

سوال ۱

$$\frac{40}{+n}, \frac{41}{+n}, \frac{42}{+n} \rightarrow 3n = 21 \rightarrow n = 7$$

$$tn = 7n + 33 \rightarrow 7n + 33 = 201 \rightarrow n = 27$$

سوال ۲

$$101, 101, \dots, 997 \rightarrow tn = 7n + 96$$

$$\text{تعداد} = \frac{997 - 101}{7} + 1 \rightarrow 129$$

سوال ۳

$$3a_{n+2} = -4n + 12 \xrightarrow{n=4} 3a_6 = -34 + 12 \rightarrow a_6 = -1$$

$$3a_{n+2} = -4n + 12 \xrightarrow{n=15} 3a_{17} = -4 \times 15 + 12 \rightarrow a_{17} = -24$$

$$a_6 + a_{17} = (-1) + (-24) = -25 \rightarrow -25$$

سوال ۴

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

$$2a_1 = a_{13} + a_{17}$$

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

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

$$2^x(4 - 2 - 1) = -1 \rightarrow 2^x(1) = -1 \rightarrow x = 2$$

$$a_3 + a_1 + a_{13} = 3 + 1 + 13 = 17$$

سوال ۵

$$a_{12} + a_{10} = 25 \quad a_{12} \rightarrow a_1 + 11d = 15$$

$$a_{12} - a_{10} = 5$$

$$a_{10} \rightarrow a_1 + 9d = 10$$

$$2d = 5 \rightarrow d = 2.5 \rightarrow a_1 = 12.5$$

$$2a_{12} = 30 \rightarrow a_{12} = 15 \rightarrow a_{10} = 10$$

$$a_{21} \rightarrow a_1 + 20d \rightarrow -12.5 + (20 \times 2.5) = 37.5$$

سوال ۶

$$a_1 + a_2 + a_3 + a_4 + a_5 = (a_4 + a_5 + a_1 + a_2 + a_3) \times \frac{1}{5}$$

$$a_1 + (a_1 + d) + (a_1 + 2d) + (a_1 + 3d) + (a_1 + 4d) = \frac{1}{5}[(a_1 + 5d) + (a_1 + 4d) + (a_1 + 3d) + (a_1 + 2d) + (a_1 + d)]$$

$$5(a_1 + 2d) = 5(a_1 + 3d) \times \frac{1}{5} \Rightarrow 2a_1 = d$$

$$\frac{a_2}{a_1} \rightarrow \frac{a_1 + d}{a_1} \rightarrow \frac{3a_1}{a_1} = 3$$

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

سوال ٧

$$\hookrightarrow t_1 + (n-1)d = t_1 + (n-3)d + 15 \rightarrow 2d = 15 \rightarrow \boxed{d = 7.5}$$

$$t_5 = t_1 + 4d = t_1 + 30$$

$$t_6 = t_1 + 5d = t_1 + 37.5$$

$$t_9 = t_1 + 8d = t_1 + 60$$

$$\left| \begin{array}{l} t_9 - t_5 = (t_1 + 8d) - (t_1 + 4d) \rightarrow \\ [(t_1 + 60) - (t_1 + 30)] [(t_1 + 60) + (t_1 + 30)] \end{array} \right.$$

$$4 \times 30 = 4 \times (t_1 + 45) \rightarrow 120 = 4(t_1 + 45) \rightarrow t_1 = 15$$

$$\frac{t_9 - t_5}{t_6 - t_5} = \frac{30}{37.5} = \frac{4}{5} = \boxed{\frac{4}{5}}$$

$$\frac{(2 + \sqrt{3}) - 2(1 + 4\sqrt{3})}{12 + 1} = \frac{13\sqrt{3}}{13} = \boxed{\sqrt{3}}$$

سوال ١١

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

سوال ٩

$$2, 5, 11, 18, 26, 35, 45, 56, 68, 81, 95, 110, 126, 143, 161, 180, 200, 221, 243, 266, 290, 315, 341, 368, 396, 425, 455, 485, 516, 548, 581, 615, 650, 686, 723, 761, 800, 840, 881, 923, 966, 1010, 1055, 1101, 1148, 1196, 1245, 1295, 1346, 1398, 1451, 1505, 1560, 1616, 1673, 1731, 1790, 1850, 1911, 1973, 2036, 2100, 2165, 2231, 2298, 2366, 2435, 2505, 2576, 2648, 2721, 2795, 2870, 2946, 3023, 3101, 3180, 3260, 3341, 3423, 3506, 3590, 3675, 3761, 3848, 3936, 4025, 4115, 4206, 4298, 4391, 4485, 4580, 4676, 4773, 4871, 4970, 5070, 5171, 5273, 5376, 5480, 5585, 5691, 5798, 5906, 6015, 6125, 6236, 6348, 6461, 6575, 6690, 6806, 6923, 7041, 7160, 7280, 7401, 7523, 7646, 7770, 7895, 8021, 8148, 8276, 8405, 8535, 8666, 8798, 8931, 9065, 9200, 9336, 9473, 9611, 9750, 9890, 10031, 10173, 10316, 10460, 10605, 10751, 10898, 11046, 11195, 11345, 11496, 11648, 11801, 11955, 12110, 12266, 12423, 12581, 12740, 12900, 13061, 13223, 13386, 13550, 13715, 13881, 14048, 14216, 14385, 14555, 14726, 14898, 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