

$$\begin{aligned}
 3 \text{ (iv)} \quad a_3 &= 15, S_{10} = 125 \\
 d &= ?, a_{10} = ? \\
 a_3 &= 15 \\
 a + 2d &= 15 \\
 \Rightarrow a &= 15 - 2d \dots \text{①} \\
 S_{10} &= \frac{10}{2} [2a + 9d] \\
 \overset{25}{125} &= \overset{1}{5} [2(15 - 2d) + 9d] \\
 25 &= 30 - 4d + 9d \\
 \Rightarrow 5d &= -5 \\
 \Rightarrow d &= -1
 \end{aligned}$$

Sub ①

$$\begin{aligned}
 a &= 15 - 2(-1) \\
 &= 15 + 2 \\
 &= 17 \\
 a_{10} &= a + 9d \\
 &= 17 + 9(-1) \\
 &= 17 - 9 \\
 &= 8
 \end{aligned}$$

$$\begin{aligned}
 3 \text{ (v)} \quad d &= 5, S_9 = 75, a = ?, a_9 = ? \\
 S_9 &= 75 \\
 \frac{9}{2} [2a + 8d] &= 75
 \end{aligned}$$

$$\begin{aligned}
 \Rightarrow 2a + 8d &= \frac{75 \times 2}{9} \\
 \Rightarrow 2a + 8 \times 5 &= \frac{50}{3} \\
 \Rightarrow 2a &= \frac{50}{3} - \frac{40}{1} \\
 \Rightarrow 2a &= \frac{50 - 120}{3} \\
 \Rightarrow \frac{1}{2} 2a &= \frac{-70}{3}
 \end{aligned}$$

$$\begin{aligned}
 \Rightarrow a &= -\frac{35}{3} \\
 a_9 &= a + 8d \\
 &= -\frac{35}{3} + 8 \times 5 \\
 &= -\frac{35}{3} + \frac{40}{1} \\
 &= \frac{-35 + 120}{3} \\
 &= \frac{85}{3}
 \end{aligned}$$

$$\begin{aligned}
 3 \text{ (vi)} \quad a &= 2, d = 8, S_n = 90, \\
 n &= ?, a_n = ? \\
 S_n &= 90
 \end{aligned}$$

$$\begin{aligned}
 \frac{n}{2} [2a + (n-1)d] &= 90 \\
 \frac{n}{2} [2 \times 2 + (n-1)8] &= 90 \\
 \Rightarrow \frac{2n}{2} (2 + 4n - 4) &= 90 \\
 \Rightarrow n(4n - 2) &= 90 \\
 \Rightarrow 4n^2 - 2n - 90 &= 0 \\
 \Rightarrow 2n^2 - n - 45 &= 0 \\
 \Rightarrow 2n^2 - 10n + 9n - 45 &= 0 \\
 \Rightarrow 2n(n-5) + 9(n-5) &= 0 \\
 \Rightarrow (n-5)(2n+9) &= 0 \\
 \Rightarrow n-5=0, 2n+9=0 \\
 \Rightarrow n=5, n=-\frac{9}{2} &\text{ rejected} \\
 a_5 &= a + 4d \\
 &= 2 + 4 \times 8 \\
 &= 34
 \end{aligned}$$