① 등차수열

$$\begin{pmatrix} 1 & 3 & 5 & 7 & 9 & 11 & \cdots & ? \\ a_1 & a_2 & a_3 & a_4 & \cdots & & & a_n \end{pmatrix}$$

$$\left.\begin{aligned} a_2 - a_1 &= 2 \\ a_3 - a_2 &= 2 \\ &\vdots \\ + \quad a_n - a_{n-1} &= 2 \end{aligned}\right)(n-1)$$

$a_n - a_1 = 2(n-1)$

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

$S = a_1 + a_2 + \cdots + a_n$

$S = a_n + a_{n-1} + \cdots + a_1$

$2S = n(a_1 + a_n)$

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

$S = 1 + 2 + 3 + \cdots + n$

$S = n + (n-1) + \cdots \quad 1$

$2S = n(n+1)$

$$\boxed{S = \frac{n(n+1)}{2}}$$

② 등비수열

$$\begin{matrix} 1 & 2 & 4 & 8 & 16 & \cdots & ? \\ a_1 & a_2 & a_3 & a_4 & \cdots & & a_n \end{matrix}$$

$\frac{a_2}{a_1} \times \frac{a_3}{a_2} \times \cdots \frac{a_n}{a_{n-1}} = 2 \times 2 \times \cdots \times 2$

$a_n = a_1 \cdot 2^{n-1}$

$$\boxed{a_n = a_1 \cdot r^{n-1}}$$

$S = a + ar + ar^2 + \cdots + ar^{n-1}$

$rS = \quad ar + ar^2 + ar^3 + \cdots + ar^n$

$(1-r)S = a - ar^n$

$$\boxed{\therefore S = \frac{a(1-r^n)}{1-r}}$$

③ 계차수열

$$\begin{matrix} 1 & & 2 & & 4 & & 7 & & 11 & & 16 \\ a_1 & & a_2 & & a_3 & & a_4 & & a_5 & & a_6 \\ & 1 & & 2 & & 3 & & 4 & & 5 & \\ & b_1 & & b_2 & & b_3 & & b_4 & & b_5 & \\ & & 1 & & 1 & & 1 & & 1 & & \end{matrix}$$

$a_n = a_1 + \sum_{k=1}^{n-1} b_k$

$= 1 + \sum k$

$= 1 + \frac{(n-1) \cdot n}{2}$