

# MATHS

## **BOOKS - KC SINHA MATHS (HINGLISH)**

## **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)





#### 7. Find the sum to n terms of the series $1.2.3+2.3.4+3.4.5+\ldots$



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

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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  $\left(3^3=2^3
ight)+\left(5^3=4^3
ight)+\left(7^3=6^3
ight)+$  to n

terms

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



17. Natural numbers are divided into groups in the following way: 1, (2, 3), (4, 5, 6), (7, 8, 9, 10), Show that the sum of the numbers in the nth group is  $\frac{n(n^2 + 1)}{2}$ 





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



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

ratio.

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**24.** Prove that: $3^{rac{1}{2}} imes 3^{rac{1}{4}} imes 3^{rac{1}{8}} imes ...=3$ 

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

26.

 $x=2+a+a^2+\infty, where |a|<1 and y=1+b+b^2+\infty, where |b|<1$ prove that:  $1+ab+a^2b^2+\infty=rac{xy}{x+y-1}$ 

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27. If  $S_1, S_2, S_3, \ldots, S_p$  are the sum of infinite geometric series whose first terms are 1,2,3,...p and whose common ratios are  $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots, \frac{.1}{p+1}$  respectively, prove that  $S_1 + S_2 + \ldots + S_p = p \frac{p+3}{2}$ 

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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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If

**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  $\frac{1-r}{r}$ 



**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.



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

0.6 as its expansion.



#### 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:  $nig(n^2+1ig)$ 

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**3.** Find the sum of n terms of the series whose nth term is: n(n+3)





12. Find the sum of the following series to n term:  $3.1^2 + 5.2^2 + 7.3^2 + \ldots$ 



13. Find the nth term of the series  $3.8+6.11+9.14+12.17+\ldots$  (A)

$$3n(3n+5)$$
 (B)  $3n(n+5)$  (C)  $n(3n+5)$  (D)  $n(n+5)$ 

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14. Find sum of series 1.2 + 2.3 + 3.4... upto n terms



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.



16. Show that 
$$rac{1 imes 2^2+2 imes 3^2+\ +\ n imes (n+1)^2}{1^2 imes 2+2^2 imes 3+\ +\ n^2 imes (n+1)}=rac{3n+5}{3n+1}.$$

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17. Find 
$$1+rac{1}{1+2}+rac{1}{1+2+3}+\ldots$$
 .  $ightarrow n$  terms.

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

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**19.** Find the sum to *n* terms of the series:  

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

I



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

23. Find the nth term and sum to n tems of the following series:3+15+35+63+......

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24.	Find	the	sum	of	n	terms	of	the	series
1 + 9 + 24 + 46 + 75									
Vatch Video Solution									

**25.** Find the nth term and sum to n tems of the following series: 1+5+12+22+.....



**26.** Find the nth term and sum to n tems of the following series: 2+6+12+20+...3+7+13+21+31+.....





**29.** Find the sum of the series 2+5+14+41+122 +.... up to n terms

and hence evaluate  $S_a$ .



**34.** Find the sum to infinity of the following Geometric Progression:  $1 \quad 1 \quad 1$ 

$$1, \frac{1}{3}, \frac{1}{9}, .$$

35. Find the sum to infinity of the following geometric progression:

$$3, -1, \frac{1}{3}, -\frac{1}{9}, \ldots \ldots$$

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

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

**38.** Find the value of 
$$9^{\frac{1}{3}}$$
,  $9^{\frac{1}{9}}$ .  $9^{\frac{1}{27}}$ ... $up$  to  $\infty$ .

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**39.** Prove that: 
$$a^{rac{1}{2}} \cdot a^{rac{1}{4}} \cdot a^{rac{1}{8}}, \ldots \to \infty = a.$$

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

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

**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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**44.** If 
$$A=1+r^a+r^{2a}+$$
 to  $\infty and B=1+r^b+r^{2b}+\infty$  , prove that

$$r=\left(rac{A-1}{A}
ight)^{1/a}=\left(rac{B-1}{B}
ight)^{1/a}$$

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

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