6. $a = 11, d = -3, a_n = -150$

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

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

$(n-1)(-3) = -150 - 11 = -161$

$n - 1 = \frac{-161}{-3}$

$n = \frac{+161}{+3} + 1 = \frac{164}{3} = 53\frac{2}{3}$

which is not an integral number.

-150 is not a term of the AP.

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7. $a_{11} = 38,\ a_{16} = 73$

$a + 10d = 38$ and $a + 15d = 73$

$a + 15d - a - 10d = 73 - 38$

$5d = 35$

$\therefore d = \frac{35}{5} = 7$

$a_{11} = a + 10d = 38$

$\therefore a = 38 - 70 = -32$

$a_{31} = a + 30d = -32 + 30(7) = -32 + 210 = \underline{178}$

8. $a_{50} = 106$

$a + 49d = 106$ ---- (i)

$a_3 = 12$

$a + 2d = 12$ ---- (ii)

eq (ii) - (i)

$a + 49d - a - 2d = 106 - 12$

$47d = 94$

$d = \frac{94}{47} = 2$

$a + 2d = 12$

$a + 2(2) = 12$

$\therefore a = 12 - 4 = \underline{8}$

$a_{29} = a + 28d = 8 + 28(2) = 8 + 56 = \underline{64}$

9. $a_3 = 4,\ a_9 = -8$

$a + 2d = 4$ ---- (i)

$a + 8d = -8$ ---- (ii)

eq (ii) - eq (i),

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

$6d = -12$

$d = -12/6 = -2$

Now, $a + 2d = 4$

$a + 2(-2) = 4$

$a - 4 = 4$

$\therefore a = 4 + 4 = \underline{8}$

$a_n = 0$

$a + (n-1)d = 0$

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

$8 = 2(n-1)$

$8/2 = n-1$

$4 = n-1$

$\therefore n = 4+1 = \underline{5}$

10. $a_{17} - a_{10} = 7$

$(a+16d) - (a+9d) = 7$

$7d = 7$

$d = 7/7 = \underline{1}$

11. $a = 3,\ d = 15-3 = 12,$

Let $a_n = 132 + a_{54}$

$a_n - a_{54} = 132$

$(n-54)12 = 132 \quad (a_n - a_k = (n-k)d)$

$n - 54 = \frac{132}{12}$

$n - 54 = 11$

$n = 11 + 54 = 65.$ $\quad a_n = \underline{65}$

12. Let $a$ and $A$ be the first term of two APs and $d$ be the common difference.

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

$a + 99d - A - 99d = 100$

$a - A = 100$

$a_{1000} - A_{1000} = a + 999d - A - 999d$

$a_{1000} - A_{1000} = a - A$

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