* لیلیا مرادی - تکلیف شماره ۱۳ *

۱-

$t_1 = 40$

$t_4 = 61 \to t_1 + 3d = 61 \to 3d = 21 \to d = \frac{21}{3} = 7$

$208 = t_1 + ?d \to 168 = 7 \times ? \to 24 = n-1$

$n = 25$ جمله ۲۵ ام

۲-

$98 + 3 = 101 \to t_1$

$108 \to t_2$

$994 + 3 = 997 \to t_n$

$\frac{997 - 101}{7} + 1$

$\frac{896}{7} = 128 + 1 = 129$

۱۲۹ عدد سه رقمی

۳-

$a_{n+1} + a_{n+2} + a_{n+3} = -9n + 12$

$a_{17} + a_8 = ? \to 17 + 8 = 25 \rightsquigarrow a_{17} + a_8 = -34$

$n = 10 \to a_{11} + a_{12} + a_{13} = -48$

$n = 11 \to a_{12} + a_{13} + a_{14} = -54$

$a_{11} + 2a_{12} + 2a_{13} + a_{14} = -102$

$(\overbrace{a_{11} + a_{14}}^{a_{25}}) = (a_{12} + a_{13}) = (a_{12} + a_{13}) =$

$3a_{25} = -102 \to a_{25} = \boxed{-34}$

۴-

$a_3 + a_8 + a_{13} = ? \quad 3 + 8 + 13 = \boxed{24}$

$a_3 = 2^x - 1 \to 3$

$a_8 = 2^{x+1} \to 8$

$a_{13} = 2^{2x} - 3 \to 13$

$3 = 1 + 11d =$

$a_{13} + a_3 = 2a_8$

$2^{2x} - 3 + 2^x - 1 = 2^{x+1} + 2^{x+1}$

$2^{x+1} \times 2$

$2^x(2^x + 1) = 2^{2x} + 2^2$

$2^x \times 2 + 2^2$

$2^x(\cancel{2^x + 1}) = 4(\cancel{2^x + 1})$

$\boxed{x = 2}$

۵- کیبا برادی

$a_{12} - a_{10} = 5 \qquad a_{21} = ?$

$a_{12} + a_{10} = 25 \to 2a_1 + 20d = 25$

$2d = 5 \to d = \frac{5}{2}$

$a_1 = \frac{-25}{2}$

$a_{21} = a_1 + 20d$

$\frac{-25}{2} + 20 \times \frac{5}{2} = \boxed{\frac{75}{2}}$

$\frac{100}{2}$

۶-

$a_1 + a_2 + a_3 + a_4 + a_5 = \frac{1}{3}(a_6 + a_7 + a_8 + a_9 + a_{10})$

$5a_1 + 10d = \frac{1}{3}(5a_1 + 35d)$

$5a_1 + 10d = \frac{5}{3}a_1 + \frac{35}{3}d$

$\frac{15}{3}a_1 + \frac{30}{3}d = \frac{5}{3}a_1 + \frac{35}{3}d$

$10a_1 = 5d \leftarrow \frac{10}{3}a_1 = \frac{5}{3}d$

$d = 2a_1$

$a_2 = a_1 + d \to a_1 + 2a_1 = 3a_1$

$a_1 = 1a_1$

$\frac{3a_1}{a_1} = 3 \to$ ۳ برابر

۷-

$t_7 = t_4 + 15 \to t_1 + 3d + 15 = t_7$

$t_n = t_{n-3} + 15$

$3d = t_7 - t_1 - 15$

$t_9^2 - t_5^2 = (t_9 + t_5)(t_9 - t_5)$

$(2t_1 + 12d)(4d)$

$t_7 = t_1 + 6d$

$8d = 8 \times 5 = 40 = 2\underbrace{(t_1 + 6d)}_{t_7}(4d)$

$\frac{\text{۲۰ برابر}}{2}$

$3d = 6d - 15 \xrightarrow{\div 3} d = 2d - 5$

$d = 5$

۸ -

$2-12\sqrt{3}$ $\qquad$ $2+\sqrt{3}$

$$d=\frac{b-a}{n+1}\rightarrow\frac{\cancel{2}+\sqrt{3}-\cancel{2}+12\sqrt{3}}{13}=\frac{13\sqrt{3}}{13}=\sqrt{3}$$

$d=\sqrt{3}$ $\qquad$ $a_{n+1}=a_1+nd$

۹ -

$$d=\frac{32-2}{4n-3+1}=\frac{30}{4n-2}=\frac{15}{2n-1}\rightarrow 11=2+n\left(\frac{15}{2n-1}\right)$$

$$n=3\leftarrow 3n=9\leftarrow 9=\frac{15n}{2n-1}$$

۱۰ -

$$a_n+a_{n+4}=a_3+a_{17}$$

$n+n+4=20\rightarrow n=8$

$a_8=3a_{\frac{n}{2}}\rightarrow a_8=3a_4$

$a_1+7d=3a_1+9d\rightarrow a_1=-d$

$a_n=a_1+(n-1)d=0$

$a_n=-d+nd-d=0$

$a_n=-2d+nd=0\rightarrow nd=2d\rightarrow n=2$