

VAISHALI EDUCATION POINT
(QUALITY EDUCATION POINT)

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BINOMIAL THEOREM

Class :- XI

Subject :- MATH

General Instructions

QNo.	Questions
1	Expand the expression $(1 - 2x)^5$
2	Expand the expression: $\left(\frac{2}{x} - \frac{x}{2}\right)^5$
3	Expand the expression : $(2x - 3)^6$
4	Expand the expression : $\left(\frac{x}{3} + \frac{1}{x}\right)^5$
5	Expand : $\left(x + \frac{1}{x}\right)^6$
6	Using Binomial Theorem, evaluate $(102)^5$
7	Using Binomial Theorem, evaluate $(101)^4$
8	Using Binomial Theorem, evaluate $(99)^5$
9	Using Binomial Theorem, indicate which number is larger $(1.1)^{10000}$ or 1000.
10	Find $(a + b)^4 - (a - b)^4$. Hence, evaluate : $(\sqrt{3} + \sqrt{2})^4 - (\sqrt{3} - \sqrt{2})^4$
11	Find $(x + 1)^6 + (x - 1)^6$. Hence or otherwise evaluate $(\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6$
12	Show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is a positive integer.

13	$\sum_{r=0}^n 3^r {}^n C_r = 4^n$ Prove that :	
14	Find the coefficient of x^5 in $(x + 3)^8$	
15	Find the coefficient of $a^5 b^7$ in $(a - 2b)^{12}$.	
16	Write the general term in the expansion of $(x^2 - y)^6$.	
17	Write the general term in the expansion of $(x^2 - yx)^{12}$, $x \neq 0$.	
18	Find the 4 th term in the expansion of $(x - 2y)^{12}$.	
19	Find the 13 th term in the expansion of : $\left(9x - \frac{1}{3\sqrt{x}}\right)^{18}$, $x \neq 0$.	
20	Find the middle terms in the expansions of : $\left(3 - \frac{x^3}{6}\right)^7$	
21	Find the middle terms in the expansions of : $\left(\frac{x}{3} + 9y\right)^{10}$	
22	In the expansion of $(1 + a)^{m+n}$, prove that coefficients of a^m and a^n are equal.	
23	The coefficients of the $(r - 1)^{\text{th}}$, r^{th} and $(r + 1)^{\text{th}}$ terms in the expansion of $(x + 1)^n$ are in the ratio 1:3:5. Find n and r.	
24	Prove that the coefficient of x^n in the expansion of $(1 + x)^{2n}$ is twice the coefficient of x^n in the expansion of $(1 + x)^{2n-1}$.	
25	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.	
26	Find the coefficient of x^5 in the product $(1 + 2x)^6 (1 - x)^7$ using binomial theorem.	

27 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.

28 Evaluate : $(\sqrt{3} + \sqrt{2})^6 - (\sqrt{3} - \sqrt{2})^6$

29 Using binomial theorem, expand the following
(i) $(x + 3y)^3$

30 Find the coefficient of
(i) x^2 in the expansion of $\left(3x - \frac{1}{x}\right)^6$.

31 Find the coefficient of
(i) y^9 in the expansion of $(5 - 2y)^{11}$.

32 Find the coefficient of
(i) x^6 in the expansion of $\left(3x^2 - \frac{1}{3x}\right)^9$.

33 Find the
(i) 5th term from the end in the expansion of $\left(\frac{x}{2} + \frac{2}{x}\right)^{10}$.

34 Find the
(i) 10th term in the expansion of $\left(2x^2 + \frac{1}{x}\right)^{12}$.

35 Using binomial theorem, expand the following
(i) $(2x + 3y)^4$

36 Using binomial theorem, expand the following
(i) $(3x^2 - 2y)^4$

37 Using binomial theorem, expand the following
(i) $\left(2x - \frac{1}{x}\right)^5$

38 Using binomial theorem, expand the following

(i) $(1 - x + x^2)^4$.

39 Using binomial theorem, expand the following

(i) $(1 + x + x^2)^3$.

40 Find the coefficients of,

(a) x^7 in the expansion of $\left(x^2 + \frac{1}{x}\right)^{11}$.

41 Find the

(a) 5th term from the end in the expansion of $\left(\frac{x^3}{2} - \frac{2}{x^2}\right)^9$.

(b) 10th term in the expansion of $\left(\frac{a}{b} - \frac{2b}{a^2}\right)^{12}$.

42 Find the middle term(s) in the expansion of

(i) $(1 + x)^{2n}$.

43 Find the term independent of x in the expansion of

(i) $\left(x^2 + \frac{1}{2x}\right)^{12}$

44 The first three terms in the expansion of $(x + y)^n$ are 1, 56 and 1372 respectively. Find the values of x and y .

45 In the expansion of $(1 + x)^{m+n}$, where m and n are natural numbers, prove that the coefficients of x^m and x^n are equal.

46 The coefficients of 2nd, 3rd and 4th terms in the expansion of $(1 + x)^{2n}$ are in A.P., prove that $2n^2 - 9n + 7 = 0$.

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

- 48 By using binomial theorem, show that
 (i) $3^{2n+2} - 8n - 9$ is divisible by 64, $n \in \mathbb{N}$.
 (ii) $6^n - 5n - 1$ is divisible by 25, $n \in \mathbb{N}$.

49 Compute $(96)^3$.

50 Find the middle term(s) in the expansion of

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

51 Find the term independent of x in the expansion of

(a) $\left(\sqrt{\frac{x}{3}} + \frac{\sqrt{3}}{2x^2}\right)^{10}$

52 If the 21st and 22nd terms in the expansion of $(1 + x)^{44}$ are equal, find the value of x .

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

54 If the coefficients of $(r - 5)^{\text{th}}$ and $(2r - 1)^{\text{th}}$ terms in the expansion of $(1 + x)^{34}$ are equal, find r .

55 Show that

(i) $(\sqrt{2} + 1)^6 - (\sqrt{2} - 1)^6 = 140\sqrt{2}$

56 Show that the middle term in the expansion of $(1 + x)^{2n}$ is $\frac{1 \cdot 3 \cdot 5 \dots (2n-1)}{n!} \cdot 2^n \cdot x^n$.

57 (i) Find $(a + b)^n$, if first three terms of the expansion are 729, 7290 and 30375.
 (ii) The first three terms in the expansion of a binomial are 1, 10, and 40. Find the expansion.

58 In the expansion of $(x + 1)^n$, the coefficients of the 5th, 6th and 7th terms are in A.P. find n .

59

Show that the greatest coefficients in the expansion of $\left(x + \frac{1}{x}\right)^{2n}$ is $\frac{1 \cdot 3 \cdot 5 \dots (2n-1) \cdot 2^n}{n!}$.

60

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

61

The 2nd, 3rd and 4th terms in the expansion of $(x + y)^n$ are 240, 720 and 1080 respectively. Find the values of x, y and n.

62

If the 3rd, 4th, 5th and 6th terms in the expansion of $(x + y)^n$ be a, b, c and d respectively, prove that

$$\frac{b^2 - ac}{c^2 - bd} = \frac{5a}{3c}$$

63

If a_1, a_2, a_3, a_4 are the coefficients of any four consecutive terms in the expansion of $(1 + x)^n$, prove that

$$\frac{a_1}{a_1 + a_2} + \frac{a_3}{a_3 + a_4} = \frac{2a_2}{a_2 + a_3}$$