Important General Series Formulas PDF

Formulas
Examples
with Units

List of 21
Important General Series Formulas

1) Fibonacci Sequence Formulas

1.1) Nth Term of Fibonaccci Sequence Formula

Evaluate Formula

Formula

$$F_n = F_{n-1} + F_{n-2}$$

Example

$$21 = 13 + 8$$

1.2) Nth Term of Fibonaccci Sequence using Golden Ratio Formula

Evaluate Formula

Formula

$$F_n = \frac{[phi]^{n_{Fib}} - \left(1 - [phi]\right)^{n_{Fib}}}{\sqrt{5}}$$

Example

$$21 = \frac{1.618^{8} - \left(1 - 1.618\right)^{8}}{\sqrt{5}}$$

1.3) Sum of First N Even Index Fibonacci Numbers Formula

Evaluate Formula

Formula

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

Example

$$1596 = 1597 - 1$$

1.4) Sum of First N Fibonacci Numbers Formula

Evaluate Formula

Formula

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

Example

$$54 = 55 - 1$$

1.5) Sum of First N Odd Index Fibonacci Numbers Formula

Evaluate Formula

Formula

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

Example

$$987 = 1 \cdot 987$$

2) Sum of 4th Powers Formulas

2.1) Sum of 10th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

2.2) Sum of 4th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

2.3) Sum of 5th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

2.4) Sum of 6th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

2.5) Sum of 7th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

2.6) Sum of 8th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

2.7) Sum of 9th Powers of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

3) Sum of Cubes Formulas

3.1) Sum of Cubes of First N Even Numbers Formula

Evaluate Formula

Formula

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

Example

$$288 = 2 \cdot \left(3 \cdot (3+1)\right)^2$$

3.2) Sum of Cubes of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

3.3) Sum of Cubes of First N Odd Numbers Formula

Evaluate Formula

Formula

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

Example

$$153 = (3)^2 \cdot \left(2 \cdot (3)^2 - 1\right)$$

4) Sum of Squares Formulas

4.1) Sum of Squares of First N Even Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

4.2) Sum of Squares of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

4.3) Sum of Squares of First N Odd Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

5) Sum of Terms Formulas

5.1) Sum of First N Even Natural Numbers Formula

Evaluate Formula

Formula

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

Example

$$12 = 3 \cdot (3+1)$$

5.2) Sum of First N Natural Numbers Formula

Evaluate Formula

Formula

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

Example

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

5.3) Sum of First N Odd Natural Numbers Formula

Evaluate Formula

Formula

$$S_{n(Odd)} = n^2$$

Example

$$9 = 3^2$$

Variables used in list of General Series Formulas above

- 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

Constants, Functions, Measurements used in list of General Series Formulas above

- constant(s): **[phi]**, 1.61803398874989484820458683436563811 *Golden ratio*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*

- 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

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