5.2

1→

	a	d	n	a_n
(i)	7	3	8	28
(ii)	-18	2	10	0
(iii)	46	-3	18	-5
(iv)	-18.9	2.5	10	3.6
(v)	3.5	0	105	3.5

(i) $a = 7$

$d = 3$

$n = 8$

$a_n = ?$

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

$= 7 + (8-1)\,3$

$= 7 + 7 \times 3$

$= 7 + 21$

$= 28$

(ii) $a = -18$

$d = ?$

$n = 10$

$a_n = 0$

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

$0 = -18 + (10-1)d$

$18 = 9d$

$\frac{18}{9} = d$

$d = 2$

(iii) $a = ?$

$d = -3$

$n = 18$

$a_n = -5$

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

$-5 = a + (18-1)-3$

$-5 = a + 17 \times -3$

$-5 = a + (-51)$

$51 - 5 = a \quad | \; a = 46$

(iv) $a = -18.9$, $d = 2.5$,

$n = ?$, $a_n = 3.6$

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

$3.6 = -18.9 + (n-1)\,2.5$

$3.6 + 18.9 = (n-1)2.5$

$22.5 = (n-)2.5$

$\frac{22.5}{2.5} = (n-1)$

$9 = n-1$

$9+1 = n$

$10 = n$

(v) $a = 3.5$ $\quad n = 105$

$d = 0$ $\quad a_n = ?$

$$a_n = a + (n-1)d$$
$$= 3.5 + (105-1)0$$
$$= 3.5 + 104 \times 0$$
$$= 3.5 + 0$$
$$a_n = 3.5$$

2) Choose the correct choice in the following and justify :-

(i) 30th term of the AP : 10, 7, 4..... is :-

Sol:- Given, $a = 10$, $n = 30$, $d = 7 - 10$, $a_n = ?$

$= -3$

$$a_n = a + (n-1)d$$
$$= 10 + (30-1)-3$$
$$= 10 + 29 \times -3$$
$$= 10 + (-87)$$
$$= 10 - 87$$
$$= -77$$

$\therefore$ option (c) -77.

(ii) 11th term of the AP $= -3, -\frac{1}{2}, 2, \ldots\ldots$ is.

Sol:- Given, $a = -3$, $d = \frac{-1}{2} - (-3)$, $a_n = ?$, $n = 11$

$$= \frac{-1}{2} + 3$$
$$\Rightarrow \frac{-1+6}{2} = \frac{5}{2}$$

$$a_n = a + (n-1)d$$
$$= -3 + (11-1)\frac{5}{2}$$
$$= -3 + 5 \cancel{10} \times \frac{5}{\cancel{2}}$$
$$\Rightarrow -3 + 25 = 22$$

$\therefore$ option (b) 22.

3 → (i) 2, [14], 26

Sol:- $a = 2$, $d = ?$, $a_3 = 26$, $n = 3$

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

$26 = 2 + (3-1)d$

$26 = 2 + 2d$

$26 - 2 = 2d$

$\frac{24}{2} = d$

$12 = d$ → common difference.

$a_2 = a + (n-1)d$

$a_2 = 2 + (2-1)12$

$a_2 = 2 + 1 \times 12$

$a_2 = 2 + 12$

$a_2 = 14$ → Ans.

(ii) [18], 13, [8], 3

Sol:- Given, $a_2 = 13$ & $a_4 = 3$

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

$13 = a + (2-1)d$

$13 = a + d$ ⟶ (i)

$a_4 = a + (n-1)d$

$3 = a + (4-1)d$

$3 = a + 3d$

Subtracting eq. (i) & (ii)

$a + d = 13$

$(-)\ a + 3d = (-)\ 3$

$-2d = 10$

$d = \frac{-10}{2} = -5$

$a_2 = 13$

$13 = a + d$

$13 - d = a$

$13 - (-5) = a$

$13 + 5 = a$

$18 = a$ → Ans.

$a_3 = a + (n-1)d$

$= 18 + (3-1) \times -5$

$= 18 + 2 \times (-5)$

$= 18 + (-10)$

$\Rightarrow 18 - 10 = 8$ → Ans.

(iii) 5, $\boxed{\frac{13}{2}}$, $\boxed{8}$, $9\frac{1}{2}$

Sol:- Given, a, 5 & $a_4 = 9\frac{1}{2} = \frac{19}{2}$

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

$a_4 = a + (n-1)d$

$\frac{19}{2} = 5 + (4-1)d$

$\frac{19}{2} = 5 + 3d$

$\frac{19}{2} - 5 = 3d$

$\frac{19-10}{2} = 3d$

$\frac{9}{2} = d$

$\frac{3}{2} = d \rightarrow$ common difference

$a_2 = a + (n-1)d$

$= 5 + 1 \times \frac{3}{2}$

$= 5 + \frac{3}{2}$

$= \frac{10+3}{2}$

$= \frac{13}{2} \rightarrow$ Ans.

$a_3 = a + (n-1)d$

$= 5 + (3-1)\frac{3}{2}$

$= 5 + 2 \times \frac{3}{2}$

$\Rightarrow 5 + 3 = 8 \rightarrow$ Ans.

(iv) -4, $\boxed{-2}$, $\boxed{0}$, $\boxed{2}$, $\boxed{4}$, 6

Sol:- $a = -4$, $a_6 = 6$ } given.

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

$a_6 = -4 + (6-1)d$

$6 = -4 + (6-1)d$

$6 = -4 + 5d$

$6 + 4 = 5d$

$\frac{10}{5} = d$

$d = 2$

$a_2 = a + d$

$= -4 + 2$

$= -2$

$a_3 = a + 2d$

$= -4 + 2 \times 2$

$= -4 + 4$

$= 0$

$a_4 = a + 3d$

$= -4 + 3 \times 2$

$= -4 + 6$

$= 2$

$a_5 = a + 4d$

$= -4 + 4 \times 2$

$= -4 + 8$

$= 4$

(v) 53, 38, 23, 8, -7, -22

Sol:- Given, $a_2 = 38$

$a_6 = -22$

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

$a_2 = a + (n-1)d$

$38 = a + (2-1)d$

$38 = a + d \longrightarrow (i)$

$a_6 = a + (n-1)d$

$-22 = a + (6-1)d$

$-22 = a + 5d \longrightarrow (ii)$

Subtracting eq. (ii) & (i)

$a + 5d = -22$

$a + d = 38$

(-) (-)

$4d = -60$

$d = \frac{-60}{4}$

$d = -15$

Putting the value of d in eq. (i)

$38 = a + d$

$38 = a + (-15)$

$38 + 15 = a$

$53 = a$

$a_3 = a + 2d$

$a_3 = 53 + 2 \times (-15)$

$a_3 = 53 + (-30)$

$a_3 = 23$

$a_4 = a + 3d$

$a_4 = 53 + (3 \times -15)$

$a_4 = 53 + (-45)$

$a_4 = 8$

$a_5 = a + 4d$

$a_5 = 53 + (4 \times -15)$

$a_5 = 53 + (-60)$

$a_5 = -7$

4) Which term of the AP: 3, 8, 13, 18 ..... is 78?

Sol:- Given, $a = 3$

$d = a_2 - a_1$

$d = 8 - 3$

$d = 5$

$a_n = 78$

$\Rightarrow a_n = a + (n-1)d$

$\Rightarrow 78 = 3 + (n-1)5$

$\Rightarrow 78 - 3 = (n-1) \times 5$

$\Rightarrow 75 = (n-1) \times 5$

$\Rightarrow \frac{75}{5} = (n-1)$

$\Rightarrow 15 + 1 = n$

$\Rightarrow 16 = n$

$\therefore$ 16th term of this AP is 78.

5) (i) 7, 13, 19, ... 205.

Sol:- Given, $a = 7$

$d = a_2 - a_1$

$d = 13 - 7$

$d = 6$

$a_n = 205.$

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

$\Rightarrow 205 = 7 + (n-1)6$

$\Rightarrow 205 - 7 = (n-1)6$

$\Rightarrow 198 = (n-1)$

$\Rightarrow \frac{198}{6} = (n-1)$

$\Rightarrow 33 = n-1$

$\Rightarrow 33 + 1 = n$

$\Rightarrow 34 = n$

$\therefore$ 34th term of this AP is 205.

(ii) $18, 15\frac{1}{2}, 13, \ldots\ldots, -47$.

Sol:- Given, $a = 18$

$d = a_2 - a_1$

$d = 15\frac{1}{2} - 18$

$d = \frac{31}{2} - 18$

$d = \frac{31-36}{2}$

$d = \frac{-5}{2}$

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

$\Rightarrow -47 = 18 + (n-1)\left(\frac{-5}{2}\right)$

$\Rightarrow -47 - 18 = (n-1)\left(\frac{-5}{2}\right)$

$\Rightarrow -65 = (n-1)(-5)$

$\Rightarrow -65 \times 2 = (n-1)(-5)$

$\Rightarrow \frac{+130}{+5} = (n-1)$

$\Rightarrow 26 + 1 = n$

$\Rightarrow 27 = n$

$\therefore 27^{th}$ term of this AP is -47.