MATHS

NCERT - NCERT MATHEMATICS(BENGALI)

BINOMIAL THEOREM

Example

1. Expand $\left(x^2+\frac{2}{x}\right)^4$,$x \geq 0$

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2. Compute $(98)^5$.

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3. Which is larger $(1.01)^{1000000}$ or 10,000?

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4. Using binomial theorem. Prove that 6^n-5n always leaves remainder 1 when divided by 25.

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5. Find a if the 17^th and 18^th terms of the expansin $(2+a)^{50}$ are equal.

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6. Show that the middle term in the expansion of $(1+x)^2 n$ is 1.3.5...(2n-1)/n! $2n.\ x^n$, where n is a positive integer.

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7. Find the coefficient of x^6 y^3 in the expansion of $(x+2y)^9$.

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8. The second, third and fourth terms in the binomial expansion $(x+a)^n$ are 240, 720 and 1080, respectively. Find x,a and n.

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9. The coefficients of three consecutive terms in the expansion of $(1+a)^n$ are are in the ratio 1: 7: 42 Find n.

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10. Find the term independent of x in the expansion of $\left(\frac{3}{2x^2}-\frac{1}{3x}\right)^6$.

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11. If the coefficients of $a^r - 1, a^r$ and $a^r + 1$ in the expansion of $(1 + a)^n$ are in arithmetic progression, prove that n^2 - n(4r+1)+$4r^2$ - 2 =0.

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12. Show that the coefficient of the middle term in the expansion of $(1 + x)^2 n$ is equal to the sum of the coefficients of two middle terms in the expansion of $(1 + x)^2 n - 1$

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13. Find the coefficient of a^4 in the product $(1+2a)^5$ using binomial theorem.

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14. Find the $r^t h$ term from the end in the expansion of $(x+a)^n$.

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15. Find the term independent of x in the expansion of $\left(\sqrt[3]{x}+\frac{1}{2\sqrt[3]{x}}\right)^{18}$,x > 0.

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16. The sum of the coefficients of the first three terms in the expansion of $\left(x-\frac{3}{x^2}\right)^m$, x != 0. m being a natural number, is 559. Find the term of the expansion containing x^3.

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17. If the coefficients of $(r-5)^t h$ and $(2r-1)^t h$ terms in the expansion of $(1+x)^{34}$ are equal, find r.

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Exercise 8 1

1. Expand the expression

$(1-2x)^5$

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2. Expand the expression

$$\left(\frac{2}{x} - \frac{x}{2}\right)^5$$

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3. Expand the expression

$$(2x - 3)^6$$

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4. Expand the expression

$$\left(\frac{x}{3}+\frac{1}{x}\right)^{5}$$

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5. Expand the expression

$$\left(x+\frac{1}{x}\right)^{6}$$

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6. Using binomial theorem, evaluate : $(96)^{3}$

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7. Using binomial theorem, evaluate $(96)^3$

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8. Using binomial theorem, evaluate $(101)^4$

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9. Using binomial theorem, evaluate $(99)^5$

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10. Using Binomial Theorem, indicate which number is larger $(1.1)^{10000}$ or 1000.

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11. Find $(a+b)^4$ - $(a-b)^4$. Hence, evaluate $\left(\sqrt{3}+\sqrt{2}\right)^4$ - $\left(\sqrt{3}-\sqrt{2}\right)^4$.

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12. Find $(x+1)^6 + (x-)^6$. Hence or otherwise evaluate $\left(\sqrt{2}+1\right)^6 + \left(\sqrt{2}-1\right)^6$.

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13. Show that $9^n + 1$ - 8n - 9 is divisible by 64, whenever n is a positive interger.

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14. Prove that $\sum_{r=0}^{n} 3^r n\, C_r = 4^n$.

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Exercise 8 2

1. Find the coefficient of x^5 in$(x+3)^8$

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2. Find the coefficient of a^5b^7 in $(a-2b)^{12}$.

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3. Write the general term in the expansion of (

$x^2 - y)^6$

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4. Write the general term in the expansion of

$(x^2 - yx)^{12}. x \neq 0.$

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5. Find the $4^{t}h$ term in the expansion of $(x-2y)^{12}$.

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6. Find the$13t^{t}h$ term in the expansion of $\left(9x-\frac{1}{3}\sqrt{x}\right)^{18}$, x !=0.

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7. Find the middle terms in the expansions of

$$\left(3 - \frac{x^3}{6^7}\right)$$

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8. Find the middle terms in the expansions of

$$\left(\frac{x}{3} + 9Y\right)^{10}.$$

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9. In the expansion of $(1+a)^m + n$, prove that coefficients of a^m and a^n are equal.

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10. The coeffcients of the $(r-1)^t h$, $r^t h$ and $(r+1)^t h$ terms in the expansion of $(x+1)^n$ are in the ration 1 : 3: 5 Find n and r.

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11. Prove that the coefficient of x^n in the expansion of $(1+x)^2 n$ is twice the coefficient of x^n in the expansion of $(1+x)^2 n-1$.

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12. Find a positive value of m for which the coefficient of x^2 in the expansion $(1+x)^m$ is 6.

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Miscellanous Exercise On Chapter 8

1. Find a,b,and n in the expansion of $(a+b)^n$ if the first three terms of the expansion are 729. 7290 and 30375, respectively.

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2. Find a if the coefficients of x^2 and x^3 in the expansion of $(3+ax)^9$ are equal.

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3. Find the confficient of x^5 in the product $(1+2x)^6\,(1-x)^7$ using binomial theoram.

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4. If a and b are distinct integers, prove that a-b is a factor of a^n - b^n , whenever n is a positive integer.

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5. Evaluate $\left(\sqrt{3}+\sqrt{2}\right)^6-\left(\sqrt{3}-\sqrt{2}\right)^6$.

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6. Find the value of $\left(a^2+\sqrt{a^2-1}\right)^4+\left(a^2-\sqrt{'a^2-1'}\right)^4$.

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7. Find an approximation of $(0.99)^5$ using the first three terms of its expansion.

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8. Find n, if the ratio of the fifth term from beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2}+\frac{1}{\sqrt[4]{3}}\right)^{n}$ id $\sqrt{6}:1$.

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9. Expand using Binomial Theorem $\left(1+\frac{x}{2}-\frac{2}{x}\right)^{4}$, x!= 0.

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10. Find the expansion of $\left(3x^2 - 2ax + 3a^2\right)^3$ using binomial theorem.

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