MATHS

BOOKS - MODERN PUBLISHERS MATHS (HINGLISH)

SEQUENCES AND SERIES

Illustrative Examples

1. Write the fourth term in the sequence, defined as below:

(i) $a_n = 5n - 2$

A. 13

B. 18

C. 3

D. None of these

Answer: B

Watch Video Solution

2. Write the first five terms of each of the following sequences whose nth terms are:

(i) $a_n = 2^n$

(ii) $T_n = \frac{n(n+1)(2n+1)}{6}$

Watch Video Solution

3. What is the 15^{th} term of the sequence defined by:

$a_n = (n-1)(2-n)(3+n)$?

A. -3276

B. 3298

C. -2764

D. -9874

Answer: A

Watch Video Solution

4. Let the sequence be defined as follow:

$a_1 = 3$

$a_n = 3a_{n-1} + 2,$ for all $n > 1.$

Find the first five terms of the sequence.

Watch Video Solution

5. Find as indicated in each case:

(i) $t_1 = 1, t_n = 2t_{n-1}, (n > 1), t_6 = ?$

(ii)$S_n = S_{n-1} - 1, (n > 2), S_1 = S_2 = 2, S_5 = ?$

Watch Video Solution

6. Find the 960^{th} and 961^{th} terms of the sequence given by:

$$t_n = \begin{cases} \frac{n}{\frac{n}{96} - 1} & \text{if n is not the square of a natural number} \\ 6\frac{1}{2} & \text{if n is the square of a natural number} \end{cases}$$

Watch Video Solution

7. Let a (n) be the finite sequence with 9 terms a (1),a(2), ..., a(9)

defined as follows:

$$a(n) = \begin{cases} 1\{(\text{if the digit n occurs infinitely many times in the decimal exp} \\ 2\{(\text{If the digit n occurs sold number of times in the decmal expa} \\ 3\{(\text{If the digit n occurs an even number of times in the decimal e} \end{cases}$$

Find all the terms of the sequence.

A.

B.

C.

D.

Answer: 2,3,1,3,3,3,3,3,3

Watch Video Solution

8. Which term in the A.P. 5,2,-1,... is -22 ?

Watch Video Solution

9. Which term of the sequence, $4, 3\frac{5}{7}, 3\frac{3}{7}$ ..... Is the first negative term?

Watch Video Solution

10. Which term of the sequence: $16-6i, 15-4i, 14-2i$..... Is pure imaginary?

Watch Video Solution

11. Show that there is no A.P. which consists of only distinct prime numbers.

Watch Video Solution

12. The sum of first 12 terms of a G.P. is five times the sum of the first 6 terms. Find the common ratio.

Watch Video Solution

13. If 7 times the 7th term of an AP is equal to 11 times its 11th term, show that the 18th term of the AP is 0.

Watch Video Solution

14. Find the number of terms common to the two AP's 3,7,11,15.... 407 and 2, 9 ,16.....709.

Watch Video Solution

15. If the pth, qth and rt terms of an A.P. be x,y,z respectively show that:

$x(q-r)+y(r-p)+z(p-q)=0$

Watch Video Solution

16. Insert three numbers between 1 and 256 so that the resulting sequence is a G.P.

Watch Video Solution

17. The arithmetic mean between two numbers is 10 and their geometric mean is 8.Find the numbers.

View Text Solution

18. The A.M. between two distinct positive numbers is twice the G.M. between them. Find the ratio of the greater to the samller.

View Text Solution

19. If one geometric mean G and two arithmetic means $A_1 and A_2$ be inserted between two given quantities, prove that $G^2 = (2A_1 - A_2)(2A_2 - A_1)$.

Watch Video Solution

20. Find all sequences which are simultaneously A.P. and G.P.

Watch Video Solution

21. The sum of first three terms of a G.P. is $\frac{13}{12}$ and their product is 1. Find the common ratio and the terms.

Watch Video Solution

22. The product of first three terms of a G.P. is 1000. If 6 added to its second term and 7 added to its third term, the terms become in A.P. Find the G.P.

Watch Video Solution

23. If p,q,r are in A.P. while x,y,z are in G.P., prove that $x^{q-r}y^{r-p}z^{p-q}=1$

Watch Video Solution

24. Find the sum to infinity of the series: $1+\frac{3}{2}+\frac{5}{2^2}+\frac{7}{2^3}+\ldots\ldots\ldots\infty$

Watch Video Solution

25. If the sum to infinity of the series: $3+(3+d)\frac{.1}{4}+(3+2d)\frac{.1}{4^2}+$ ..... Is $4\frac{8}{9}$ find d. Also name the series.

Watch Video Solution

26. Sum up the following series to n terms:

$3 + 7 + 14 + 24 + 37 + \ldots\ldots\ldots\ldots\ldots$

Watch Video Solution

27. Find the nth term and the sum of n term of the series

$6 + 9 + 21 + 69 + 261 +$ .....

Watch Video Solution

Faqs

1. Find the sum of indicated number of terms of the following arithmetic progression: 16,11,6,.....23 terms.

Watch Video Solution

2. Determine the value of S_n in A.P. if we have the following:

$a = \frac{17}{2}, d = \frac{3}{2}, n = 64$

Watch Video Solution

3. If n^{th} terms of the sequence $\{a_n\}$ where $a_n = (-1)^{n-1}5^{n+1}$, find a_1, a_2, and $a_3$is

Watch Video Solution

4. The n^{th} term of an A.P. is $a_n = 3 + 2n$, then the common difference is.

Watch Video Solution

5. Determine the sum of first thirty five terms of an arithmetic progression if $t_2 = 2$ and $t_7 = 22$.

Watch Video Solution

6. The twelfth term of an A.P. is (-13) and the sum of its first four terms is 24, find the sum of first 12 terms of the A.P.

Watch Video Solution

7. The sum of first 6 terms of a G.P. is nine times the sum of the first 3 terms. Find the common ratio.

Watch Video Solution

8. Find the sum of the all the three digit numbers, which leave the remainder 2 when divided by 5.

Watch Video Solution

9. Let S_n be the sum of first n terms of and A.P. If $S_{3n} = 5S_n$, then find the value of $\frac{S_{5n}}{S_n}$ is.

Watch Video Solution

10. If positive integers $a_1, a_2, a_3, \ldots\ldots$ are in A.P. such that $a_8 + a_{10} = 24$ then the value of a_9 is.

Watch Video Solution

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

Watch Video Solution

12. the income of a person is Rs. 300,000 in the first year and he receivers in increase of Rs. 10000 to his income per year for the next 19 years. Find the total amount, he received in 20 years.

Watch Video Solution

13. A person buys every year National Saving Certificates of value exceeding that last year's purchase by Rs. 500. After ten years he finds that the total value of the national saving certificates purchased by him is Rs. 27,500. Find the value of the certificates purchased by him in the first year.

Watch Video Solution

14. A manufacturer of T.V. serts produced 600 units in the third year and 700 units in the seventh year. Assuming the production uniformly increases by a fixed number every year, find:

(i) the production in the first year

(ii) The production in the 10 year and

(iii) the total prodction in 7 years.

Watch Video Solution

15. In a state, all the school teachers decided to help those underpriveleged children in the streets by donating some money every year to the child welfare fund. In the first year, they donated Rs. 10,000 in the second year they donated Rs. 20,000 and in the third year they donated Rs. 30,000 and they continue to pay for 10 years. Find the total amount that will be doneated after 10 years.

Watch Video Solution

16. Find the indicated terms in the following:

$a = 1, r = 1.2, t_4, t_n$

View Text Solution

17. Find the 10 th term of the geometric series:

$5 + 25 + 125 + \ldots\ldots\ldots\ldots$

Also find its nth term.

View Text Solution

18. The first term of a G.P. is 1. The sum of the third and fifth terms is 90. Find the common ratio of the G.P.

Watch Video Solution

19. In a finite G.P. the product of the terms equidistant from the beginning and the end is always same and equal to the product of first and last term.

Watch Video Solution

20. Prove that the product of first n terms of a G.P. whose first term is a and last term is I, is $(al)^{n/2}$.

View Text Solution

21. The number of crimes in a locality doubles every month. If there were 20 crimes occurring in the month of January, how many cirmes will occur in the month of February and April?

View Text Solution

22. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2nd hour, 4th hour and nth hour?

Watch Video Solution

23. Evaluate : $\sum_{i=1}^{10}\left\{\left(\frac{1}{2}\right)^{j-1}+\left(\frac{1}{5}\right)^{j+1}\right\}$

View Text Solution

24. Find the sum of first n terms and the sum of first 5 terms of the geometric series $1+\frac{2}{3}+\frac{4}{9}+\vdots$

Watch Video Solution

25. Determine the number of terms in G.P. `<>,ifa_1=3,a_n=96a n dS_n=189.`

Watch Video Solution

26. The sum to n terms of the series $11+103+1005+\ldots.$ is

Watch Video Solution

27. Find the sum of n terms of the series $(a+b)+\left(a^2+2b\right)+\left(a^2+3b\right)+\ldots..$

Watch Video Solution

28. Find the sum to n terms of the series: $\left(x+\frac{1}{x}\right)^2+\left(x^2+\frac{1}{x^2}\right)^2+\left(x^3+\frac{1}{x^3}\right)^2+$`.....

Watch Video Solution

29. Find the least value of n for which the sum $1+3+3^2+\ \rightarrow n$ terms is greater then 7000.

Watch Video Solution

30. Find the sum to n terms of the series 4+44+4444+· · ·

Watch Video Solution

31. Find the sumiof 50 terms of a sequence $7, 7.7, 7.77, 7.777.$

Watch Video Solution

32. If S_n denotes the sum fo n terms of a G.P. whose first term and common ratio are a and r respectively then show that: $S_1 + S_3 + S_5 + \ldots\ldots\ldots + S_{2n} - 1 = \frac{an}{1-r} - \frac{ar\left(1-r^{2n}\right)}{\left(1-r^2\right)}$

Watch Video Solution

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

Watch Video Solution

34. A person has 2 parents, 4 grandparents, 8 great grand parents, and so on. Find the number of his ancestors during the ten generations preceding his one.

Watch Video Solution

35. An insect starts from a point and travels in a straight path 1 mm in the first second and half of the distance covered in the previous second in the succeeding second. In how much time would it reach a point 3 mm away from its starting point.

Watch Video Solution

36. Verify that 10,-9,8.1..... is a geometric progression. Find the sum to infinity of the G.P.

Watch Video Solution

37. Find the sum to infinity of the G.P. $-\frac{3}{4}, \frac{3}{16}, -\frac{3}{64}, \ldots\ldots\ldots$

Watch Video Solution

38. Prove that: $3^{\frac{1}{2}} \times 3^{\frac{1}{4}} \times 3^{\frac{1}{8}} \times \ldots = 3$

Watch Video Solution

39. The first term of G.P. is 2 and the sum to infinity is 6. Find the common ratio.

Watch Video Solution

40. If $A = 1 + r^a + r^{2a} +$ to $\infty and B = 1 + r^b + r^{2b} + \infty$, prove that $r = \left(\frac{A-1}{A}\right)^{1/a} = \left(\frac{B-1}{B}\right)^{1/a}$

Watch Video Solution

41. Use geometric series to express $0.555\ldots = 0.\bar{5}$ as a rational number.

Watch Video Solution

42. Evaluate $.2\overline{345}$.

Watch Video Solution

43. Which is the rational number having the decimal expansion $0.\overline{356}$?

Watch Video Solution

44. If $x = a + \frac{a}{r} + \frac{a}{r^2} + \infty, y = b - \frac{b}{r} + \frac{b}{r^2} + \infty, and z = c + \frac{c}{r^2} + \frac{c}{r^4} + \infty$ prove that $\frac{xy}{z} = \frac{ab}{.}$

Watch Video Solution

45. let $0 < \phi < \frac{\pi}{2}, \quad x = \sum_{n=0}^{\infty} \cos^{2n}\phi, \quad y = \sum_{n=0}^{\infty} \sin^{2n}\phi$ and $z = \sum_{n=0}^{\infty} \cos^{2n}\phi \sin^{2n}\phi$

Watch Video Solution

46. If S_1, S_2, S_3 are the sum of first n natural numbers, their squares and their cubes, respectively, show that $9S_2^2 = S_3(1 + 8S_1)$.

Watch Video Solution

47. Find the sum to n terms of the series $1^2 + 3^2 + 5^2 + \ldots.$ upto n terms .

Watch Video Solution

48. Find the sum to n term of the series whose nth term is $n(n + 1)(n + 4)$

Watch Video Solution

49. $\frac{1^3}{1} + \frac{1^3 + 2^3}{1 + 3} + \frac{1^3 + 2^3 + 3^3}{1 + 3 + 5} + \ldots\ldots$ upto nth term

Watch Video Solution

50. Sum of n terms the series : $1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 +$

Watch Video Solution

51. The value of the expression $1.(2-\omega).\left(2-\omega^2\right)+2.(3-\omega)\left(3-\omega^2\right)+.\ +(n-1)(n-\omega)\left(n-\omega^2\right)$, where omega is an imaginary cube root of unity, is.....

Watch Video Solution

52. Find the sum of the products of first n natural numbers, taken two at a time.

Watch Video Solution

53. The sequence N of natural numbers is divided into classes as follows.

Show that the sum of the numbers in nth row is $\left(2n^2+1\right)$

Watch Video Solution

Illustrative Example

1. (i)Insert 3 arithmetic means between 3 and 19

Watch Video Solution

2. There are n A.M.s between 3 and 17. The ratio of the last mean to the first mean is 3:1. Find the value of n.

Watch Video Solution

3. The sum of two numbers is $\frac{13}{6}$. An even number of arithmetic means are being inserted between them and sum exceeds their number by 1. find the number of means inserted.

Watch Video Solution

4. If the A.M. between mth and nth terms of an A.P. be equal to the A.M. between pth and qth terms of an A.P. then prove that $m+n=p+q$.

Watch Video Solution

5. If the roots of the equation $a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal show that $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

Watch Video Solution

6. The sum of three numbers in A.P. is $-3,$ and their product is $8.$ Find the numbers.

Watch Video Solution

7. Find the four numbers in A.P. whose sum is 20 and the sum of whose squares is 120.

Watch Video Solution

8. The digits of a positive integer, having three digits, are in A.P. and their sum is 15. The number obtained by reversing the digits is 594 less than the original number. Find the number.

Watch Video Solution

9. The fourth power of common difference of an arithmetic progression with integer entries is added to the product of any four consecutive terms of it. Prove that the resulting sum is the square of an integer.

Watch Video Solution

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

(i) $(ab)^{-1}$, $(ca)^{-1}$ and $(bc)^{-1}$ are also in A.P.

(ii) $\frac{ab+ac}{bc}, \frac{bc+ca}{ca}, \frac{ca+cb}{ab}$ are also in A.P.

Watch Video Solution

11. If (b+c-a)/a,(c+a-b)/b,(a+b-c)/c are in A.P. Prove that 1/a,1/b,1/c are also inA.P

Watch Video Solution

12.

If a^2, b^2, c^2 are in A.P., prove that $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are also in A.P

Watch Video Solution

13. If $a^2(b+c), b^2(c+a), c^2(a+b),$ are in A.P. show that either a, b, c are in A.P., or $ab+bc+ca=0$.

Watch Video Solution

14. If a, b, c are in A.P., prove that $a^3+4b^3+c^3=3b\left(a^2+c^2\right)$.

Watch Video Solution

Exercise 9 A Satq

1. Write the first four terms of each of the following sequence whose nth terms are

(i) 2^n (ii) $\frac{n}{n+1}$

(iii) $n^2 - 16$ (iv) $\frac{3^n}{2^n + 1}$

(v) $\frac{n+4}{n+1}$ (vi) $\log\left(1 + \frac{1}{n}\right)$

Watch Video Solution

2. Write the first five terms of each of the following sequences whose nth terms are:

(i) $a_n = 2n + 5$ (ii) $a_n = n(n+2)$

(iii) $a_n = \frac{n-3}{4}$ (iv) $a_n = \frac{n}{n+1}$

(v) $a_n = \frac{n\left(n^2+5\right)}{4}$

Watch Video Solution

3. Find the term indicated in each case:

(i) $a_n = \frac{n^2}{2^n} : a_7$

(ii) $a_n = \frac{n(n-2)}{n-3}, a_{20}$

(iii) $a_n = \left[\frac{1+(-1)^n}{2}3^n\right], a_7$

Watch Video Solution

4. Find the first five terms of the sequence and write corresponding series given by

(i) $\begin{cases} a_1 = 1 \\ a_n = a_{n-1} + 2, n \geq 2 \end{cases}$

(ii) $\begin{cases} a_1 = a_2 = 1 \\ a_n = a_{n-1} + a_{n-2}, n \geq 3 \end{cases}$

View Text Solution

5. Find the first six terms of the sequence whose first temr is 1 and whose (n+1) th term is obtained by adding n to the nth term.

Watch Video Solution

Exercise 9 A Latq

1. Find the terms indicated in each case:

(i) $a_n = 4n - 3, a_{17}, a_{24}$

(ii) $a_n = (n-1)(2-n)(3+n), a_1, a_2, a_3$

Watch Video Solution

2. Find the terms (s) indicated in each case:

(i) $t_n = t_{n-1} + 3(n > 1), t_1 = 1, t_4$

(ii) $T_n = \frac{T_{n-1}}{T_{n-2}}, (n > 2), T_1 = 1, T_2 = 2, T_6$

Watch Video Solution

3. Write the first five terms of the sequence and obtain the corresponding series : $a_1 = -1, a_n = \frac{a_{n-1}}{n}, n \geq 2$

Watch Video Solution

4. Write the first six terms of each of following sequences,

(i) $a_1 = -1, a_n = \frac{a_{n-1}}{n}, (n \geq 2)$

(ii) $a_1 = 4, a_{n+1} = 2na_n$

Watch Video Solution

5. The sequence a(n)is defined by:

$a(n) = (n-1)(n-2)(n-3).$

Show that the first three of the sequence are zero, but the rest of terms are positive.

Watch Video Solution

6. a. Find the 21 st and 42 nd terms of the sequence defined by:

$$t_n = \begin{cases} 0 & \text{if n is odd} \\ 1 & \text{if n is even} \end{cases}$$

(b) Find the 18 th and 25 th terms of the sequence defined by

$$t_n = \begin{cases} n(n+2) & \text{if n is even natural number} \\ \frac{4n}{n^2+1} & \text{ifn is odd natural number} \end{cases}$$

(c) Find the 440th and 441st terms of the sequance given by:

$$t_n = \begin{cases} \frac{n}{\frac{n}{44}-1} & \text{If n is not the square ofa natural nunber} \\ 2.7 & \text{if n is the square of a natural number} \end{cases}$$

Watch Video Solution

7. If $a_0 = 1, a_1 = 3$ and $a_n^2 - a_{n-1} \cdot a_{n+1} = (-1)^n$. Find a_3.

Watch Video Solution

8. Consider the sequence defined by $t_n = an^2 + bn + c$ If $t_2 = 3, t_4 = 13$ and $t_7 = 113$, show that $3t_n = 17n^2 - 87n + 115$.

Watch Video Solution

9. The third term of an A.P. is 25 and the tenth term is -3. find the first term and the common difference.

Watch Video Solution

10. (i) The 3rd term of an A.P. is 1 and 6 th term is -11. Determine its 15th term and rth term.

(ii) In an A.P. , the third term is p and the fourth term is q, find the 10 th term and the general term.

Watch Video Solution

11. The mth term of an A.P. is $\frac{1}{n}$ and nth term is $\frac{1}{m}$. Its (mn)th term is :

Watch Video Solution

12. The fourth term of an A.P. is equal to 3 times the first term and seventh term exceeds twice the third term by 1. find the first term and the common difference.

Watch Video Solution

13. The 2 nd,31st and last terms of an A.P.are $7\frac{3}{4}, \frac{1}{2}$ and $-6\frac{1}{2}$ respectively. find the first term and the number of terms

Watch Video Solution

14. (i) The pth term of an A.P. is q the 1th term is p, show that rth term is p+q-r.

(ii) in the A.P. if mth term is n and the nth term is m, where $m \neq n$, find the pth term.

Watch Video Solution

15. If pth term of an A.P. is c and the qth term is d, what is the rth term?

View Text Solution

16. For the A.P., a_1, a_2, a_3,..... if $\frac{a_4}{a_7} = \frac{2}{3}$, find $\frac{a_6}{a_8}$

Watch Video Solution

17. If $a_1, a_2, a_3, , a_n$ are an A.P. of non-zero terms, prove that $\frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} + + \frac{1}{a_{n-1} a_n} =$

Watch Video Solution

18. If $a_1, a-(2), a_3, \ldots\ldots\ldots\ldots a_n$ are in A.P. with common differecne d, prove that

$\sin[\cos eca_1 \cos eca_2 + \cos eca_2 \cos eca_3 + \ldots\ldots\ldots\ldots + \cos eca_{n-1} \cos eca$

.

Watch Video Solution

19. A man serves Rs. 320 in the month of January Rs. 360 in the month of February, Rs. 400 in the month of March. If he continues his saving in the same way:

a. Find his saving in the month of November in the same year.

b. Find his saving in the month of July in the same year.

Watch Video Solution

20. If m times the m^{th} term of an A.P. is equal to n times its n^{th} term, show that the $(m+n)^{th}$ term of the A.P. is zero.

Watch Video Solution

Exercise 9 B Satq

1. Find d and write the next four terms of the following A.P.'s

(i) $0, -3, -6, -9,$.....

(ii) $\frac{1}{6}, \frac{1}{3}, \frac{1}{2}$.....

Watch Video Solution

2. Find the indicated term(s) in each of the followng A.P.'s

(i) $-1, \ -2, \ -3, \ -4 \ldots\ldots\ldots\ldots, t_{100}$

(ii) $n-1, n-2, n-3, \ldots\ldots\ldots\ldots, a_m$

(iii) $a=3, d=2, a_{10}, a_n$

Watch Video Solution

3. Find the 20th, 25th and nth term of the A.P. Given by

21, 16,11,6,1,-4,-9.....

Watch Video Solution

4. Is 310 a term of the A.P 3,8,13,18,.....?

Watch Video Solution

5. Which term in the A.P. 1,6,11,16,.....is 301?

Watch Video Solution

6. Determine the number of terms in the A.P. $17, 14\frac{1}{2}, 12, \ldots\ldots\ldots\ldots, -38.$

Watch Video Solution

7. Determine k so that:

(i) $k+2, 4k-6, 3k-2$

(ii) $8k+4, 6k-2, 2k-7$

(iii) $\frac{2}{3}, k, \frac{5}{8}$

are the three consecutive terms of an A.P.

Watch Video Solution

8. Show that the linear function in n i.e. $f(n) = an + b$ determines an arithmetic progression, where a,b are constants.

Watch Video Solution

Exercise 9 C Satq

1. Find the sum of indicated number of terms of each of the following A.P.'s

$(i) 5, 2, -1, -4, -7, \ldots\ldots\ldots\ldots, n\ terms$

$(ii) -1, \frac{1}{4}, \frac{3}{2}, \ldots\ldots\ldots\ldots\ldots, 81\ terms$

$(iii) 2, 4, 6, \ldots\ldots\ldots\ldots, 100\ terms$

$(iv) -0.5, -1.0, -1.5, \ldots\ldots\ldots\ldots\ldots, 10\ terms\ ; 50\ terms$

$(v) x+y, x-y, x-3y, \ldots\ldots\ldots\ldots\ldots 22\ terms$

Watch Video Solution

2. Out of l,a,n,d and S_n, determine the one that are missing from each of the following:

(i) $l = 8, n = 8, S_8 = -20$

(ii) $a = -3030, l = -1530, n = 51$

Watch Video Solution

Watch Video Solution

3. How many terms of the sequence $18,\ 16,\ 14,\ \cdot$ should be taken so that their sum is zero?

Watch Video Solution

4. Find the sum of the sequence, 72 + 70 + 68 + ... + 40

Watch Video Solution

5. (i) Find the sum of first n natural numbers.

(ii) Find the sum of first 100 natural numbers.

Watch Video Solution

6. Find the sum to n terms of the A.P., whose kth term is 5k+1.

Watch Video Solution

7. If the sum of n terms of an A.P. is $\left(pn + qn^2\right)$, where p and q are constants, find the common difference.

Watch Video Solution

Exercise 9 C Latq

1. (i) If the sum of a certain number of terms of the A.P. 25,22,19,..... is 116, find the last term.

(ii) Find the sum of 32 terms of an A.P. whose third terms is 1 and the 6th term is -11.

Watch Video Solution

2. If the first term of an A.P. is 2 and the sum of the first five terms is equal to one fourth of the sum of the next five terms, find

(i) the 20th term

(ii) the sum of first 30 terms.

Watch Video Solution

3. If 12th term of an A.P. is -13 and the sum of the first four terms is 4, what is the sum of first 10 terms ?

Watch Video Solution

4. (i) Show that the sum of n consecutive odd integers beginning with 1 equals n^2.

(ii) show that the sum of first n even numbers is equal to $\left(1+\frac{1}{n}\right)$ times the sum of first n odd numbers.

Watch Video Solution

5. (i) Find the sum of odd integers from 1to 2001.

(ii) Find the sum of all natural numbers between 99 and 1001, which are multiples of 5.

Watch Video Solution

6. How many terms are there in the A.P. whose first and fifth terms are -14 and 2 respectively and the sum of the terms is40?

Watch Video Solution

7. Prove that a sequence in an A.P., if the sum of its n terms is of the form $An^2 + Bn, where A, B$ are constants.

Watch Video Solution

8. If the 5th and 12th terms of an A.P. are 30 and 65 respectively, what is the sum of first 0 terms?

Watch Video Solution

9. If the first term a_1 of an A.P. is 22, the common difference $d = -4$ and the sum to n terms is 64, find n. Explain the double answer.

Watch Video Solution

10. If the sum of first p terms of an A.P. is equal to the sum of the first q terms, then find the sum of the first (p+q) terms.

Watch Video Solution

11. The first and last terms of an AP are a and l respectively. If S be the sum of terms then show that the common difference is $\frac{l^2 - a^2}{2S - (a + l)}$

Watch Video Solution

12. In an A.P. of which a is the first term if the sum of the first p terms is zero, then the sum of the next q terms is $\frac{a(p+q)p}{q+1}$ b. $\frac{a(p+q)p}{p+1}$ c. $\frac{a(p+q)q}{p-1}$ s d. none of these

Watch Video Solution

13. (i) The sum of n terms of two arithmetic series are in the ratio of $\frac{7n+1}{4n+27}$. Find the ratio of their 11 th terms.

(ii) The sum of n terms of arithmetic progressions are in the ratio $(3n+8):(7n+15)$. Find the ratio of their 12 th terms.

Watch Video Solution

14. A man saves Rs. 3200 during the first year, Rs. 3600 in the next year Rs. 4000 in the third year. If he continues his saving in this sequence, in how many years will he have Rs. 200000?

Watch Video Solution

15. A gentleman buys every year Bank's certificates of value exceeding the last year's purchase by Rs. 25. After 20 years he finds that the total value of the certificates purchased by him is Rs. 7250. Find the value of the certificates bought by him:

(i) in the first year

(ii) in the 13 th year.

Watch Video Solution

16. a. If in an A.P. $S_1 = 6$ and $S_7 = 105$ prove that :

$S_n, S_{n-3} : : (n+3); (n-3)$

b. In an A.P., $S_3 = 6$ and $S_6 = 3$ prove that:

$2(2n+1)S_{n+4} = (n+4)S_{2n+1}.$

Watch Video Solution

17. if the pth term of an A.P. is x and qth term is y, show tht the sum of $(p+q)$ terms is $\frac{p+q}{2}\left[x+y+\left(\frac{x-y}{p-q}\right)\right]$

Watch Video Solution

Exercise 9 D Satq

1. Insert 3 arithmetic means between:

(i) 3 and 15 (ii) 5 and 21.

Watch Video Solution

2. (i) Insert 5 arithmetic means betwene 8 and 26.

(ii) Insert 6 arithmetic means between 3 and 24

(iii) Insert 10 arithmetic means between 2 and 57.

Watch Video Solution

3. If A is the A.M between a and b prove that :

(i) $(A-a)^2+(A-b)^2=\frac{1}{2}(a-b)^2$

(ii) $4(a-A)(A-b)=(a-b)^2$

Watch Video Solution

4. If A_1 and A_2 are two A.M.'s between a and b, prove that

(i) $(2A_1-A_2)(2A_2-A_1)=ab$

(ii) $A_1+A_2=a+b$

Watch Video Solution

5. Insert 10 AM.'s between 5 and -17 and prove that their sum is ten times the A.M. between them.

Watch Video Solution

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

$a^3 + 4b^3 + c^3 = 3b(a^2 + c^2)$

Watch Video Solution

7. Find n so that:

(i) $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ (ii) $\frac{a^n + b^n}{a^{n-1} + b^{n-10}}$ may be A.M. between a and b.

Watch Video Solution

Exercise 9 E Latq

1. Find three numbers in A.P.

(i) Whose sum is 21 and product is 315.

(ii) whose sum is 24 and product is 440.

Watch Video Solution

2. The sum of the first three terms of an A.P. is 36 while their product is 1620. Find the A.P.

Watch Video Solution

3. The sum of three consecutive terms of an A.P. is 15 and sum of their squares is 83. Find the terms.

Watch Video Solution

4. The sum of three consecutive terms of an A.P. is 9 and the sum of their squares is 35. Find the terms.

Watch Video Solution

5. Split 69 in three parts such that they are in A.P. and product of two smaller parts is 483.

Watch Video Solution

Watch Video Solution

6. Solve the equation (i) $1 + 6 + 11 + 16 + \ldots\ldots\ldots\ldots\ldots + x = 148$

(ii) $2 + 5 + 8 + 11 + \ldots\ldots\ldots + x = 345$

Watch Video Solution

7. The sum of four numbers in A.P. is 4 and their product is 385. Find the numbers.

Watch Video Solution

8. Find the four numbers in A.P. whose sum is 20 and the sum of whose squares is 120.

Watch Video Solution

Exercise 9 F Satq

1. We are given an A.P. with Ist terma and common difference d.

(i) If each of its terms is increased by the same quantity k, is the resulting progression also an A.P.? If so find its common difference.

(ii) If each of the terms is multiplied by the same number c. is the resulting progresssion also an A.P. ? If so, find its common difference.

Watch Video Solution

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

(i) $b+c, c+a, a+b$ are also in A.P.

(ii) $\frac{1}{\sqrt{b}+\sqrt{c}}, \frac{1}{\sqrt{c}+\sqrt{a}}, \frac{1}{\sqrt{a}+\sqrt{b}}$ are also in A.P.

Watch Video Solution

3. If $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P. prove that:

(i) $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are also in A.P.

(ii) $a(b+c), b(c+a), c(a+b)$ are also in A.P.

Watch Video Solution

4. If $\frac{b+c}{a}, \frac{c+a}{b}, \frac{a+b}{c}$ are in $A.P.$ show that $\frac{1}{a}, \frac{1}{b}\frac{1}{c}$ are also in $A.P.(a+b+c \neq 0)$.

Watch Video Solution

5. If a^2, b^2, c^2 are in A.P, show that: $\frac{a}{b+c}, \frac{b}{c+a}, \frac{c}{a+b}$ are in A.P.

Watch Video Solution

6. if $\left(a^2+2bc\right), \left(b^2+2ac\right), \left(c^2+2ab\right)$ are in AP, show that

`1 / ((b-c)) ,1/((c -a)) , 1/ ((a-b)) are in AP.

Watch Video Solution

Exercise 9 G Satq

1. Find r and write the next four terms of each of the following progresssion:

(i) $5, 0.5, 0.05 \ldots \ldots \ldots \ldots$ (ii) $-\frac{2}{3}, -6, -54 \ldots \ldots \ldots \ldots$

Watch Video Solution

2. Which term of the geometric sequences,

(i) $2, 8, 32, \ldots \ldots . is 131072?$

(ii) $\sqrt{3}, 3, 3\sqrt{3}, \ldots \ldots \ldots . is 729?$

(iii) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27} \ldots \ldots \ldots \ldots \ldots \ldots \ldots . is \frac{1}{19683}?$

Watch Video Solution

3. For what values of x, the numbers $-\frac{2}{7}, x, -\frac{7}{2}$ are in G.P

Watch Video Solution

4. (i) In a G.P. the third term is 24 and the 6th term is 192. Find the 10th term.

(ii) find the 12th term of a G.P., whose 8th term is 192 and the common ratio is 2.

Watch Video Solution

5. The first term of a G. P. is 1. The sum of the third and fifth terms is 90. Find the common ratio of G.P.

Watch Video Solution

Exercise 9 G Latq

1. The fourth term of a G.P. is square of its 2nd term and the first term is -3. Determine the

(i) 7th term

(ii) 6th term

Watch Video Solution

2. (i) The 4th, 7th and 10t terms of a G.P. are a,b,c respectively. Show that $b^2 = ac.$

(ii) If the 4th, 10th and 16th terms of a G.P are x,y,z respectively, prove that x,y,z are in G.P.

Watch Video Solution

3. If $a, b, andc$ are respectively, the pth, qth , and rth terms of a G.P., show that $(q-r)\log a + (r-p)\log b + (p-q)\log c = 0.$

Watch Video Solution

4. If pth term of a G.P. is P and its qt term is Q, prove that the nth term is $\left(\frac{P^{n-q}}{Q^{n-p}}\right)^{\frac{1}{p-q}}$

Watch Video Solution

5. The terms of a G.P. with first term a and common ratio r are squared. Is the resulting sequence also a G.P.? If its is so, find the its first term, common ratio and the nth term.

Watch Video Solution

6. If x,y,z are three positive numbers forming a geometric sequence, then show that $\log_a x, \log_a y, \log_a z$ form an arithmetic sequence ;a being positive and not equal to 1.

Watch Video Solution

7. The $(m+n)thand(m-n)th$ terms fa G.P. ae $pandq$ respectively. Show that the mth and nth terms are $\sqrt{pq}andp\left(\frac{q}{p}\right)^{m/2n}$ respectively.

Watch Video Solution

8. If a, b, c are in A.P. and x, y, z are in G.P., then prove that :

$x^{b-c}.\ y^{c-a}.\ z^{a-b} = 1$

Watch Video Solution

Exercise 9 H Satq

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

Watch Video Solution

2. Find the sum of the indicated number of terms of each of the following geometric progressions:

a. (i) $\sqrt{7}, \sqrt{21}, 3\sqrt{7}$,.....n terms.

(ii) $2, -\frac{1}{2}, \frac{1}{8}$, ...n terms 12 terms

(iii)$1, \frac{1}{3}, \frac{1}{9}$, ...,n terms 5 terms

b. (i) x^3, x^5, x^7.....,n terms $(x \neq \pm 1)$

(ii) $1, -a, a^2, -a^3$....., n terms $(a \neq -1)$

(iii) $x^2 - y^2, x - y, \frac{x-y}{x+y}$ ..... , n terms $(x + y \neq 1)$.

Watch Video Solution

3. (i) How many terms of the G.P. $3, 3^2, 3^3$..... Are needed to give the sum 120?

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

Watch Video Solution

4. Determine the number n of terms of the GP 3,6,12,..... So that $S_n = 381$

Watch Video Solution

5. (i) Given a G.P. with a=729 and 7th term 64 find S_7.

(ii) If $\{a_n\}$ is a G.P. and $a_1 = 4, r = 5$, find a_6 and S_6.

Watch Video Solution

Exercise 9 H Latq

1. Find a G.P. for which sum of the first two terms is -4 and the fifth term is 4 times the third term.

Watch Video Solution

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

Watch Video Solution

3. Sum of n terms:

(i) $5 + 55 + 555 +$ .....

(ii) $9 + 99 + 999 +$ .....

(iii) $3 + 33 + 333 +$ .....

(v) $8 + 88 + 888 +$ .....

Watch Video Solution

4. Sum of n terms:

$(i) 0.7 + 0.77 + 0.777 +$ .....

(ii) $0.6 + 0.66 + 0.666 +$ .....

(iii) $0.3 + 0.33 + 0.333 +$ .....

(iv) $0.5 + 0.55 + 0.555 +$ .....

Watch Video Solution

5. If $\frac{1}{1+l} = v$, prove that

$v + v^2 + v^3 + \ldots\ldots\ldots + v^n = \frac{1 - v^n}{l}$

Watch Video Solution

6. Find the sum to n terms of the sequence $1, 2, 4, 7, 11, 16, \ldots\ldots$

Watch Video Solution

7. If the sum of first 10 terms is 33 times the sum of first 5 terms of G.P. find the common ratio.

Watch Video Solution

8. 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 $\frac{1}{r^n}$.

Watch Video Solution

9. Find the sum of the products of the corresponding terms of the sequences $2, 4, 8, 16, 32$ and $128, 32, 8, 2, \frac{1}{2}$.

Watch Video Solution

10. If S_1, $S_2 and S_3$ be respectively the sum of n, 2n and 3n terms of a G.P., prove that $S_1(S_3 - S_2) = S_1(S_2 - S_1)^2$

Watch Video Solution

11. The inventor of the chess board suggested a reward of one grain of when for the first square, 2 grains for the second, 4 grains for the third and so on, doubling the number of the grains for subsequent squares. How many grains would have to be given to inventory? (There are 64 square sin the chess board).

Watch Video Solution

12. Dipesh writes letters to four of his friends. He asks each of them to copy the letter and mail to four different persons with the request that they continue the chain similarly. Assuming that the chain is not broken

and that it costs 25 paise to mail one letter, find the total money spent on postage till the 8th set of letters is mailed.

Watch Video Solution

13. The price of a machine is depreciated at the rate of 10% yearly and the ultimate scrap value was Rs. 6561. Find the effective life of the macine. The price of the machine is Rs. 10,000.

Watch Video Solution

Exercise 9 I Latq

1. Insert two number between 3 and 81 so that the resulting sequence is G.P.

Watch Video Solution

2. Insert four geometric means between 6 and 192.

Watch Video Solution

3. The A.M. between two numbers is 20 and their G.M. is 16. find the numbers.

Watch Video Solution

4. If a, b, c are in G.P., x and y are the A.M.'s of a, b and b, c respectively, then prove that:

$(i)\frac{a}{x}+\frac{c}{y}=2 \qquad (ii)\frac{1}{x}+\frac{1}{y}=\frac{2}{b}$

Watch Video Solution

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

Watch Video Solution

6. If G_1 is the first of n G.M. s between positive numbers a and b , then show that $G_1^{n+1} = a^n b$.

Watch Video Solution

7. If G is the geometric mean between two distinct positive numbers a and b, then show that $\frac{1}{G-a} + \frac{1}{G-b} = \frac{1}{G}$

Watch Video Solution

8. If A.M. and GM. of roots of a quadratic equation are 8 and 5, respectively, then obtain the quadratic equation.

Watch Video Solution

9. If a is the A.M. of $bandc$ and the two geometric means are $G_1 and G_2$, then prove that $G13 + G23 = 2ab$.

Watch Video Solution

10. If $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the GM between a and b, then the value of n is

Watch Video Solution

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

Watch Video Solution

12. Prove that the A.M. of two positive real numbers is greater than their G.M.

Watch Video Solution

Exercise 9 J Latq

1. The sum of three numbers in A.P. is 15. If 1, 4 and 19 are added to the numbers the resulting numbers are in G.P. Find the numbers.

Watch Video Solution

2. 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.

Watch Video Solution

3. There are four numbers such that the first three of them form an arithmetic sequence and the last three form a geometric sequence. The sum of the first and third terms is 2 that of second and fourth is 26. What are these numbers?

Watch Video Solution

4. The sum of first three terms of a G.P is 7 and the sum of their squares is 21. Determine the first five terms of the G.P.

View Text Solution

5. Find three numbers in G.P. :

(i) Whose sum is 30 and whose product is 216

(ii) Whose sumis 38 and whose product is 1728.

View Text Solution

6. Find three numhers in G.P. whose sum is 35 and sum of their squares is 525.

Watch Video Solution

7. If a,b,c are in G.P. , prove that the following are also in G.P,

(i) a^2, b^2, c^2

(ii)a^3, b^3, c^3

(iii) $a^2 + b^2, ab + bc, b^2 + c^2$

Watch Video Solution

8. If a, b, c, d are in G.P., prove that $a + b +$, $b + c, c + d$ are also in G.P.

Watch Video Solution

9. If a,b, and c are three consecutive terms of an A.P, prove that k^a, k^b and $k^c$are three consecutive terms of a G.P. Assume k to be a non zero real number.

Watch Video Solution

10. If $\frac{1}{a+b}, \frac{1}{2b}, \frac{1}{b+c}$ are three consecutive terms of an A.P., prove that a, b, c are the three consecutive terms of a G.P.

Watch Video Solution

11. If the sum of four numbers in $G.P.$ is 60 and the $A.M.$ of he first and the last is 18 then the four terms of the $G.P.$ are

Watch Video Solution

Exercise 9 L Latq

1. Find the sum to n terms of the following (1-2) series:

(i) $1+\frac{3}{2}+\frac{5}{2^2}+\frac{7}{2^3}+\ldots\ldots\ldots\ldots$

(ii) $1+\frac{2}{3}+\frac{3}{3^2}+\frac{4}{3^3}+\ldots\ldots\ldots\ldots$

Watch Video Solution

2. (i) $1 + 2x + 3x^2 + 4x^3 I + \ldots\ldots\ldots$ When $|x| < 1$

(ii) $1 + 3x + 5x^2 + 7x^3 + \ldots\ldots\ldots$ When $|x| < 1$ (iii)

$1 + 4x + 7x^2 + 10x^3 + \ldots\ldots\ldots\ldots$when$|x| < 1$.

Watch Video Solution

3. Find the sum to infinity of the following series:

(i) $2 + \frac{3}{2} + 1 + \frac{5}{8} + \ldots\ldots\ldots$

(ii) $1 + \frac{2}{3} + \frac{3}{3^2} + \frac{4}{3^3} + \ldots\ldots\ldots$

(iii) $1 - \frac{3}{2} + \frac{5}{4} - \frac{7}{8} + \ldots\ldots\ldots$

(iv) $1 - \frac{2}{3} + \frac{3}{3^2} - \frac{4}{3^3} + \frac{5}{3^4} - \ldots\ldots\ldots$

Watch Video Solution

4. If the sum to the infinity of the series $3 + 5r + 7r^2 + \ldots.$ is $\frac{44}{9}$ then find the value of r

Watch Video Solution

5. Sum to ∞ terms of the series,:

$2 + 5x + 8x^2 + 11x^3 + \ldots\ldots\ldots\ldots\ldots, |x| < 1.$

Watch Video Solution

6. Prove that: $2^{\frac{1}{4}}.4^{\frac{1}{8}}, 8^{\frac{1}{16}}.16^{\frac{1}{32}}\ldots\ldots\ldots\infty = 2.$

Watch Video Solution

Exercise 9 M Latq

1. Find the sum of the following series:

$2.3 + 3.4 +$ .....to$n$ terms

Watch Video Solution

2. Find the sum of n terms of the series $1.3.5. \ + 3.5. .7 + 5.7.9 + \ldots$

Watch Video Solution

3. Find the sum to n terms: $5.6 + 6.7 + 7.8 + \ldots\ldots\ldots\ldots\ldots\ldots$

Watch Video Solution

4. $2^2 + 5^2 + 8^2 + \ldots\ldots\ldots\ldots\ldots\ldots$ to 15 terms.

View Text Solution

5. Find the sum to n terms of the series :$5^2 + 6^2 + 7^2 + \vdots + 20^2$

Watch Video Solution

6. (i)$1 + (1 + 2) + (1 + 2 + 3) + \ldots\ldots\ldots$ to n terms.

(ii)$1^2 + \left(1^2 + 2^2\right) + \left(1^2 + 2^2 + 3^2\right) +$ .....to n terms.

Watch Video Solution

7. Find the sum of n-terms:

$$\left[\left(\frac{1}{1}\right)+\frac{1^3+2^3}{2}+\frac{1^3+2^3+3^3}{3}+\ldots.\ \rightarrow n-terms\right.$$

Watch Video Solution

8. Find the sum of the first n terms of the series whose nth term is

(i)$n(n+3)$(ii)$3n^2+5$

(iii)n^2+2^n

Watch Video Solution

9. Find the sum S_n of cubes of first n terms o fan A.P.and show that the sum of first n terms of A.P.is a factor of S_n.

Watch Video Solution

10. 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.

Watch Video Solution

Additional Questions

1. find the sum $3 + 5 + 7 +$ ..... upto n terms is

A. n^2

B. $n(n-2)$

C. $n(n+2)$

D. $(n+1)^2$

Answer: C

Watch Video Solution

2. The arithmetic mean of two numbers x and y is 3 and geometric mean is 1. Then $x^2 + y^2$ is equal to

A. 30

B. 31

C. 32

D. 34

Answer: D

Watch Video Solution

3. $11^3 + 12^3 + 13^3 + \ldots\ldots\ldots\ldots\ldots + 20^3$ is

A. an even integer

B. an odd integer divisible by 5

C. multiple of 10

D. odd integer but not a multiple of 5.

Answer: B

Watch Video Solution

Fill In The Blanks

1. The arithmetic mean between 4and 14 is.....

Watch Video Solution

2. The nth term of a G.P. $3, 3^2, 3^3,$ is.....

Watch Video Solution

3. G.M. Between a and b is equal to.....

Watch Video Solution

4. 19th term of the sequence $a(n) = \frac{n-2}{n+3}$ is.....

Watch Video Solution

5. nth term of the sequence:

$5, 2, -1, -4, -7,$ is.....

Watch Video Solution

6. General term of A.P. given $x+b, x+3b, x+5b,$ Is.....

Watch Video Solution

7. Sum of 100 terms of A.P.:

2,4,6,Is .....

Watch Video Solution

8. t_6 of the following G.P.:

$12, 8, \frac{16}{3}$, is .....

Watch Video Solution

9. Insert four geometric means between 6 and 192.

Watch Video Solution

10. S_∞ of the following infinite G.P. $1, \frac{1}{2}, \frac{1}{2^2}$ To ∞ is .....

Watch Video Solution

True False

1. If p,q,r are in G.P then $\frac{p}{q} = \frac{q}{r}$ (True/False)

View Text Solution

2. In a G.P. $S_n = \frac{b(1-r^n)}{1-r}, r < 1$ (True/False)

View Text Solution

3. Next term of the sequence:

$\frac{1}{6}, \frac{1}{3}, \frac{2}{3}$,..... Is $\frac{4}{3}$ (True/False)

View Text Solution

4. If the first term of a G.P. is 729 and the 7 the term is 64, then $S_\infty = 2180$. True or False.

Watch Video Solution

Very Short Answer Type Questions

1. Define an arithmetic progression.

Watch Video Solution

2. Define Geometrical progression.

Watch Video Solution

3. Write the (i) 3rd (ii) 5 th (iii) 6th term of the sequence whose nth term is $a_n = 2n + 5$.

Watch Video Solution

4. Write the first three terms of the sequence defined by

(i) $a_n = n(n + 2)$ (ii) $a_n = \frac{n}{n + 1}$

Watch Video Solution

Watch Video Solution

5. Find the term indicated in each case:

(i) $t_n = 4^n + n^2 - n - 1, t_3$

(ii) $h(n) = n^2 - 3n + 4, h(10)$

Watch Video Solution

6. Write the next term of the sequence: $\frac{1}{6}, \frac{1}{3}, \frac{1}{2}$.....

Watch Video Solution

7. Which term in the A.P. $68, 64, 60$ is -8?

Watch Video Solution

8. Find the A.M. between:

(i) 3.7 and 5.5 (ii) 6 and -8

Watch Video Solution

9. (i) Find the 10 th term of the G.P.

5,25,125.....

(ii) Find the nth term of the G.P. 5,25,125,.....

Watch Video Solution

10. Which term of the following sequences:(a) $2, 2\sqrt{2}, 4, \ldots$ is 128? (b) $\sqrt{3}, 3, 3\sqrt{3}, \ldots$ is 729?(c) $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \ldots$ is $\frac{1}{19683}$?

Watch Video Solution

11. Find the indicated term of the following G.P.:

$12, 8, \frac{16}{3}, \ldots\ldots\ldots\ldots\ldots t_{10}$

Watch Video Solution

12. In a GP the 3rd term is 24 and the 6th term is 192. Find the 10th term.

Watch Video Solution

13. Evaluate $\sum_{n=1}^{13}\left(i^n+i^{n+1}\right)$, where $n \in N$.

Watch Video Solution

14. Given a G.P. with $a=1, r=\sqrt{2}$. Find S_{20} ??

View Text Solution

15. Find the sum of the infinite geometric series $\left(1+\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\ldots\infty\right)$.

Watch Video Solution

16. Find the sum of series in GP $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}$ ..... up to ∞

Watch Video Solution

17. 0.3,0.18,0.108,.....to ∞

Watch Video Solution

18. Find the sum of the following series: $\left(\sqrt{2}-1\right)+1+\left(\sqrt{2}-1\right)+\infty$

Watch Video Solution

19. Find the sum of the following series to infinity:

$2/5+3/5^2+2/5^3+3/5^4+\infty$

Watch Video Solution

20. Find a rational number for the following which will have as its expantion :

(i) $0.6\bar{8}$ (ii) $0.23\bar{4}$

Watch Video Solution

21. Find the sum to inifinity of the following series:

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

Find the sum of the following (22-24) series:

Watch Video Solution

22. Find the sum of the series:

$\left(2^2+4^2+6^2+8^2+\ldots \text{to n terms}\right)$

Watch Video Solution

23. Sum of n terms of the following series$1^3 + 3^3 + 5^3 + 7^3 +$

Watch Video Solution

24. $1.3 + 3.5 + 5.7 + \ldots\ldots$. n terms =

Watch Video Solution

25. Find the sum of first n terms of the series whose nth term is $3n^2 + 5$.

Watch Video Solution

Ncert File Questions From Ncert Book Exercise 9 1

1. Write the first five terms of the sequence whose n^{th} terms are : $a_n = n(n+1)$

Watch Video Solution

2. Write the first five terms of the sequence whose n^{th}terms are : $a_n = \frac{n}{n+1}$

Watch Video Solution

3. Write the first five terms of the following sequence whose nth terms is:

$a_n = 2^n$

Watch Video Solution

4. Write the first five terms of each of the following sequences whose n th terms are: $a_n = 3n + 2$ (ii) $a_n = \frac{n-2}{3}$ $a_n = 3^n$ (iv) $a_n = \frac{3n-2}{5}$ $a_n = (-1)^n.2^n$ (vi) $a_n = \frac{n(n-2)}{2}$ $a_n = n^2 - n + 1$ (vii) $a_n = 2n^2 - 3n + 1$ $a_n = \frac{2n-3}{6}$

Watch Video Solution

5. Write the first five terms of the sequence whose n^{th}terms are : $a_n = (-1)^{n-1}5^{n+1}$

Watch Video Solution

6. Write the first five terms of the sequence whose n^{th}terms are : $a_n = n\frac{n^2+5}{4}$

Watch Video Solution

7. Find the indicated terms in each of the following sequences whose nth nth terms are:$4n-3, t_{17}, t_{24}$

Watch Video Solution

8. Find the indicated terms in each of the following sequences whose nth nth terms are:$t_n = \frac{n^2}{2^n}, t_4, t_6$

Watch Video Solution

Watch Video Solution

9. Find the indicated terms in each of the following sequences whose nth nth terms are:$t_n = (-1)^{n-1}.\, n^3,\, t_9$

Watch Video Solution

10. Find the indicated terms in each of the following sequences whose nth nth terms are:$t_n = \dfrac{n(n-2)}{n+3},\, t_{20}$

Watch Video Solution

11. Write the first five terms of the sequence and obtain the corresponding series : $a_1 = 3,\, a_n = 3a_{n-1} + 2$for all $n > 1$

Watch Video Solution

12. Write the first five terms of the sequence and obtain the corresponding series : $a_1 = -1, a_n = \frac{a_{n-1}}{n}, n \geq 2$

Watch Video Solution

13. Write the first five terms of the following sequence amd obtain the corresponding series.

$a_1 = a_2 = 2, a_n = a_{n-1} - 1, n > 2$

Watch Video Solution

14. The Fibonacci sequence is defined by

$1 = a_1 = a_2$ and $a_n = a_{n-1} + a_{n-2}, n > 2.$

Find $\frac{a_{n+1}}{a_n}$, for n $= 1, 2, 3, 4, 5.$

Watch Video Solution

Ncert File Questions From Ncert Book Exercise 9 2

1. Find the sum of odd integers from 1 to 2001.

Watch Video Solution

2. Find the sum of all natural numbers lying between 100 and 1000, which are multiples of 5.

Watch Video Solution

3. In an A.P., the first term is 2 and the sum of the first five terms is one-fourth of the next five terms. Show that 20th term is -112.

Watch Video Solution

4. How many terms of the A.P. $-6, \ -\frac{11}{2}, \ -5 \ldots$ are needed to give the sum -25?

Watch Video Solution

Watch Video Solution

5. In an A.P., if p^{th} term is $\frac{1}{q}$ and q^{th} term is $\frac{1}{p}$, prove that the sum of first pq terms is $\frac{1}{2}(pq+1)$, where $p \neq q$.

Watch Video Solution

6. If the sum of a certain number of terms of the A.P. 25, 22, 19.... is 116. Find the last term.

Watch Video Solution

7. Find the sum to n terms of the A.P., whose kth term is 5k+1.

Watch Video Solution

8. If the sum of n terms of an A.P. is $\left(pn+qn^2\right)$, where p and q are constants, find the common difference.

Watch Video Solution

9. The sum of n terms of two arithmetic progressions are in the ratio $5n+4 : 9n+6$. Find the ratio of their $18th$ terms.

Watch Video Solution

10. If the sum of first p terms of an A.P. is equal to the sum of the first q terms, then find the sum of the first (p+q) terms.

Watch Video Solution

11. Sum of the first p, q and r terms of an A.P are a, b and c, respectively.Prove that $\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0$

Watch Video Solution

12. The ratio of the sums of m terms and n terms of an A.P. is $m^2 : n^2$. Prove that the ratio of their mth and nth term will be (2m - 1) : (2n-1).

Watch Video Solution

13. If the sum of n terms of an A.P. is $3n^2 + 5n$ and its mth term is 164, find the value of m.

Watch Video Solution

14. Insert five numbers between 8 and 26 such that the resulting sequence is an A.P.

Watch Video Solution

15. If $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the A.M. between" a and b, then find the value of n.

Watch Video Solution

16. Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A.P. and the ratio of 7th and (m-1)th numbers is 5 : 9. Find the value of m.

Watch Video Solution

17. A man starts repaying a loan as first instalment of Rs. 100. If he increases the instalments by Rs. 5 every month, what amount he will pay in the 30th instalment?

Watch Video Solution

18. The difference between any two consecutive interior angles of a polygon is $5o$. If the smallest angle is $120o$, find the number of the sides of the polygon.

Watch Video Solution

Ncert File Questions From Ncert Book Exercise 9 3

1. Fidnteh 20th and nth term of the G.P. $\frac{5}{2}, \frac{5}{4}, \frac{5}{8}, \ldots\ldots$

Watch Video Solution

2. Find the 12th term of a G.P. whose 8th term is 192 and the common ratio is 2.

Watch Video Solution

3. The 5th, 8th and 11th terms of a G.P. are p, q and s, respectively. Show that $q^2 = ps$.

Watch Video Solution

4. 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 $\frac{1}{r^n}$. 9873740001

Watch Video Solution

5. If a, b, c and d are in G.P. show that $\left(a^2+b^2+c^2\right)\left(b^2+c^2+d^2\right)=(ab+bc+cd)^2$.

Watch Video Solution

6. Insert two number between 3 and 81 so that the resulting sequence is G.P.

Watch Video Solution

7. 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.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

10. The number of bacteria in a certain culture doubles every hour. If there were 30 bacteria present in the culture originally, how many bacteria will be present at the end of 2nd hour, 4th hour and nth hour?

Watch Video Solution

11. What will Rs. 500 amounts to in 10 years after its deposit in a bank which pays annual interest are 10% compounded annually?

Watch Video Solution

12. If A.M. and GM. of roots of a quadratic equation are 8 and 5, respectively, then obtain the quadratic equation.

Watch Video Solution

Ncert File Questions From Ncert Book Exercise 9 4

1. Find the sum to n terms of the series : $1 \times 2 + 2 \times 3 + 3 \times 4 + 4 \times 5 + \ldots\ldots$

Watch Video Solution

2. Find the sum to n terms of the series : $1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \vdots$

Watch Video Solution

3. Find the sum to n terms of the series :$3 \times a^2 + 5 \times 2^2 + 7 \times 3^2 + \vdots$

Watch Video Solution

4. Find the sum to n terms of the series $1/(1 \times 2) + 1/(2 \times 3) + 1/(3 \times 4) + \ + 1/n(n+1)$.

Watch Video Solution

5. Find the sum to n terms of the series :$5^2 + 6^2 + 7^2 + \ \vdots + 20^2$

Watch Video Solution

6. Find the sum to n terms of the series :$3 \times 8 + 6 \times 11 + 9 \times 14 + \vdots$

Watch Video Solution

7. Find the sum to n terms of the series : $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \vdots$

Watch Video Solution

8. Find the sum to n terms of the series, whose n^{th}terms is given by : $n(n+1)(n+4)$

Watch Video Solution

9. Find the sum to n terms of the series, whose n^{th}terms is given by : $n^2 + 2^n$

Watch Video Solution

10. Find the sum to n terms of the series, whose n^{th}terms is given by : $(2n-1)^2$

Watch Video Solution

Miscellaneous Exercise On Chapter 9

1. 32. Show that the sum of $(m+n)^{th}$ and $(m-n)^{th}$ terms of an A.P. is equal to twice the m^{th} term

Watch Video Solution

Miscellaneous Exercise On Chapter 10

1. If the sum of three numbers in A.P. is 24 and their product is 440, find the numbers.

Watch Video Solution

Miscellaneous Exercise On Chapter 11

1. Let the sum of n, 2n, 3n terms of an A.P. be S_1, $S_2$and S_3, respectively, show that $S_3 = 3(S_2 - S_1)$.

Watch Video Solution

Miscellaneous Exercise On Chapter 12

1. Find the sum of all numbers between 200 and 400 which are divisible by 7.

Watch Video Solution

Miscellaneous Exercise On Chapter 13

1. Find the sum of integers from 1 to 100 that are divisible by 2 or 5.

Watch Video Solution

Miscellaneous Exercise On Chapter 14

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

Watch Video Solution

Miscellaneous Exercise On Chapter 15

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

Watch Video Solution

Miscellaneous Exercise On Chapter 16

1. 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.

Watch Video Solution

Miscellaneous Exercise On Chapter 17

1. The first term of a G.P. is 1. The sum of the third term and fifth term is 90. Find the common ratio of G.P.

Watch Video Solution

Miscellaneous Exercise On Chapter 18

1. The sum of three numbers in GP. Is 56. If we subtract 1, 7, 21 from these numbers in that order, we obtain an arithmetic progression. Find the numbers.

Watch Video Solution

Miscellaneous Exercise On Chapter 19

1. 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.

Watch Video Solution

Miscellaneous Exercise On Chapter 20

1. 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.

Watch Video Solution

Miscellaneous Exercise On Chapter 21

1. If $\frac{a+bx}{a-bx}=\frac{b+cx}{b-cx}=\frac{c+dx}{c-dx}(x\neq 0)$, then show that a, b, c and d are in G.P.

Watch Video Solution

Miscellaneous Exercise On Chapter 22

1. Let S e the sum, P the product, adn R the sum of reciprocals of n terms in a G.P. Prove that $P^2R^n=S^n$.

Watch Video Solution

Miscellaneous Exercise On Chapter 23

1. The p^{th}, $q^{th}$and r^{th}terms of an A.P. are a, b, c, respectively. Show that $(q-r)a+(r-p)b+(p-q)c=0$.

Watch Video Solution

Miscellaneous Exercise On Chapter 24

1. If $a\left(\frac{1}{b}+\frac{1}{c}\right), b\left(\frac{1}{c}+\frac{1}{a}\right), c\left(\frac{1}{a}+\frac{1}{b}\right)$ are in A.P. prove that a, b, c are in A.P.

Watch Video Solution

Miscellaneous Exercise On Chapter 25

1. If a, b, c are in G.P. prove that $(a^n + b^n), (b^n + c^n), (c^n + d^n)$ are in G.P.

Watch Video Solution

Miscellaneous Exercise On Chapter 26

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

Watch Video Solution

Miscellaneous Exercise On Chapter 27

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

Watch Video Solution

Miscellaneous Exercise On Chapter 28

1. 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.

Watch Video Solution

Miscellaneous Exercise On Chapter 29

1. Find the sum of the following series up to n terms: (i) $5 + 55 + 555 + \cdots$ (ii) $.6 + .66 + .666 + \cdots$

Watch Video Solution

Miscellaneous Exercise On Chapter 30

1. Find the 20^{th} term of the series $2 \times 4 + 4 \times 6 + 6 \times 8 + \vdots + n$ terms.

Watch Video Solution

Miscellaneous Exercise On Chapter 31

1. Find the sum of the first n terms of the series : $3 + 7 + 13 + 21 + 31 + \vdots$

Watch Video Solution

Miscellaneous Exercise On Chapter 32

1. If S_1, S_2, S_3 are the sum of first n natural numbers, their squares and their cubes, respectively, show that $9S_2^2 = S_3(1 + 8S_1)$.

Watch Video Solution

Miscellaneous Exercise On Chapter 33

1. Find the sum of the following series up to n terms :

$$\frac{1^3}{1} + \frac{1^3 + 2^2}{1 + 3} + \frac{1^3 + 2^3 + 3^3}{1 + 3 + 5} + \vdots$$

Watch Video Solution

Miscellaneous Exercise On Chapter 34

1. Show that $\frac{1 \times 2^2 + 2 \times 3^2 + \vdots + n \times (n+1)^2}{1^2 \times 2 + 2^2 \times 3 + \vdots + n^2 \times (n+1)} = \frac{3n + 5}{3n + 1}$.

Watch Video Solution

Miscellaneous Exercise On Chapter 35

1. A fanner buys a used tractor for Rs 12000. He pays Rs 6000 cash and agrees to pay the balance in annual instalments of Rs 500 plus 12% interest on the unpaid amount. How much will the tractor cost him?

Watch Video Solution

Miscellaneous Exercise On Chapter 36

1. Shamshad Ali buys a scooter for Rs. 2200. He pays Rs. 4000 cash and agrees to pay the balance in annual instalments of Rs. 1000 plus 10% interest on the unpaid amount. How much the scooter will cost him?

Watch Video Solution

Miscellaneous Exercise On Chapter 37

1. A person writes a letter to four of his friends. He asks each one of them to copy the letter and mail to four different persons with instruction that they move the chain similarly. Assuming that the chain is not broken and that it costs 0 paise to mail one letter. Find the amount spend on the postage when 8th set of letter is mailed.

Watch Video Solution

Miscellaneous Exercise On Chapter 38

1. A man deposited Rs 10000 in a bank at the rate of 5% simple interest annually. Find the amount in 15^{th} year since he deposited the amount and also calculate the total amount after 20 years.

Watch Video Solution

Miscellaneous Exercise On Chapter 39

1. A manufacture reckons that the value of a machine which costs him Rs. 156250, will depreciate each year by 20%. Find the estimated value at the end of 5 years.

Watch Video Solution

Miscellaneous Exercise On Chapter 40

1. 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day, 4 more workers dropped out on the third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was complete.

Watch Video Solution

Questions From Ncert Examplar

1. If there are $(2n+1)$ terms in A.P., then prove that the ratio of the sum of odd terms and the sum of even terms is $(n+1):n$.

Watch Video Solution

2. The product of three numbers in A.P. is 224, and the largest number is 7 times the smallest. Find the numbers.

Watch Video Solution

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

Watch Video Solution

4. If a,b, c, d are in G.P., prove that $\left(a^2-b^2\right), \left(b^2-c^2\right), \left(c^2-d^2\right)$ are in G.P. and $\frac{1}{a^2+b^2}, \frac{1}{b^2+c^2}, \frac{1}{c^2+d^2}$ are in G.P

Watch Video Solution

5. Find the natural number a for which $\sum_{k=1}^{n} f(a+k) = 16(2^n - 1)$, where the function f satisfies the relation $f(x+y) = f(x)f(y)$ for all natural number $x, yand, further, f(1) = 2$.

Watch Video Solution

Exercise

1. IF the sum of p terms of an AP is q and the sum of q terms is p, then show that the sum of p+q terms is - (p+q) ,Also find the sum of first p-q terms (where , pgtq).

Watch Video Solution

2. Find te rth term of an AP sum of whose first n terms is $2n + 3n^2$.

Watch Video Solution

3. If $\theta_1, \theta_2, \theta_3, , \theta_n$ are in AP, whose common difference is d , show that $\sec\theta_1 sec\theta_2 + sec\theta_2 \sec\theta_3 + \ + \sec\theta_{n-1}\sec\theta_n = \frac{tan\theta_n - tan\theta_1 /}{\sin d}$

Watch Video Solution

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

Watch Video Solution

5. If G_1 and G_2 are two geometric means and A is the arithmetic mean inserted two numbers, then the value of $\frac{G_1^2}{G_2} + \frac{G_2^2}{G_1}$ is:

Watch Video Solution

6. Find the sum of series $\left(3^3 = 2^3\right) + \left(5^3 = 4^3\right) + \left(7^3 = 6^3\right) +$ to n terms

Watch Video Solution

7. A man saved Rs. 66000 in 20 years. In each succeeding year after the first year he saved Rs. 200 more than what he saved in the previous year. How much did he save in the first year?

Watch Video Solution

Revesion Exercise

1. निम्नलिखित अनुक्रमों में पहले पाँच पद ज्ञात कीजिए |

$$\begin{cases} a_1 = 1 \\ a_n = a_{n-1} + 2, n \geq 2 \end{cases}$$

Watch Video Solution

2. Which term of the progression $19, 18\frac{1}{5}, 17\frac{2}{5}$ ..... Is the first negative term?

Watch Video Solution

3. Each term of an A.P. is doubled,. Is the resulting sequence also an A.P.? If it is write its first term, common difference and nth term.

Watch Video Solution

4. If the mth term of an A.P. be $1/n$ and nth term be $1/m$ then show that its (mn) term is 1.

Watch Video Solution

5. If a, b, c are in AP, then prove that $(a-c)^2 = 4(b^2 - ac)$

Watch Video Solution

6. Show that the sequence $\log a, \log(ab), \log\left(ab^2\right), \log\left(ab^3\right),$ is an A.P. Find its nth term.

Watch Video Solution

7. How many numbers of two digits are divisible by 7?

Watch Video Solution

8. Let S_n denotes the sum to terms of an A.P. whose first term is a . If the commom difference d is given by $d = S_n - kS_{n-1} + S_{n-2}$, then k is equal to

Watch Video Solution

9. If S_1, S_2, S_3, S_m are the sums of n terms of m A.P. $'s$ whose first terms are $1, 2, 3, , m$ and common differences are $1, 3, 5, , (2m-1)$ respectively. Show that $S_1 + S_2, + S_m = \frac{mn}{2}(mn+1)$

Watch Video Solution

10. If the sum of m terms of an A.P. is equal to the sum of either the next n terms or the next p terms, then prove that $(m+n)\left(\frac{1}{m} - \frac{1}{p}\right) = (m+p)\left(\frac{1}{m} - \frac{1}{n}\right)$.

Watch Video Solution

11. IF the sum of p terms of an AP is q and the sum of q terms is p, then show that the sum of p+q terms is - (p+q) ,Also find the sum of first p-q terms (where , pgtq).

Watch Video Solution

12. In a G.P. the first term is $a,$ second term is b and the last term is c then sum of the series is

Watch Video Solution

13. Find the sum of all natural numbers between 1 and $100,$ which are divisible by 2 or 5

Watch Video Solution

14. A man gets an appointment with two options. Either he can accept Rs. 450 per day for 30 days or Rs. 300 on the first day with an increase of Rs. 15 per day for 30 days. Which of the options will be beneficial to him? How much will he gain by that choice?

Watch Video Solution

15. A fanner buys a used tractor for Rs 12000. He pays Rs 6000 cash and agrees to pay the balance in annual instalments of Rs 500 plus 12% interest on the unpaid amount. How much will the tractor cost him?

Watch Video Solution

16. Shamshad Ali buys a scooter for Rs. 2200. He pays Rs. 4000 cash and agrees to pay the balance in annual instalments of Rs. 1000 plus 10% interest on the unpaid amount. How much the scooter will cost him?

Watch Video Solution

17. Two cars start together in the same direction from the same place. The first goes with uniform speed of 10km/hr. The second goes at a speed of 8km/hr in the first hour and increases its speed by $\frac{1}{2}$ km/hr each succeeding hours. After how many hours will the second car overtake the first, if both cars go non stop? How much distance would the first car have traveled till then?

Watch Video Solution

18. The ages of the students of a class form an A.P. whose common difference is 4 months. If the youngest student is 8 years old and the sum of the ages of all the students of the class is 168 years, find the number of students in the class.

Watch Video Solution

19.

If a^2, b^2, c^2 are in A.P., prove that $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are also in A.P

Watch Video Solution

20. If $a^{-1}, b^{-1}, c^{-1}, d^{-1}$ are in A.P. then show that $b = \frac{2ac}{a+c}$ and $\frac{b}{d} = \frac{3a-c}{a+c}$

Watch Video Solution

21. if the A.M. between pth and qth terms of an A.P. be equal to the A.M. between rth and sth terms of the A.P., then show that $p + q = r + s$

Watch Video Solution

22. If a, b, c are in A.P., prove that $a^3 + 4b^3 + c^3 = 3b(a^2 + c^2)$.

Watch Video Solution

23. If $a^2(b + c), b^2(c + a), c^2(a + b),$ are in A.P. show that either a, b, c are in A.P., or $ab + bc + ca = 0$.

Watch Video Solution

24. If mth, nth and pth terms of a G.P. form three consecutive terms of a G.P. Prove that $m, n, andp$ form three consecutive terms of an arithmetic system.

Watch Video Solution

25. If x,y,z are in G.P and $a^x = b^y = c^z$,then

Watch Video Solution

26. We are given two G.P's one with the first term a and common ratio r and the other with first term b and common ratio s. Show that the sequence formed by the product of corresponding terms is a G.P. Find its first term and the common ratio. Show also that the sequence formed by the quotient of corresponding terms is in G.P. Find its first term and common ratio.

Watch Video Solution

27. if s_n, denotes the sum of n terms of a GP whose first term and common ratio are a and r respectively. then $S_1 + S_2 \ldots\ldots\ldots + S_n$ is

Watch Video Solution

28. If p, q, r are in G.P. and the equations, $px^2 + 2qx + r = 0$and $dx^2 + 2ex + f = 0$have a common root, then show that $\frac{d}{p}, \frac{e}{q}, \frac{f}{r}$are in A.P.

Watch Video Solution

29. If S_n denotes the sum of n terms of a G.P., prove that: $(S_{10} - S_{20})^2 = S_{10}(S_{30} - S_{20})$

Watch Video Solution

30. The sum of the first thre consecutive terms of G.P is 13 and the sum of their squares is 91. Determine the G.P.

Watch Video Solution

31. If $\frac{1}{a+b}+\frac{1}{b+c}=\frac{1}{b}$, prove that a,b,c are in G.P.

Watch Video Solution

32. 150 workers were engaged to finish a job in a certain number of days. 4 workers dropped out on second day, 4 more workers dropped out on the third day and so on. It took 8 more days to finish the work. Find the number of days in which the work was complete.

Watch Video Solution

33. If $|x|<1 and |y|<1$, find the sum of infinity of the following series:

$(x+y)+\left(x^2+xy+y^2\right)+(x+y)+\left(x^3+x^2y+xy^2+y^3\right)+$

Watch Video Solution

34. A manufacture reckons that the value of a machine which costs him Rs. 156250, will depreciate each year by 20%. Find the estimated value at the end of 5 years.

Watch Video Solution

35. The sum of the series : $1+\frac{1}{1+2}+\frac{1}{1+2+3}+\ldots\ldots$ upto 10 terms is :

Watch Video Solution

36. Find the sum of the series: $1.n+2.(n-1)+3.(n-2)++(n-1).2+n.1.$

Watch Video Solution

37. Obtain the sum of the series

$\frac{1}{4}+\frac{1}{16}+\frac{1}{64}$.....to ∞

Watch Video Solution

38. Show that $\frac{1\times 2^2+2\times 3^2+\vdots+n\times(n+1)^2}{1^2\times 2+2^2\times 3+\vdots+n^2\times(n+1)}=\frac{3n+5}{3n+1}$.

Watch Video Solution

39. What will Rs. 500 amounts to in 10 years after its deposit in a bank which pays annual interest are 10% compounded annually?

Watch Video Solution

40. A man deposited Rs 10000 in a bank at the rate of 5% simple interest annually. Find the amount in 15^{th} year since he deposited the amount

and also calculate the total amount after 20 years.

Watch Video Solution

41. If $a_1, a_2, a_3, , a_n$ are in A.P., where $a_i > 0$ for all i , show that $\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_1}+\sqrt{a_3}} + + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} = \frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}.$

Watch Video Solution

42. if S is the sum , P the product and R the sum of reciprocals of n terms in $G.\ P.$ prove that $P^2R^n = S^n$

Watch Video Solution

43. A thief runs with a uniform speed of 100 m/min. After one minute a policeman runs after the thief to catch him. He goes with a speed of 100 m/min in first minute and increases his speed by 10 m/min every

succeeding minute. After how many minutes the policeman will catch the thief.

Watch Video Solution

Check Your Understanding

1. Define a sequence.

Watch Video Solution

2. Sum of first n terms of an A.P. whose last term is l and common difference is d, is

Watch Video Solution

3. Sum of first n terms of an A.P. whose last term is l and common difference is d, is

Watch Video Solution

4. Find the general term of G.P. where first term is a and common ratio is r.

View Text Solution

5. Fill in the blanks:

(i) A.M.=.....

(ii) G.M. =..... where a and b are two numbers.

Watch Video Solution

6. Find the sum of n terms of G.P where first term is a and common ratio is r.

View Text Solution

7. When the sum of an A.P. is known then for

(i) three (ii) four (iii) five terms.

Watch Video Solution

8. When the product of a G.P. is known , then which are (i) three (ii) four (iii) five terms,

Watch Video Solution

9. Find the sum of an infinite number of terms of a G.P. where a is the first term and $r(<1)$ is the common ratio.

View Text Solution

10. Fill in the blanks:

(i) $\sum_{k=1}^{n} k = 1+2+3+\ldots\ldots\ldots\ldots\ldots+n =$ .....

(ii) $\sum_{k=1}^{n} k^2 = 1^2 + 2^2 + 3^2 + \ldots\ldots\ldots\ldots\ldots\ldots + n^2 = \ldots\ldots\ldots$

(iii) $\sum_{k=1}^{n} k^3 = 1^3 + 2^3 + 3^3 + \ldots\ldots\ldots\ldots + n^3 = \ldots\ldots\ldots$

Watch Video Solution

Competition File

1. The first two terms of a geometric progression add up to 12. The sum of the third and the fourth terms is 48. If the terms of the geometric progression are alternately positive and negative, then the first term is (1) 4 (2) 12 (3) 12 (4) 4

A. 4

B. -4

C. -12

D. 12

Answer: C

Watch Video Solution

2. $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+\frac{14}{3^4}+$

A. 2

B. 3

C. 4

D. 6

Answer: B

Watch Video Solution

3. A person is to cout 4500 currency notes. Let a_n denotes the number of notes he counts in the nth minute. If $a_1=a_2=\ldots\ldots\ldots=a_{10}=150$ and $a_{10}, a_{11}, \ldots\ldots,$ are in AP with common difference -2, then the time taken by him to count all notes is

A. 24 minutes

B. 34 minutes

C. 125 minutes

D. 135 minutes

Answer: B

Watch Video Solution

4. A man saves Rs. 200 in each of the first three months of his service. In each of the subsequent months his saving increases by Rs. 40 more than the saving of immediately previous month. His total saving from the start of swrvice will be Rs. 11040 after

A. 18 months

B. 19 months

C. 20 months

D. 21 months

Answer: D

Watch Video Solution

5. Let a_n be the nth term of an AP, if $\sum_{r=1}^{100} a_{2r} = \alpha$ and $\sum_{r=1}^{100} a_{2r-1} = \beta$, then the common difference of the AP is

A. $\alpha - \beta$

B. $\frac{\alpha - \beta}{100}$

C. $\beta - \alpha$

D. $\frac{\alpha - \beta}{200}$

Answer: B

Watch Video Solution

6. 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 50 th term

C. 150

D. zero

Answer: D

Watch Video Solution

7. If x, y, z are in A.P. and $\tan^{-1} x, \tan^{-1} y$ and $\tan^{-1} z$ are also in A.P. then

A. $2x = 3y = 6z$

B. $6x = 3y = 2z$

C. $6x = 4y = 3z$

D. $x = y = z$

Answer: D

Watch Video Solution

8. The sum of first 20 terms of the sequence $0.7, 0.77, 0.777, \ldots\ldots$ is

A. $\frac{7}{9}\left(99 - 10^{-20}\right)$

B. $\frac{7}{81}\left(179 + 10^{-20}\right)$

C. $\frac{7}{9}\left(99 + 10^{-20}\right)$

D. $\frac{7}{81}\left(179 - 10^{-20}\right)$

Answer: B

Watch Video Solution

9. Let α and β be the roots of equation $px^2 + qx + r = 0, p \neq 0$.If p, q, r are in A.P. and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$, then the value of $|\alpha - \beta|$ is :

A. $\frac{2\sqrt{17}}{9}$

B. $\frac{\sqrt{34}}{9}$

C. $\frac{2\sqrt{13}}{9}$

D. $\frac{\sqrt{61}}{9}$

Answer: C

Watch Video Solution

10. Three positive numbers form an increasing GP. If the middle term in this GP is doubled, then new numbers are in AP. Then, the common ratio of the GP is

A. $3+\sqrt{2}$

B. $2-\sqrt{3}$

C. $2+\sqrt{3}$

D. $\sqrt{2}+\sqrt{3}$

Answer: C

Watch Video Solution

11. If $(10)^9 + 2(11)^1(10)^8 + 3(11)^2(10)^7 + \cdot\cdot + 10(11)^9 = k(10)^9$, then k is equal to (1) $\frac{121}{10}$ (2) $\frac{441}{100}$ (3) 100 (4) 110

A. $\frac{441}{100}$

B. 100

C. 110

D. $\frac{121}{10}$

Answer: B

Watch Video Solution

12. If m is the AM of two distinct real numbers l and n $(l, n > 1)$ and G_1, G_2 and G_3 are three geometric means between l and n, then $G_1^4, 2G_2^4, G_3^4$ equals

A. $4l^2mn$

B. $4lm^2n$

C. $4lmn^2$

D. $4l^2m^2n^2$

Answer: B

Watch Video Solution

13. The sum of first 9 terms of the series $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+\ldots\ldots$ is

A. 71

B. 96

C. 142

D. 192

Answer: B

Watch Video Solution

14. If the 2nd , 5th and 9th terms of a non-constant A.P. are in G.P., then the common ratio of this G.P. is :

A. $\frac{4}{3}$

B. 1

C. $\frac{7}{4}$

D. $\frac{8}{5}$

Answer: A

Watch Video Solution

15. If the surm of the first ten terms of the series, $\left(1\frac{3}{5}\right)^2+\left(2\frac{2}{5}\right)^2+\left(3\frac{1}{5}\right)^2+4^2+\left(4\frac{4}{5}\right)^2+\ldots\ldots..$, is $\frac{16}{5}m$,then m is equal to

A. 102

B. 101

C. 100

D. 99

Answer: B

Watch Video Solution

16. For any three positive real numbers a, b and c, $9\left(25a^2+b^2\right)+25\left(c^2-3ac\right)=15b(3a+c)$. Then : a, b and$c$ are in $A\dot{P}$. (2) a, b and c are in $G\dot{P}$. b, c and a are in $G\dot{P}$. (4) b, c and a are in $A\dot{P}$.

A. b,cand a are in A.P

B. a,b and c are in A.P

C. a,b and c are in G.P

D. b,c and a are in G.P

Answer: A

Watch Video Solution

17. Let $a, b, c \in R$. If $f(x) = ax^2 + bx + c$ be such that $a + b + c = 3$ and $f(x + y) = f(x) + f(y) + xy, \forall x, y \in R,$ then $\sum_{n=1}^{10}$ is equal to

A. 165

B. 190

C. 255

D. 330

Answer: D

Watch Video Solution

18. Let $a_1, a_2, a_3 \ldots a_{49}$ be in AP such that $\sum_{k=0}^{12} (a_4 k + 1) = 416$ and $a_9 + a_{43} = 66$ If $a_1^2 + a_2^2 + \ldots + a_{17}^2 = 140m$ then m is equal to (1) 66 (2) 68 (3) 34 (4) 33

A. 66

B. 68

C. 34

D. 33

Answer: C

Watch Video Solution

19. Let A be the sum of the first 20 terms and B be the sum of the first 40 terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + 5^2 + 2.6^2 + \ldots$ If $B - 2A = 100\lambda$ then λ is equal to (1) 232 (2) 248 (3) 464 (4)496

A. 232

B. 248

C. 464

D. 496

Answer: B

Watch Video Solution

20. The product of three consecutive terms of a G.P. is 512. If 4 is added to each of the first and the second of these terms, the three terms now form an A.P. Then the sum of the original three terms of the given G.P. is

A. 36

B. 32

C. 24

D. 28

Answer: D

Watch Video Solution

21. Let a_1, a_2 ..... A_(50)$arenonconstanttermsofan$A.P. $And \sum ofn$ $termsisgivenby$S_(n)=50n+(n)(n-7)(A)/(2). , $then$ or $deredpair$(d, a_(50)) $is(where$d` is the common difference)

A. (A,45A)

B. $(A, 50 + 46A)$

C. $(2A, 46A)$

D. $(2A, 50 + 49A)$

Answer: B

Watch Video Solution

Chapter Test

1. If in an A.P., the pth term is $q\ and\ (p+q)^{th}$ term is zero then the q^{th} term is

A. $-p$

B. p

C. $p+q$

D. $p-q$

Answer: B

Watch Video Solution

2. $11^3+12^3+13^3+\ldots\ldots\ldots\ldots+20^3$ is

A. an even integer

B. odd integer divisible by 5

C. multiple of 10

D. odd integer but not a multiple of 5.

Answer: B

Watch Video Solution

3. If $a_n = \left\{ \frac{1 + (-1)^n}{23^n} \right\}$ then $a_7 =$ .....

Watch Video Solution

4. Prove that $9^{1/3} \times 9^{1/9} \times 9^{1/27} \times \ldots \infty = 3.$

Watch Video Solution

5. If A is the A.M. between a and b, then find $(A - a)^2 + (A - b)^2.$

View Text Solution

6. 32. Show that the sum of $(m+n)^{th}$ and $(m-n)^{th}$ terms of an A.P. is equal to twice the m^{th} term

Watch Video Solution

7. If p th term of an A.P. is $\frac{1}{q}$ and q th term is $\frac{1}{p}$ prove that the sum of the first pq terms is $\frac{1}{2}[pq+1]$

Watch Video Solution

8. 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 $\frac{1}{r^n}$.

Watch Video Solution

9. Prove that: $2^{\frac{1}{4}}.4^{\frac{1}{8}}, 8^{\frac{1}{16}}.16^{\frac{1}{32}}.....\infty = 2.$

Watch Video Solution

10. $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+3+5}+\ldots\ldots$ upto nth term

Watch Video Solution

11. if the pth term of an A.P. is x and qth term is y, show tht the sum of $(p+q)$ terms is $\frac{p+q}{2}\left[x+y+\left(\frac{x-y}{p-q}\right)\right]$

Watch Video Solution

12. Find the sum of 50 terms of the sequence:

7,7.7,7.77,7.777.....,

Watch Video Solution