10th Arithmetic Progression solves questions

Part -A

1. An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

Solution: $12 = a + 2d$

$106 = a + 49d$

So, $106-12 = 47d$

Or, $94 = 47d$

Or, $d = 2$

Hence, $a = 8$

And, $n_{29} = 8 + 28 \times 2 = 64$

2. If the 3rd and the 9th terms of an AP are 4 and -8 respectively, which term of this AP is zero?

Solution: $-8 = a + 8d$

$4 = a + 2d$

Or, $-8 - 4 = 6d$

Or, $-12 = 6d$

Or, $d = -2$

Hence, $a = -8 + 16 = 8$

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

Or, $8 = 2(n-1)$

Or, $n-1 = 4$

Or, n = 5

3. The 17th term of an AP exceeds its 10th term by 7. Find the common difference.

Solution: $n_7 = a + 6d$

And, $n_{10} = a + 9d$

Or, $a + 9d - a - 6d = 7$

Or, $3d = 7$

Or, $d = 7/3$

4. Which term of the AP: 3. 15, 27, 39, … will be 132 more than its 54th term?

Solution: d = 12,

132/12 = 11

So, 54 + 11 = 65th term will be 132 more than the 54th term.

5. How many three digit numbers are divisible by 7?

Solution: Smallest three digit number divisible by 7 is 105

Greatest three digit number divisible by 7 is 994

Number of terms

= {(last term – first term)/common difference }+1

= {(994-105)/7}+1

= (889/7)+1=127+1=128

6. How many multiples of 4 lie between 10 and 250?

Solution: Smallest number divisible by 4 after 10 is 12,

The greatest number below 250 which is divisible by 4 is 248

Number of terms: {(248-12)/4}+1

{236/4}+1 = 59+1 = 60

7. For what value of n, are the nth terms of two APs: 63, 65, 67,… and 3, 10, 17,… equal?

Solution: In the first AP   a = 63 and d = 2

In the second AP   a = 3 and d = 7

As per question,

63+2(n-1) = 2+ 7(n-1)

Or, 61 = 5 (n-1)

Or, n-1 = 61/5

As the result is not an integer so there wont be a term with equal values for both APs.

8. Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12.

Solution: As the 7th term exceeds the 5th term by 12, so the 5th term will exceed the 3rd term by 12 as well

So, $n_3 = 16$

$n_5 = 28$

$n_7 = 40$

n_4 or n_6 can be calculated by taking average of the preceding and next term

So, $n_4 = (28+16)/2 = 22$

This gives the d = 6

AP: 4, 10, 16, 22, 28, 34, 40, 46, ……..

9. Find the 20th term from the last term of the AP: 3, 8, 13, ……, 253.

Solution: a = 3, d = 5

253 = 3 + 5(n-1)

Or, 5(n-1) = 250

Or, n-1 = 50

Or, n = 51

So, the 20th term from the last term = 51 – 19 = 32nd term

Now, n_{32} = 3 + 5x31 = 158

10. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and the 10th terms is 44. Find the first three terms of the AP.

Solution: a + 3d + a + 7d = 24

Or, 2a + 10d = 24

Similarly, 2a + 14d = 44

So, 44 – 24 = 4d

Or, d = 5

2a + 10x5 = 24

Or, a + 25 = 12

Or, a = -13

So, first three terms of AP: -13, -8, -3,

11. Subba Rao started work in 1995 at an annual salary of Rs. 5000 and received an increment of Rs. 200 each year. In which year did his income reached Rs. 7000.?

Solution: 7000 = 5000 + 200(n-1)

Or, 200(n-1) = 2000

Or, n-1 = 10

Or, n = 11

12. Ramkali saved Rs. 5 in the first week of a year and then increased her weekly savings by Rs. 1.75. If in the nth week, her savings become Rs. 20.75, find n.

Solution: 20.75 = 5 + 1.75(n-1)

Or, 1.75(n-1) = 15.75

Or, n-1 = 9

Or, n = 10