

$$\textcircled{1} T = \frac{1}{a_1} + \frac{1}{a_2} + \dots + \frac{1}{a_n} = \frac{1}{a_1} + \frac{1}{a_1 q} + \dots + \frac{1}{a_1 q^{n-1}} = \frac{q^{n-1} + q^{n-2} + \dots + 1}{a_1 q^{n-1}} = \frac{1103}{103} \text{ (if } q=10\text{)}$$

$$= \frac{q^{n-1} \left(\left(\frac{1}{q}\right)^n - 1 \right)}{a_1 q^{n-1}} = \frac{1 - q^{-n}}{a_1 (1 - \frac{1}{q})} = \frac{1 - q^{-n}}{a_1 \frac{q-1}{q}} = \frac{1 - q^{-n}}{a_1 (q-1)}$$

$$S = \frac{a_1 (q^n - 1)}{q - 1}$$

$$\frac{S}{T} = \frac{a_1 (q^n - 1) \frac{1}{a_1 (q-1)}}{\frac{1 - q^{-n}}{a_1 (q-1)}} = a_1 \cdot a_1 q^{n-1} = a_1^2 q^{n-1}$$

$$\textcircled{2} \left(\sum_{i=1}^n a_i\right)^{1/2} = (a_1 a_n)^{1/2} \quad \text{if } a_1 a_2 \dots a_n = a_1 (a_1 q) (a_1 q^2) \dots (a_1 q^{n-1}) = a_1^n q^{1+2+\dots+(n-1)}$$

$$= a_1^n q^{\frac{n(n-1)}{2}} = a_1^n q^{\frac{n^2 - n}{2}} = (a_1^2 q^{n-1})^{n/2} = (a_1 a_1 q^{n-1})^{n/2} = (a_1 a_n)^{n/2}$$