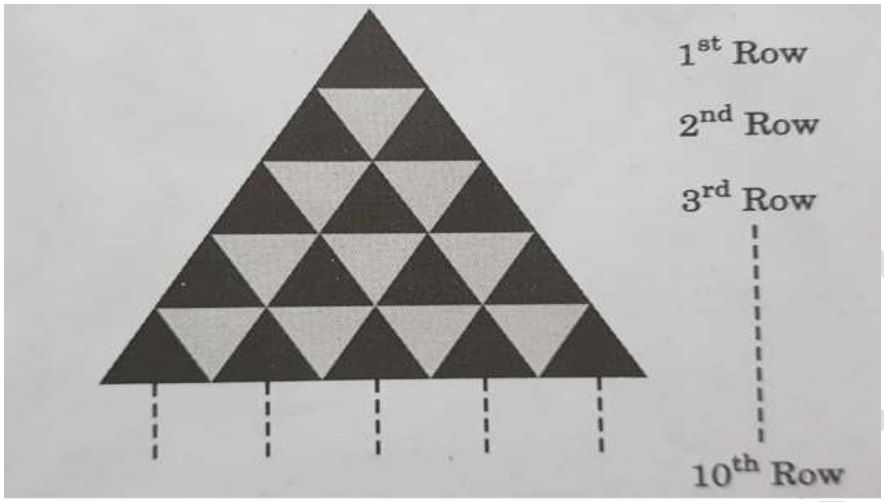
ARITHMETIC PROGRESSIONS

CLASS X (2025-26) *SUJITHKUMAR KP*

1 In an equilateral triangle of side 10 cm, equilateral triangles of 1 cm are formed as shown in the figure below, such that there is one triangle in the first row, three triangles in the second row, five triangles in the third row and so on. CBSE- 2025



Based on the given information, answer the following questions using AP.

(i) How many triangles will be there in the bottom most row?

(ii) How many triangles will be there in the fourth row from the bottom?

(iii) (a) Find the total number of triangles of side 1 cm each till 8^{th} row?

OR

(b) How many more number of triangles are there from 5^{th} row to 10^{th} row than in first 4 rows? Show working.

2 **Assertion (A)** : For an AP, 3, 6, 9, ……., 198, 10^{th} term from the end is 168. CBSE- 2025

Reason (R) : If a *and* l are the first term and last term of an AP with common difference d, then nth term from the end of the given AP is $l - (n-1)d$.

3 If the first term a is 6 and the common difference d is 3, then the AP is _____.

4 Which of the following list of numbers form an AP? If they form an AP,

write the next two terms :

(i) 4, 10, 16, 22, . . . (ii) 1, – 1, – 3, – 5, . . .

(iii) – 2, 2, – 2, 2, – 2, . . . (iv) 11, 22, 33, 44,……..

(v) 1,3, 9,27…… (vi) 10, $10+2^5$, $10+2^6$, $10+2^7$…

5 For the following APs, write the common difference (d)

i) $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}$ … … ….

ii) $0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ … … …

iii) $7,\ 7+\sqrt{3},\ 7+2\sqrt{3},\ 7+3\sqrt{3}$……..

6 Find " d" and the next term of the A.P. $\sqrt{7}, \sqrt{28}, \sqrt{63}$,……

7 Find d and the next term of the A.P $p,\ p+0.12,\ p+0.24,\ p+0.36$ … … ….

8 Determine k, so that $k+2,\ 4k-6,\ and\ 3k-2$ are three consecutive terms of an AP

9 Find the common difference of the AP. $x+3y,\ 2x+5y,\ 3x+7y$, … … ….

10 Determine k, so that $k,\ k+4,\ and\ 3k$ are three consecutive terms of an AP.

11 Find a, b such that the numbers a, 7 , b, 23 are in AP.

12 Find the value of x for which $(8x + 4)$, $(6x – 2)$ and $(2x + 7)$ are in A.P.

13 If $x + 1$, $3x$ and $4x + 2$ are in A.P., find the value of x.

14 Find the 20^{th} term of the AP 7, 3, $-1, -5$ ... .

15 Find the 18^{th} term of the AP $\sqrt{2}, 3\sqrt{2}, 5\sqrt{2}, 7\sqrt{2}$, ...

16 Find the n^{th} term of the AP 13, 8, 3, -2, ...

17 Find the 9^{th} term of the AP $\frac{3}{4}, \frac{5}{4}, \frac{7}{4}, \frac{9}{4}$, ...

18 Which term of the AP 84, 80, 76, ... …is 0?

19 The n^{th} term of an AP is $6n + 2$. Find its common difference.

20 Is 68 a term of the A.P. 7, 10, 13,……. ?

21 The first term of an A.P. is 5, the common difference is 3 and the last term is 80; find the number of terms.

22 If 10 times the 10^{th} term of an A.P. is equal to 15 times the 15^{th} term, show that 25^{th} term of the A.P. is zero

23 Find the 12^{th} term from the end of the following arithmetic progression: 3, 5, 7, 9, …. 201

24 Find the number of two-digit numbers which are divisible by 6.

25 Find the sum of 10 terms of AP 2, 5, 8, 11, ...

26 Find the sum: 3 + 11 + 19 + ... + 803.

27 Find the sum of all 2-digit odd positive numbers.

28 The n^{th} term (a_n) of an Arithmetic Progression is given by $a_n = 4n – 5$. Find the sum of the first 25 terms of the Arithmetic Progression.

29 How many terms of the AP 3, 5, 7, ... must be taken so that the sum is 120?

30 Find the sum of first 25 terms of an AP whose n^{th} term is $1 – 4n$.

31 The sum of n terms of an AP is $3n^2 + 5n$. Find the AP. Hence, find its 16^{th} term.

32 In an AP, the first term is 8, n^{th} term is 33 and sum to first n terms is 123. Find n and d, the common difference.

33 Find the sum of all three-digit numbers each of which leaves the remainder 2, when divided by 3

34 How many terms of the AP : 24, 21, 18, . . . must be taken so that their sum is 78?

35 MCQs

1. If p – 1, p + 3, 3p – 1 are in AP, then p is equal to
(a) 4 (b) – 4 (c) 2 (d) – 2

2. If the third term of an AP is 12 and the seventh term is 24, then the 10^{th} term is
(a) 33 (b) 34 (c) 35 (d) 36

3. A number 15 is divided into three parts which are in AP and sum of their squares is 83. The smallest part is
(a) 2 (b) 5 (c) 3 (d) 6

4. How many terms of an AP must be taken for their sum to be equal to 120 if its third term is 9 and the

difference between the seventh and second term is 20 ?

(a) 7 (b) 8 (c) 9 (d) 6

5. 9th term of an AP is 499 and 499th term is 9. The term which is equal to zero is

(a) 507th (b) 508th (c) 509th (d) 510^{th}

6. The sum of all two digit numbers which when divided by 4 yield unity as remainder is

(a) 1012 (b) 1201 (c) 1212 (d) 1210

7. An AP consist of 31 terms if its 16th term is m, then sum of all the terms of this AP is

(a) 16 m (b) 47 m (c) 31 m (d) 52 m

8. In a certain AP, 5 times the 5th term is equal to 8 times the 8th term, then its 13th term is equal to

(a) 5 (b) 1 (c) 0 (d) 13

9. The sum of 5 numbers in AP is 30 and sum of their squares is 220. Which of the following is the third term ?

(a) 5 (b) 6 (c) 7 (d) 8

10. If a, b, c, d, e and f are in AP, then e – c is equal to

(a) 2(c – a) (b) 2(f – d) (c) 2(d – c) (d) d – c

11.7th term of an AP is 40. The sum of its first 13th terms is

(a) 500 (b) 510 (c) 520 (d) 530

12. The sum of the first four terms of an AP is 28 and sum of the first eight terms of the same AP is 88 . Sum of first 16 terms of the AP is

(a) 346 (b) 340 (c) 304 (d) 268

13. Which term of the AP 4, 9, 14, 19, ….. is 109?

(a) 14th (b) 18th (c) 22^{nd} (d) 16^{th}

14. How many terms are there in the arithmetic series

1 + 3 + 5 +…… …….. + 73 + 75?

(a) 28 (b) 30 (c) 36 (d) 38

15. The sum 51 + 52 + 53 + 54 +……. + 100 = ?

(a) 3775 (b) 4025 (c) 4275 (d) 5050

16.How many natural numbers between 1 and 1000 are divisible by 5?

(a) 197 (b) 198 (c) 199 (d) 200

17. If a, a – 2 and 3a are in AP, then the value of a is

(a) –3 (b) –2 (c) 3 (d) 2

18. How many terms are there in the AP 7, 10, 13, …. , 151?

(a) 50 (b) 55 (c) 45 (d) 49

19. The 4th term of an AP is 14 and its 12th term is 70. What is its first term?

(a) –10 (b) –7 (c) 7 (d) 10

20 . Which term of the AP 72, 63, 54,…….. is 0?

(a) 8th (b) 9th (c) 11th (d) 12th

36 If p, q, r are in AP, then $p^3 + r^3 – 8q^3$ is equal to

(a) 4pqr (b) – 6pqr c) 2pqr (d) 8pqr

37 The list of numbers –10, – 6, –2, 2, ... is_____

(a) an AP with d = –16 (b) an AP with d = 4

(c) an AP with d = – 4 (d) not an AP

38 Two APs have the same common difference. The first term of one of these is –1 and that of the other is –8. Then the difference between their 4th terms is
(a) –1 (b) –8 (c) 7 (d) –9

39 If p – 1, p + 3, 3p – 1 are in AP, then p is equal to _____.

40 In an AP, if d = –2, n = 5 and $a_n = 0$, the value of a is
(a) 10 (b) 5 (c) –8 (d) 8

41 If the common difference of an AP is 3, then $a_{20} - a_{15}$ is_____
(a) 5 (b) 3 (c) 15 (d) 20

42 The next term of the AP $\sqrt{18}, \sqrt{50}, \sqrt{98}, \ldots\ldots\ldots$ ... is

43 If the nth term of an AP is (2n + 1), then the sum of its first three terms is_____-
(a) 6n + 3 (b) 15 (c) 12 (d) 21

44 An AP consists of 31 terms. If its 16th term is m, then sum of all the terms of this AP is_____
(a) 16 m (b) 47 m (c) 31 m (d) 52 m

45 If the first term of an AP is 2 and common difference is 4, then sum of its first 40 terms is _____.

46 7th term of an AP is 40. The sum of its first 13th terms is _____.

47 The first term of an AP of consecutive integers is $p^2 + 1$. The sum of 2p + 1 terms of this AP is
(a) $(p + 1)^2$ (b) $(2p + 1)(p + 1)^2$ c) $(p + 1)^3$ (d) $p^3 + (p + 1)^3$

48 If the sum of first n terms of an AP is $An + Bn^2$ where A and B are constants, the common difference of AP will be
(a) A + B (b) A – B (c) 2A (d) 2B

49 Find the 10th term of the AP 2, 7, 12, ...

50 The *n*th term of an AP is 7 – 4*n*. Find its common difference.

51 Which term of the AP 21, 18, 15, ..., is zero?

52 For what value of *p*, are 2*p* + 1, 13, 5*p* – 3 three consecutive terms of an AP?

53 Find the sum of first 22 terms of the AP 8, 3, – 2, ...

54 If the sum of first *m* terms of an AP is $2m^2 + 3m$, then what is its second term?

55 If the sum of first *p* terms of an AP is $ap^2 + bp$, find its common difference.

56 In an AP, if $a = 3$, $n = 8$, $S_n = 192$, find *d*.

57 The *n*th term of an AP is 6*n* + 2. Find its common difference.

58 Find the 11th term of the AP – 3, $\frac{-1}{2}$, 2, ...

59 The first term of an AP is *p* and its common difference is *q*. Find its 10th term.

60 Find the 12th term of the AP with first term 9 and common difference 10.

61 Find the sum of the first 1000 positive integers.

62 If sum of first *n* terms of an AP is $2n^2 + 5n$. Then find S_{20}.

63 The 6th term of an Arithmetic Progression (AP) is –10 and its 10th term is –26.

Determine the 15th term of the AP.

64 Is –150 a term of the AP 17, 12, 7, 2...?

65 Which term of the AP 21, 42, 63, 84, ... is 420?

66 Determine the 25th term of an AP whose 9th term is – 6 and common difference is 5/4.

67 Determine k so that $4k + 8$, $2k^2 + 3k + 6$ and $3k^2 + 4k + 4$ are three consecutive terms of an AP.

68 If 5 times the 5th term of an AP is equal to 10 times the 10th term, show that its 15th term is zero.

69 In an AP, the 24th term is twice the 10th term. Prove that the 36th term is twice the 16th term.

70 Find the number of terms in the AP $17, 14\frac{1}{2}, 12, \ldots\ldots\ldots, -38$.

71 Find 10th term from end of the AP 4, 9, 14, ... , 254.

72 How many terms are there in an AP whose first term and 6th term are –12 and 8 respectively, and sum of all its terms is 120?

73 The first term, common difference and last term of an AP are 12, 6 and 252 respectively. Find the sum of all terms of this AP.

74 Find the common difference of an AP whose first term is 4, the last term is 49 and the sum of all its terms is 265.

75 Find the sum of the:
(i) first 11 terms of the AP: 2, 6, 10, ...
(ii) first 51 terms of the AP whose second term is 2 and fourth term is 8.

76 Find the sum: 2 + 4 + 6 + ... + 200

77 Find the sum: –5 + (–8) + (–11) + ... + (–230).

78 Find the sum of the first 25 terms of an AP whose nth term is given by $t_n = 7 - 3n$.

79 If the sum of first n terms of an AP is given by $S_n = 3n^2 + 2n$, find the nth term of the AP.

80 Find the sum of all the natural numbers less than 100 which are divisible by 6.

81 Using AP, find the sum of all 3-digit natural numbers which are the multiples of 7.

82 The sum of three numbers of an AP is 27 and their product is 405. Find the numbers.

83 Which term of the AP 14, 11, 8, ...is –1?

84 Write the next two terms of the AP: 1, –1, –3, –5, ...

85 Find the 6th term from the end of the AP 17, 14, 11, ..., – 40.

86 Which term of AP 3, 15, 27, 39, ... will be 120 more than its 21st term?

87 Which term of the AP 5, 2, – 1, ... is – 22?

88 Find the sum of n terms of AP where $a_n = 5 - 2n$.

89 Find the sum of 10 terms of AP 2, 5, 8, 11, ...

90 Find the sum of first 25 terms of an AP whose nth term is $1 - 4n$.

91 In an AP, the first term is – 4, the last term is 29 and the sum of all its terms is 150. Find its common difference.

92 Find the sum: 3 + 11 + 19 + ... + 803.

93 The nth term (t_n) of an Arithmetic Progression is given by $t_n = 4n - 5$. Find the sum of the first 25 terms of the Arithmetic Progression.

94 Find the sum of all 2-digit odd positive numbers.

95 Find the sum of all 2-digit positive numbers divisible by 3.

96 The sum of n terms of an AP is $3n^2 + 5n$. Find the AP. Hence, find its 16th term.

97 If m times the mth term of an AP is equal to n times its nth term, find the $(m + n)$th term of the AP.

98 If 9th term of an AP is zero, prove that its 29th term is double of its 19th term.

99 Find the value of the middle term of the following AP: –6, –2, 2, ..., ……..58.

100 Determine the AP whose fourth term is 18 and the difference of the ninth term from the fifteenth term is 30.

101 How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3?

102 If the pth, qth, rth terms of an AP be x, y, z respectively, show that
$x(q - r) + y(r - p) + z(p - q) = 0$.

103 The sum of n terms of an AP is $5n^2 - 3n$. Find the AP and also its 10th term.

104 Find the number of two-digit numbers which are divisible by 6.

105 In an AP, the first term is 12 and the common difference is 6. If the last term of the AP is 252, find its middle term.

106 Find the number of three-digit natural numbers which are divisible by 11.

107 Find $a_{30} - a_{20}$ for the AP
(i) – 9, – 14, – 19, – 24, ...
(ii) a, $a + d$, $a + 2d$, $a + 3d$, ...

108 The fifth term of an AP is 1, whereas its 31st term is –77. Which term of the AP is –17?

109 The 8th term of an Arithmetic Progression (AP) is 37 and its 12th term is 57. Find the AP.

110 The 8th term of an arithmetic progression is zero Prove that its 38th term is triple of its 18th term.

111 The 19th term of an AP is equal to three times its sixth term. If its 9th term is 19, find the AP.

112 How many terms of the AP 3, 5, 7, ... must be taken so that the sum is 120?

113 Find the number of terms of the AP 54, 51, 48, ... so that their sum is 513.

114 The sum of first six terms of an AP is 42. The ratio of its 10th term to its 30th term is 1 : 3. Calculate the first and the thirteenth terms of the AP.

115 In an AP, the sum of first ten terms is –150 and the sum of its next ten terms is –550. Find the AP.

116 How many multiples of 4 lie between 10 and 250? Also find their sum.

117 If the sum of first 6 terms of an AP is 36 and that of the first 16 terms is 256, find the sum of first 10 terms.

118 150 workers were engaged to finish a piece of work in a certain number of days. Four workers dropped the second day, four more worker dropped the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.

119 Interior angles of a polygon are in AP. If the smallest angle is 120° and common difference is 5°, find the number of sides of the polygon.

120 Which term of the AP 121, 117. 113, ... is its first negative term?

121 With all round development in infrastructure METRO plays an important role in producing transport as well as beautifying the city. If we look around different designs of pillars have been erected between two stations. As class XI student I can consider two stations as two numbers and pillars erected at equal distances as means in sequence terms. Let as take the positions of two stations A and B as 1 km stone and 3 km stone and 14 pillars have been erected between two stations.

i) If station A is considered first term then station B will be which term with respect to 14 pillars?
ii) What is the position of 14th means (14th pillars)?
iii) Sum of positions of 14 means (14 pillars) is

OR

iii) What is difference between two consecutive means (pillars)?

122 Write the first 3 terms of each of the following sequences whose n^{th} term are:

(i) a_n = 2n + 1 (ii) $a_n = \frac{n-2}{3}$ (iii) a_n = 5n

(iv) $a_n = \frac{3n-2}{2}$ (v) $a_n = (-1)^n \cdot 3n$ vi) $a_n = (2)^n$

123 If the first term *a* is 10 and the common difference *d* is 4, then the AP is -----

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