

Adding A Sequence In The Form: $\frac{1}{a} + \frac{1}{a^2} + \dots + \frac{1}{a^n}$

A. This sequence reduces to the following:

$$\sum_{i=1}^n \frac{1}{a^i} = \frac{1}{a} + \frac{1}{a^2} + \dots + \frac{1}{a^n} = \frac{(a^n - 1)/a - 1}{a - 1}$$

B. Use the following rules:

1. To find the numerator, subtract 1 from the denominator of the last fraction and divide by (a-1).
2. The denominator of the answer is the same as the last denominator in the series.

Ex [1] $\frac{1}{2} + \frac{1}{4} + \dots + \frac{1}{64} = \underline{\hspace{2cm}}$

- a. The numerator is equal to the following: $(64-1)/(2-1) = 63$.
- b. The denominator is 64.
- c. The answer is $63/64$.

Ex [2] $4^{-1} + 4^{-2} + 4^{-3} + 4^{-4} = \underline{\hspace{2cm}}$.

- a. The last number is 4^4 or $16^2 = 256$. See [Squares](#).
- b. The numerator is $(256-1)/(4-1) = 255/3 = 85$.
- c. The denominator is 256.
- d. The answer is $85/256$.