1) The general term of a sequence is given by $a_n = -4n + 15$. Is the sequence an AP?

$a_n = -4n + 15$

∴ Sequence $= -4(0)+15, -4(1)+15, -4(2)+15, -4(3)+15, \ldots$

$= 15, 11, 7, 3, \ldots$

Now, $a_2 - a_1 = 11 - 15 = -4$

$a_3 - a_2 = 7 - 11 = -4$

∵ the difference between the consecutive terms of the sequence is constant.

∴ It is an AP.

2) The nth term of an AP is $6n + 11$. Find the common difference.

∴ The sequence $= 6(0)+11, 6(1)+11, 6(2)+11, 6(3)+11, \ldots$

$= 11, 17, 23, 29$

$d = a_3 - a_2 = a_2 - a_3 = a_2 - a_1 = 29 - 23 = 23 - 17 = 17 - 11 = 6$.

∴ The common difference is 6.

3)

(3) If the nth term of the AP 9, 7, 5, ... is same as the nth term of the AP. 15, 12, 9, ... find n.

nth term of an AP $= a + (n-1)d$.

for 1st AP,

nth term $= 9 + (n-1)\cdot(-2)$

$= 9 - 2n + 2 = 11 - 2n$

for the 2nd AP:

nth term $= a + (n-1)d$

$= 15 + (n-1)\cdot(-3) = 15 + -3n + 3 = 18 - 3n$.

A/Q

$11 - 2n = 18 - 3n$

$\Rightarrow -2n + 3n = 18 - 11$

$\Rightarrow n = 7$

So the 7th term of AP 1 and AP 2 is equal.

4) If the 8th term of an AP. is 31 and the 15th term is 16 more than the 11th term, find the A.P.

$a_8 = a + 7d = 31$

$a_{11} = a + 10d = a_8 + 3d$

$a_{15} = a + 14d = a_8 + 3d + 16.$

general term of an AP = $a_n = a + (n-1)d$.

$a_8 = 31 = a + 7d.$

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

$\Rightarrow a + 7d = 31$ and $4d = 16$

$\Rightarrow d = 16/4 = 4.$

Putting the value of d in $a + 7d = 31$,

$a + 7(4) = 31$

$\Rightarrow a + 28 = 31$

$\Rightarrow a = 31 - 28 = 3.$

$\therefore$ The AP is: 3, 7, 11, 15, ...

(5) Find the 10th term of the arithmetic progression 1, 3.5, 8.5.

$a = 1, d = 3.5 - 1 = 2.5$

$\therefore a_{10} = 1 + (10-1)2.5$

$= 1 + 9(2.5)$

$= 1 + 22.5 = 23.5$

6. Find the sum of the first 10 natural numbers

The AP : 1, 2, 3, ..., 10.

$$S_{10} = \frac{10}{2}[2(1) + (10-1)1]$$

$$= 5[2+9]$$

$$= 5[11]$$

$$= 55.$$