سینا فاطمی

۱- $\frac{1}{4}$

$aq^{-1} \times a \times aq = 64$

$a^3 = 64 \to a = 4$

$4q^{-1} + 4 + 4q = 21$

$\frac{4}{q} + 4q = 17 \to \frac{4+4q^2}{q} = 17 \to 4 + 4q^2 = 17q$

$4q^2 - 17q + 4 = 0 \to q^2 - 17q + 16 = 0 \quad \underbrace{(q-1)}_{1}\underbrace{(q-16)}_{16} = 0$

$q = \frac{1}{4} , 4$

۲-

$(x^2+4)(x^2-2) = 4x^2 \to x^4 + 2x^2 - 8 = 4x^2$

$x^4 - 2x^2 - 8 = 0 \to (x^2-4)(x^2+2) = 0$

$\underbrace{(x+2)}_{-2}\underbrace{(x-2)}_{2}(x^2+2) = 0$

$S_7 = 8\left(\frac{(\frac{1}{2})^7 - 1}{\frac{1}{2} - 1}\right) = \frac{127}{8}$

$x = 2 \to 8 , 4 , 2$

$\times\frac{1}{2} \to q = \frac{1}{2}$

۳-

$a + aq + aq^2 + aq^3 + aq^4 = a(1 + q + q^2 + q^3 + q^4) = a\left(\frac{121}{81}\right) = 243 \times \frac{121}{81} = 363$

۴-

$\frac{64-1}{5+1} = \frac{63}{6} = 10.5$

جمله وسط : $a_4 = a_1 + 3d \to 1 + 31.5 = 32.5 \to A$

$A + B = 32.5 + 8 = 40.5$

$q^{n+1} = \frac{b}{a} \to q^6 = \frac{64}{1} \to q = \pm 2$

$a_4 = a_1 \times q^3 \to 1 \times 8 = 8 \quad B$

$d = \frac{-95}{4} - (-24) = \frac{1}{4}$

$a_{101} = a_1 + 100d \rightarrow -24 + 100 \times \frac{1}{4} = 1$

۳ فرض: $a_8 = 1 \rightarrow a_n = a q^{n-1} \rightarrow 1 = 128 \times q^7 \rightarrow q^7 = \frac{1}{128} \Rightarrow q = \frac{1}{2}$

۶-

$(a+2d)(a+8d) = (a+6d)^2$

$a^2 + 10ad + 16d^2 = a^2 + 12ad + 36d^2$

$-2ad = 20d^2$

$-2a = 20d$

$d = \frac{-a}{10}$

۷-

a, aq, aq^2

$\downarrow$

$\frac{1}{4}, \frac{q}{4}, \frac{q^2}{4}$

$\frac{q}{4} = \frac{1}{4} + 2d \xrightarrow{\times(-3)} \begin{cases} \frac{-3q}{4} = \frac{-3}{4} - 6d \\ \frac{q^2}{4} = \frac{1}{4} + 6d \end{cases}$

$\frac{q^2}{4} = \frac{1}{4} + 6d$

$\frac{q^2}{4} - \frac{3q}{4} = \frac{-1}{2}$

۵ $\frac{q^2}{4} - \frac{3q}{4} + \frac{1}{2} = 0 \rightarrow \frac{q^2 - 3q + 2}{4} = 0 \rightarrow \underbrace{(q-2)}_{2}\underbrace{(q-1)}_{1} = 0$

غ ق ق

$q = 2 \rightarrow a_{10} = \frac{1}{4} \times 2^9 = a_{10} = 2^7 = 128$

سینا کاظمی

SUBJECT

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۸-

③

$a , a+d , a+2d$

$\downarrow \quad \downarrow \quad \downarrow$

$3aq \quad 2aq^2 \quad aq^3 \rightarrow aq^3 + 3aq = 4aq^2$

$aq(q^2+3) = aq(4q) \rightarrow q^2+3 = 4q \rightarrow q^2 - 4q + 3 = 0$

$\underbrace{(q-3)}_{3}\underbrace{(q-1)}_{1} = 0$

غ ق ق (غیر ثابت)

۹-

$2 , \frac{7}{4} , \ldots$

$d = \frac{7}{4} - 2 = \frac{-1}{4} \rightarrow a_4 = \frac{5}{4} \qquad a_8 = a_1 + 7d \rightarrow 2 + 7\left(-\frac{1}{4}\right) = \frac{1}{4}$

$a_{13} = a_1 + 12d \rightarrow 2 + 12\left(\cancel{-\frac{1}{4}}\right)^{-3} = -1$

$\frac{5}{4} + x , \frac{1}{4} + x , \cancel{-1+x}^{\,x-1} \rightarrow \left(x + \frac{5}{4}\right)(x-1) = \left(x + \frac{1}{4}\right)^2$

$\cancel{x^2} + \frac{x}{4} - \frac{5}{4} = \cancel{x^2} + \frac{x}{2} + \frac{1}{16}$

$\frac{x}{2} + \frac{1}{16} - \frac{x}{4} + \frac{5}{4} = 0 \rightarrow \frac{2x - x}{4} + \frac{1+20}{16} = 0 \rightarrow \frac{x}{4} + \frac{21}{16} = 0$

$\frac{x}{4} = \frac{-21}{16} \rightarrow x = \frac{-21}{4}$

$\frac{5}{4} - \frac{21}{4} , \frac{1}{4} - \frac{21}{4} , -1 - \frac{21}{4} \rightarrow -4 , -5 , -\frac{25}{4}$

$q = \frac{5}{4}$

۱۰-

$a_1 + a_4 + a_7 = 73 \rightarrow a_1 + a_2 + a_{10} = 73 \rightarrow a + a + d + a + 9d = 73$

$3a + 10d = 73$

$a_1 \times a_{10} = a_2^2 \rightarrow a_1 \times (a_1 + 9d) = (a+d)^2$

$\rightarrow \cancel{a^2} + 9ad = \cancel{a^2} + d^2 + 2ad \rightarrow 3a = 73 - 10d$

$d^2 - 7ad = 0 \rightarrow d^2 - 7d\left(\frac{73}{3} - \frac{10}{3}d\right) = 0$

$a = \frac{73}{3} - \frac{10}{3}d$