6. AP: 11, 8, 5, 2 . . .

$a_1 = a = 11$

$d = a_2 - a_1$

$= 8 - 11$

$= -3$

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

$\Rightarrow -150 = 11 + (n-1)-3$

$\Rightarrow -161 = (n-1)-3$

$\Rightarrow \frac{\cancel{+}161}{\cancel{+}3} = n-1$

$\Rightarrow 5.366\ldots = n-1$

$\Rightarrow 6.3666\ldots = n$

It is not an integral no.

$\therefore$ This ~~mod~~, -150 is not a term in this AP.

7. Given

$a_{11} = 38$

$a_{16} = 73$

$a_{11} = a + 10d$

$38 = a + 10d$ — (1)

$a_{16} = a + 15d$

$73 = a + 15d$ — (11)

a

Subtracting (i) from (ii), we get ;

$$
\begin{array}{rcl}
a + 10d &=& 38 \\
\ominus\; a + 15d &=& 73 \\
\hline
-5d &=& -35 \\
d &=& 7
\end{array}
$$

$a_{11} = a + 10d$

$\Rightarrow 38 = a + 10(7)$

$\Rightarrow 38 - 70 = a$

$\Rightarrow -32 = a$

$\therefore a_{31} = a + 30d$

$= -32 + 30(7)$

$= -32 + 210$

$= 178$

8. $a_3 = 12$

$a_{50} = 106$

$a_3 = a + 2d$

$\Rightarrow 12 = a + 2d \longrightarrow (i)$

$a_{50} = a + 49d$

$\Rightarrow 106 = a + 49d \longrightarrow (ii)$

Subtracting (I) from (II), we get:

$$106 = a + 49d$$
$$\ominus \quad 12 = a + 2d$$
$$94 = 47d$$
$$\frac{94}{47} = d$$
$$2 = d$$

$a_3 = a + 2d$

$\Rightarrow 12 = a + 2 \times 2$

$\Rightarrow 8 = a$

$a_{29} = a + 28d$

$= 8 + 28(2)$

$= 8 + 56$

$= 64$

9. $a_3 = a + 2d$

$4 = a + 2d$ —— (I)

$a_9 = a + 8d$

$-8 = a + 8d$ —— (II)

Substracting (ii) from (i), we get :

$$a + 8d = -8$$
$$\ominus\ a + 2d = +4$$

$$\cancel{6d = -4}$$

$$6d = -12$$

$$d = -2$$

$a_3 = a + 2d$

$\Rightarrow 4 = a + 2 \times -2$

$\Rightarrow 8 = a$

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

$\Rightarrow 0 = 8 + (n-1)-2$

$\Rightarrow \frac{-8}{-2} = n-1$

$\Rightarrow 4 = n-1$

$\Rightarrow 5 = n$

$\therefore$ 5th term, $a_5 = 0$

10. $a_{17} - a_{10} = 7$ —— (1)

$$a_{17} = a + 16d$$
$$\ominus\ a_{10} = a + 9d$$
$$a_{17} - a_{10} = 7d \quad \text{—— (11)}$$

from (1) and (11), we get

$$7 = 7d$$
$$\Rightarrow 1 = d$$

11. AP: 3, 15, 27, 39 ....

$a = 13$

$d = a_2 - a_1$
$= 15 - 3$
$= 12$

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

$a_{54} = \cancel{1}3 + (54-1)\,12$
$= \cancel{1}3 + (53 \times 12)$
$= \cancel{1}3 + 636$
$= 639$

$$\begin{array}{r} 53 \\ \times 12 \\ \hline 106 \\ 530 \\ \hline 636 \end{array}$$

According to the question, we have,

$a_n = 132 + a_{54}$

$\Rightarrow a + (n-1)d = 132 + 639$

$\Rightarrow 3 + (n-1)12 = 771$

$\Rightarrow 3 + 12n - 12 = 771$

$\Rightarrow 12n - 9 = 771$

$\Rightarrow 12n = 780$

$\Rightarrow n = \frac{780}{12}$

$\Rightarrow n = 65$

$\therefore$ 65^{th} term is the required term

12. Let 'a' and 'A' be the first terms of two APs and 'd' be the common difference.

Given

$a_{100} - A_{100} = 100$

$\Rightarrow a + (100-1)d - [A + (100-1)d] = 100$

$\Rightarrow a + 99d - [A + 99d] = 100$

$\Rightarrow a + \cancel{99d} - A - \cancel{99d} = 100$

$\Rightarrow a - A = 100$

$$a_{1000} - A_{1000}$$

$$= a + (1000-1)d - [A + (1000-1)d]$$

$$= a + \cancel{999d} - A - \cancel{999d}$$

$$= a - A$$

$$= 100$$

$$\therefore a_{1000} - A_{1000} = 100$$