MATHS

BOOKS - MAXIMUM PUBLICATION

SEQUENCE AND SERIES

Example

1. Find the nth term of the sequence

$5, 2, \ -1, \ -4, \ -7, \ldots$

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2. Find the nth term of the sequence

$12, 7, 2, \, -3, \, -8, \ldots .$

3. A sequence is given $\{a_n\}$ by

$a_n = n^2 - 1, n \in N$ show that it is not an AP.

4. Find the sum to

15 terms of the AP 3,7,11,......

5. Find the sum to

20 terms of the AP 10,7,4,......

6. Find the sum to

81 terms of the AP-1, $\dfrac{1}{4}, \dfrac{3}{2}$,......

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7. Insert 6 arithmetic means between 3 and 24.

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8. If the $n^t h$ term of a GP -2,4,-8,,16,...... is 1024.

Find n.

9. If the nth term of a GP $2,2\sqrt{2},4,......$ is 64.

Find n.

10. Find the sum of first 20 terms of the GP

$\sqrt{3}, 2\sqrt{3}, 4\sqrt{3}, 8\sqrt{3},........$

11. In a GP $\{a_n\}$, if $a_1 = 3, a_n = 96$ and $S_n = 189$. Find common ration and n.

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12. Find the sum to n terms of the question:

$9 + 99 + 999 + \ldots.$

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13. Find the sum to n terms of the question:

$$4 + 44 + 444 + \ldots .$$

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14. The third term of a GP is 4. Find the product of the first five terms.

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15. Insert 4 geometric means between 4 and 972.

16. Find the sum to infinity of this geometric progression.

$$1, \frac{1}{2}, \frac{1}{2^2}, \frac{1}{2^3}, \ldots\ldots$$

17. Find the sum to infinity of this geometric progression.

$$5, \frac{20}{7}, \frac{80}{49}, \ldots \ldots$$

18. The 10th term of an AP is 73 and the 20th term is 43. Find the 44th term.

19. The 7th term of an AP is 34 and the 15th term is 74. Find the 40th term.

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20. Find the sum of 32 terms of an AP whose third term is 1 and the 6th term is -11.

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21. Find the sum to n terms of a series is $7n^2 - 5n$. Show that it is an AP and find the $15^{t}h$ term.

22. Find three numbers in AP whose sum is -3 and whose product is 8.

23. Find the three numbers in AP whose sum is 21 and product is 231.

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24. Find the sum of all natural numbers between 100 and 1000 which are multiple of 5.

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25. If the AM and GM between two numbers are 34 and 16 respectively. Find the numbers.

26. If the pth, q^{th} and r^{th} terms of a GP are a,b,c respectively, show that $a^{q-r} b^{r-p} c^{p-q} = 1$

27. The sum of the first p,q,r terms of an AP are a,b,c respectively, prove that

$$\frac{a}{p}(q - r) + \frac{b}{q}(r - p) + \frac{c}{r}(p - q) = 0$$

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28. The ratio between the sums to n terms of two AP is $7n + 1 : 4n + 27$. Find the ratio of their $11^t h$ terms.

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29. If the sum of p terms of an AP is the same as the sum of its q terms, show that the sum of its $(p + q)$ terms is zero.

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30. The sum of the first two terms of a GP Is -4 and the fifth term is 4 times the third term. Find the first term and the common ratio.

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31. The sum of the first two terms of a GP Is -4 and the fifth term is 4 times the third term. Find the GP.

32. The sum of three numbers in GP is 38 and their product is 1728. Find the GP.

33. Find the three numbers in GP whose sum is

13 and the sum of whose squares is 91.

34. Find the sum to n terms of this series.

$$1 \times 4 + 3 \times 7 + 5 \times 10 + \ldots\ldots$$

35. Find the sum to n terms of this series.

$$1 \times 2^2 + 2 \times 3^2 + 3 \times 4^2 + \ldots \ldots$$

36. Find the sum to n terms of this series.

$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \ldots \ldots$$

37. Find the sum to n terms of this series.

$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \ldots\ldots$$

38. Find the sum to n terms of this series.

$$1^2 + 3^2 + 5^2 + \ldots\ldots\ldots$$

39. nth tern of some sequence are given below.

Which term can be the n th term of an AP?

    A. $a_n = n(n + 1)$

    B. $a_n = 2 + 5n$

    C. $a_n = 2^n + 2$

    D. $a_n = n^2 + n + 1$

Answer: B

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40. if the sum of 12th and 22th terms of an AP is 100. Find the sum of first 33 terms.

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41. The product of first 3 terms of a GP is 1000. If 6 terms to the second term and 7 is added to the third term, the terms become an AP. Find the second term of GP.

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42. The product of first 3 terms of a GP is 1000. If 6 terms to the second term and 7 is added to the third term, the terms become an AP. Find the terms of the GP.

43. Find the sum of n terms of the series

$7 + 77 + 777 + \ldots\ldots$

44. Consider the GP $3, 3^2, 3^3, \ldots$.

Find the sum to n terms of this GP.

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45. Consider the GP $3, 3^2, 3^3, \ldots$.

Find the value of n so that the sum to n terms

of this GP Is 120.

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46. Given sum of three consecutive terms in an AP is 21 and their product is 280.

Find the middle term of the above terms.

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47. Given sum of three consecutive terms in an AP is 21 and their product is 280.

Find the remaining two terms of the above AP.

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48. Consider the GP 3,6,12,......

Which term of this GP is 96?

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49. Consider the GP 3,6,12,......

Find the value of n so that sum to n terms of this GP is 381.

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50. What is the sum of the first 'n' natural numbers?

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51. Find the sum to 'n' terms of the series

$3 \times 8 + 6 \times 11 + 9 \times 14 + \ldots\ldots$

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52. If the sum of the first n terms of an Arithmetic progression is $S_n = nX + \frac{1}{2}n(n-1)Y$ where X and Y are constants, find S_1 and S_2.

53. If the sum of the first n terms of an Arithmetic progression is $S_n = nX + \frac{1}{2}n(n-1)Y$ where X and Y are

constants, find the first term and common difference.

54. If the sum of the first n terms of an Arithmetic progression is $S_n = nX + \frac{1}{2}n(n-1)Y$ where X and Y are constants, find

The $n^t h$ term.

55. Find the sum to n terms of the series,

$$2^2 + 5^2 + 8^2 + \ldots\ldots\ldots$$

56. Write the first four terms of the sequence whose nth term $a_n = \dfrac{n}{n+1}$

57. The sum of first three terms of a Geometric Progression is $\dfrac{13}{12}$ and their product is -1. Find the common ratio and the terms.

58. If the numbers $\dfrac{5}{2}, x, \dfrac{5}{8}$ are three consecutive terms of a GP, then find x.

59. Find the sum of the first n-terms of the series. $2 + 22 + 222 + \dots$.

60. Find the $5^{t}h$ term of the sequence whose nth term is $a_n = \dfrac{n(n-2)}{n+3}$

61. Write the sum of first n natural numbers.

62. The 5th, 8th and 11th terms of a GP are p, q and s respectively. Prove that $q^2 = ps$.

63. A man starts repaying a loan as first instalment of Rs. 1,000. If he increases the instalment by Rs. 150 every month, what amount will he pay in the 30th instalment?

64. Find the sum to n terms of the sequence

$7, 77, 777, 7777, \ldots \ldots$

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65. Consider the AP 4,10,16,22,...... Find its common difference and the $7^{t}h$ term.

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66. If the mth terms of an AP is $\dfrac{1}{n}$ and the nth term is $\dfrac{1}{m}$, prove that the sum of the first mn terms is $\dfrac{1}{2}(mn + 1)$

67. The 6th term of the sequence whose n^{th} term is $t_n = \dfrac{2n - 3}{6}$ is ....

A. 3

B. $\dfrac{1}{2}$

C. $\dfrac{3}{2}$

D. $\dfrac{1}{3}$

Answer: C

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68. Find the sum to infinity of the sequence $1, \dfrac{1}{3}, \dfrac{1}{9}, \ldots \ldots \ldots$

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69. If a, b, c are in AP and $a^{\frac{1}{x}} = b^{\frac{1}{y}} = c^{\frac{1}{z}}$ prove

that x, y, z are in AP.

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70. In an AP, the first term is 2 and the sum of

the first five terms is one fourth the sum of

the next five terms.

Find the common dfference.

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71. In an AP, the first term is 2 and the sum of the first five terms is one fourth the sum of the next five terms.

Find the 20th term.

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72. If AM and GM of two numbers are 10 and 8 respectively, find the numbers.

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73. In an AP if m^{th} term is 'n' and n^{th} term is 'm', find the $(m+n)^{th}$ term.

74. If 3rd, 8th and 13th th terms of a GP are x,y,z respectively, prove that x, y, z in GP.

75. Prove that 3rd, 8th and 13th th terms of a GP are x,y,z satisfies the equation of

$$\frac{y^{10}}{(xz)^5} = 1.$$

76. Which of the following is the nth term of

an AP?

    A. $3 - 2n$

    B. $n^2 - 3$

    C. $3^n - 2$

    D. $2 - 3n^2$

Answer: A

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77. Find the 10th term of the sequence

$-6, \ -\dfrac{11}{2}, \ -5,..............$

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78. The sum of the first three terms of a GP is

$\dfrac{39}{10}$ and their product is 1. Find the common

ratio and the terms.

79. Find the 10th term of an AP whose nth term is $\dfrac{2n-3}{6}$.

80. Find the sum of the first 10 terms of the AP which is $\dfrac{2n-3}{6}$.

81. Find the sum of the first 10 terms of a GP, whose 3rd term is 12 and 8th term is 384.

82. Find the 5th term of the sequence whose n^{th} term $a_n = \dfrac{n^2 - 5}{4}$

83. Find the sum of n terms of the series

$7 + 77 + 777 + $ ....

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84. Find the sum to n terms of the series.

$1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + $ ....

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85. Find the sum of multiple of 7 between 200 and 400.

86. The sum of first 3 terms of a GP is $\dfrac{39}{10}$ and their product Is 1. Find the terms.

87. If 'a' is the first term and 'd is the common difference of an AP, then the nth term of the AP, a_n= ....

88. In an AP, if the mth term is 'n' and the nth term is 'm', prove that its pth term is $n + m - p$.

89. Find the sum to n terms of the series.

$$1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \ldots\ldots\ldots$$

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90. If the sum of certain number of terms of the AP 25,22,19,........is 116, then find the last term.

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91. Find the sum to n terms of the series

$$1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \ldots\ldots .$$

92. The $3^r d$ term of the sequence whose $n^t h$ term is $\left(\dfrac{3}{2}\right)^{n+1}$ ....

93. Insert three numbers between 1 and 256 so that the resulting sequence is a GP.

94. If p^th term of an AP is 'q' and q^th term is 'p', where $p \neq q$ find r^th term.

95. Geometric mean of 16 and 4 is ....

A. 20

B. 4

C. 10

D. 8

Answer: D

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96. Find the sum to n terms of the series:

$5 + 55 + 555 + \ldots \ldots \ldots$

97. Find the sum of n terms of the AP, whose $K^{t}h$ term is $a_k = 5K + 1$.

98. If the first three terms of an AP is $x - 1$, $x + 1, 2x + 3$, then x is...........

    A. -2

    B. 2

C. 0

D. 4

Answer: C

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99. Find the sum to n terms of the series.

$$1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \text{.............}$$

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100. The nth term of the GP $5, -\dfrac{5}{2}, \dfrac{5}{4}, -\dfrac{5}{8}$

....

is $\dfrac{5}{1024}$. Find 'n'.

101. The nth term of the GP 5,25,125, ...

A. n^5

B. 5^n

C. $(2n)^5$

D. $(5)^{2n}$

Answer: B

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102. Find the sum of all natural numbers between 200 and 1000 which are multiples of 10.

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103. Find the sum of the first n terms of the series whose nth term is $n(n + 3)$.

104. Which among the following represents the sequence whose n^th terms is $\dfrac{n}{n + 1}$

A. 1,2,3,4,5,6

B. 2,3,4,5,6

C. 2, $\dfrac{3}{2}$, $\dfrac{4}{3}$, $\dfrac{5}{4}$, $\dfrac{6}{5}$

D. $\dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{4}, \dfrac{4}{5}, \dfrac{5}{6}$

Answer: D

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105. Using progression, find the sum of first five terms of the series $1 + \dfrac{2}{3} + \dfrac{4}{9} + \ldots$.

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106. Calculate: $0.6 + 0.66 + 0.666 + ...$ n

terms.

107. The sum of the infinite series

$1, \dfrac{1}{3}, \dfrac{1}{9}, ...$ Is...............

A. $\dfrac{3}{2}$

B. $\dfrac{5}{2}$

C. $\dfrac{2}{3}$

D. $\dfrac{7}{2}$

Answer: A

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108. Find the sum of all natural numbers between 100 and 1000 which is a multiple of 5.

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109. Find the sum to n terms of the series:

8, 88, 888,.....

110. The 6th term of the GP $\dfrac{1}{2}, \dfrac{1}{4}, \dfrac{1}{8}, \ldots\ldots$

A. $\dfrac{1}{32}$

B. $\dfrac{1}{64}$

C. $\dfrac{1}{16}$

D. $\dfrac{1}{128}$

Answer: B

111. Find the sum to n terms of the series

$$3 \times 1^2 + 5 \times 2^2 + 7 \times 3^2 + \ldots\ldots$$