

Bhai Parmanand Vidya Mandir**Maths. Assignment****Class - XI****Ch. 8 Binomial Theorem**

- Using binomial theorem, expand (i) $(\sqrt{\frac{x}{a}} - \sqrt{\frac{a}{x}})^6$ (ii) $(\sqrt[3]{x} - \sqrt[3]{a})^6$ (iii) $(x + 1 - \frac{1}{x})^3$
- Using binomial theorem, prove that.
 - $2^{3n} - 7n - 1$ is divisible by 49, $n \in \mathbb{N}$
 - $3^{2n+2} - 8n - 9$ is divisible by 64, $n \in \mathbb{N}$.
 - $3^{3n} - 26n - 1$ is divisible by 676.
- Using binomial theorem determine which number is larger $(1.2)^{4000}$ or 800 ?
- Find the value of $(1.01)^{10} + (1 - 0.01)^{10}$ correct to 7 places of decimals.
- Find the value of α for which the coefficients of the middle terms in the expansion of $(1 + \alpha x)^4$ and $(1 - \alpha x)^6$ are equal, find α .
- Find the coefficient of x^7 in $(ax^2 + \frac{1}{bx})^{11}$ and x^{-7} in $(ax - \frac{1}{bx^2})^{11}$ and find the relation between a and b so that the coefficients are equal.
- If the coefficients of x and x^2 in the expansion of $(1 + x)^m(1 - x)^n$ are 3 and -6 respectively. Find the values of m and n .
- If the fourth term in the expansion of $(ax + \frac{1}{x})^n$ is $\frac{5}{2}$, then find the values of a and n .
- In the binomial expansion of $(a + b)^n$, the coefficients of the fourth and thirteenth terms are equal to each other. Find n .
- Find the 11th term from the beginning and the 11th term from the end in the expansion of $(2x - \frac{1}{x^2})^{25}$.
- Does the expansion of $(2x^2 - \frac{1}{x})^{20}$ contain any term involving x^9 ?
- Show that the expansion of $(x^2 + 1/x)^{12}$ does not contain any term involving x^{-1} .
- Find the middle term(s) in the expansion of (i) $(x - \frac{1}{x})^{2n+1}$. (ii) $(3x - \frac{2}{x^2})^{15}$
- Find the term independent of x in the expansion of $(\sqrt[3]{x} + \frac{1}{2}\sqrt[3]{x})^{18}$, $x > 0$
- If the coefficients of $(2r+1)^{\text{th}}$ term and $(r+2)^{\text{th}}$ term in the expansion of $(1+x)^{43}$ are equal, find r .
- Prove that the coefficients of $(r+1)^{\text{th}}$ term in the expansion of $(1+x)^{n+1}$ is equal to the sum of the Coefficients of r^{th} and $(r+1)^{\text{th}}$ terms in the expansion of $(1+x)^n$.

17. Prove that the terms independent of x in the expansion of $(x + \frac{1}{x})^{2n}$ is $\frac{1 \cdot 3 \cdot 5 \dots (2n-1)}{n!} 2^n$.
18. If the coefficients of 2^{nd} , 3^{rd} and 4^{th} term in the expansion of $(1+x)^{2n}$ are in A.P, then Show that $2n^2 - 9n + 7 = 0$.
19. If in the expansion of $(1+x)^n$, the coefficients of p^{th} and q^{th} terms are equal, prove that $p+q = n+2$, $p \neq q$.
20. If 3^{rd} , 4^{th} , 5^{th} and 6^{th} terms in the expansion of $(x+\alpha)^n$ be respectively a, b, c and d .
Prove that $\frac{b^2 - ac}{c^2 - bd} = \frac{5a}{3c}$
21. If 6^{th} , 7^{th} and 8^{th} terms in the expansion of $(x+a)^n$ are 112, 7 and $\frac{1}{4}$ resp. Find x, a, n
22. Find a , if the coefficient of x^2 and x^3 in the expansion of $(3+ax)^9$ are equal.
23. Find the coefficient of a^4 in the product $(1+2a)^4 (2-a)^5$.
24. Find the coefficient of x^5 in the expansion of $(1+x)^{21} + (1+x)^{22} + \dots + (1+x)^{30}$.
25. If in the expansion of $(1-x)^{2n-1}$, the coefficient of x^r is denoted by a_r , then Prove that $a_{r-1} + a_{2n-r} = 0$.
26. The binomial coefficient of the third term from the end in the expansion of $(y^{2/3} + x^{5/4})^n$ Is 91, find 9^{th} term of the expansion.
27. Find the coefficient of x^{10} in the expansion of $(1+3x+3x^2+x^3)^{14}$.

Answer key:

1. (i) $\frac{x^8}{8!} - 6 \frac{x^6}{6!} + 15 \frac{x^4}{4!} - 20 + 15 \frac{x^2}{2!} - 6 \frac{x^0}{0!} + \frac{x^8}{8!}$.
(ii) $x^2 - 6x^{5/3}a^{1/3} + 15x^{4/3}a^{2/3} - 20ax + 15x^{2/3}a^{4/3} - 6x^{1/3}a^{5/3} + a^2$
(iii) $x^3 + 3x^2 - 5 + \frac{3}{x^2} - \frac{1}{x^8}$
3. 800 4. 2.0090042 5. $\alpha = 0, -\frac{3}{10}$ 6. $ab = 1$ 7. $m = 12, n = 9$ 8. $a = \frac{1}{2}, n = 6$
9. 15 10. ${}^{25}C_{10} \left(\frac{2^{15}}{x^5}\right), -{}^{25}C_{15} \left(\frac{2^{10}}{x^{20}}\right)$ 11. No 13.(i) $(-1)^n \cdot {}^{2n+1}C_n x, (-1)^{n+1} \cdot {}^{2n+1}C_n \cdot \frac{1}{x}$
- (ii) $\frac{-6435 x^3 3^8 x^2 7}{x^6}, \frac{6437 x^3 3^7 x^2 8}{x^9}$ 14. $\frac{{}^{18}C}{2^9}$ 15. 14 21. $n = 8, x = 4, a = \frac{1}{2}$ 23. -438
24. $31C_6 - {}^{21}C_6$