MATHS

BOOKS - MBD MATHS (ODIA ENGLISH)

Elements of Mathematics

Question Bank

1. The raws n = 6 and n = 7 in Pascal triangle have been kept vacant. Fill in the gaps.

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2. Write down the expansion of $(a+b)^8$ using Pascal's triangle.

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3. Find the 3rd term in expansion of $\left(2x^3 - \frac{1}{x^6}\right)^4$ using rules of Pascal Triangle.

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4. Expand the following $(7a+3b)^6$

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5. Expand the following $\left(-9\frac{a}{2}+b\right)^{7}$

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6. Expand the following $\left(a-7\frac{c}{3}\right)^{4}$

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7. Apply Binomial Theorem to find the value of $(1.01)^{5}$

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8. State true or false. The number of terms in expansion of $\left(x^2 - 2 + \frac{1}{x^2}\right)^6$ is equal to 7.

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9. State true or false. There is a term independent of both x and y in the expansion of $\left(x^2 + \frac{1}{y^2}\right)^9$

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10. State true or false. The highest power in the expansion of $x^{40}\left(x^2 + \frac{1}{x^2}\right)^{20}$ is equal to 40.

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11. State true or false. The product of K consecutive natural numbers is divisible by K!.

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12. Answer the following: If 6th term in the expansion of $(x + \cdot)^n$ is equal to ${}^nC_5 x^{n-10}$ find *.

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13. Find the number of terms in the expansion of $(1+x)^n(1-x)^n$.

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14. Find the value of $\hat{}\mathrm{nC\_(r\text{-}1)//}^nC_r$

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15. How many terms in the expansion of $\left(\frac{3}{a}+\frac{a}{3}\right)^{10}$ have positive powers of a? How many have negative powers of a?

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16. Find the middle term in the expansion of the $\left(\frac{a}{b}+\frac{b}{a}\right)^{6}$.

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17. Find the middle term in the expansion of the $\left(x+\frac{1}{x}\right)^{9}$

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18. Find the middle term in the expansion of the $\left(x^{\frac{3}{2}} - y^{\frac{3}{2}}\right)^8$

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19. Find the 6th term in the expansion of $\left(x^2 + \frac{a^4}{y^2}\right)^{10}$.

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20. Find the fifth term in the expansion of $\left(6x - \frac{a^3}{x}\right)^{10}$

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21. Find the coefficient of $\frac{1}{y^{10}}$ in the expansion of $\left(y^3+\frac{a^7}{y^5}\right)^{10}$

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22. In the expansion of $\left(y^3+\frac{a^7}{y^5}\right)^{10}$, Does there exist a term independent of y in the above expansion?

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23. Find the coefficient of x^4 in the expansion of $(1+3x+10x^2)\left(x+\frac{1}{x}\right)^{10}$

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24. Find the term independent of x in the above expansion. $(1+3x+10x^2)\left(x+\frac{1}{x}\right)^{10}$

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25. Show that the coefficient of a^m and a^n in expansion of $(1+a)^{m+n}$ are equal.

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26. An expression of the form (a+b+c+d+ ....) consisting of sum of many distinct symbols is called a multinomial. Show that $(a+b+c)^n$ is the sum of all terms of the form $n\frac{!}{p}!q!e!a^p b^q c^r$ where p, q and r range over all possible triples of non negative integers such that p+q+r = n.

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27. State and prove a multinomial Theorem.

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28. Prove that ${}^{2n}C_0 + {}^{2n}C_2 + \ldots + {}^{2n}C_{2n} = 2^{2n-1}$

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29. Prove that ${}^{2n}C_1 + {}^{2n}C_3 + \ldots + {}^{2n}C_{2n-1} = 2^{2n-1}$

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30. Find the sum of $C_1 + 2C_2 + 3C_3 + \ldots + nC_n$

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31. Find the sum of

$C_0 + 2C_1 + 3C_2 + ... + (n+1)C_n$

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32. Compute $\frac{(1+k)\left(1+\frac{k}{2}\right).... .\left(1+\frac{k}{n}\right)}{(1+n)\left(1+\frac{n}{2}\right).... .\left(1+\frac{n}{k}\right)}$

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33. Show that

$C_0C_1 + C_1C_2 + C_2C_3 + ... + C_{n-1}C_n$

$= \frac{2n!}{(n-1)!(n+1!)}$

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34. $C_0C_1 + C_1C_2 + ... + C_{n-1}C_n$ = $\frac{2^n . n.1.3.5...(2n-1)}{n+1}$

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35. Show that $3C_0 - 8C_1 + 13C_2 - 18C_3 + ... + (n+1)^{th}$ term = 0

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36. Show that

$C_0 n^2 + C_1(2-n)^2 + C_2(4-n)^2 + \ldots + C_n(2n-n)^2$

$= n.2^n$

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37. Show that $C_0 + 3C_1 + 5C_2 + \ldots + (2n+1)C_n$

$= (n+1)(2^n)$

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38. Find the sum of the following

$C_1 - 2C_2 + 3C_3 - \ldots . + n(-1)^{n-1}C_n$

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39. Find the sum of the following

$1.2C_2 + 2.3C_3 + \ldots + (n-1)nCn$

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40. Find the sum of the following

$C_1 + 2^2C_2 + 3^2C_3 + \ldots + n^2C_n$

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41. Find the sum of the following

$C_1 - 2C_2 + 3C_3 - \ldots . + n(-1)^{n-1}C_n$

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42. Show that $C_1^2 + 2C_2^2 + 3C_3^2 + \ldots + {}^nC_n^2 = \frac{(2n-1!)}{\{(n-1)!\}^2}$

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43. Show that $C_2 + 2C_3 + 3C_4 + \ldots + (n-1)C_n =$

1+ (n-2) 2^(n-1)`

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44. prove that :-

$$C_1 - \frac{1}{2}C_2 + \frac{1}{3}C_3 + \ldots + (-1)^{n+1}\frac{1}{n}C_n$$ = 1+1/2 + ... +1/n

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45. $C_0C_1 + C_1C_2 + \ldots. + C_{n-1}C_n$ = $\frac{2^n.\, n.1.3.5\ldots(2n-1)}{n+1}$

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46. The sum $\frac{1}{1!9!}+\frac{1}{3!7!}+\ldots+\frac{1}{7!3!}+\frac{1}{9!1!}$ can be written in the form $\frac{2^a}{b!}$ Find a and b.

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47. Using binomial theorem show that $1^{99}+2^{99}+3^{99}+4^{99}+5^{99}$ is divisible by 5

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48. Using the binomial theorem show that $1^{99}+2^{99}+3^{99}+4^{99}+5^{99}$ is divisible by 3 and 5 so that it is actually divisible by 15.

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