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الف) $a^n: aq^{n-1} \rightarrow r^{-1} \times r^{n-1} = r^{n-1} \rightarrow a_1 = r^1 = 2 \times 2$

ب) $\frac{a_{14}}{a_{13}} = q^1 = r^1 = 12$

ج) $q^{n+1} = \frac{b}{a} \Rightarrow q^7 = \frac{a_{11}}{a_1} = q^4 \times r^4 \Rightarrow q = 1 \rightarrow 4, (32), 2 \times 2$

د) $128 = \frac{1}{r} \times r^{n-1} \rightarrow r^7 = r^{n-1} \rightarrow 7 = n-1 \rightarrow n = 8$

$\frac{a_8}{a_5} = q^3 \rightarrow \frac{96}{4} = q^3 \rightarrow q = 2$

$\rightarrow a_1 = a_8 q^7 = 96 \times 2 = 192$

الف) $a_1 \cdot a_2 \cdot a_3 \cdot a_4 \cdot a_5 = a^5 d^{10} = 2 \times 3^5 \Rightarrow (ad^2)^5 = 3^5 \rightarrow ad^2 = 3 \rightarrow a_2 = 3$

ب) $a_1 \cdot a_5 = a^2 d^4 = (ad^2)^2 = 3^2 = 9$

$(\frac{1}{\sqrt{2}})^2 = r^a \times r^b \rightarrow r^2 = r^{a+b} \rightarrow a+b=2$

نسبت $\frac{a+b}{f+1} = \frac{2}{2} = 1$

$\frac{a_{11}}{a_1} = \frac{a_7}{a_3} = q^4 \Rightarrow a_{11}, a_7$ نسبت به a_3 و a_1

$n^2 = (1+n)(1-n) \Rightarrow n^2 = 1-n^2 \rightarrow 2n^2 = 1 \rightarrow n = \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{1}{\sqrt{2}}$

$\rightarrow n = \frac{-\sqrt{2}}{2} \rightarrow q^4 = \frac{-\frac{\sqrt{2}}{2} + 1}{-\frac{\sqrt{2}}{2}} = \frac{-\sqrt{2} + 2}{-\sqrt{2}} = \frac{(-\sqrt{2} + 2)(-\sqrt{2})}{2} = \frac{2 - 2\sqrt{2}}{2} = 1 - \sqrt{2}$
 $\Rightarrow 1 - \sqrt{2} < 0, q^4 > 0 \rightarrow n \neq \frac{-\sqrt{2}}{2}, n = \frac{\sqrt{2}}{2}$

فقط $n = \frac{\sqrt{2}}{2}$

$a + aq^3 = 21 \rightarrow a(1 + q^3) = 21 \rightarrow \frac{a_1 + a_2}{a_1 + a_2} \cdot \frac{a(1+q)(1-q+q^2)}{aq(1+q)} = \frac{21}{21}$ $3 - 3q + 3q^2 = \sqrt{q} \rightarrow 3 - 1 \cdot q + 3q^2 = \sqrt{q} \rightarrow \Delta = 1 \dots \Delta(1) = 74 \rightarrow q = \frac{1 \pm \sqrt{74}}{2} = \frac{1 \pm 8}{2}$ $q_1 = \frac{1}{2} = \frac{1}{2} \quad 21 = \frac{21}{2} \cdot \frac{1}{2} \rightarrow a = 1 \rightarrow \text{مطلوبه} : aq^3 = 1 \times \left(\frac{1}{2}\right)^3 = \frac{1}{8}$ در صورت برعکس	6
$\frac{a}{2} \times a \times aq = 27 \rightarrow a^3 = 27 \rightarrow a = 3$ $\frac{a}{2} + 3 + 3q = 12 \rightarrow \frac{3}{2} + 3q = 9 \rightarrow 3q = 9 - \frac{3}{2} = \frac{15}{2} \rightarrow q = \frac{5}{2}$ مطلوبه سوال if $q = 3 \rightarrow \frac{3}{2}, 3, 3 \times 3 \rightarrow 1, 3, 9$ if $q = \frac{1}{3} \rightarrow \frac{3}{2}, 2, 2 \times \frac{1}{3} \rightarrow 9, 3, 1$	7
$S_1 = 2 \left(\frac{3^k - 1}{3 - 1} \right), 3^k - 1 = 29048$ مطلوبه —) $a_1 = 2 \times 3^1 \rightarrow \sqrt{(a_1 \times a_1)} = (a_1 \times a_1)^{\frac{1}{2}} = (2^2 \times 3^2)^{\frac{1}{2}} = 2 \times 3 = 6$	8
$a_n = a, aq, aq^2, \dots, aq^{n-1}$ $b_n = a(q-1), aq(q-1), aq^2(q-1), \dots, aq^{n-1}(q-1)$ $\frac{b_n}{b} \rightarrow \frac{b_n}{b} = \frac{aq^n(q-1)}{a(q-1)} = q^n \Rightarrow \frac{b_n}{b_{n-1}} = \frac{aq^n(q-1)}{aq^{n-1}(q-1)} = q^{n-1-n+1} = q$	9
مجموع حسابی = $\frac{ن \times (اولی + آخری)}{2} \rightarrow S = \frac{n(a_1 + a_n)}{2} = \frac{n}{2}(a + a_n), a_n = a + (n-1)d$ $\rightarrow S = \frac{n}{2}(a + a + (n-1)d) = \frac{n}{2}(2a + (n-1)d)$ —) $S_n = a + aq + aq^2 + \dots + aq^{n-1} \times q \rightarrow qS_n = aq + aq^2 + \dots + aq^n$ $\rightarrow qS_n - S_n = (aq + aq^2 + \dots + aq^n) - (a + aq + \dots + aq^{n-1}) = aq^n - a = a(q^n - 1)$ $S_n(q-1) = a(q^n - 1) \rightarrow S_n = a \left(\frac{q^n - 1}{q - 1} \right)$	10