MATHS

BOOKS - KC SINHA ENGLISH

SPECIAL SERIES - FOR BOARDS

Solved Examples

1. Find the sum of n terms of the series whose nth term is $12n^2 - 6n + 5$.

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

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

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

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5. Find the sum of the series $1^2 + 3^2 + 5^2 + \rightarrow n$ terms.

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

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7. Find the sum to n terms of the series (1.2.3) + (2.3.4) + (3.4.5) ...`

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8. Find the sum of the series:

$1.\, n + 2.\, (n-1) + 3.\, (n-2) + \ + (n-1).\, 2 + n.1.$

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9. Find the sum to n terms of the series

$1 + (1+2) + (1+2+3) + \ldots\ldots$

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10. Find the sum to n terms of the series

$1 + (1+2) + (1+2+3) + \ldots\ldots$

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

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

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13. Find the sum of series $(3^3 - 2^3) + (5^3 - 4^3) + (7^3 - 6^3) + \ldots$ n terms.

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14. $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots$ to n terms

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15. FInd the sum of infinite terms of the series $\frac{1}{1.2.3}+\frac{1}{2.3.4}+\frac{1}{3.4.5}\ldots\ldots$.

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16. Find the sum to n terms of the series : $5+11+19+29+41\ldots$

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17. Natural numbers are written as 1, (2,3), (4,5,6)..

Show that the sum of number in the nth group is $\frac{n}{2}(n+1)$.

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18. Sum to n terms the series $1+3+7+15+31+\ldots$

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19. Find the sum of the following series to n terms

$5 + 7 + 13 + 31 + 85 +$

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20. The sum to n terms of the G.P. $1 + \frac{1}{2} + \frac{1}{4} + \ldots$ is

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21. Find the sum of the following series:

$(\sqrt{2} + 1) + 1(\sqrt{2} - 1) + \ldots\ldots + \infty$

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22. Find the sum of the series

$x(x + y) + x^2(x^2 + y^2) + x^3(x^3 + y^3) + \ldots\ldots \rightarrow$ infinity where

$|x| < 1$ and $|y| < 1$.

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23. about to only mathematics

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

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25. If $S = 1 + a + a^2 + a^3 + a^4 + \ldots\ldots\ldots \to \infty$ and $|a| < 1$ then prove that $a = \dfrac{S-1}{S}$

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26. If

$x = 2 + a + a^2 + \infty, where |a| < 1 and y = 1 + b + b^2 + \infty, where |b| < 1$

prove that: $1 + ab + a^2b^2 + \infty = \frac{xy}{x + y - 1}$

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27. If $S_1, S_2, S_3, \ldots\ldots, S_p$ are the sums of infinite geometric series whose first terms are 1, 2, 3..... p and whose common ratios are $\frac{1}{2}, \frac{1}{3}, \ldots. \frac{1}{p+1}$ respectively, prove that

$S_1 + S_2 + S_3 + \ldots. + S_p = \frac{1}{2}p(p+3)$.

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28. The sum of an infinite geometric series is 15 and the sum of the squares of these terms is 45. Find the series.

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29. Prove that in an infinite G.P. whose common ratio r is numerically less than one, the ratio of any term to the sum of all the succeeding terms is $\frac{1-r}{r}$

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30. The sum of first two terms of an infinite geometric series is 15 and each term is equal to the sum of all the terms following it, find the series.

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31. Find the rational number having $0.4\overline{23}$ as its expansion.

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32. Find a rational number, which when expressed as a decimal will have 0.6 as its expansion.

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Exercise

1. Find the sum of n terms of the series whose nth term is: $n(n-1)(n+1)$

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2. Find the sum of n terms of the series whose nth term is: $n\left(n^2+1\right)$

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3. Find the sum to n terms of the series whose n^{th}term is $n(n+3)$.

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4. Find the sum of n terms of the series whose nth term is: n^3-3^n

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5. Find the sum of the following series to n term: $1^3 + 3^3 + 5^3 + 7^3 + \cdot$

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6. Find the - sum of n terms of the series $1^2 + 4^2 + 7^2 + \ldots$

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7. Find the sum of the following series to n term: $1^2 - 2^2 + 3^2 - 4^2 + \ldots\ldots$

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8. Find the sum of the following series to n term: $1.23. + 2.3.5 + 3.4.5 + \ldots\ldots\ldots$

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9. Find the sum of the following series to n term: $1+(1+3)+(1+3+5)+\ldots\ldots\ldots\ldots$

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10. Find the sum of n terms of the series $1.\ 2^2=2.\ 3^2+3.\ 4^2+$

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11. Find the sum of the following series to n term: $\left(n^2-1^2\right)+2\left(n^2-2^2\right)+3\left(n^2-3^2\right)+\ldots\ldots\ldots$

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12. Find the sum of the following series to n term: $3 \times 1^2 + 5 \times 2^2 + 7 \times 3^2 +$

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13. Find the nth term of the series $3.8 + 6.11 + 9.14 + 12.17 + . .$ (A) $3n(3n + 5)$ (B) $3n(n + 5)$ (C) $n(3n + 5)$ (D) $n(n + 5)$

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14. The sum of the series $1.2 + 2.3 + 3.4 + \ldots \ldots .$ up to 20 tems is

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15. Find the nth term and hence the 20th term of series `2.4+4.6+6.8+.....

Also find the sum of its 20 terms.

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16. Show that $\frac{1 \times 2^2 + 2 \times 3^2 + \ + n \times (n1)^2}{1^2 \times 2 + 2^2 \times 3 + \ + n^2 \times (n+1)} = \frac{3n+5}{3n+1}$.

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17. Find the sum $1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \ + \frac{1}{1+2+3+\ +n}$.

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18. Find the sum to n terms of the series: $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} +$

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19. Find the sum to n terms of the series: $\frac{1}{1+1^2+1^4} + \frac{1}{1+2^2+2^4} + \frac{1}{1+3^2+3^4} +$

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20. Find sum of the series to n terms $\frac{1}{2.4}+\frac{1}{4.6}+\frac{1}{6.8}+\ldots$

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21. Find the nth term and sum to n tems of the following series: 2+6+12+20+...

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22. Find the nth term and sum to n tems of the following series: 3+6+11+18+...

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23. Find the sum to n terms of the series: $3+15+35+63+$

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24. Find the sum of n terms of the series $1+9+24+46+75.....$

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25. Find the nth term and sum of n terms of the series, $1+5+12+22+35+...$

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26. Find the nth term and sum to n tems of the following series: 2+6+12+20+...

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27. Find the sum to 10 terms oif the series 1+3+6+10+.....

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28. Natural numbers have been divided into groups in the following way: $91, 3), (5, 7, 9, 11), (13, 15, \ldots., 23), \ldots\ldots.$ Show that the sum of numbers in the nth group is $4n^3$

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29. Find the sum of the series $2 + 5 + 14 + 41 + 122$ +.... up to n terms and hence evaluate S_8.

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30. Find the nth term and deduce the sum to n terms of the series 1+5+13+29+....

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31. Sum the following series to n terms: $1 + 4 + 13 + 40 + 121 +$

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32. Find the sum to n terms of the series : $5 + 11 + 19 + 29 + 41 \ldots$

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33. Find the sum of the given series 3+5+9+17+33 + ..

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34. Find the sum to infinity of the following Geometric Progression: $1, \frac{1}{3}, \frac{1}{9}, \ldots$

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35. Find the sum to infinity of the following geometric progression: $3, -1, \frac{1}{3}, -\frac{1}{9}, \ldots \ldots \ldots$

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36. Find the sum to infinity of the following geometric progression: $\frac{1}{5}+\frac{1}{7}+\frac{1}{5^2}+\frac{1}{7^2}+\ldots..$

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37. Find the sum of the infinite geometric series $1+3x+9x^2+27x^3+\ldots..$

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38. The valueo f $9^{1/3}\times 9^{1/9}\times 9^{1/27}\times .....\infty$ is

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39. Prove that: $a^{\frac{1}{2}}.a^{\frac{1}{4}}.a^{\frac{1}{8}},.....\to\infty=a.$

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40. If $y = x + x^2 + x^3 + \ldots\ldots\ldots\ldots\infty$, prove that $x = \frac{y}{1+y}$

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41. The first term of as G.P. is 3 and the sum to infinity is 12. Find the common ratio.

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42. The sum of intinite number of terms of a decreasing G.P.is 4 and the sum of the squares of its terms to infinity is $\frac{16}{3}$ find the G.P.

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43. The sum of an infinite G.P. whose common ratio is numerically less than 1 is 32 and the sum of the first two terms is 24. Find the terms of G.P.

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

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45. Express $0.\overline{54}$ as a rational number.

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46. Find the value of the recuring decimal $1.\overline{15}$ considering it as a geometric series.

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