This Side is Arithmetic

Because you asked

This Side is Geometric

Arithmetic

d = any term − term before

Explicit Formula for nth term a_n

$$a_n = a_1 + (n-1)d$$

Recursive Formula

a_1 = 1st number

$a_n = a_{n-1} + d$

Series

The sum of the first n-terms

$$S_n = \sum_{k=1}^{n} (\text{linear})$$

Formula

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Geometric

$r = \dfrac{\text{any term}}{\text{term before}}$

Explicit Formula for nth term a_n

$$a_n = a_1 (r)^{n-1}$$

Recursive Formula

a_1 = 1st number

$a_n = r \cdot a_{n-1}$

remember recursive Formulas require two equations

a_{n-1} means the term before a_n

Series

The sum of the first n-terms

$$S_n = \sum_{K=1}^{n} (\text{exponential}) = \sum_{K=1}^{n} a_1 (r)^{n-1}$$

Formula

$$S_n = \frac{a_1 (1-r^n)}{(1-r)}$$

These are finite sums

Notice for infinite geometric series the r-value must be between $-1 < r < 1$ if it is outside that range then the sum does not exist.

$$\sum_{K=1}^{\infty} (\text{exponential})$$

Infinite geometric Sum

$$S_\infty = \frac{a_1}{(1-r)}$$

only use when $-1 < r < 1$

Arithmetic Side

Geometric Side

Geometric Side