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# Important Formulas of AP, GP and HP

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# List of 28 Important Formulas of AP, GP and HP

## Important Formulas of AP, GP and HP

### Arithmetic Geometric Progression

#### 1) Nth Term of Arithmetic Geometric Progression

$$\text{fx } T_n = (a + ((n - 1) \cdot d)) \cdot (r^{n-1})$$

[Open Calculator](#)

$$\text{ex } 736 = (3 + ((6 - 1) \cdot 4)) \cdot ((2)^{6-1})$$

#### 2) Sum of First N Terms of Arithmetic Geometric Progression

**fx**
[Open Calculator](#)

$$S_n = \left( \frac{a - ((a + (n - 1) \cdot d) \cdot r^n)}{1 - r} \right) + \left( d \cdot r \cdot \frac{1 - r^{n-1}}{(1 - r)^2} \right)$$

$$\text{ex } 1221 = \left( \frac{3 - ((3 + (6 - 1) \cdot 4) \cdot (2)^6)}{1 - 2} \right) + \left( 4 \cdot 2 \cdot \frac{1 - (2)^{6-1}}{(1 - 2)^2} \right)$$



### 3) Sum of Infinite Arithmetic Geometric Progression

$$\text{fx } S_{\infty} = \left( \frac{a}{1 - r_{\infty}} \right) + \left( \frac{d \cdot r_{\infty}}{(1 - r_{\infty})^2} \right)$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

$$\text{ex } 95 = \left( \frac{3}{1 - 0.8} \right) + \left( \frac{4 \cdot 0.8}{(1 - 0.8)^2} \right)$$

## Arithmetic Progression

### 4) Common Difference of Arithmetic Progression

$$\text{fx } d = T_n - T_{n-1}$$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc\_img.jpg\)](#)

$$\text{ex } 10 = 60 - 50$$

### 5) Common Difference of Arithmetic Progression given Last Term

$$\text{fx } d = \left( \frac{l - a}{n_{\text{Total}} - 1} \right)$$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e\_img.jpg\)](#)

$$\text{ex } 10.77778 = \left( \frac{100 - 3}{10 - 1} \right)$$

### 6) First Term of Arithmetic Progression

$$\text{fx } a = T_n - ((n - 1) \cdot d)$$

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639\_img.jpg\)](#)

$$\text{ex } 40 = 60 - ((6 - 1) \cdot 4)$$



## 7) Nth Term from End of Arithmetic Progression

$$\text{fx } T_{n(\text{End})} = a + (n_{\text{Total}} - n) \cdot d$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)

$$\text{ex } 19 = 3 + (10 - 6) \cdot 4$$

## 8) Nth Term of Arithmetic Progression

$$\text{fx } T_n = a + (n - 1) \cdot d$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)

$$\text{ex } 23 = 3 + (6 - 1) \cdot 4$$

## 9) Nth Term of Arithmetic Progression given Pth and Qth Terms

**fx**
[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

$$T_n = \left( \frac{T_p \cdot (q - 1) - T_q \cdot (p - 1)}{q - p} \right) + (n - 1) \cdot \left( \frac{T_q - T_p}{q - p} \right)$$

$$\text{ex } 60 = \left( \frac{50 \cdot (8 - 1) - 80 \cdot (5 - 1)}{8 - 5} \right) + (6 - 1) \cdot \left( \frac{80 - 50}{8 - 5} \right)$$

## 10) Number of Terms of Arithmetic Progression

$$\text{fx } n = \left( \frac{T_n - a}{d} \right) + 1$$

[Open Calculator !\[\]\(c1168d6a8b365d11e842ece304635fa7\_img.jpg\)](#)

$$\text{ex } 15.25 = \left( \frac{60 - 3}{4} \right) + 1$$



## 11) Sum of First N Terms of Arithmetic Progression

$$\text{fx } S_n = \left(\frac{n}{2}\right) \cdot ((2 \cdot a) + ((n - 1) \cdot d))$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a\_img.jpg\)](#)

$$\text{ex } 78 = \left(\frac{6}{2}\right) \cdot ((2 \cdot 3) + ((6 - 1) \cdot 4))$$

## 12) Sum of Last N Terms of Arithmetic Progression

**fx**
[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021\_img.jpg\)](#)

$$S_{n(\text{End})} = \left(\frac{n}{2}\right) \cdot ((2 \cdot a) + (d \cdot ((2 \cdot n_{\text{Total}}) - n - 1)))$$

$$\text{ex } 174 = \left(\frac{6}{2}\right) \cdot ((2 \cdot 3) + (4 \cdot ((2 \cdot 10) - 6 - 1)))$$

## 13) Sum of Terms from Pth to Qth Terms of Arithmetic Progression

**fx**
[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3\_img.jpg\)](#)

$$S_{p-q} = \left(\frac{q - p + 1}{2}\right) \cdot ((2 \cdot a) + ((p + q - 2) \cdot d))$$

$$\text{ex } 100 = \left(\frac{8 - 5 + 1}{2}\right) \cdot ((2 \cdot 3) + ((5 + 8 - 2) \cdot 4))$$

## 14) Sum of Total Terms of Arithmetic Progression given Last Term

$$\text{fx } S_{\text{Total}} = \left(\frac{n_{\text{Total}}}{2}\right) \cdot (a + l)$$

[Open Calculator !\[\]\(4436e6b00b9d5e62c2a161129eb3e4d0\_img.jpg\)](#)

$$\text{ex } 515 = \left(\frac{10}{2}\right) \cdot (3 + 100)$$



## Geometric Progression

### 15) Common Ratio of Geometric Progression

$$\text{fx } r = \frac{T_n}{T_{n-1}}$$

[Open Calculator !\[\]\(950a62bbddad88d64435fd35607dfc42\_img.jpg\)](#)

$$\text{ex } 1.2 = \frac{60}{50}$$

### 16) First Term of Geometric Progression

$$\text{fx } a = \frac{T_n}{r^{n-1}}$$

[Open Calculator !\[\]\(73002692dd5e7a64e60946be3158e719\_img.jpg\)](#)

$$\text{ex } 1.875 = \frac{60}{(2)^{6-1}}$$

### 17) Nth Term from End of Geometric Progression

$$\text{fx } T_{n(\text{End})} = a \cdot (r^{n_{\text{Total}}-n})$$

[Open Calculator !\[\]\(104fbf564e2e5a8fbd84f31656d114c7\_img.jpg\)](#)

$$\text{ex } 48 = 3 \cdot ((2)^{10-6})$$

### 18) Nth Term of Geometric Progression

$$\text{fx } T_n = a \cdot (r^{n-1})$$

[Open Calculator !\[\]\(21226b58c700e5231ab98d27101bac58\_img.jpg\)](#)

$$\text{ex } 96 = 3 \cdot ((2)^{6-1})$$



## 19) Number of Terms of Geometric Progression

$$fx \quad n = \log \left( r, \frac{T_n}{a} \right) + 1$$

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5\_img.jpg\)](#)

$$ex \quad 5.321928 = \log \left( 2, \frac{60}{3} \right) + 1$$

## 20) Sum of First N Terms of Geometric Progression

$$fx \quad S_n = \frac{a \cdot (r^n - 1)}{r - 1}$$

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5\_img.jpg\)](#)

$$ex \quad 189 = \frac{3 \cdot ((2)^6 - 1)}{2 - 1}$$

## 21) Sum of Infinite Geometric Progression

$$fx \quad S_\infty = \frac{a}{1 - r_\infty}$$

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2\_img.jpg\)](#)

$$ex \quad 15 = \frac{3}{1 - 0.8}$$



## 22) Sum of Last N Terms of Geometric Progression

$$\text{fx } S_{n(\text{End})} = \frac{1 \cdot \left( \left( \frac{1}{r} \right)^n - 1 \right)}{\left( \frac{1}{r} \right) - 1}$$

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107\_img.jpg\)](#)

$$\text{ex } 196.875 = \frac{100 \cdot \left( \left( \frac{1}{2} \right)^6 - 1 \right)}{\left( \frac{1}{2} \right) - 1}$$

## 23) Sum of Total Terms of Geometric Progression

$$\text{fx } S_{\text{Total}} = \frac{a \cdot (r^{n_{\text{Total}}} - 1)}{r - 1}$$

[Open Calculator !\[\]\(e8fb589d58dad1692debababa5e928b6\_img.jpg\)](#)

$$\text{ex } 3069 = \frac{3 \cdot \left( (2)^{10} - 1 \right)}{2 - 1}$$

## Harmonic Progression

### 24) Common Difference of Harmonic Progression


$$\text{fx } d = \left( \frac{1}{T_n} - \frac{1}{T_{n-1}} \right)$$

[Open Calculator !\[\]\(e9474ce1d70442456f8fe9c393ea149c\_img.jpg\)](#)

$$\text{ex } -0.003333 = \left( \frac{1}{60} - \frac{1}{50} \right)$$






25) First Term of Harmonic Progression 

$$\text{fx } a = \frac{1}{T_n} - ((n - 1) \cdot d)$$

Open Calculator 

$$\text{ex } -19.983333 = \frac{1}{60} - ((6 - 1) \cdot 4)$$

26) Nth Term of Harmonic Progression 

$$\text{fx } T_n = \frac{1}{a + (n - 1) \cdot d}$$

Open Calculator 

$$\text{ex } 0.043478 = \frac{1}{3 + (6 - 1) \cdot 4}$$

27) Nth Term of Harmonic Progression from End 

$$\text{fx } T_n = \frac{1}{l - (n - 1) \cdot d}$$

Open Calculator 

$$\text{ex } 0.0125 = \frac{1}{100 - (6 - 1) \cdot 4}$$

28) Sum of First N Terms of Harmonic Progression 

$$\text{fx } S_n = \left( \frac{1}{d} \right) \cdot \ln \left( \frac{2 \cdot a + (2 \cdot n - 1) \cdot d}{2 \cdot a - d} \right)$$

Open Calculator 

$$\text{ex } 0.804719 = \left( \frac{1}{4} \right) \cdot \ln \left( \frac{2 \cdot 3 + (2 \cdot 6 - 1) \cdot 4}{2 \cdot 3 - 4} \right)$$



## Variables Used

- **a** First Term of Progression
- **d** Common Difference of Progression
- **l** Last Term of Progression
- **n** Index N of Progression
- **n<sub>Total</sub>** Number of Total Terms of Progression
- **p** Index P of Progression
- **q** Index Q of Progression
- **r** Common Ratio of Progression
- **r<sub>∞</sub>** Common Ratio of Infinite Progression
- **S<sub>∞</sub>** Sum of Infinite Progression
- **S<sub>n</sub>** Sum of First N Terms of Progression
- **S<sub>n(End)</sub>** Sum of Last N Terms of Progression
- **S<sub>p-q</sub>** Sum of Terms from Pth to Qth Terms of Progression
- **S<sub>Total</sub>** Sum of Total Terms of Progression
- **T<sub>n</sub>** Nth Term of Progression
- **T<sub>n(End)</sub>** Nth Term from End of Progression
- **T<sub>n-1</sub>** (N-1)th Term of Progression
- **T<sub>p</sub>** Pth Term of Progression
- **T<sub>q</sub>** Qth Term of Progression



## Constants, Functions, Measurements used

- **Function:**  $\ln$ ,  $\ln(\text{Number})$

*The natural logarithm, also known as the logarithm to the base  $e$ , is the inverse function of the natural exponential function.*

- **Function:**  $\log$ ,  $\log(\text{Base}, \text{Number})$

*Logarithmic function is an inverse function to exponentiation.*



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