

$$a_n = \frac{1}{r}, 1, 2, \dots$$

(۱)

$$q=2$$

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

$$\Rightarrow a_1 = \frac{1}{r} (r)^0 = r^0 = 1$$

(الف) $a_{10} = ?$

$$a_{10} = \frac{1}{r} (r)^{10} = r^{10}$$

$$\Rightarrow \frac{a_{10}}{a_1} = \frac{r^{10}}{r^0} = r^{10} = 14$$

(ب) $\frac{a_{10}}{a_1} = ?$

$$a_{10} = \frac{1}{r} (r)^{10} = r^{10}$$

(ج)

$$a_{10} = 2 \times \left(\frac{1}{2}\right)^9 = 2 \times \frac{1}{512} = \frac{2}{512} = \frac{1}{256}$$

$$\Rightarrow b^2 = (r^0)^2 \Rightarrow b = r^0 = 1$$

$$a_1 = 2 \times \left(\frac{1}{2}\right)^0 = 2$$

$$128 = \frac{1}{r} (r)^{n-1}$$

$$\Rightarrow 128 = \frac{1}{r} \times r^n \times r^{-1} = 128 \times r = r^n \Rightarrow \frac{128}{r} = r^n \Rightarrow n = 9$$

$$\frac{a_1}{a_0} = \frac{a_9}{a_8} = \frac{9}{12} \Rightarrow q^9 = 1 \Rightarrow q = 2$$

(۲) $a_{10} = ?$

$$a_{10} \Rightarrow a_n q^9 \Rightarrow 9 \times 8 = 72 \Rightarrow a_{10} = 72$$

$$P_n = (1, 2, 3, \dots)^n \Rightarrow 123 = (a_n)^n \Rightarrow a_n = 3$$

$$a_1 \times a_2 \times a_3 \times a_4 \times a_5 = 123$$

(الف) $a_n = ?$

$$(a_1 \times a_2) (a_3 \times a_4) \times 5 = 123 \Rightarrow (a_1 \times a_2) (a_3 \times a_4) = 1 \Rightarrow (a_1 \times a_2) = \frac{1}{5}$$

$$\Rightarrow (1 \times 2)^2 = 2 \times 2^2 \Rightarrow 2 = 2^{b+a} \Rightarrow b+a = 1$$

$$\Rightarrow \frac{a+b}{2} \Rightarrow \frac{1}{2} \Rightarrow \frac{1}{2}$$

(۴)

$$a_{11} = n+1, a_n = n, a_1 = 1-n$$

$$\frac{a_n}{a_1} = q^n \Rightarrow q^n = \frac{n}{1-n}$$

$$\frac{a_{11}}{a_n} = \frac{n+1}{n}, \frac{n+1}{n} = \frac{n}{1-n}$$

$$1-n^2 = n^2 = 1 = n^2 + n^2 \Rightarrow$$

$$n^2 = 1 \Rightarrow n^2 = \frac{1}{r} \Rightarrow n = \pm \sqrt{\frac{1}{r}}$$

$$\pm \frac{1}{r} = \pm \frac{1}{r}$$

$$q_1 + q_2 = 12 \quad (4) \quad q_1 + q_2 = 12$$

$$\frac{q_1 + q_1 r^2}{q_1 r + q_1 r^2} = \frac{12}{12} = \frac{1}{1} \Rightarrow \frac{q_1 (1 + r^2)}{q_1 (r + r^2)} = \frac{(1 + r^2)}{(r + r^2)} = \frac{(1 + r)(1 - r + r^2)}{r(1 + r)}$$

$$\frac{1 - r + r^2}{r} = \frac{1}{1} \Rightarrow 1 - r + r^2 = r \Rightarrow r^2 - 2r + 1 = 0 \Rightarrow (r - 1)^2 = 0 \Rightarrow r = 1$$

$$(r - 1)(r - 1) \Rightarrow r = 1 \Rightarrow \frac{q_1}{r} = 12 \Rightarrow -1, 1, 3, 9, \dots \Rightarrow \frac{q_1}{r} = 12 \Rightarrow 12, 4, 3, 1, \dots$$

$$r = 1 \Rightarrow q_1 \times r = 12 \Rightarrow q_1 = 12 \Rightarrow \frac{q_1}{r} = 12 \Rightarrow \frac{1}{1} \times 12 = 12 \Rightarrow q_1 = 12$$

$$q_1 + q_1 q + q_1 q^2 \rightarrow q_1 (1 + q + q^2) = 12 \Rightarrow q_1 \times q_1 \times q_1 = 12 \Rightarrow q_1 + q_1 + q_1 = 12 \Rightarrow q_1 = 12$$

$$q_1 q^2 = 12 \Rightarrow (q_1 q^2)^3 = 12^3 \Rightarrow q_1 q^2 = 12 \Rightarrow q_1 = 12$$

$$q_1 + q_1 = 12 \Rightarrow q_1 (1 + q) = 12 \Rightarrow q_1 + q_1 q = 12 \Rightarrow q_1 \times q_1 = 12 \Rightarrow q_1 q^2 = 12 \Rightarrow q_1 q = 12$$

$$q^2 - 10q + 12 = 0 \Rightarrow (q - 2)(q - 6) = 0 \Rightarrow q = 2, 6 \Rightarrow \frac{12}{2} = 6, \frac{12}{6} = 2 \Rightarrow q = 2, 6$$

$$q = 2 \Rightarrow q_1 = 6, q_2 = 6, q_3 = 6, \dots \Rightarrow q = 6 \Rightarrow q_1 = 2, q_2 = 2, q_3 = 2, \dots$$

$$S_1 = 12 \times \left(\frac{1 - 1}{1 - 1} \right) = \frac{12}{1 - 1} \Rightarrow S_1 = 12 \Rightarrow S_1 = 12$$

$$P_1 = (q_1 \times q_1)^\omega \Rightarrow (q_1 \times q_1 \times q_1)^\omega = (12 \times 12 \times 12)^\omega = (12^\omega)^\omega = 12^{10}$$

$$aq - a, aq^2 - aq, aq^3 - aq^2, aq^4 - aq^3, \dots \Rightarrow a(q - 1), aq(q - 1), aq^2(q - 1), aq^3(q - 1), \dots$$

$$S_n = \frac{n}{2} (2a_1 + (n - 1)d) \Rightarrow S_n = a_1 + a_1 + a_1 + \dots + a_1 \Rightarrow S_n = a_1 + (a_1 + d) + (a_1 + 2d) + \dots + [a_1 + (n - 1)d] + [a_1 + (n - 1)d]$$

$$S_n = a \left[\frac{q^n - 1}{q - 1} \right] \Rightarrow S_n = a_1 + a_1 q + a_1 q^2 + \dots + a_1 q^{n-1} \Rightarrow S_n = aq + aq^2 + aq^3 + \dots + aq^{n-1} + aq^n$$