$S_5 = \frac{5}{2}(2a_1 + 4d) = 5a_1 + 10d$

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

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

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

$\frac{15}{3}a_1 - \frac{5}{3}a_1 = \frac{35}{3}d - \frac{30}{3}d \quad \frac{10}{3}a_1 = \frac{5}{3}d \quad 2a_1 = d \quad a_1 = \frac{d}{2}$

$a_2 = a_1 + d = \frac{3d}{2}$
$a_1 = a_1 = \frac{d}{2}$ ۳ برابر

۲

$d(n-1-n+4) = 15 \quad 3d = 15 \quad d = 5$

-7. $t_n = t_{n+3} + 15 \rightarrow a + (n-1)d = a + (n-4)d + 15$

$t_9 = a + 8(5) = a + 40$
$t_5 = a + 4(5) = a + 20$, $(t_9)^2 - (t_5)^2 = (t_9 + t_5) \times (t_9 - t_5)$
$(2a_1 + 60) \quad (20$
$20(2a_1 + 60) = 40a_1 + 1200$

8. $d = \frac{t_m - t_n}{m - n} = \frac{2 - 12\sqrt{3} - 2 - \sqrt{3}}{13} = -\sqrt{3}$

۲

9. $d = \frac{32 - 2}{4n - 2} = \frac{9}{n+1} \rightarrow 30n + 3 = 39n - 18$
$21 = 9n \quad n = \frac{7}{3}$

۱۸

10. $t_n + t_{n+4} = t_3 + t_{17} \qquad t_n = 3(t_{\frac{n}{2}})$

$a_1 + (n-1)d + a_1 + (n+3)d = a_1 + 2d + a_1 + 16d$

$(n-1+n+3)d = 18d$

$2n + 2 = 18 \quad 2n = 16 \quad n = 8$

$t_8 = 3(t_4)$ ۲

$a_1 + 7d = 3a_1 + 9d$

$-2a_1 = 2d$

$a_1 = -d$

$t_2 = a_1 + d = 0$

جمله ۱۲ام

۱۷٫۲۵

آرشید اردشکری

۱-

$a_1 = 40 \quad a_4 = 61$

$a_4 = a_1 + 3d \Rightarrow 61 = 40 + 3d \rightarrow \boxed{7}$

$a_n = 40 + (n-1)7$

$7n - 7 + 40 \quad +33$

$40 + (n-1)7 = 208$

$7n = 175$

$\boxed{n = 25}$

۲

۲-

$100 \le 7x + 3 \le 999 \Rightarrow 97 \le 7n \le 996 \quad 15 \le n \le 142$

تعداد $= 142 - 15 + 1 = \boxed{128}$

۱٫۷۵

کمترین عدد $\rightarrow 14(7) + 3 = 101$ آخرین عدد $= 142(7) + 3 = 997$

تعداد $\dfrac{997 - 101}{7} + 1 = 129$

۳-

$a_{12} - a_{10} = 5 \rightarrow 2d \quad \boxed{d = 2.5}$

$a_{12} + a_{10} = 25 \quad 2(a_{12}) = 30 \quad a_{12} = 15$

$a_{12} = a_1 + 11(2.5)$

$a_{10} = a_1 + 9(2.5)$

$2a_1 + 20(2.5) = 25$

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

$a_{21} = \dfrac{-25}{2} + (20)(2.5) = -12.5 + 50$

$\boxed{37.5}$

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۴-

دنباله حسابی

$a_3 = 2^x - 1$

$a_8 = 2^{x+1} \longrightarrow 2(a_8) = a_3 + a_{13}$

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

$2^x \times 4 = 2^x + (2^x \times 2) + (2^x)^2 - 4$

$2^x(1 + 2 + 2^x) - 4$

$\Rightarrow 2^x = 5$

$(2^x)^2 - 3 + (2^x)^2 \times 2 + (2^x) - 1 = 36$

۱

$$q_v = a_4 + 3a_5$$

$$\frac{q_9^2 - q_5^2}{q_v} = \frac{4a_0(a_1 + 3a_0)}{a_4 + 3a_0} = 40$$

ادامه سوال ۷

$$a_1 + nd + a_1 + (n+1)d + a_1 + (n+2)d =$$

$$3a_1 + (3n+3)d = -6n + 12$$

$$3a_1 + 3nd + 3d = -6n + 12$$

$$3a_1 + 3(-2) = 12 \Rightarrow 3a_1 = 18 \quad \boxed{a_1 = 6}$$

$$3d = -6 \quad \boxed{d = -2}$$

$$a_8 + a_{17} = a_1 + 14d + a_1 + 16d = 6 - 14 + 6 - 32 \Rightarrow \boxed{-34}$$

سوال ۳۵

سوال ۴

$a_3 + a_{13} = a_1 + a_{15}$

$2^n - 1 + 2^{2n} - 3 = 2(2^{n+1})$

$2^{2n} - 4 = 2(2 \times 2^n) - 2^n$

$2^{2n} - 3 \times 2^n - 4 = 0 \longrightarrow 2^n = t$

$t^2 - 3t - 4 = 0 \rightarrow t = 4 \longrightarrow 2^n = 4 \rightarrow n = 2$

$t = -1$ غ ق ق

جملات $\rightarrow 2^2 - 1 \;/\; 2^{2+1} \;/\; 2^{2(2)} - 3$

$3 + 8 + 13 = \boxed{24}$

سوال ۹

$3 - 4n$ واسطه‌ی حسابی درج شده است بین ۳۲ جمله‌ی $4n - 1$ است!

$a_{4n-1} = a_1 + (4n-2)d = 32 \rightarrow (4n-2)d = 30 \rightarrow (2n-1)d = 15$

واسطه‌ی n ام جمله‌ی $n+1$ است!

$a_{n+1} = a_1 + nd = 11 \rightarrow nd = 9$

$2nd - d = 15 \xrightarrow{nd=9} d = 3$, $n = 3$ ✓