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General Series Formulas

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List of 21 General Series Formulas

General Series

Fibonacci Sequence

1) Nth Term of Fibonacci Sequence

$$\text{fx } F_n = F_{n-1} + F_{n-2}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 21 = 13 + 8$$

2) Nth Term of Fibonacci Sequence using Golden Ratio

$$\text{fx } F_n = \frac{[\text{phi}]^{n\text{Fib}} - (1 - [\text{phi}])^{n\text{Fib}}}{\sqrt{5}}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 21 = \frac{[\text{phi}]^8 - (1 - [\text{phi}])^8}{\sqrt{5}}$$

3) Sum of First N Even Index Fibonacci Numbers

$$\text{fx } S_{n(\text{Fib})\text{Even}} = F_{2n+1} - 1$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d_img.jpg\)](#)

$$\text{ex } 1596 = 1597 - 1$$

4) Sum of First N Fibonacci Numbers

$$\text{fx } S_{n(\text{Fib})} = F_{n+2} - 1$$

[Open Calculator !\[\]\(166772600a13ad0a433053f90fe45649_img.jpg\)](#)

$$\text{ex } 54 = 55 - 1$$

5) Sum of First N Odd Index Fibonacci Numbers

$$\text{fx } S_{n(\text{Fib})\text{Odd}} = 1 \cdot F_{2n}$$

[Open Calculator !\[\]\(a8ff699ced33317c53c86f9bf3171905_img.jpg\)](#)

$$\text{ex } 987 = 1 \cdot 987$$



Sum of 4th Powers 6) Sum of 10th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n10} = \frac{n \cdot (n + 1) \cdot (2 \cdot n + 1) \cdot (n^2 + n - 1) \cdot (3 \cdot n^6 + 9 \cdot n^5 + 2 \cdot n^4 - 11 \cdot n^3 + 3 \cdot n^2 + 10)}{66}$$

ex

$$60074 = \frac{3 \cdot (3 + 1) \cdot (2 \cdot 3 + 1) \cdot ((3)^2 + 3 - 1) \cdot (3 \cdot (3)^6 + 9 \cdot (3)^5 + 2 \cdot (3)^4 - 11 \cdot (3)^3 + 3 \cdot (3)^2 + 10 \cdot 3 - 10)}{66}$$

7) Sum of 4th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n4} = \frac{n \cdot (n + 1) \cdot (2 \cdot n + 1) \cdot (3 \cdot n^2 + 3 \cdot n - 1)}{30}$$

ex

$$98 = \frac{3 \cdot (3 + 1) \cdot (2 \cdot 3 + 1) \cdot (3 \cdot (3)^2 + 3 \cdot 3 - 1)}{30}$$

8) Sum of 5th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n5} = \frac{n^2 \cdot (2 \cdot n^2 + 2 \cdot n - 1) \cdot (n + 1)^2}{12}$$

ex

$$276 = \frac{(3)^2 \cdot (2 \cdot (3)^2 + 2 \cdot 3 - 1) \cdot (3 + 1)^2}{12}$$

9) Sum of 6th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n6} = \frac{n \cdot (n + 1) \cdot (2 \cdot n + 1) \cdot (3 \cdot n^4 + 6 \cdot n^3 - 3 \cdot n + 1)}{42}$$

ex

$$794 = \frac{3 \cdot (3 + 1) \cdot (2 \cdot 3 + 1) \cdot (3 \cdot (3)^4 + 6 \cdot (3)^3 - 3 \cdot 3 + 1)}{42}$$

10) Sum of 7th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n7} = \frac{n^2 \cdot (3 \cdot n^4 + 6 \cdot n^3 - n^2 - 4 \cdot n + 2) \cdot (n + 1)^2}{24}$$

ex

$$2316 = \frac{(3)^2 \cdot (3 \cdot (3)^4 + 6 \cdot (3)^3 - (3)^2 - 4 \cdot 3 + 2) \cdot (3 + 1)^2}{24}$$



11) Sum of 8th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n8} = \frac{n \cdot (n + 1) \cdot (2 \cdot n + 1) \cdot (5 \cdot n^6 + 15 \cdot n^5 + 5 \cdot n^4 - 15 \cdot n^3 - n^2 + 9 \cdot n - 3)}{90}$$

$$\text{ex } 6818 = \frac{3 \cdot (3 + 1) \cdot (2 \cdot 3 + 1) \cdot (5 \cdot (3)^6 + 15 \cdot (3)^5 + 5 \cdot (3)^4 - 15 \cdot (3)^3 - (3)^2 + 9 \cdot 3 - 3)}{90}$$

12) Sum of 9th Powers of First N Natural Numbers 

fx

Open Calculator 

$$S_{n9} = \frac{n^2 \cdot (n^2 + n - 1) \cdot (2 \cdot n^4 + 4 \cdot n^3 - n^2 - 3 \cdot n + 3) \cdot (n + 1)^2}{20}$$

$$\text{ex } 20196 = \frac{(3)^2 \cdot ((3)^2 + 3 - 1) \cdot (2 \cdot (3)^4 + 4 \cdot (3)^3 - (3)^2 - 3 \cdot 3 + 3) \cdot (3 + 1)^2}{20}$$

Sum of Cubes 13) Sum of Cubes of First N Even Numbers 

$$\text{fx } S_{n3(\text{Even})} = 2 \cdot (n \cdot (n + 1))^2$$

Open Calculator 

$$\text{ex } 288 = 2 \cdot (3 \cdot (3 + 1))^2$$

14) Sum of Cubes of First N Natural Numbers 

$$\text{fx } S_{n3} = \frac{(n \cdot (n + 1))^2}{4}$$

Open Calculator 

$$\text{ex } 36 = \frac{(3 \cdot (3 + 1))^2}{4}$$

15) Sum of Cubes of First N Odd Numbers 

$$\text{fx } S_{n3(\text{Odd})} = (n)^2 \cdot (2 \cdot (n)^2 - 1)$$

Open Calculator 

$$\text{ex } 153 = (3)^2 \cdot (2 \cdot (3)^2 - 1)$$



Sum of Squares

16) Sum of Squares of First N Even Natural Numbers

$$\text{fx } S_{n2(\text{Even})} = \frac{2 \cdot n \cdot (n + 1) \cdot ((2 \cdot n) + 1)}{3}$$

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\)](#)

$$\text{ex } 56 = \frac{2 \cdot 3 \cdot (3 + 1) \cdot ((2 \cdot 3) + 1)}{3}$$

17) Sum of Squares of First N Natural Numbers

$$\text{fx } S_{n2} = \frac{n \cdot (n + 1) \cdot ((2 \cdot n) + 1)}{6}$$

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762_img.jpg\)](#)

$$\text{ex } 14 = \frac{3 \cdot (3 + 1) \cdot ((2 \cdot 3) + 1)}{6}$$

18) Sum of Squares of First N Odd Natural Numbers

$$\text{fx } S_{n2(\text{Odd})} = \frac{n \cdot ((2 \cdot n) + 1) \cdot ((2 \cdot n) - 1)}{3}$$

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3_img.jpg\)](#)

$$\text{ex } 35 = \frac{3 \cdot ((2 \cdot 3) + 1) \cdot ((2 \cdot 3) - 1)}{3}$$

Sum of Terms

19) Sum of First N Even Natural Numbers

$$\text{fx } S_{n(\text{Even})} = n \cdot (n + 1)$$

[Open Calculator !\[\]\(4436e6b00b9d5e62c2a161129eb3e4d0_img.jpg\)](#)

$$\text{ex } 12 = 3 \cdot (3 + 1)$$

20) Sum of First N Natural Numbers

$$\text{fx } S_n = \frac{n \cdot (n + 1)}{2}$$

[Open Calculator !\[\]\(2088942ccfedc84a0a076c3fee3541aa_img.jpg\)](#)

$$\text{ex } 6 = \frac{3 \cdot (3 + 1)}{2}$$

21) Sum of First N Odd Natural Numbers

$$\text{fx } S_{n(\text{Odd})} = n^2$$

[Open Calculator !\[\]\(008bfeb2de157dcb66edb3a8218c280e_img.jpg\)](#)

$$\text{ex } 9 = (3)^2$$



Variables Used

- F_{2n} 2Nth Term of Fibonacci Sequence
- F_{2n+1} (2N+1)th Term of Fibonacci Sequence
- F_n Nth Term of Fibonacci Sequence
- F_{n+2} (N+2)th Term of Fibonacci Sequence
- F_{n-1} (N-1)th Term of Fibonacci Sequence
- F_{n-2} (N-2)th Term of Fibonacci Sequence
- n Value of N
- n_{Fib} Value of N of Fibonacci Sequence
- S_n Sum of First N Natural Numbers
- $S_{n(Even)}$ Sum of First N Even Natural Numbers
- $S_{n(Fib)}$ Sum of First N Fibonacci Numbers
- $S_{n(Fib)Even}$ Sum of First N Even Index Fibonacci Numbers
- $S_{n(Fib)Odd}$ Sum of First N Odd Index Fibonacci Numbers
- $S_{n(Odd)}$ Sum of First N Odd Natural Numbers
- S_{n10} Sum of 10th Powers of First N Natural Numbers
- S_{n2} Sum of Squares of First N Natural Numbers
- $S_{n2(Even)}$ Sum of Squares of First N Even Natural Numbers
- $S_{n2(Odd)}$ Sum of Squares of First N Odd Natural Numbers
- S_{n3} Sum of Cubes of First N Natural Numbers
- $S_{n3(Even)}$ Sum of Cubes of First N Even Natural Numbers
- $S_{n3(Odd)}$ Sum of Cubes of First N Odd Natural Numbers
- S_{n4} Sum of 4th Powers of First N Natural Numbers
- S_{n5} Sum of 5th Powers of First N Natural Numbers
- S_{n6} Sum of 6th Powers of First N Natural Numbers
- S_{n7} Sum of 7th Powers of First N Natural Numbers
- S_{n8} Sum of 8th Powers of First N Natural Numbers
- S_{n9} Sum of 9th Powers of First N Natural Numbers






Constants, Functions, Measurements used

- **Constant:** **[phi]**, 1.61803398874989484820458683436563811
Golden ratio
- **Function:** **sqrt**, sqrt(Number)
Square root function



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