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$$t_n = 5, 9, 13, 17, \dots$$

$$\xrightarrow{4} \xrightarrow{4} \xrightarrow{4}$$

$$\text{الف) } t_n = 4n + 1 \quad \checkmark$$

$$\text{ب) } t_{10} = 4(10) + 1 = 41 \quad \checkmark$$

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$$t_n = 6, 10, 14, 18, \dots$$

$$\xrightarrow{4} \xrightarrow{4} \xrightarrow{4}$$

$$\text{الف) } S_1 = \frac{1}{4}(2(6) + 9(4)) = 5(12 + 36) = 5 \times 48 = 240 \quad \checkmark$$

$$\text{ب) } 4 \times 1 = 22 \Rightarrow 29, 30, 31, 32 \Rightarrow S_{32} = 16(6 + 130) = 16 \times 136 = 2176 \quad \ominus \quad 496 \quad \checkmark$$

$$t_n = 4n + 2 \Rightarrow t_{32} = 130, t_{31} = 126 \quad S_{31} = 14(6 + 126) = 1960$$

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$$1 + \sqrt{3}, 2, 3, \sqrt{3}, \dots$$

$$\xrightarrow{+1-\sqrt{3}} \xrightarrow{+1-\sqrt{3}} \xrightarrow{+1-\sqrt{3}}$$

$$t_n = (1 - \sqrt{3})n + 2\sqrt{3} \rightarrow t_{33} = (1 - \sqrt{3})33 + 2\sqrt{3} = 33 - 33\sqrt{3} + 2\sqrt{3} = 33 - 31\sqrt{3}$$

$$t_{34} = (1 - \sqrt{3})34 + 2\sqrt{3} = 34 - 34\sqrt{3} + 2\sqrt{3} = 34 - 32\sqrt{3}$$

$$t_{34} - t_{33} = 34 - 32\sqrt{3} - (33 - 31\sqrt{3}) = 34 - 32\sqrt{3} - 33 + 31\sqrt{3} = 1 - \sqrt{3} \quad \checkmark$$

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$$a_n = a^{2x}, 2x \cdot 2\omega^x, a^y \rightarrow 2b = a + c \Rightarrow 2x(2\omega^x) = a^y + a^{2x} \Rightarrow 4\omega^x = a^y + a^{2x}$$

$$\Rightarrow \omega^x = \omega^y \Rightarrow \omega^{x+1} = \omega^y \Rightarrow x+1 = y \Rightarrow x+1 = 4-x \Rightarrow 2x = 3 \Rightarrow x = 1$$

$$b_n = x, 2, y \rightarrow 2b = a + c \Rightarrow 2x(2) = y + x \Rightarrow y + x = 4 \Rightarrow y = 4 - x \Rightarrow y = 4 - 1 = 3$$

$$\Rightarrow xy = 1 \times 3 = 3 \quad \checkmark$$

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$$2b = a + c \Rightarrow 2(2x - 1) = (2x - 4) + (6x) \Rightarrow 4x - 2 = 8x - 4 \Rightarrow 4x = 2 \Rightarrow x = \frac{1}{2}$$

$$\Rightarrow \left\{ 2\left(\frac{1}{2}\right) - 4, 2\left(\frac{1}{2}\right) - 1, 6\left(\frac{1}{2}\right) \right\} = \{ -3, 0, 3 \}$$

$$t_1 + t_3 = t_2 + t_4 \Rightarrow -3 + t_4 = 0 + 3 \Rightarrow t_4 = 6 \quad \checkmark$$

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$$\left. \begin{aligned} d_a = 2, d_b = 3 \Rightarrow d = 6 \\ a_n = 2n, b_n = 3n \end{aligned} \right\} \Rightarrow a'_n = \omega + (n-1)6 \Rightarrow a'_n = \omega + \frac{6}{n} \Rightarrow a'_n = 9n-1$$

(111)

$$\begin{aligned} a_n &= a_1 + (n-1)d \Rightarrow a_n = 2 + (n-1)2 \Rightarrow a_n = 2n+1 \Rightarrow a_{10} = 2(10)+1=21 \\ b_n &= b_1 + (n-1)d \Rightarrow b_n = 3 + (n-1)3 \Rightarrow b_n = 3n \Rightarrow b_{10} = 3(10)=30 \end{aligned} \Rightarrow a'_n < b_1$$

(111)

$$\begin{aligned} a_\omega &= a_1 + \omega d \Rightarrow a_1 + a_p + a_p + \omega d = 10d \\ a_1 + a_p + a_p &= 21 \end{aligned} \Rightarrow \omega d = 18 \Rightarrow d = 21$$

$$\begin{aligned} \Rightarrow a_1 + a_p + a_p &= a_1 + a_1 + d + a_1 + \omega d = 21 \Rightarrow 3a_1 + 2(21) = 21 \Rightarrow 3a_1 = -9 \Rightarrow a_1 = -3 \\ \Rightarrow \frac{a_p - a_1 + a_1}{a_1} &= \frac{a_1 + \omega d - a_1 - d + a_1}{a_1} = \frac{a_1 + d}{a_1} = \frac{-3 + 21}{-3} = \frac{18}{-3} = -6 \end{aligned}$$

(111)

$$a_1 + a_p + a_p + a_p + a_\omega = 10 + 20 = 30 \Rightarrow 4a_p = 30 \Rightarrow a_p = \frac{15}{2}$$

$$\begin{aligned} \left. \begin{aligned} a_p &= a_1 + a_p \\ a_1 + a_p + a_p &= 10 \end{aligned} \right\} \Rightarrow 3a_p = 10 \Rightarrow a_p = \frac{10}{3} \Rightarrow a_1 + a_p = \frac{10}{3} \Rightarrow a_1 = \frac{10}{3} - \frac{10}{3} = 0 \\ a_p - a_1 &= d \Rightarrow \frac{10}{3} - 0 = d \Rightarrow d = \frac{10}{3} \Rightarrow t_n = \frac{10}{3}n + c \Rightarrow \frac{10}{3} + c = 10 \Rightarrow c = 10 - \frac{10}{3} = \frac{20}{3} \\ \Rightarrow t_n &= \frac{10}{3}n + \frac{20}{3} \Rightarrow t_{10} = \frac{10}{3} \times 10 + \frac{20}{3} = \frac{100}{3} + \frac{20}{3} = \frac{120}{3} = 40 \end{aligned}$$

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$$S_9 = \frac{9}{2}(2a_1 + 8d) \quad S_p = \frac{p}{2}(2a_1 + (p-1)d)$$

$$\Rightarrow \frac{9}{2}(2a_1 + 8d) = \frac{p}{2}(2a_1 + (p-1)d) \Rightarrow \frac{9(2a_1 + 8d)}{p} = 2a_1 + (p-1)d \Rightarrow a_1 + 4d = \frac{2a_1 + (p-1)d}{2}$$

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$$\frac{a_{10}}{a_1} = \frac{a_1 + 9d}{a_1 + d} = \frac{a_1 + 9(4a_1)}{a_1 + 4(4a_1)} = \frac{37a_1}{17a_1} = \frac{37}{17}$$

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$$d = \frac{2\omega - 11}{\omega - 1} = \frac{2\omega}{\omega - 1} - \frac{11}{\omega - 1} = 2 \Rightarrow t_n = \omega n + c \Rightarrow \omega + c = 11 \Rightarrow c = 11 - \omega \Rightarrow t_n = \omega n + 11 - \omega \Rightarrow t_x = 19 + 11 - 2 = 28$$

$$d' = \frac{2\omega - 11}{\omega - 1} = \frac{-11}{\omega - 1} = -\omega \Rightarrow d' = \frac{b-a}{n+1} \Rightarrow -\omega = \frac{19-28}{n+1} \Rightarrow -\omega = \frac{-9}{n+1} \Rightarrow -\omega(n+1) = -9 \Rightarrow -\omega n - \omega = -9$$

$$\Rightarrow -\omega n = -9 \Rightarrow n = \frac{9}{\omega}$$

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