Important Formulas of AP, GP and HP PDF

Formulas
Examples
with Units

List of 28
Important Formulas of AP, GP and HP

1) Arithmetic Geometric Progression Formulas

1.1) Nth Term of Arithmetic Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

1.2) Sum of First N Terms of Arithmetic Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

1.3) Sum of Infinite Arithmetic Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

2) Arithmetic Progression Formulas

2.1) Common Difference of Arithmetic Progression Formula

Evaluate Formula

Formula

$$d = T_n - T_{n-1}$$

Example

$$10 = 60 - 50$$

2.2) Common Difference of Arithmetic Progression given Last Term Formula

Evaluate Formula

Formula

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

Example

$$10.7778 = \left(\frac{100 - 3}{10 - 1} \right)$$

2.3) First Term of Arithmetic Progression Formula

Evaluate Formula

Formula

$$a = T_n - \left(\left(n - 1 \right) \cdot d \right)$$

Example

$$40 = 60 - \left(\left(6 - 1 \right) \cdot 4 \right)$$

2.4) Nth Term from End of Arithmetic Progression Formula

Evaluate Formula

Formula

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

Example

$$19 = 3 + \left(10 - 6 \right) \cdot 4$$

2.5) Nth Term of Arithmetic Progression Formula

Evaluate Formula

Formula

$$T_n = a + \left(n - 1 \right) \cdot d$$

Example

$$23 = 3 + \left(6 - 1 \right) \cdot 4$$

2.6) Nth Term of Arithmetic Progression given Pth and Qth Terms Formula

Evaluate Formula

Formula

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

Example

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

2.7) Number of Terms of Arithmetic Progression Formula

Evaluate Formula

Formula

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

Example

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

2.8) Sum of First N Terms of Arithmetic Progression Formula

Evaluate Formula

Formula

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

Example

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

2.9) Sum of Last N Terms of Arithmetic Progression Formula

Evaluate Formula

Formula

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

Example

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

2.10) Sum of Terms from Pth to Qth Terms of Arithmetic Progression Formula

Evaluate Formula

Formula

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

Example

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

2.11) Sum of Total Terms of Arithmetic Progression given Last Term Formula

Evaluate Formula

Formula

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

Example

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

3) Geometric Progression Formulas

3.1) Common Ratio of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

3.2) First Term of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

$$1.875 = \frac{60}{2^{6 - 1}}$$

3.3) Nth Term from End of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

$$48 = 3 \cdot \left(2^{10 - 6}\right)$$

3.4) Nth Term of Geometric Progression Formula

Evaluate Formula

Formula

$$T_n = a \cdot \left(r^{n-1} \right)$$

Example

$$96 = 3 \cdot \left(2^{6-1} \right)$$

3.5) Number of Terms of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

$$5.3219 = \log\left(2, \frac{60}{3} \right) + 1$$

3.6) Sum of First N Terms of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

3.7) Sum of Infinite Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

3.8) Sum of Last N Terms of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

3.9) Sum of Total Terms of Geometric Progression Formula

Evaluate Formula

Formula

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

Example

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

4) Harmonic Progression Formulas

4.1) Common Difference of Harmonic Progression Formula

Evaluate Formula

Formula

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

Example

$$-0.0033 = \left(\frac{1}{60} - \frac{1}{50} \right)$$

4.2) First Term of Harmonic Progression Formula

Evaluate Formula

Formula

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

Example

$$-19.9833 = \frac{1}{60} - \left(\left(6 - 1 \right) \cdot 4 \right)$$

4.3) Nth Term of Harmonic Progression Formula

Evaluate Formula

Formula

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

Example

$$0.0435 = \frac{1}{3 + \left(6 - 1 \right) \cdot 4}$$

4.4) Nth Term of Harmonic Progression from End Formula

Evaluate Formula

Formula

$$T_n = \frac{1}{l - \left(n - 1 \right) \cdot d}$$

Example

$$0.0125 = \frac{1}{100 - \left(6 - 1 \right) \cdot 4}$$

4.5) Sum of First N Terms of Harmonic Progression Formula

Evaluate Formula

Formula

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

Example

$$0.8047 = \left(\frac{1}{4} \right) \cdot \ln\left(\frac{2 \cdot 3 + \left(2 \cdot 6 - 1 \right) \cdot 4}{2 \cdot 3 - 4} \right)$$

Variables used in list of Important Formulas of AP, GP and HP above

- **a** First Term of Progression
- **d** Common Difference of Progression
- **l** Last Term of Progression
- **n** Index N of Progression
- n_{Total} Number of Total Terms of Progression
- **p** Index P of Progression
- **q** Index Q of Progression
- **r** Common Ratio of Progression
- r_{∞} Common Ratio of Infinite Progression
- S_{∞} Sum of Infinite Progression
- S_n Sum of First N Terms of Progression
- $S_{n(End)}$ Sum of Last N Terms of Progression
- S_{p-q} Sum of Terms from Pth to Qth Terms of Progression
- S_{Total} Sum of Total Terms of Progression
- T_n Nth Term of Progression
- $T_{n(End)}$ Nth Term from End of Progression
- T_{n-1} (N-1)th Term of Progression
- T_p Pth Term of Progression
- T_q Qth Term of Progression

Constants, Functions, Measurements used in list of Important Formulas of AP, GP and HP above

- Functions: **ln**, ln(Number)
  The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.
- Functions: **log**, log(Base, Number)
  Logarithmic function is an inverse function to exponentiation.

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