**Formula of Series**

***1 Proof of n(n+1)/2***

It is used to find the sum of 1 to n numbers

Let’s take a series of numbers

1,2,3,4,5,6

Let’s make a group (1,6)=7,(2,5)=7,(3,4)=7 Here each group sum is 7. Now we have 3 group sum is 7 so total sum is 7X3=21. Which match 1+2+3+4+5+6=21.

Now if we have numbers from 1 to n, here is the series,

1,2,3,4……(n-2),(n-1),n.

Now if we go with previous one like making group where (1,n),(2,n-1),(3,n-2) etc we will find total n/2 numbers. We will discuss if n is odd. Now here sum of each group is (n+1). Now we have n/2 group where each group sum is (n+1). Now total sum will be (n+1)\*n/2. Here comes the formula

N=(n\*(n+1))/2

In case of odd, the middle one is like n/2 so this formula work with n odd numbers as well

***2 Proof of Sn=(n\*(a1+an))/2***

It is used to find the sum of ranged numbers

**WE KNOW THE SERIES MOST BASIC FORMULA WHICH IS AN=A1+(N-1)\*D🡪1 WHERE D IS DIFFRENCE OF NUMBER IF D IS NOT GIVEN THEN DEFAULT VALUE WILL BE 1.**

Now from eq. 1 we find the total terms of n will be ((an-a1)/d)+1.

Now that we find the n terms the equation will be Sn=(n\*(a1+a2))/2.

***3 Proof of Sn=(n\*(n+1)) for sum of even numbers***

It is used to find the sum of all even number upto n numbers.

Let’s consider,

2+4+6+8..

2(1+2+3+4+..) ->Taking 2 common

Now we know from proof (1) for 1 to n value sum is gonna be (n\*(n+1)/2 and if we multiply with 2 then the equation becomes n\*(n+1).Now we have to set the numbers of term for first beginning number and last number. We know to find the group we will use n/2. Now here first we will find for the last number which will be an/2 and for the first number it will be ((a1-1)/2) then we will find the sum of even numbers upto them and then minus it. Here it will be the equation.

For the last number an=((n/2)\*((n/2)+1));

For the first number a1=(((n-1)/2)\*(((n-1)/2)+1));

Then an-a1 and we will find the result

***3 Proof of Sn=((n+1)/2)) \* ((n+1)/2)) for sum of odd numbers***

It is used to find the sum of all odd numbers. Here we know the total odd numbers in a ranged will be (n+1)/2 group which was found from n/2 understanding and its sum will be (n+1)/2 \*(n+1)/2. Now if we pass the term for upto first number and last number and then minus them we will find the total number of equation. Here for the first number the term will be

((a1-1)+1)/2

And the sum of those groups will be

((a1-1)+1)/2\*((a1-1)+1)/2

And for the last number the term will be

(an+1)/2

And the sum of those groups will be

(an+1)/2\*(an+1)/2

And now the total group are found so now we can find the total summation of their substraction.