(1) $If\ the\ 1st\ term\ =\ a, common\ ratio\ =\ r\ in\ a\ GP, then$

(a) $n-th\ term\ =\ t_n\ =\ ar^{n-1}$

(b) $Sum\ of\ 1st\ n\ terms,$

$$S_n = \frac{a(1-r^n)}{1-r} \qquad when, -1 < r < 1$$

$$= \frac{a(r^n-1)}{r-1} \qquad when,\ r > 1\ or\ r < -1$$

(2) $If\ x\ be\ the\ GM\ of\ two\ numbers\ a\ \&\ b, then\ x\ =\ \pm\sqrt{ab}$

Infinite GP

$$S_n = \frac{a}{1-r} \quad when, -1 < r < 1$$

$For\ r > 1\ or\ r < -1, \qquad the\ series\ doesn't\ exist.$

HP

(1) $If\ a, b, c\ are\ in\ HP$

$then\ \frac{1}{a}, \frac{1}{b}, \frac{1}{c}\ are\ in\ AP$

(2) $If\ x\ be\ the\ HM\ of\ two\ numbers\ a\ \&\ b, then\ x\ =\ \frac{2ab}{a+b}.$

Infinite Series

$If\ n\ is\ a-ve\ integer\ or\ fraction\ \&\ |x| < 1, then$

(1) $(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \frac{n(n-1)(n-2)}{3!}x^3 + \cdots \ldots \ldots \infty$

(2) $(1-x)^n = 1 - nx + \frac{n(n-1)}{2!}x^2 - \frac{n(n-1)(n-2)}{3!}x^3 + \cdots \ldots \ldots \infty$

(3) $(1+x)^{-n} = 1 - nx + \frac{n(n+1)}{2!}x^2 - \frac{n(n+1)(n+2)}{3!}x^3 + \cdots \ldots \ldots \infty$

(4) $(1-x)^{-n} = 1 + nx + \frac{n(n+1)}{2!}x^2 + \frac{n(n+1)(n+2)}{3!}x^3 + \cdots \ldots \ldots \infty$

(5) $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots \ldots \ldots + \frac{x^r}{r!} + \cdots \ldots \ldots \infty$

(6) $e^{-x} = 1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + \cdots \ldots \ldots + (-1)^r \frac{x^r}{r!} + \cdots \ldots \ldots \infty$

(7) $e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots \ldots \ldots \infty$

(8) $e^{-1} = 1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \cdots \ldots \ldots \infty$

(9) $a^x = 1 + \frac{(\log_e a)}{1!}x + \frac{(\log_e a)^2}{2!}x^2 + \frac{(\log_e a)^3}{3!}x^3 + \cdots \ldots \ldots \infty$

(10) $\log_e(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots \ldots \ldots \infty; \qquad when -1 < x \leq 1$

(11) $\log_e(1-x) = -x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} + \cdots \ldots \ldots \infty; \qquad when -1 \leq x < 1$

(12) $\log_e 2 = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \cdots \ldots \ldots \infty$

Quadratic Equation