

MATHEMATICS
WORKSHEET_071125
CHAPTER 06 BINOMIAL THEOREM

SUBJECT: MATHEMATICS

MAX. MARKS : 40

CLASS : XI

DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 10 MCQs of 1 mark each. **Section B** comprises of 4 questions of 2 marks each. **Section C** comprises of 3 questions of 3 marks each. **Section D** comprises of 1 question of 5 marks each and **Section E** comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. For what value of k, coefficients of x^2 and x^3 will be equal in the expansion of $(3 + kx)^9$?
(a) $4/7$ (b) $5/7$ (c) $9/7$ (d) $11/7$
2. Find the number of terms in the expansion of the following : $(1 + 2x + x^2)^{20}$
(a) 41 (b) 42 (c) 43 (d) 44
3. Find the number of terms in the expansion of the following : $(1 + 5\sqrt{2}x)^9 + (1 - 5\sqrt{2}x)^9$
(a) 4 (b) 5 (c) 10 (d) 11
4. Given the integers $r > 1$, $n > 2$ and coefficients of $(3r)$ th and $(r + 2)$ th terms in the binomial expansion of $(1 + x)^{2n}$ are equal then
(a) $n = 2r$ (b) $n = 3r$ (c) $n = 2r + 1$ (d) none of these
5. The total number of terms in the expansion of $(x + a)^{100} + (x - a)^{100}$ after simplification is
(a) 50 (b) 202 (c) 51 (d) none of these
6. The coefficient of x^n in the expansion of $(1 + x)^{2n}$ and $(1 + x)^{2n-1}$ are in the ratio
(a) 1 : 2 (b) 1 : 3 (c) 3 : 1 (d) 2 : 1
7. If the coefficients of x^7 and x^8 in $\left(2 + \frac{x}{3}\right)^n$ are equal then n is equal to
(a) 56 (b) 55 (c) 45 (d) 15
8. The total number of terms in the expansion of $(x + a)^{51} - (x - a)^{51}$ after simplification is
(a) 102 (b) 25 (c) 26 (d) none of these

For Q9 and Q10, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
 - (b) Both A and R are true but R is not the correct explanation of A.
 - (c) A is true but R is false.
 - (d) A is false but R is true.
9. **Assertion (A):** The coefficient of a^4b^5 in the expansion of $(a + b)^9$ is 9C_4 .
Reason (R): The formula of $(a + b)^n$ is ${}^nC_0a^nb^0 + {}^nC_1a^{n-1}b^1 + \dots + {}^nC_na^n$.

10. Assertion (A): The term independent of x in the expansion of $\left(x + \frac{1}{x} + 2\right)^m$ is $\frac{(4m)!}{(2m!)^2}$

Reason (R): The coefficient of x^6 in the expansion of $(1 + x)^n$ is nC_6 .

SECTION – B

Questions 11 to 14 carry 2 marks each.

- 11.** Find the coefficient of x in the expansion of $(1 - 3x + 7x^2)(1 - x)^{16}$.
- 12.** Using Binomial Theorem, indicate which number is larger $(1.1)^{10000}$ or 1000.
- 13.** Using Binomial theorem, find the value of $(0.98)^{14}$ upto 4 places of decimal.
- 14.** 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 .

SECTION – C

Questions 15 to 17 carry 3 marks each.

- 15.** Evaluate: $(\sqrt{3} + \sqrt{2})^6 + (\sqrt{3} - \sqrt{2})^6$
- 16.** Simplify: $(x + \sqrt{x-1})^6 + (\sqrt{x} - \sqrt{x-1})^6$
- 17.** By using binomial theorem show that : $6^n - 5n - 1$ is divisible by 25, $n \in \mathbb{N}$.

SECTION – D

Questions 18 carry 5 marks.

- 18.** Using the binomial theorem, show that $6^n - 5n$ always leaves remainder 1 when divided by 25.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

- 19.** Four friends applied the knowledge of Binomial Theorem while playing a game to make the equations by observing some conditions they make some equations.



- (a) Expand, $(1 - x + x^2)^4$.
- (b) Expand the expression, $(1 - 3x)^7$.

OR

- (b) Show that $11^9 + 9^{11}$ is divisible by 10.

20. Pascal's triangle defines the coefficients which appear in binomial expansions. That means the n th row of Pascal's triangle comprises the coefficients of the expanded expression of the polynomial $(x + y)^n$.

Exponent	Pascal's Triangle															
0	1															
1	1		1													
2	1			2		1										
3	1				3		3		1							
4	1					4		6		4	1					
5	1						5		10		10	5	1			
6	1							6		15		20		15	6	1

The expansion of $(x + y)^n$ is:

$$(x + y)^n = a_0x^n + a_1x^{n-1}y + a_2x^{n-2}y^2 + \dots + a_{n-1}xy^{n-1} + a_ny^n$$

Based on the above data answer any four of the following questions.

- Find the number of terms in the expansion of $(x + y)^6$
- Find the coefficient of the fifth term in the expansion of $(x + y)^6$
- Find the number of terms in the expansion of $(x + y)^{10} (x - y)^{10}$
- Find the number of terms in $(x + y)^{10} + (x - y)^{10}$

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