IMPORTANT QUESTIONS

Level 1 (1 Mark questions)

1. Find 13th terms of

   -12, -1, 10, 21, ...

2. Find nth term of

   10,15,20,25,.....

   $Sn = \frac{n}{2}[a + a_n]$

3. Find sum of first 20 terms S of A.P.

   5, 13, 21, 29, ...

Level II (2 marks questions)

4. Find A.P. whose 5th term is 29 and 15 the term is 70. Also find its 55th terms.

5. Find numbers of terms of A.P.

   i) 7, 13, 19, ... 205.

   ii) 18, 15½, 13, ...-47.

6. Which terms of A.P. is 3, 15, 27, 39, ... will be 132 more than its 54th term

7. Find 20th term from the last terms of A.P. 3,8, 13..... 253

8. For what values of n the nth term of A.P. is 63, 65, 67, ... and 3, 10, 17,..... are equal

9. If 7 times the 7th term of an A.P. is equal to 11 times the 11th term then find its 18th term.

10. Which term of sequences

7.3, 6.9, 6.5, 6.1 ..... is first negative term. (Hint $a_n<0$)

Level III (3 marks questions)

11. Find the sum 5+9+13 + ...+81

12. Find the no. of terms of A.P.

6,9,12, ... so that their sum is 627.

13. Show that a_1, a_2, a_3 ..... a_n form an A.P., where $a_n = 3+4n$

Also find the sum of first 15 terms.

14. If $Sn = 4x - x^2$

What is first term? what is sum of first two terms. What is second term.

Similarly find 3rd term, 10th and nth term.

15. Find the sum of first 15 multiples of 8.

ANSWERS AND SOLUTIONS

Answers :

1.	120	2.	5n+5	3. 1620	4. 603 A.P. is 9,14,19.....
5.	(i) 34 (ii) 27	6.	65	7. 158	8. n=13
9.	Zero	10.	20th	11. 860	12. 19
13.	525	14.	a=3, S_2 = 4, a_2 =1 , a_3=-1, a_{10} = -15, a_n = 5 - 2n		
15.	960				

ARITHMETIC PROGRESSIONS

Level I (1 Mark Questions)

Q.1 Find 13th term of

-12, -1, 10, 21 ..... $\Rightarrow$

Here,

$a = -12$

$d = -1 - (-12) = 11$

We know that

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

$a_{13} = -12 + (13-1)\,11$

$= -12 + 132$

$= 120$

So, the 13th term is 120.

Q.2 Find nth term of

10,15,20,25,.....

Here,

$a = 10$

$d = 15 - 10 = 5$

We know that

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

$a_n = 10 + (n-1)\,5$

$= 10 + 5n - 5$

$= 5n + 5$ $\Rightarrow$

So, the nth term is 5n + 5.

Q.3 Find sum of first 20 terms of A.P.

5,13, 21, 29.....

Here,

$a = 5$

$d = 13-5 = 8$

$n = 20$

and, we know that

i.e. $S_{20} = \frac{20}{2}[2 \times 5 + (20-1)8]$

i.e. = 10 [10 + 152]

= 10 [162]

i.e. = 1620

So, the sum of first 20 terms is 1620.

Level 2 [2 Marks Questions]

Q.4 Find A.P. whose 5th term is 29 and 15th term is 79. Also find its 55th terms.

We have,

a_5 = 29 i.e., a + 4d = 29 (i) $S_n = \frac{n}{2}[2a + (n-1)d]$

a_{15} = 79 i.e., a+14d = 79 (ii)

Subtracting (i) from (ii), we get

a + 14d = 79
a + 4d = 29
- - -

10d = 50

So, d = 5

Put this, d=5 in equation (i), we get

i.e., a + 4 (5) = 29

i.e., a + 20 = 29

i.e., $a = 9$

So, $a = a_1 = 9$, $a_2 = a + 5 = 14$ .....

The A.P. is 9, 14, 19, 23.....

or, $a_{55} = a + 54d$

i.e. $= 9 + 54\ (5)$

$= a + 270$

So, $a_{55} = 279$

Q.5 Find number of terms of A.P.

1. 7, 13, 19 205

Here,

$a = 7$

$d = 13-7 = 6$

$a_n = 205$

and, We know that

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

i.e., $205 = 7 + (n-1)\ 6$

i.e., $205 = 7 + 6n - 6$

i.e., $204 = 6n$

i.e., n = 34

18, 15½, 13..... 47

Here

a= 18

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

a_n = -47

Now,

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

i.e., $-47 = 18 + (n-1)\ \frac{-5}{2}$

i.e., $n - 47 = 18 - \frac{135 \times 2}{2 \times -5} - \frac{5n}{2} + \frac{5}{2}$

i.e., $-47 = -\frac{5n}{2} + \frac{41}{2}$

i.e., $-47\frac{-41}{2} = -\frac{5}{2}n$

i.e. $\frac{-135}{2} = -\frac{5}{2}n$

i.e.

So, n= 27

Q.6 Which term of A.P. is 3, 15, 27, 39..... will be 132 more than its 54th term.

Here,

a = 3

d = 15-3 = 12

and, we know that

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

i.e. $a_{54} = 3+(54-1)\, 12$

i.e. = 3+ 636

So, $a_{54} = 639$

Acc. to Ques.

nth term = 639 + 132 = 771

Now,

771 = 3 + (n-1) 12

or, 771= 3 + 12n - 12

or, 771 + 9 = 12n

or, 780 = 12n

or, n = 65

So, n= 65

Q.7 Find 20th term of from the last term of A.P. 3, 8, 13, ...253

Here,

$a = 3$

$d = 8 - 3 = 5$

but, Acc. to Ques.

$a = 253$ [A.P. is 253, 248, 243 .....3]

$d = -5$

Now, $a_n = a + (n-1)\, d$

i.e. $a_{20} = 253 + (20-1) - 5$

i.e. $a_{20} = 253 - 95$

i.e. $a_{20} = 158$

So, 20th term is 158.

Q.8 For what values of n the nth term of A.P. is 63, 65, 67..... and 3, 10, 17 .....

are equal.

We have,

Ist A.P. = 63, 65, 67.....

Here, $a = 63$

$d = 65-63=2$

IInd A.P. = 3, 10, 17 .....

Here,

$a = 3$

$d = 10-3 = 7$

Now,

Acc. to Que

$63 + (n-1)\, d = 3+ (n-1)\, d$

i.e. $63 + (n-1)\, 2 = 3 + (n-1)\, 7$

i.e. $63 + 2n - 2 = 3 + 7n - 7$

i.e. $63 - 2 - 3 + 7 = 7n - 2n$

i.e. $65 = 5n$

i.e. $n = 13$

So, $n= 13$

Q.9 If 7 times the 7th term of an A.P. is equal to 11 times the 11th term, then find its 18th term. We have,

$7(a_7) = 11(a_{11})$

i.e. $7 (a + 6d) = 11 (a + 10d)$

Acc. to Que.

or, $7 (a+6d) = 11 (a + 10d)$

or, $7a + 42d = 11a + 110d$

or, $7a - 11a = 110 d - 42d$

or, $-4a = 68 d$

or, $a = -17d$

and, $a_{18} = a + 17d$

$= -17d + 17d$

So, $a_{18} = 0$

The 18th term of zero.

Q.10 Which term of sequence

7.3, 6.9, 6.5, 6.1 ..... is first negative term (Hint $a_n < 0$)

Here,

$a = 7.3$

$d = 6.9 - 7.3 = - 0.4$

Now,

$a_n < 0$

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

i.e., $7.3 (n-1) - 0.4 < 0$

i.e., $7.3 - 0.4n + 0.4 < 0$

i.e., $- 0.4n + 7.7 < 0$

i.e., $-0.4\, n < -7.7$

i.e., $0.4n > 7.7$

$\Rightarrow \quad n = \frac{7,\ 7}{0,\ 4} = 19.25$

So, the first negative term is 20.

Level III [3 marks questions]

Q.11 Find the sum 5+9 + 13 + ...+81.

Here,

$a = 5$

$d = 9 - 5 = 4$

$a_n = 81$

Now,

$an = a + (n-1)\, d$

i.e. $81 = 5 + (x-1)\, 4$

$S_n = \quad 81 = 5 + 4n - 4$

$4n = 80$

$n = 20$

$S_{20} = \frac{20}{2}[10 + (20-1)4]$

= 10 (10 + 76)

= 860

$\beta = \frac{-9-123}{6} = -22$

negative value rejected.

∴ The required no. of terms to get sum 627 is 19.

Q.13 Show that a_1, a_2, a_3 ..... are form an A.P. where, $a_n = 3 + 4_n$

Also find the sum of first 15 terms.

$a_n = 3 + 4n$

Solution - ∴ $S_{15} = \frac{15}{2}[2(7) + (15-1)4]$

As, an = 3 + 4n

So, $a_1 = 3 + 4(1) = 7$

$a_2 = 3 + 4(2) = 11$

List of no. becomes 7, 11, 15, 19.....

Here, 11 - 7 = 15 - 11, 19 - 15 = 4 and so on.

So, it forms an A.P. with common difference = 4.

To find, S_{15} we have n = 15, a = 7, d = 4

$$= \frac{15}{2}[14 + 56]$$

$$= \frac{15}{2}[70]$$

So, $S_{15} = 525$

Q.12 Find the no. of terms of A.P.

6, 9, 12..... So that their sum is 627.

We have,

a = 6

d = 9-6 = 3

$S_n = 627$

and,

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

i.e. $$627 = \frac{n}{2}[2 \times 6 + (n-1)3]$$

i.e. $1254 = 9n + 3n^2$

i.e. $3n^2 + 9n - 1254 = 0$

Using Quadratic formula

$\therefore$ $D = b^2 - 4ac$

$= (9)^2 - 4(3)(-1254)$

$= 81 + 15048$

= 15129

= 123

$\Rightarrow \quad \alpha = \frac{-b \pm \sqrt{D}}{2a} = \frac{-9+123}{6} = 19$

Q.14 If $S_n = 4n - n^2$

What is first term? What is the sum of first two terms. What is second term.

Similarly, find 3rd term, 10th and nth term.

$S_n = 4n - n^2$

Solution -

As, $S_n = 4n - n^2$

So, $S(1) = 4(1) - (1)^2 = 3 \quad \because \sqrt{D}$

$S(2) = 4\,(2) - (2)^2 = 4$

$S(3) = 4(3) - (3)^2 = 3$

$a_2 = S_2 - S_1 = 4\text{-}3 = 1$

$a = 3$

$a_2 = a+d$

$1 = 3 + d$

$\therefore \quad d = -2$

$a_3 = a + 2d$

= 3+2(-2)

= -1

a_{10} = 1+9d

= (3) + 9 (-2)

= - 15

a_n = a + (n-1) d

= 3 + (n-1) - 2

= 3 - 2n + 2

= 5 - 2n

Q.15 Find the sum of first 15 multiples of 8. $S_{15} = \frac{15}{2}[8+120]$

Here, A.P. is 8, 16, 24, 32..... 120

We have,

a = 8

l = 120

n= 15

and

$= \frac{15}{2} x 128$

So S_{15} = 960