

$$a_1 = 10 \quad a_5 = a_1 + 4d = 10 + 4d = 21 \quad 4d = 11 \quad \boxed{d = 11/4}$$

$$101 = 10 + 11(n-1)$$

$$101 = 10 + 11n - 11 = 11 + 11n$$

$$11n = 91 \quad \boxed{n = 8.27} \quad \checkmark$$

$$k = 7n + 3 \quad 100 \leq k \leq 999 \quad 100 \leq 7n + 3 \leq 999 \quad 97 \leq 7n \leq 996$$

$$13, 14, \dots, 142, 143, \dots \quad n = 14, 15, 16, \dots, 142$$

$$142 - 14 + 1 = \boxed{129} \quad \checkmark$$

$$a_2 + a_3 + a_4 = 9$$

$$a + d + a + 2d + a + 3d = 9$$

$$3a + 6d = 9$$

$$3d = -9$$

$$d = -3$$

$$a_3 + a_4 + a_5 = 0$$

$$a + 2d + a + 3d + a + 4d = 0$$

$$3a + 9d = 0$$

$$a + 3d = 0$$

$$a = -3d$$

$$\boxed{a = 9}$$

$$a_{14} + a_1$$

$$a + 13d + a + d = ?$$

$$2a + 14d = 18 - 42 = \boxed{-24} \quad \checkmark$$

$$a_{13} - a_1 = a_1 - a_3 \quad (r^k = t)$$

$$t^3 - 3 - 2t = 1t - t + 1 \rightarrow t^3 - 3t - 2 = 0$$

$$t = \frac{3 \pm \sqrt{9 + 12}}{3} = \frac{3 \pm \sqrt{21}}{3} = 1 \pm \sqrt{7} \rightarrow t = 1 + \sqrt{7} > 0 \Rightarrow t = 1 + \sqrt{7}$$

$$a_3 + a_1 + a_{13} = t - 1 + 2t + t^3 - 3 = 1 + 1 + 13 = \boxed{15} \quad \checkmark$$

$$a_{12} - a_{10} = 2 \rightarrow a + 11d - a - 9d = 2d = 2 \rightarrow d = 1$$

$$a_{12} + a_{10} = 22 \rightarrow a + 11d + a + 9d = 2a + 20d = 22 \rightarrow a + 10d = 11 \rightarrow a = 11 - 10d$$

$$a_{12} = a + 11d$$

$$a_{10} = a + 9d$$

$$a_{21} = a + 20d = 11 - 10d + 20d = 11 + 10d = \boxed{31} \quad \checkmark$$

کیا ضروری

$S_0 = a + a + d + a + r d + a + r d + a + r d = 5a + 10d$ $S_0' (q_1) = a + 5d + a + r d + a + r d + a + r d + a + r d = 5a + 3rd$ $5a + 10d = \frac{1}{r} (5a + 3rd)$ $15a + 30d = 5a + 3rd$ $10a = 5d \rightarrow 2a = d$ $a_r = a + d = a + 2a_1 = 3a_1$ $a_r = 3a_1 \checkmark$	6
$t_n = t_{n-1} + 1d \Rightarrow 1d = rd \quad d = 5$ $t_0 = t + rd = t + r_0$ $t_v = t + rd = t + r_0$ $t_q = t + 1d = t + 5$ $t_q^r - t_0^r = (t + 5)^r - (t + r_0)^r = t^r + 1500 + 150t - t^r - r_0 - r_0t = 1500 + 5t$ $\frac{r_0 t + 1500}{t + r_0} = \boxed{r_0} \checkmark$	7
$d = \frac{2 + \sqrt{3} - 2 + 12\sqrt{3}}{12} = \frac{12\sqrt{3}}{12} = \boxed{\sqrt{3}} \checkmark$	8
$a_1 = r$ $a_{fn-1} + r = 3r$ $a_{fn-1} = 3r \rightarrow \text{مقام } f_{n-1}$ $a_{fn-1} = a_1 + (fn-1)d = 3r$ $r + (fn-1)d = 3r$ $(fn-1)d = 2r \rightarrow d = \frac{2r}{fn-1}$ $r + dn = 11$ $d = \frac{9}{n}$ $\frac{9}{n} = \frac{r_0}{fn-1}$ $3n = 34n - 11$ $4n = 11$ $\boxed{n=3} \checkmark$ $d=3$	9
$r_0 = 1 + 5 + n$ $r_0 = 2n + 5$ $14 = 2n$ $\boxed{n=7}$ $a_1 + a_{1r} = a_p + a_{1v}$ $a_n = 3a_r$ $a_1 + vd = 3(a + rd)$ $a_1 + vd = 3a_1 + 9d$ $-2a = 2d$ $-a = d$ $a_m = a_1 + (m-1)d = 0$ $a_1 - a_1(m-1) = 0$ $a_1(1 - (m-1)) = 0$ $a_1(2-m) = 0$ $a_1 \neq 0 \Rightarrow 2-m=0 \Rightarrow \boxed{m=2} \checkmark$	10