terms, we start our addition from the last term till we get to n = 1

The formula used is given as… (My formula though)

After you do this, we expand until n=1.

To explain, let us take an example

The series,

Solution:

As we can see, ,

Now, we expand

Remember I said that, when finding the sum, we start from the last term (n). So the above is for the last term.

To get the term before it, wherever we see (n), we minus 1

For (n-1):

For (n-2)

For (n-3)

For n = 3,

For n = 2,

And we keep going like that till we get n = 1

Recall,

For n =1,

Now if we add all the equations together,

For the left side,

We can see that the second parameter on the left of the previous terms cancels out the first parameter of the following term

At the end, what we are left with is this

And this can be written based on our equation as

Right there on the left hand side.

For the right hand side,

We can see also that the second value on the right hand side of each term is one (1). That means that if we add all the terms together, the sum of the ones (1s) that are the second values will sum up to the number of terms or the last term (n).

At the end, what we are left with is:

As we know, in math,

That is the sum of all terms in the series of numbers.

But we should also notice that each term has a two in front of it. That means, instead of getting, we get

Now, what we have on the right will be given as:

On combining the right and left sides, we get

If you can recall, you will see that this was the same answer we got when we solved using the common difference and the first term. However, even though the first method was shorter, it can’t be used for powers greater than 1. Hence we use the second method for powers 2 and above

And in general,

EXAMPLES

1. Find the sum of the series

Another way of solving

But

And,

Therefore,

QUESTIONS

1. Prove that
2. Prove that:
3. Prove that for any natural numbers n,
4. Also, solve this Answer: 120
5. Answer -196
6. Find the sum of the series: Answer: 155