

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

$$\left. \begin{array}{l} a_1 = 40 \\ a_{17} = a_1 + 16d = 91 \end{array} \right\} \xrightarrow{\text{از هم کم می کنیم}} 16d = 51 \Rightarrow d = \frac{51}{16} \Rightarrow a_n = 40 + (n-1) \frac{51}{16}$$

$$\Rightarrow \frac{51n - 15}{16} \Rightarrow \boxed{51n - 15}$$

$$a_n = 51n - 15 = 40 \Rightarrow 51n = 55 \Rightarrow \boxed{n = 1}$$

$$100 \leq 51n - 15 \leq 999 \Rightarrow 115 \leq 51n \leq 1014 \Rightarrow$$

$$\frac{115}{51} \leq n \leq \frac{1014}{51} \Rightarrow 2.25 \leq n \leq 19.88 \Rightarrow 3 \leq n \leq 19 \Rightarrow$$

$$\underbrace{(19 - 3)}_{16} + 1 = \boxed{17} \text{ عدد}$$

$$a_n = a_1 + (n-1)d \Rightarrow a_{n+1} + a_{n+2} + a_{n+3} = -4n + 12$$

$$\begin{array}{c} \downarrow \quad \downarrow \quad \downarrow \\ a_1 + dn + a_1 + dn + d + a_1 + dn + 2d = -4n + 12 \Rightarrow \\ 3a_1 + 3dn + 3d = -4n + 12 \Rightarrow \div 3 \Rightarrow a_1 + dn + d = -\frac{4}{3}n + 4 \Rightarrow d = -\frac{4}{3} \end{array}$$

$$\left. \begin{array}{l} d = -\frac{4}{3} \\ a_1 = 4 \end{array} \right\} \Rightarrow$$

$$a_1 + a_{17} = a_1 + 16d + a_1 + 16d = 2a_1 + 32d = 8 - 64 = \boxed{-56}$$

$$a_n - a_p = a_{17} - a_n$$

$$\begin{array}{l} r^{n+1} - r^n + 1 = r^n - r - r \Rightarrow r^n(r-1) + 1 = r^n(r-1) - r \Rightarrow \\ r^n + 1 = r^{n+1} - r \Rightarrow r = r^{n+1} - r^n \Rightarrow r = r^n(r-1) \Rightarrow n = 1 \Rightarrow \end{array}$$

$$\left. \begin{array}{l} a_2 = 2 \\ a_n = 1 \\ a_{17} = 17 \end{array} \right\} \Rightarrow \boxed{2+1+17=20}$$

$$\left. \begin{array}{l} a_{17} - a_{10} = 7 \\ a_{17} + a_{10} = 25 \end{array} \right\} \xrightarrow{\text{جمع کنیم}} 2a_{17} = 32 \Rightarrow a_{17} = 16 \Rightarrow \boxed{a_{10} = 10} \Rightarrow$$

$$a_{17} - a_{10} = a_1 + 16d - (a_1 + 9d) = 7d \Rightarrow 7d = 7 \Rightarrow \boxed{d = 1, 7}$$

$$a_{17} = a_{10} + 7d \Rightarrow \boxed{a_{17} = 10 + 7(1, 7) = 17, 59}$$

$$\text{مجموعه } n \text{ جمله حسابی} = \frac{n}{2} (a_1 + a_n) \Rightarrow \frac{\cancel{\frac{n}{2}} (a_1 + a_5)}{\cancel{\frac{n}{2}} (a_4 + a_{10})} = \frac{1}{3} \Rightarrow$$

$$ra_1 + r(a_1 + rd) = a_1 + 4d + a_1 + 9d \Rightarrow$$

$$4a_1 + 14d = 2a_1 + 13d \Rightarrow 2a_1 = -d \Rightarrow a_1 = -\frac{d}{2} \Rightarrow \boxed{a_1 = \frac{d}{2}}$$

$$\begin{aligned} \text{جمله دوم} = a_2 = a_1 + d &\xrightarrow{a_1 = \frac{d}{2}} \frac{d}{2} + d = \frac{3d}{2} \\ \text{جمله اول} a_1 = \frac{d}{2} &\end{aligned} \Rightarrow \frac{a_2}{a_1} = \frac{\frac{3d}{2}}{\frac{d}{2}} = \boxed{3 \text{ برابر}}$$

$$a_k = a_1 + 15 \Rightarrow a_1 + rd - a_1 = 15 \Rightarrow d = 5 \Rightarrow$$

$$\underbrace{t_9 - t_0}_{\text{مزدوج}} = (t_9 - t_0)(t_9 + t_0) = \underbrace{(t_v + rd - (t_v - rd))}_{rd} \underbrace{(t_v + rd + t_v - rd)}_{2t_v} =$$

$$(rd)(2t_v) \xrightarrow{d=5} \boxed{r_0 t_v} \Rightarrow \frac{r_0 t_v}{t_v} = \boxed{r_0 \text{ برابر}}$$

$$d = \frac{a_n - a_1}{f-1} = \frac{(2 + \sqrt{3} - 2 + 12\sqrt{3}) \cancel{12\sqrt{3}}}{\cancel{12} \cancel{\sqrt{3}} \cancel{12}} = \boxed{+\sqrt{3}}$$

$$\frac{\frac{r_0}{r_n - r + 1}}{r_n - r} = d \Rightarrow \frac{15}{r_n - 1} = d \Rightarrow$$

$$\begin{aligned} \text{واسطه } n \text{ ام} = n+1 \text{ جمله} = a_1 + nd &\Rightarrow 2 + n \left(\frac{15}{r_n - 1} \right) = 11 \Rightarrow 15n = 11n - 9 \Rightarrow \\ r_n = 9 &\Rightarrow \boxed{n = 3} \end{aligned}$$

$$m + n = r + s \xrightarrow[\text{حسابی}]{\text{تساوی}} t_m + t_n = t_r + t_s \Rightarrow$$

$$t_n + t_n + r = t_r + t_{14} \Rightarrow n + n + r = r + 14 \Rightarrow 2n = 14 \Rightarrow \boxed{n = 7}$$

$$\frac{t_n}{t_r} = r \Rightarrow \frac{a_1 + nd}{a_1 + rd} = r \Rightarrow \cancel{a_1} + \cancel{nd} = \cancel{ra_1} + \cancel{rd} \Rightarrow ra_1 = -rd \Rightarrow$$

$$a_1 = -d \Rightarrow a_r = a_1 + d \xrightarrow{a_1 = -d} \boxed{a_r = 0} \Rightarrow \text{جمله دوم}$$