Arithmetic progression

1) $a_n = 4n + 15$

$a_1 = -4(1) + 15 = -4 + 15 = 11$

$a_2 = -4(2) + 15 = -8 + 15 = 7$

$a_3 = -4(3) + 15 = -12 + 15 = 3$

$a_4 = -4(4) + 15 = -16 + 15 = -1$

$a_2 - a_1 = 7 - 11 = -4$

$a_3 - a_2 = 3 - 7 = -4$

$a_4 - a_3 = -1 - 3 = -4$

$a_{15} = -4(15) + 15$

$= -60 + 15 = -45$

2) $n = 1$, term is 17

$n = 2$, term is 23

common difference $= 23 - 17$

$= 6$

3) n^{th} term of AP $9, 7, 5 \ldots = a + (n-1)d$

$= 9 + (n-1) - 2$

$9 - 2n + 2$

$= 11 - 2n$

n^{th} term of AP $15, 12, 9 \ldots = a + (n-1)d$

$15 + (n-1) - 3$

$15 - 3n + 3$

$= 18 - 3n$

$\therefore 11 - 2n = 18 - 3n$

$3n - 2n = 18 - 11$

$n = 7$

4) Let a be the first term & d be the common difference of the AP.

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

$a_8 = 31$

$a_{15} = 16 + a_{11}$

$a + 7d = 31$ &
$a + 14d = 16 + a + 10d$

$a + 7d = 31$ & $4d = 16$

$a + 7d = 31$ & $d = 4$

$a + 28 = 31$
$a = 3$

AP is, $a, a+d, a+2d, a+3d$ ....
i.e, 3, 7, 11, 15, 19

5) $a = 1$
$d = 2.5$

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

$a_{10} = 1 + (10-1)\,2.5$
$a_{10} = 1 + 9 \times 2.5$
$= 23.5$

6) $\frac{n(n+1)}{2}$ $(n = 10)$

$$\frac{10 \cdot (10+1)}{2} = \frac{10 \times 11}{2} = 55$$