# MATHS

# NCERT - NCERT MATHEMATICS(TELUGU)

# BINOMIAL THEOREM

## Example

**1.** Expand $\left(X^2 + \frac{3}{x}\right)^4$ , x != 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.** The coefficients of three consecutive terms in the expansion of $(1+x)^n$ are in the ratio

$1:7:42$, then $n =$

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

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**6.** 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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**7.** 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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**8.** Find the $r^t h$ term from the end in the expansion of $(x+a)^n$.

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**9.** 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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**10.** 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 $(102)^{5}$

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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 $(\sqrt{3}+\sqrt{2})^4 - (\sqrt{3}-\sqrt{2})^4$.

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

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**13.** 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 $a^5 b^7$ 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 $4^th$ term in the expansion of $(x-2y)^{12}$.

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

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**7.** Find the middle terms in the expansions of $\left(3-\frac{x^3}{6}\right)^7$

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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.** The coeffcients of the $(r-1)^{th}$, $r^{th}$ and $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ration 1 : 3: 5 Find n and r.

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**10.** 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 coefficient of $x^5$ in the product $(1+2x)^6\,(1-x)^7$ using binomial theorem.

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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 $\left(a^2+\sqrt{a^2-1}\right)^4+\left(a^2-\sqrt{a^2-1}\right)^4$ if a=$\sqrt{5}$.

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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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