kd education academy (9582701166

Time : 10 Hour | **STD 11 Maths** | **Total Marks : 350**

kd90+ ch- 8 sequences and series

*** Choose the right answer from the given options. [1 Marks Each]** **[64]**

1. If 3rd term of an A.P. is 6 and 5th term of that A.P. is 12. Then find the 21st term of that A.P.

   (A) 40 (B) 42 (C) 60 (D) 63

2. The sum of first three terms of a G.P. is $\frac{21}{2}$ and their product is 27. Find the common ratio.

   (A) 2 (B) $\frac{1}{2}$ (C) $2 \text{ or} \frac{1}{2}$ (D) $\text{neither } 2 \text{ nor} \frac{1}{2}$

3. If in an infinite G.P., first term is equal to 10 times the sum of all successive terms, the its common ratio is:

   (A) $\frac{1}{10}$ (B) $\frac{1}{11}$ (C) $\frac{1}{9}$ (D) $\frac{1}{20}$

4. If an A.P. is 1,7,13, 19, ... Find the sum of 22 terms.

   (A) 127 (B) 1204 (C) 1408 (D) 1604

5. After striking the floor, a certain ball rebounds $\left(\frac{4}{5}\right)$ th of height from which it has fallen. Then, the total distance that it travels before coming to rest, if it is gentlydropped from a height of 120 m is:

   (A) 1260 m (B) 600 m (C) 1080 m (D) None of these

6. If a, b, c are in G.P. is 2 and x, y are AM's between a, b and b, c respectively, then:

   (A) $\frac{1}{x} + \frac{1}{y} = 2$ (B) $\frac{1}{x} + \frac{1}{y} = \frac{1}{2}$ (C) $\frac{1}{x} + \frac{1}{y} = \frac{2}{a}$ (D) $\frac{1}{x} + \frac{1}{y} = \frac{2}{b}$.

7. $\text{Let so} = \frac{8}{5} + \frac{16}{65} \ldots\ldots + \frac{128}{2}^{18} + 1$:

   (A) $s = \frac{1088}{545}$ (B) $s = \frac{1088}{545}$ (C) $s = \frac{1056}{545}$ (D) $s = \frac{545}{1056}$

8. The sum of the series $\frac{1}{\log_2 4} + \frac{1}{\log_4 4} + \frac{1}{\log_8 4} + \ldots + \frac{1}{\log_2 {}^n 4}$ is :

   (A) $\frac{n(n+1)}{2}$ (B) $\frac{n(n+1)(2n+1)}{12}$ (C) $\frac{n(n+1)}{4}$ (D) none of these.

9. Find the sum of squares of first n terms.

   (A) $\frac{n(n+1)}{2}$ (B) $\left(\frac{n(n+1)}{2}\right)^3$ (C) $\frac{n(n+1)(2n+1)}{6}$ (D) $\left(\frac{n(n+1)}{2}\right)$

10. The nth term of a G.P. is 128 and the sum of its n terms is 225. If its common ratio is 2, then its first term is:

    (A) 1 (B) 3 (C) 8 (D) None of these.

11. If first term of a G.P. is 20 and common ratio is 4. Find the 5^{th} term.

(A) 10240 (B) 40960 (C) 5120 (D) 2560

12. If A.M. of two numbers is $\frac{15}{2}$ and their G.M. is 6, then find the two numbers.
(A) 6 and 8 (B) 12 and 3 (C) 24 and 6 (D) 27 and 3

13. If $S_n = \sum_{r=1}^{n} \frac{1+2+2^2+ \text{... Sum to r terms}}{2^r}$, then S_n is equal to:
(A) $2^n - n - 1$ (B) $1 - \frac{1}{2^n}$ (C) $n - 1 - \frac{1}{2^n}$ (D) $2^n - 1$

14. Find the sum of series $1^2 + 3^2 + 5^2 +$.....$+ 11^2$.
(A) 279 (B) 286 (C) 309 (D) 409

15. Find the sum of series $6^2 + 7^2 +$.....$+ 15^2$.
(A) 55 (B) 1185 (C) 1240 (D) 1385

16. The sum of an infinite G.P. is 4 and the sum of the cubes of its terms is 92. The common ratio of original G.P. is:
(A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) $\frac{-1}{2}$.

17. If a, b, c are in G.P. and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$, then xyz are in:
(A) AP (B) GP (C) HP (D) None of these.

18. The two geometric means between the numbers 1 and 64 are:
(A) 1 and 64 (B) 4 and 16 (C) 2 and 16 (D) 8 and 16.

19. If S be the sum, P the product and R be the sum of the reciprocals of n terms of a G.P. then P^2 is equal to:
(A) $\frac{S}{R}$ (B) $\frac{R}{S}$ (C) $\left(\frac{R}{S}\right)^n$ (D) $\left(\frac{S}{R}\right)^n$.

20. The sum to n terms of the series $\frac{1}{\sqrt{1}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{7}} + \ldots.$ is :
(A) $\sqrt{2n+1}$ (B) $\frac{1}{2}\sqrt{2n+1}$ (C) $\sqrt{2n+1} - 1$ (D) $\frac{1}{2}\{\sqrt{2n+1} - 1\}$

21. If $\sum n = 210$, then $\sum n^2 =$
(A) 2870 (B) 2160 (C) 2970 (D) none of these.

22. The consecutive digits of a three digit number are in GP. If the middle digit be increased by 2, then they form an AP. If 792 is subtracted from this, then we get the number constituting of same three digits but in reverse order. Then, number is divisible by:
(A) 7 (B) 49 (C) 19 (D) None of these

23. The sum of the series $1^2 + 3^2 + 5^2 +$ ... to n terms is:
(A) $\frac{n(n+1)(2n+1)}{2}$ (B) $\frac{n(2n-1)(2n+1)}{3}$ (C) $\frac{(n-1)^2(2n+1)}{6}$ (D) $\frac{(2n+1)^3}{3}$

24. The product $(32), (32)^{\frac{1}{6}} (32)^{\frac{1}{36}} \ldots$ to ∞ is equal to:

(A) 64 (B) 16 (C) 32 (D) 0

25. The sum of first three terms of a G.P. is $\frac{21}{2}$ and their product is 27. Which of the following is not a term of the G.P. if the numbers are positive?

(A) 3 (B) $\frac{2}{3}$ (C) $\frac{3}{2}$ (D) 6

26. If 100 times the 100th term of an AP with non-zero common difference equals the 50 times its 50th term, then the 150th term of this AP is:

(A) –150 (B) 150 times its 50th term

(C) 150 (D) zero

27. The AM,HMandGMbetween two numbers are $\frac{144}{15}, 15$ and 12, but not necessarily in thisorder. Then, HM, GM and AM respectively are:

(A) $15, 12, \frac{144}{15}$ (B) $\frac{144}{15}, 12, 15$ (C) $15, 12, \frac{144}{15}$ (D) $\frac{144}{15}, 15, 12$

28. Choose the correct answer.
If the third term of G.P. is 4, then the product of its first 5 terms is:

(A) 4^3 (B) 4^4 (C) 4^5 (D) None of these.

29. If second term of a G.P. is 2 and the sum of its infinite terms is 8, then its first terms is:

(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) 2 (D) 4.

30. In a geometric progression consisting of positive terms, each term equals the sum of the next two terms. Then, the common ratio of this progression is equal to:

(A) $\frac{1}{2}(1-\sqrt{5})$ (B) $\frac{1}{2}.\sqrt{5}$ (C) $\sqrt{5}$ (D) $\frac{1}{2}(\sqrt{5-1})$

31. The sum of n terms of two arithmetic progressions are in the ratio (2n + 3) : (7n + 5). Find the ratio of their 9th terms.

(A) 4 : 5 (B) 5 : 4 (C) 9 : 31 (D) 31 : 9

32. The sum of the series $\frac{2}{3}+\frac{8}{9}+\frac{26}{27}+\frac{80}{81}+\ldots.$ to n terms is:

(A) $n-\frac{1}{2}(3^{-n}-1)$ (B) $n-\frac{1}{2}(1-3^{-n})$ (C) $n+\frac{1}{2}(3^{n}-1)$ (D) $n-\frac{1}{1}(3^{n}-1)$

33. Choose the correct answer.
The lengths of three unequal edges of a rectangular solid block are in G.P. If the volume of the block is 216cm^3 and the total surface area is 252cm^2, then the length of the longest edge is:

(A) 12cm (B) 6cm (C) 18cm (D) 3cm

34. The value of $9^{\frac{1}{3}}.9^{\frac{1}{9}}.9^{\frac{1}{27}}\ldots\text{to}\ \infty$, is:

(A) 1 (B) 3 (C) 9 (D) None of these.

35. Find the sum to n terms of the series whose nth term is n (n-2).

(A) $\frac{n(n-1)(2n+4)}{6}$ (B) $\frac{n(n-1)(2n-5)}{6}$ (C) $\frac{(n-1)(2n-5)}{3}$ (D) $\frac{n(n-1)(2n-5)}{3}$

36. The value of $\sum_{r=1}^{n}\left\{(2r-1)a+\frac{1}{b^r}\right\}$ is equal to:

(A) $an^2+\frac{b^{n-1}-1}{b^{n-1}(b-1)}$ (B) $an^2+\frac{b^n-1}{b^n(b-1)}$ (C) $an^3+\frac{b^{n-1}-1}{b^n(b-1)}$ (D) none of these.

37. Given that x > 0, the sum $\sum_{n=1}^{\infty}\left(\frac{x}{x+1}\right)^{n-1}$ equals:

(A) x (B) $x+1$ (C) $\frac{x}{2x+1}$ (D) $\frac{x+1}{2x+1}$

38. Choose the correct answer.

If in an A.P., $S_n = qn^2$ and $S_m = qm^2$, where S_r denotes the sum of r terms of the AP, then S_q equals:

(A) $\frac{q^3}{2}$ (B) mnq (C) q^3 (D) $(m + n)q^2$

39. Jairam purchased a house in Rs. 15000 and paid Rs. 5000 at once. Rest money he promised to pay in annual instalment of Rs. 1000 with 10% per annum interest. How much money is to be paid by Jairam?

(A) Rs. 21555 (B) Rs. 20475 (C) Rs. 20500 (D) Rs. 20700

40. Let x be the A.M. and y, z be two G.M.s between two positive numbers. Then, $\frac{y^3+z^3}{xyz}$ is equal to:

(A) 1 (B) 2 (C) $\frac{1}{2}$ (D) None of these.

41. Find the sum $1^3+2^3+3^3+\ldots\ldots\ldots\ldots+8^3$.

(A) 1225 (B) 1184 (C) 1475 (D) 1296

42. Find the sum to 6 terms of each of the series 2*3+4*6+6*11+8*18+.....

(A) 784 (B) 882 (C) 928 (D) 966

43. Choose the correct answer.

If x, 2y and 3z are in A.P. where the distinct numbers x, y and z are in G.P., then the common ratio of the G.P. is:

(A) 3 (B) $\frac{1}{3}$ (C) 2 (D) $\frac{1}{2}$

44. The ratio of the A.M. and G.M. of two positive numbers a and b is 5 : 3. Find the ratio of a to b.

(A) 9 : 1 (B) 3 : 5 (C) 1 : 9 (D) 3 : 1

45. Find the sum of series $1^3 + 3^3 + 5^3 + \ldots\ldots\ldots\ldots\ldots\ldots + 11^3$.

(A) 2556 (B) 5248 (C) 6589 (D) 9874

46. Let S be the sum, P be the product and R be the sum of the reciprocals of 3 terms of a G.P. then $P^2R^3 : S^3$ is equal to:

(A) 1 : 1

(B) (common ratio)^n : 1

(C) (First term)^2(common ratio)^2

(D) None of these.

47. If in an A.P., first term is 20, common difference is 2 and nth term is 42, then find n.

(A) 10 (B) 11 (C) 12 (D) 14

48. 150 workers were engaged to finish a piece of work in a certain number of days. 4 workers dropped the second day, 4 more workers dropped the third day and so on. It takes eight more days to finish the work now. The number of days in which the work was completed is:

(A) 15 (B) 20 (C) 25 (D) 30

49. Find the sum of series $6^3 + 7^3 + \ldots\ldots\ldots\ldots\ldots\ldots + 20^3$.

(A) 43875 (B) 83775 (C) 43775 (D) 43975

50. Find the sum of cubes of first n terms

(A) $\frac{n(n+1)}{2}$ (B) $\left(\frac{n(n+1)}{2}\right)^3$ (C) $\frac{n(n+1)(2n+1}{6}$ (D) $\left(\frac{n(n+1)}{2}\right)$

51. The value of $\sum_{r=1}^{n} \log\left(\frac{a^r}{b^{r-1}}\right)$ is

(A) $\frac{n}{2}\log\left(\frac{a^n}{b^n}\right)$ (B) $\frac{n}{2}\log\left(\frac{a^{n+1}}{b^n}\right)$ (C) $\frac{n}{2}\log\left(\frac{a^{n+1}}{b^{n-1}}\right)$ (D) $\frac{n}{2}\log\left(\frac{a^{n+1}}{b^{n+1}}\right)$

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

(A) 1190 (B) 1197 (C) 1210 (D) None of these

53. The sum of the integers from 1 to 100 which are not divisible by 3 or 5 is

(A) 2489 (B) 4735 (C) 2317 (D) 2632

54. If twice the 11^{th} term of an $A.P.$ is equal to 7 times of its 21^{st} term, then its 25^{th} term is equal to

(A) 24 (B) 120 (C) 0 (D) None of these

55. If $\frac{a}{b}, \frac{b}{c}, \frac{c}{a}$ are in $H.P.$, then

(A) a^2b, c^2a, b^2c are in $A.P.$

(B) a^2b, b^2c, c^2a are in $H.P.$

(C) a^2b, b^2c, c^2a are in $G.P.$

(D) None of these

56. If a^2, b^2, c^2 be in $A.P.$, then $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ will be in

(A) $A.P.$ (B) $G.P.$ (C) $H.P.$ (D) None of these

57. If the angles of a quadrilateral are in $A.P.$ whose common difference is 10^o, then the angles of the quadrilateral are

(A) $65^o, 85^o, 95^o, 105^o$

(B) $75^o, 85^o, 95^o, 105^o$

(C) $65^o, 75^o, 85^o, 95^o$ (D) $65^o, 95^o, 105^o, 115^o$

58. Jairam purchased a house in Rs. 15000 and paid Rs. 5000 at once. Rest money he promised to pay in annual installment of Rs. 1000 with 10% per annum interest. How much money is to be paid by Jairam Rs. .....

(A) 21555 (B) 20475 (C) 20500 (D) 20700

59. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in $A.P.$, then their common difference will be

(A) ± 1 (B) ± 2 (C) ± 3 (D) ± 4

60. The $A.M.$ of a 50 set of numbers is 38. If two numbers of the set, namely 55 and 45 are discarded, the $A.M.$ of the remaining set of numbers is

(A) 38.5 (B) 37.5 (C) 36.5 (D) 36

61. 150 workers were engaged to finish a piece of work in a certain number of days. 4 workers dropped the second day, 4 more workers dropped the third day and so on. It takes eight more days to finish the work now. The number of days in which the work was completed is

(A) 15 (B) 20 (C) 25 (D) 30

62. Given that n A.M.'s are inserted between two sets of numbers a, $2b$and $2a$, b, where a, $b \in R$. Suppose further that m^{th} mean between these sets of numbers is same, then the ratio $a : b$ equals

(A) $n - m + 1 : m$ (B) $n - m + 1 : n$ (C) $n : n - m + 1$ (D) $m : n - m + 1$

63. If α, β, γ are the geometric means between ca, ab; ab, bc; bc, ca respectively where a, b, c are in A.P., then α^2, β^2, γ^2 are in

(A) $A.P.$ (B) $H.P.$

(C) $G.P.$ (D) None of the above

64. Maximum value of sum of arithmetic progression $50, 48, 46, 44 \ldots\ldots$ is :-

(A) 325 (B) 648 (C) 652 (D) 650

*** Given section consists of questions of 2 marks each.** **[34]**

65. A manufacturer reckons that the value of a machine, which cost him ₹ 15625 will depreciate each year by 20%. Find the estimated value at the end of 5 years.

66. Find the indicated terms of the sequence, whose nth term is $a_n = \frac{n(n-2)}{n+3}$; a_{20}

67. Write the first five terms of the sequence whose n^{th} term is $a_n = n(n+2)$

68. If a, b, c are in G.P., Prove that $\log a, \log b, \log c$ are in A.P.

69. If a is the G.M. of 2 and $\frac{1}{4}$, find a.

70. If a, b, c are in G.P., Prove that $\frac{1}{\log_a m}, \frac{1}{\log_b m}, \frac{1}{\log_c m}$ are in A.P.

71. Find the sum of the following series to infinit:
$10 - 9 + 8.1 - 7.29 + \ldots\infty$

72. Find:
The 8th term of the G.P. 0.3, 0.06, 0.012, ...

73. Find the sum of the following series to infinity:
$\frac{2}{5} + \frac{3}{5^2} + \frac{2}{5^3} + \frac{3}{5^4} + \ldots\infty$

74. Find:
The 12th term of the G.P. $\frac{1}{a^3x^3}, ax, a^5x^5 \ldots$

75. Find:
The ninth term of the G.P. 1, 4, 16, 64, ...

76. Find the sum of the following series to infinity:
$1 - \frac{1}{3} + \frac{1}{3^2} - \frac{1}{3^3} + \frac{1}{3^4} + \ldots.\infty$

77. How many terms of the series 2 + 6 + 18 + ... must be make the sum equal to 728₹

78. The sum of three numbers which are consecutive terms of an A.P. is 21. If the second number is reduced by 1 and the third is increased by 1, we obtain three consecutive terms of a G.P. Find the numbers.

79. Find the sum of the following geometric progrssions:
1, 3, 9, 27, ... to 8 terms

80. The sum of interior angles of a triangle is 180°. Show that the sum of the interior angles of polygons with 3, 4, 5, 6,... sides form an arithmetic progression. Find the sum of the interior angles for a 21 sided polygon.

81. The first term of an A.P. is a and the sum of the first p terms is zero, show that the sum of its next q term is $\frac{-a(p+q)q}{p-1}$.
[**Hint:** Required sum = $S_{p+q} - S_p$]

*** Given section consists of questions of 3 marks each.** **[129]**

82. The sum of some terms of G.P. is 315 whose first term and the common ratio are 5 and 2 respectively. Find the last term and the number of terms.

83. If f is a function satisfying f (x+y) = f (x) f (y) for all x, y $\in$ N such that f (1) = 3 and $\sum_{x=1}^{n} f(x) = 120$ find the value of n.

84. Shamshad Ali buys a scooter for ₹ 22000. He pays ₹ 4000 cash and agrees to pay the balance in annual installment of ₹ 1000 plus 10% interest on the unpaid amount. How much will the scooter cost him?

85. Find the sum of the series up to n terms .6 +. 66 + .666+...

86. Find the sum of the series up to n terms 5 + 55 + 555 + ...

87. If a and b are the roots x^2 - 3x + p = 0 and c, d are roots of x^2 - 12x + q = 0 where a, b, c, d form a G.P. Prove that (q + p):(q - p) = 17:15.

88. Let S be the sum, P the product and R the sum of reciprocals of n terms in a G.P. Prove that $P^2R^n = S^n$.

89. The sum of the first four terms of an A.P. is 56. The sum of the last four terms is 112. If its first term is 11, then find the number of terms.

90. A G.P. consists of an even number of terms. If the sum of all the terms is 5 times the sum of terms occupying odd places, then find its common ratio.

91. If A and G be A.M. and G.M. respectively between two positive numbers, prove that the numbers are $\mathrm{A} \pm \sqrt{(\mathrm{A}+\mathrm{G})(\mathrm{A}-\mathrm{G})}$.

92. The sum of two numbers is 6 times their geometric mean, show that numbers are in the ratio $(3+2\sqrt{2}) : (3-2\sqrt{2})$.

93. Find the value of n so that $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ may be the geometric mean between a and b.

94. Show that the ratio of the sum of first n terms of a G.P. to the sum of terms from (n + 1)th to (2n)th term is $\frac{1}{r^n}$.

95. Find the sum to n terms of the sequences 8, 88, 888, 8888, ...

96. How many terms of G.P. 3, 3^2 , 3^3 ..... are needed to give the sum 120?

97. The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1. Find the common ratio and the terms.

98. Evaluate: $\sum_{k=1}^{11} \left(2+3^k\right)$

99. Find the sum to indicated number of terms of the geometric progression x^3, x^5, x^7 ... n terms (if $x \neq \pm 1$).

100. The number of terms of an A.P. is even; the sum of odd terms is 24, of the even terms is 30, and the last term exceeds the first by $10\frac{1}{2}$, find the number of terms and the series.

101. If $\mathrm{a}^2, \mathrm{b}^2, \mathrm{c}^2$ are in A.P., prove that $\frac{\mathrm{a}}{\mathrm{b}+\mathrm{c}}, \frac{\mathrm{b}}{\mathrm{c}+\mathrm{a}}, \frac{\mathrm{c}}{\mathrm{a}+\mathrm{b}}$ are in A.P.

102. There are 25 trees at equal distances of 5 metres in a line with a well, the distance of the well from the nearest tree being 10 metres. A gardener waters all the trees separately starting from the well and he returns to the well after watering each tree to get water for the next. Find the total distance the gardener will cover in order to water all the trees.

103. A man is employed to count ₹ 10710. he count at the rate od ₹ 180 per minute for half an hour. after this he counts at the rate of ₹ 3 less every minute than the preceding minute. find the time takan by him to count the entire amount.

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

105. How many terms of G.P. $3, \frac{3}{2}, \frac{3}{4} \cdots$ are needed to give the sum $\frac{3069}{512}$?

106. Find the sum: $\sum_{n=1}^{10} \left\{ \left(\frac{1}{2}\right)^{n-1} + \left(\frac{1}{5}\right)^{n+1} \right\}$.

107. Show that the ratio of the sum of the first n terms of a G.P. to the sum of terms from $(n+1)^{th}$ to $(2n)^{th}$ terms is $\frac{1}{r^n}$.

108. The ratio of the sum of first three term is to that of first 6 terms of a G.P. is 125 : 152. Find the common ratio.

109. Find the two numbers whose A.M. is 25 and G.M. is 20.

110. If S_p denotes the sum of the series $1 + r^p + r^{2r} + \ldots$ to ∞ and S_p the sum of the series $1 - r^p + r^{2p} - \ldots$ to ∞, prove that $S_p + S_p = 2S_{2p}$.

111. Find k such that $k+9, k-6$ and 4 from three consecutive terms of a G.P.

112. Prove that: $\left(9^{\frac{1}{3}}.9^{\frac{1}{9}}.9^{\frac{1}{27}} \ldots \infty\right) = 3$.

113. Find the sum of the following series to infinit:
$\frac{1}{3} + \frac{1}{5^2} + \frac{1}{3^3} + \frac{1}{5^4} + \frac{1}{3^5} + \frac{1}{5^6} + \ldots\infty$

114. If a, b, c, d and p are different real numbers such that:
$(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + a^2) \leq 0$, then show that a, b, c and d are in G.P.

115. Find the sum of the following geometric series:
$\frac{a}{1+i} + \frac{a}{(1+i)^2} + \frac{a}{(1+i)^3} + \ldots + \frac{a}{(1+i)^n}$.

116. Find the sum of the following series:
0.6 + 0.66 + 0.666 + ... to n terms.

117. If A is the arithmetic mean and G_1 , G_2 be two geometric means between any two numbers, then prove that:
$2A = \frac{G_1^2}{G_2} + \frac{G_2^2}{G_2}$

118. In a cricket tournament 16 school teams participated. A sum of Rs. 8000 is to be awarded among themselves as prize money. If the last placed team is awarded Rs. 275 in prize money and the award increases by the same amount for successive finishing places, how much amount will the first place team receive?

119. If a_1, a_2, a_3, ..., an are in A.P., where $a_i > 0$ for all i, show that:

$\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \ldots + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} = \frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$

120. Find the r^{th} term of an A.P. sum of whose first n terms is $2n + 3n^2$.
[**Hint:** an = $S_n - S_n - 1$]

121. A man accepts a position with an initial salary of Rs. 5200 per month. It is understood that he will receive an automatic increase of Rs. 320 in the very next month and each month thereafter.
   a. Find his salary for the tenth month.
   b. What is his total earnings during the first year?

122. Match the questions given under Column I with their appropriate answers given under the Column II.

	Column I		**Column II**
(a)	$4, 1, \frac{1}{4}, \frac{1}{16}$	(i)	A.P.
(b)	2, 3, 5, 7	(ii)	Squence
(c)	13, 8, 3, -2, -7	(iii)	G.P.

123. If S_1, S_2, S_3 are respectively the sum of $n, 2n$ and $3n$ terms of G.P. then prove that $S_1{}^2 + S_2{}^2 = S_1\ (S_2 + S_3)$.

124. For a G.P., if $(m+n)^{\text{th}}$ term is P and $(m-n)$ th term is q, then prove that m^{th} and q^{th} term are $\sqrt{pq}$ and $p\left(\frac{q}{p}\right)^{m/2n}$ respectively.

*** Given section consists of questions of 5 marks each.** **[115]**

125. Show that $\frac{1\times2^2+2\times3^2+\ldots\ldots+n\times(n+1)^2}{1^2\times2+2^2\times3+\ldots\ldots+n^2(n+1)} = \frac{3n+5}{3n+1}$

126. Find the sum of the following series up to n terms: $\frac{1^3}{1} + \frac{1^3+2^3}{1+3} + \frac{1^3+2^3+3^3}{1+3+5} + \ldots\ldots$

127. If S_1, S_2, S_3 are the sum of first n natural no. their squares and their cubes respectively, show that $9S_2^2 = S_3\,(1 + 8S_1)$.

128. If a, b, c are in A.P.; b, c, d are in G.P. and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in A.P., prove that a, c, e are in G.P.

129. The ratio of the A.M. and G.M. of two positive numbers a and b is $m : n$. Show that $a : b = (m + \sqrt{m^2 - n^2}\ ) : (m - \sqrt{m^2 - n^2})$

130. If a, b, c are in A.P., prove that:
$a^3 + c^3 + 6abc = 8b^3$

131. If a, b, c are in A.P., prove that:
$(a - c)^2 = 4(a - b)(b - c)$

132. If a, b, c are in A.P., prove that:

$a^2 + c^2 + 4ac = 2(ab + bc + ca)$

133. Show that $x^2 + xy + y^2$, $z^2 + zx + x^2$ and $y^2 + yz + z^2$ are consecutive terms of an A.P., if x, y and z are in A.P.

134. Show that $x^2 + xy + y^2$, $z^2 + zx + x^2$ and $y^2 + yz + z^2$ are consecutive terms of an A.P., if x, y and z are in A.P.

135. If a, b, c are in A.P., prove that:
$(a - c)^2 = 4(a - b)(b - c)$

136. Find the sum of all two digit numbers which when divided by 4, yields 1 as remainder.

137. A man accepts a position with an initial salary of ₹ 5200 per month. It is understood that he will receive an automatic increase of ₹ 320 in the very next month and each month thereafter.
    i. Find his salary for the tenth month.
    ii. What is his total earnings during the first year?

138. If a, b, c, d are in G.P., prove that:
$(b + c)(b + d) = (c + a)(c + d)$

139. If a and b are the roots of $x^2 - 3x + p = 0$ and c, d are roots $x^2 - 12x + q = 0$, where a, b, c, d from a G.P. Prove that (q + p) : (q - p) = 17 : 15.

140. The product of three numbers in G.P. is 125 and the sum of their products taken in pairs is $87\frac{1}{2}$. Find them.

141. If a, b, c are in G.P., prove that:
$(a + 2b + 2c)(a - 2b + 2c) = a^2 + 4c^2$

142. One side of equilateral triangle is 18 cm. The mid-points of its sides are joined to from another triangle whose mind-points, in turn, are joined to from still another triangle. the process is continued indefinitely. Find the sum of the (i) Perimeters of all the triangles. (ii) Areas of all triangles.

143. If a, b, c, are in G.P., prove that:
$(a^2 + b^2), (b^2 + c^2), (c^2 + d^2)$ are in G.P.

144. If the 4th, 10th and 16th terms of a G.P. are x, y and z respectiveiy. Prove that x, y, z are in G.P.

145. Find the 4th term from the end of the G.P. $\frac{1}{2}, \frac{1}{6}, \frac{1}{18}\frac{1}{54}, \ldots, \frac{1}{4374}$.

146. If the pth and qth terms of a G.P. are q and p respectively, show that its (p + q)th term is $\left(\frac{q^p}{p^q}\right)^{\frac{1}{p-q}}$.

147. Match the questions given under Column I with their appropriate answers given under the Column II.

	Column I		Column II
(a)	$1^2+2^2+3^2+\ldots+n^2$	(i)	$\left[\frac{n(n+1)}{2}\right]^2$
(b)	$1^3+2^3+3^3+\ldots n^3$	(ii)	$n(n+1)$
(c)	$2+4+6+\ldots+2n$	(iii)	$\frac{n(n+1)(2n+1)}{6}$
(d)	$1+2+3+\ldots n$	(iv)	$\frac{n(n+1)}{2}$

*** Case study based questions** **[8]**

148. A company produces 500 computers in the third year and 600 computers in the seventh year. Assuming that the production increases uniformly by a constant number every year.

Based on the above information, answer the following questions.

(i) The value of the fixed number by which production is increasing every year is
(a) 25 (b) 20 (c) 10 (d) 30

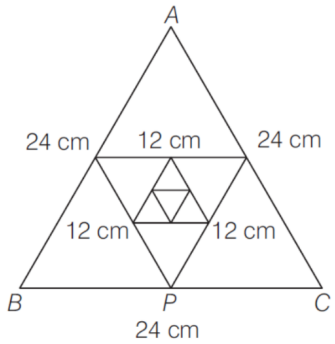
(ii) The production in first year is
(a) 400 (b) 250 (c) 450 (d) 300

(iii) The total production in 10 years is
(a) 5625 (b) 5265 (c) 2655 (d) 6525

(iv) The number of computers produced in 21 st year is
(a) 650 (b) 700 (c) 850 (d) 950

(v) The difference in number of computers produced in 10th year and 8th year is
(a) 25 (b) 50 (c) 100 (d) 75

149. Each side of an equilateral triangle is $24\ \text{cm}$. The mid-point of its sides are joined to form another triangle. This process is going continuously infinite.



Based on above information, answer the following questions.

(i) The side of the 5th triangle is (in cm)

(a) 3 (b) 6 (c) 1.5 (d) 0.75

(ii) The sum of perimeter of first 6 triangle is (in cm)

(a) $\frac{569}{4}$ (b) $\frac{567}{4}$ (c) 120 (d) 144

(iii) The area of all the triangle is (in sq cm)

(a) 576 (b) $192\sqrt{3}$ (c) $144\sqrt{3}$ (d) $169\sqrt{3}$

(iv) The sum of perimeter of all triangle is (in cm)

(a) 144 (b) 169 (c) 400 (d) 625

(v) The perimeter of 7 th triangle is (in cm)

(a) $\frac{7}{8}$ (b) $\frac{9}{8}$ (c) $\frac{5}{8}$ (d) $\frac{3}{4}$

----- “Opportunities don’t happen, you create them. -----