آفرین! ۲۰

۱- (۲)

$a_1 = 40$
$a_4 = a_1 + 3d = 91$ $\Big\} \Rightarrow 3d = 21 \Rightarrow d = 7 \Rightarrow a_n = 7n + 33$

$7n + 33 = 201 \Rightarrow 7n = 168 \Rightarrow \boxed{n = 24}$ ✓

۲- (۲)

$100 \leq 7n + 3 \leq 999 \Rightarrow 97 \leq 7n \leq 996$

$\Rightarrow 13,\overline{857} \leq n \leq 142,\overline{428} \Rightarrow 14 \leq n \leq 142$

عدد ۱۲۹ ✓

۳- (۲)

$n=0 \Rightarrow a_1 + a_2 + a_3 = 12$
$n=1 \Rightarrow a_2 + a_3 + a_4 = 9$ $\Big\} a_4 - a_1 = -3 \Rightarrow d = -1$ ✓

$a_n + d + a_n + 2d + a_n + 3d = -9n + 12 \Rightarrow 3a_n - 12 = -9n + 12 \Rightarrow a_n = -3n + 8$

$\Rightarrow a_8 + a_{12} = -24 + 8 - 36 + 8 = \boxed{-44}$ ✓

۴- (۴)

$d = 2(2^a) - 2^x + 1 = 2^x + 1$

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

$\Rightarrow a_2 + a_8 + a_{12} = 2 + 8 + 12 = \boxed{22}$ ✓

۵- (۲)

$a_{12} - a_{10} = 5 \Rightarrow 2d = 5 \Rightarrow d = 2,5$ ✓

$\Rightarrow a_{10} + a_{10} + 2d = 25 \Rightarrow 2a_{10} = 20 \Rightarrow a_{10} = 10$

$\Rightarrow a_{21} = a_{10} + 11d = 10 + 27,5 = 37,5$ ✓

$2(S_{1-2}) = S_{4-10} \Rightarrow \frac{2}{2}(2a_1+4d)\times 2 = \frac{4}{2}(2a_4+4d)$ (۲) -۶

$\Rightarrow 4a_1+12d = 2a_4+4d \Rightarrow 2a_1+4d = a_4+2d$

$\Rightarrow 2a_1+4d = a_1+3d$

$\Rightarrow 2a_1 = d$

$\Rightarrow \frac{a_2}{a_1} = \frac{a_1+2a_1}{a_1} = \boxed{3}$ ✓

$\Rightarrow 4d = 12 \Rightarrow d = 3$

$\Rightarrow \frac{6_1^2-6_5^2}{6_7} = \frac{(6_5+2_0)^2-6_5^2}{6_5+10} \Rightarrow \frac{6_5^2+40_5+100-6_5^2}{6_5+10} = \frac{40(6_5+10)}{6_5+10} = \boxed{40}$ (۲) -۷

$d = \frac{2+\sqrt{5}-2\sqrt{10}\sqrt{2}}{15} = \frac{15\sqrt{5}}{15} = \boxed{\sqrt{5}}$ ✓ (۲) -۸

$d = \frac{33-3}{4n-2}$ (۲) -۹

$a_{n+1} = 4n$ 2nd/19 $= 2+n\left(\frac{2_0}{4_{n-2}}\right) = 11 \Rightarrow n\left(\frac{2_0}{4_{n-2}}\right) = 9 \Rightarrow 20n = 36n-18$

$\Rightarrow 18 = 16n \Rightarrow \boxed{n=3}$ ✓

$2a_n+4d = 2a_5+14d \Rightarrow a_n = a_5+3d \Rightarrow a_n = a_8$ (۲) -۱۰

$2a_4 = a_n \Rightarrow 2a_1+6d = a_1+7d \Rightarrow 2d = -2a_1 \Rightarrow -d = a_1$

$a_n = a_1+(n-1)d \Rightarrow 0 = -d+(n-1)d \Rightarrow n-1 = 1 \Rightarrow \boxed{n=2}$ ✓