Series

→ Arithmetic Progression (diff $= T_2 - T_1 = T_4 - T_3 = T_n - T_{n-1}$

$$T_n = a + (n-1)d$$

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

→ Geometric Progression (common ratio $= \frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_n}{T_{n-1}}$)

$$T_n = ar^{n-1}$$

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

$$S_\infty = \frac{a}{1-r} \quad \text{when} \quad r < 1$$

→ Binomial expansion

ex. $\left[2x + \frac{a}{x^2}\right]^5$

$$\binom{5}{0}\left[2x\right]^5 + \binom{5}{1}\left[2x\right]^4\left[\frac{a}{x^2}\right] + \binom{5}{2}\left[2x\right]^3\left[\frac{a}{x^2}\right]^2 + \binom{5}{3}\left[2x\right]^2\left[\frac{a}{x^2}\right]^3$$

$$+ \binom{5}{4}\left[2x\right]\left[\frac{a}{x^2}\right]^4 + \binom{5}{5}\left[\frac{a}{x^2}\right]^5$$

VK Notes