H.W: **Exercise 5.2.**

Q1. (i) $a = 7$,

$d = 3$.

$n = 8$.

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

$a_8 = 7 + (8-1)3 = 7 + 21 = 28$.

(ii) $a = -18$.

$n = 10$.

$a_n = 0$.

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

$\rightarrow 0 = -18 + (10-1)d$.

$\rightarrow 0 = -18 + 9d$.

$d = 2$.

(iii) $d = -3$.

$n = 18$.

$a_n = -5$.

$\therefore a_n = a + (n-1)$.

$\rightarrow -5 = a + (18-1) - 3$.

$\rightarrow a = 46$.

(iv) $a = -18.9$.

$d = 2.5$.

$a_n = 3.6$.

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

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

$\rightarrow 25 = 2.5n$.

$\rightarrow n = \frac{25}{2.5} = 10$.

(v) $a = 3.5$.

$d = 0$.

$n = 105$.

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

$= 3.5 + (105-1)0 = 3.5$.

Q2. (i) 10, 7, 4, ...

$a = 10$.

$d = 7 - 10 = -3$.

$n = 30$.

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

$\rightarrow a_{30} = a + (30-1)d = a + 29d = 10 + 29(-3)$

$= 10 - 87 = -77$.

(ii) $-3, -\frac{1}{2}, 2, \ldots$.

$a = -3$.

$n = 11$.

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

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

$a_n = a + (n-1)d \rightarrow a_{11} =$

$a + (11-1)d$.

$\rightarrow a_{11} = a + 10d$

$= -3 + 10 \times \frac{5}{2} = -3 + 25 =$

$= 22$.

Q3. (i) $a = 2$.

$t_3 = 26$.

$t_3 = a + (3-1)d$.

$\Rightarrow 26 = 2 + 2d$.

$\Rightarrow d = 12$

$\therefore t_2 = t_3 - d = 26 - 12$

$= 14$.

$\therefore$ the complete sequence is

2, $\boxed{14}$, 26.

(ii) $t_2 = 13$.

$t_4 = 3$.

$t_2 = a + (2-1)d$.

$\Rightarrow 13 = a + d$ --- (i)

$t_4 = a + (4-1)d$.

$\Rightarrow 3 = a + 3d$ --- (ii).

$d = -5$

$d = -5$.

(i) $a = 13 + 5 = 18$.

$\therefore t_3 = a + (3-1)d$.

$= 18 + 2 \times (-5) = 18 - 10 = 8$

$\therefore \boxed{18}$, 13, $\boxed{8}$, 3.

(iii) $a = 5$.

$t_4 = 9\frac{1}{5} = \frac{19}{2}$.

then, $t_4 = a + (4-1)d$.

$\Rightarrow \frac{19}{2} = 5 + 3d \quad \Rightarrow d = \frac{9}{2} = \frac{3}{2}$.

$\therefore t_3 = t_4 - d$.

$= \frac{19}{2} - \frac{3}{2} = \frac{16}{2} = 8$.

$t_2 = t_3 - d$.

$= 8 - \frac{3}{2} = \frac{16-3}{2} = \frac{13}{2} = 6\frac{1}{2}$.

Hence, the complete sequence is 5, $\boxed{6\frac{1}{2}}$, $\boxed{8}$, $9\frac{1}{2}$.

(iv) $a = -4$.

$t_6 = 6$.

then, $t_6 = a + (6-1)d$.

$\rightarrow 6_4 = -4 + 5d$. $\rightarrow d = 2$.

$\therefore t_2 = a + d = -4 + 2 = -2$.

$t_3 = a + 2d = -4 + 4 = 0$.

$t_4 = a + 3d = -4 + 6 = 2$.

$t_5 = a + 4d = -4 + 8 = 4$.

$\therefore -4, \boxed{-2}, \boxed{0}, \boxed{2}, \boxed{4}, 6$.

Q4. given : 3, a, 13, 18, ...

$a = 3$.

$d = 8 - 3 = 5$.

Let term is 78.

$a_n = 78$.

$a + (n-1)d = 78$.

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

$\rightarrow (n-1)5 = 78 - 3$.

$\rightarrow (n-1)5 = 75$.

$\rightarrow n - 1 = 15$.

$\rightarrow n = 15 + 1$.

$\rightarrow n = 16$.

$\therefore$ hence, $a_{16} = 78$.

Q5. (i) $a = 7$.

$d = 13 - 7 = 6$.

$l = 205$.

$l = a + (n-1)d$,

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

$\rightarrow (n-1) = \frac{198}{6} = 33$.

$\rightarrow n = 33 + 1 = 34$.

$\therefore$ Hence, the no. of terms in this AP is 34.

$$d = 15\frac{1}{2} - 18 = \frac{31-36}{2} = -\frac{5}{2}.$$

$$l = -47.$$

$l = a + (n-1)d$, we get:

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

$$\Rightarrow (n-1) = \frac{65 \times 2}{5} = 26.$$

$$\Rightarrow n = 26 + 1 = 27.$$

$\therefore$ hence, the no. of terms in AP is 27.

— • — Completed.