CBSE

ARITHMETIC PROGRESSION WS 6
Class 10 - Mathematics

Section A

1. The sum of first 40 positive integers divisible by 6 is **[1]**

   a) 4920

   b) 3460

   c) 4860

   d) 2460

2. **Assertion (A):** The sum of the first n terms of an AP is given by $S_n = 3n^2 - 4n$. Then its nth term $a_n = 6n - 7$ **[1]**

   Reason (R): nth term of an AP, whose sum to n terms is S_n, is given by $a_n = S_n - S_{n-1}$

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

3. **Assertion (A):** Three consecutive terms 2k + 1, 3k + 3 and 5k - 1 form an AP than k is equal to 6. **[1]**

   Reason (R): In an AP a, a + d, a + 2d, ... the sum to n terms of the AP be $S_n = \frac{n}{2}(2a + (n-1)d)$

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

4. **Assertion (A):** If S_n is the sum of the first n terms of an A.P., then its nth term a_n is given by $a_n = S_n - S_{n-1}$ **[1]**

   Reason (R): The 10th term of the A.P. 5, 8, 11, 14, ... is 35.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

5. **Assertion (A):** Sum of first n terms in an A.P. is given by the formula: $S_n = 2n \times [2a + (n-1)d]$ **[1]**

   Reason (R): Sum of first 15 terms of 2 , 5 , 8 ... is 345.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

6. **Assertion (A):** Arithmetic mean between 8 and 12 is 10. **[1]**

   Reason (R): Arithmetic mean between two numbers a and b is given as $\frac{a+b}{2}$.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

7. **Assertion (A):** Sum of first hundred even natural numbers divisible by 5 is 500 **[1]**

Reason (R): Sum of first n-terms of an A.P. is given by $S_n = \frac{n}{2}[a + l]$ where l = last term.

    a) Both A and R are true and R is the correct explanation of A.

    b) Both A and R are true but R is not the correct explanation of A.

    c) A is true but R is false.

    d) A is false but R is true.

8. **Assertion (A):** Sum of first 10 terms of the arithmetic progression -0.5, -1.0, -1.5, ... is 27.5 **[1]**

    Reason (R): Sum of n terms of an A.P. is given as $S_n = \frac{n}{2}[2a + (n-1)d]$ where a = first term, d = common difference.

    a) Both A and R are true and R is the correct explanation of A.

    b) Both A and R are true but R is not the correct explanation of A.

    c) A is true but R is false.

    d) A is false but R is true.

9. **Assertion (A):** The 11th term of an AP is 7, 9, 11, 13 is 67. **[1]**

    Reason (R): If s_n is the sum of first n terms of an AP then its nth term an is given by a n = $s_n + s_{n-1}$.

    a) Both A and R are true and R is the correct explanation of A.

    b) Both A and R are true but R is not the correct explanation of A.

    c) A is true but R is false.

    d) A is false but R is true.

10. **Assertion (A):** The sum of series with the nth term t_n = (9 - 5n) is 220 when no. of terms n = 6. **[1]**

    Reason (R): Sum of first n terms in an A.P. is given by the formula: Sn = 2 n × [2a + (n - 1)d]

    a) Both A and R are true and R is the correct explanation of A.

    b) Both A and R are true but R is not the correct explanation of A.

    c) A is true but R is false.

    d) A is false but R is true.

11. **Assertion (A):** a, b, c are in A.P. if and only if 2b = a + c. **[1]**

    Reason (R): The sum of first n odd natural numbers is n^2.

    a) Both A and R are true and R is the correct explanation of A.

    b) Both A and R are true but R is not the correct explanation of A.

    c) A is true but R is false.

    d) A is false but R is true.

12. **State True or False:** **[1]**

    (a)   If first term of an AP is 'a' and its common difference is 'd', then the sum of its first n term S_n, is given **[1]** by the formula $S_n = \frac{n}{2}[2a - (n+1)d]$.

13. **Fill in the blanks:** **[1]**

    (a)   The sum of the AP, 1 + 2 + 3 + 4 + 5 + 6 + ... 10 is _____. **[1]**

14. The first and the last terms of an AP are 1 and 11 respectively. If the sum of its terms is 36, find the number of terms. **[1]**

<p style="text-align:center">Section B</p>
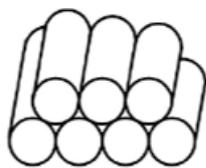
15. Find the sum of the first 51 terms of an AP whose second and third terms are 14 and 18 respectively. **[2]**

16. In an AP: a = 3, n = 8, s = 192, find d. **[2]**

<p style="text-align:center">Section C</p>

17. The sum of the 4th and 8th term of an A.P. is 24 and the sum of the 6th and 10th term of the A.P. is 44. Find the A.P. Also, find the sum of first 25 terms of the A.P. **[5]**

18. Find the sum of all natural numbers between 1 and 100, which are divisible by 3. **[5]**

19. The sum of the first seven terms of an A.P. is 182. If its 4th and 17th terms are in the ratio 1 : 5, find the A.P. **[5]**

20. The sum of first m terms of an AP is $(4m^2 - m)$. If its nth term is 107, find the value of n. Also, find the 21st term of this AP. **[5]**

21. Find the middle term of the sequence formed by all three-digit numbers which leave a remainder 3 when divided by 4. Also, find the sum of all numbers on both sides of the middle term. **[5]**

22. Find the sum of all integers between 100 and 550, which are divisible by 9. **[5]**

23. Ramkali would need ₹1800 for admission fee and books etc., for her daughter to start going to school from next year. She saved ₹50 in the first month of this year and increased her monthly saving by ₹20. After a year, how much money will she save? Will she be able to fulfil her dream of sending her daughter to school? **[5]**

24. The ratio of the 11th term to 17th term of an A.P. is 3: 4. Find the ratio of 5th term to 21st term of the same A.P. Also, find the ratio of the sum of first 5 terms to that of first 21 terms. **[5]**

25. Prerna saves ₹ 32 during the first month, ₹ 36 in the second month and ₹ 40 in the third month. If she continues to save in this manner, in how many months will she save ₹ 2000? **[5]**

26. The sums of first n terms of three A.P.s are S_1, S_2, and S_3. The first term of each is 5 and their common differences are 2, 4 and 6 respectively. Prove that $S_1 + S_3 = 2S_2$. **[5]**

27. In an A.P., the sum of first n terms is $\frac{3n^2}{2} + \frac{13}{2}n$. Find its 25th term. **[5]**

28. In an A.P., the sum of first ten terms is -150 and the sum of its next ten terms is -550. Find the A.P. **[5]**

29. If the ratio of the sum of the first n terms of two APs is $(7n +1): (4n + 27)$ then find the ratio of their 9th terms. **[5]**

30. Find the sum of first 25 terms of the A.P. whose n^{th} term is given by $a_n = 5 + 6n$. Also, find the ratio of 20th term to 45th term. **[5]**

31. Find the sum of all odd numbers between 100 and 300. **[5]**

32. Solve the AP: $(-4) + (-1) + 2 + 5 + ---- + x = 437$. **[5]**

33. Let there be an A.P. with first term 'a', common difference 'd'. If a_n denotes its nth term and S_n the sum of first n terms, find d, if a = 3, n = 8 and $S_n = 192$. **[5]**

34. Let there be an A.P. with first term 'a', common difference 'd'. If a_n denotes its nth term and S_n the sum of first n terms, find. k, if $S_n = 3n^2 + 5n$ and $a_k = 164$. **[5]**

35. If the sum of the first p terms of an A.P. is q and the sum of the first q terms is p; then show that the sum of the first (p + q) terms is { -(p + q)}. **[5]**

36. Let there be an A.P. with first term 'a', common difference 'd'. If a_n denotes its nth term and S_n the sum of first n terms, find n and a_n, if a = 2, d = 8 and $S_n = 90$. **[5]**

37. 250 logs are stacked in the following manner: **[5]**
22 logs in the bottom row, 21 in the next row, 20 in the row next to it and so on (as shown by an example). In how many rows, are the 250 logs placed and how many logs are there in the top row?


(Example)

38. If the sum of the first 7 terms of an A.P. is -21 and that of the first 17 terms is -221, then find the sum of its first **[5]**

n terms.

39. Find the sum of the integers between 100 and 200 that are not divisible by 9. [Hint : These numbers will be : Total numbers – Total numbers divisible by 9] **[5]**

40. Let there be an A.P. with first term 'a', common difference 'd'. If a_n denotes its nth term and S_n the sum of first n terms, find n and a, if $a_n = 4$, d = 2 and $S_n = -14$. **[5]**

41. If sum of first 6 terms of an A.P. is 36 and that of the first 16 terms is 256, find the sum of the first 10 terms. **[5]**

42. Find the sum of all integers between 84 and 719, which are multiples of 5. **[5]**

43. Find the sum of integers between 100 and 200 which are (i) divisible by 9 (ii) not divisible by 9. **[5]**

44. In an A.P., the sum of the first **n** terms is $3n^2 + n$. Find the first term and the common difference of the A.P. Hence, find its 15th term. **[5]**

45. The sum of 4th and 8th terms of an AP is 24 and the sum of its 6th and 10th terms is 44. Find the sum of first ten terms of the AP. **[5]**

46. Solve the equation: **[5]**

    -4 + (-1) + 2 + 5 + ... + x = 437.

47. In an AP of 50 terms, the sum of first 10 terms is 210 and the sum of its last 15 terms is 2565. Find the AP. **[5]**

48. The first term of an A.P. is 5, the last term is 45 and the sum of all the terms is 400. Find the number of terms and the common difference of the A.P. **[5]**

49. The first term of an A.P. is -5 and the last term is 45. If the sum of all the terms of the A.P. is 120, find the number of terms and the common difference. **[5]**

50. In a school, students decided to plant trees in and around the school to reduce air pollution. It was decided that the number of trees that each section of each class will plant will be double of the class in which they are studying. If there are 1 to 12 classes in the school and each class has two sections, find how many trees were planted by students. **[5]**

51. Along a road lie an odd number of stones placed at intervals of 10 metres. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. A man carried the job with one of the end stones by carrying them in succession. In carrying all the stones he covered a distance of 3 km. Find the number of stones? **[5]**

52. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and other potatoes are placed 3 m apart in a straight line. There are n potatoes in the line (See Fig.). **[5]**
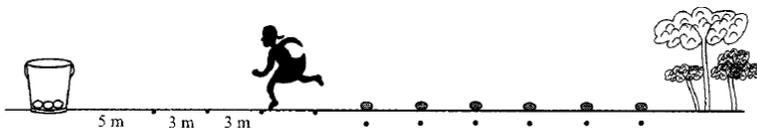

    A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run?

    [**Hint:** To pick up the first potato and the second potato, the total distance (in metres) run by a competitor is $2 \times 5 + 2 \times (5 + 3)$]

53. Show that the sum of all odd integers between 1 and 1000 which are divisible by 3 is 83667. **[5]**

54. A spiral is made up of successive semicircles, with centres alternately at A and B, starting with centre at A, of radii 0.5 cm, 1.0 cm, 1.5 cm, 2.0 cm, ... as shown in Figure. What is the total length of such a spiral made up of thirteen consecutive semicircles? $\left(Take\ \pi = \frac{22}{7}\right)$ **[5]**

[**Hint:** Length of successive semicircles is l_1, l_2, l_3, l_4, ... with centres at A, B, A, B, ... respectively.]
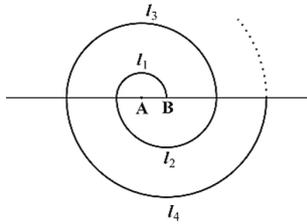
55. Find the sum of -5 + (-8) + (-11) + ... + (-230). **[5]**

56. The 13th term of an AP is 4 times its 3rd term. If its 5th term is 16, find the sum of its first 10 terms. **[5]**

57. Let there be an A.P. with first term 'a', common difference 'd'. If a_n denotes its nth term and S_n the sum of first n terms, find. n and S_n, if a = 5, d = 3 and a_n = 50. **[5]**

58. Solve the equation for x: 1 + 4 + 7 + 10 + ... + x = 287. **[5]**

59. If the sum of the first n terms of an A.P. is $4n - n^2$, what is the first term? What is the sum of first two terms? What is the second term? Similarly, find the third, the tenth and the nth term. **[5]**

60. If the sum of the first 7 terms of an A.P. is -14 and that of 11 terms is -55, then find the sum of its first **n** terms. **[5]**

61. The sum of the first 9 terms of an AP is 81 and that of its first 20 terms is 400. Find the first term and the common difference of the AP. **[5]**

62. Find the sum of the integers between 100 and 200 that are divisible by 9? **[5]**

63. Find the sum of all integers between 1 and 500 which are multiples of 2 as well as of 5. **[5]**

64. Find the sum of all odd numbers between 100 and 200. **[5]**

65. Find the sum of all integers from 1 to 500 which are multiples of 2 or 5. [hint: These numbers will be : multiples of 2 + multiples of 5 – multiples of 2 as well as of 5] **[5]**

66. Which term of the A.P - 2, - 7, -1 2 ,... will be - 77? Find the sum of this A.P. upto the term -77. **[5]**

67. The sum of the first 8 terms of an A.P. is 100 and the sum of its first 19 terms is 551. Find the sum of its first **n** terms. **[5]**

68. In an AP, it is given that $S_5 + S_7$ = 167 and S_{10} = 235, then find the AP, where S_n denotes the sum of its first n terms. **[5]**

69. How many terms of the series 54, 51, 48,... be taken so that their sum is 513. Explain **[5]**

70. The sum of the 4th and the 8th terms of an AP is 24 and the sum of its 6th and 10th terms is 44. Find the sum of its first 10 terms. **[5]**

71. Find the sum of all integers between 100 and 550 which are not divisible by 9. **[5]**

72. If the sum of first 7 terms of an A.P. is 49 and that of first 17 terms is 289, find the sum of first n terms. **[5]**

73. The first term of an AP is 3, the last term is 83 and the sum of all its terms is 903. Find the number of terms and the common difference of the AP. **[5]**

74. How many terms of the AP $20, 19\frac{1}{3}, 18\frac{2}{3}, \ldots$ must be taken so that their sum is 300? Explain the double answer. **[5]**

75. Find the sum of all integers from 1 to 500 which are multiplies of 2 as well as of 5. **[5]**