NCERT Solutions Class 11 Maths
Chapter 7: Binomial Theorem
EXERCISE 7.1

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Quick Summary: In NCERT Solutions Class 11 Maths Chapter 7 Exercise 7.1, students learn to expand binomial expressions using the Binomial Theorem for positive integers. This exercise covers fundamental expansion techniques and general term formulas which are essential for CBSE Class 11 exams and form the foundation for advanced algebraic concepts in higher mathematics.

Key Takeaways:

- Master the Binomial Theorem formula: (a+b)^n = \sum_r=0^n \binom(n)/(r) a^n-r b^r
- Learn to find the general term: T_r+1 = \binom(n)/(r) a^n-r b^r in binomial expansion
- Practice expanding expressions with negative terms like (1-2x)^6 and fractional forms
- Develop skills in calculating binomial coefficients using \binom(n)/(r) = (n!)/(r!(n-r)!)

Complete Solutions

Question 1

QUESTION

Expand (1 - 2x)^5.

SOLUTION

We are asked to expand the binomial expression using the Binomial Theorem.

Step 1: Recall the Binomial Theorem

The Binomial Theorem states that for any positive integer :

where are the binomial coefficients.

Step 2: Identify , , and in our expression

In our case, , , and .

Step 3: Apply the Binomial Theorem

We will expand using the formula:

Step 4: Calculate the binomial coefficients and simplify

, , , , ,

So, the expansion becomes:

Step 5: Simplify further

Final Answer:

ANSWER

1 - 10x + 40x^2 - 80x^3 + 80x^4 - 32x^5

Question 2

QUESTION

Expand \left((2)/(x) - (x)/(2) \right)^5.

SOLUTION

We need to expand the binomial expression using the binomial theorem.

Step 1: Recall the Binomial Theorem

The binomial theorem states that for any positive integer :

In our case, , , and .

Step 2: Apply the Binomial Theorem

Step 3: Expand the summation

We will calculate each term of the expansion:

For :

For :

For :

For :

For :

For :

Step 4: Combine the terms

Adding all the terms together, we get:

Final Answer:

ANSWER

(32)/(x^5) - (40)/(x^3) + (20)/(x) - 5x + (5)/(8)x^3 - (x^5)/(32)

Question 3

QUESTION

Expand (2x - 3)^6.

SOLUTION

We need to expand using the Binomial Theorem.

Step 1: Recall the Binomial Theorem

The Binomial Theorem states that for any positive integer :

In our case, , , and .

Step 2: Apply the Binomial Theorem

Expanding the summation:

Step 3: Calculate the binomial coefficients and simplify

, , , , , ,

So,

Step 4: Simplify further

Final Answer:

ANSWER

64x^6 - 576x^5 + 2160x^4 - 4320x^3 + 4860x^2 - 2916x + 729

Question 4

QUESTION

Expand \left((x)/(3) + (1)/(x) \right)^5.

SOLUTION

We need to expand the binomial expression using the binomial theorem.

Step 1: Recall the Binomial Theorem

The binomial theorem states that for any non-negative integer :

In our case, , , and .

Step 2: Apply the Binomial Theorem

Step 3: Calculate the binomial coefficients and simplify each term

, , , , ,

Term 1:

Term 2:

Term 3:

Term 4:

Term 5:

Term 6:

Step 4: Combine the terms

Final Answer:

ANSWER

(x^5)/(243) + (5x^3)/(81) + (10x)/(27) + (10)/(9x) + (5)/(3x^3) + (1)/(x^5)

Question 5

QUESTION

Expand \left(x + (1)/(x) \right)^6.

SOLUTION

We need to expand the binomial expression using the binomial theorem.

Step 1: Recall the Binomial Theorem

The binomial theorem states that for any non-negative integer :

In our case, , , and .

Step 2: Apply the Binomial Theorem

We will expand the expression using the formula:

Step 3: Calculate the Binomial Coefficients

We need to calculate the binomial coefficients:

, , , , , ,

Step 4: Simplify the Expression

Substitute the binomial coefficients into the expansion:

Simplify each term:

Final Answer:

ANSWER

x^6 + 6x^4 + 15x^2 + 20 + (15)/(x^2) + (6)/(x^4) + (1)/(x^6)

Question 6

QUESTION

Using Binomial Theorem, evaluate 96^3.

SOLUTION

We need to evaluate using the Binomial Theorem. The key is to express 96 as a sum or difference that makes the calculation easier.

Step 1: Express 96 as a difference

We can write as . This is convenient because 100 is easy to raise to powers.

So, .

Step 2: Apply the Binomial Theorem

The Binomial Theorem states that for any positive integer :

In our case, , , and . Therefore:

Step 3: Calculate the binomial coefficients and simplify

We have:

, , ,

So:

Step 4: Perform the arithmetic

Final Answer:

ANSWER

884736

Question 7

QUESTION

Using Binomial Theorem, evaluate 102^5.

SOLUTION

We are asked to evaluate using the Binomial Theorem.

Step 1: Express 102 as a sum

We can write 102 as . This allows us to use the Binomial Theorem.

Step 2: Apply the Binomial Theorem

The Binomial Theorem states that for any positive integer :

In our case, , , and . So we have:

Step 3: Calculate the binomial coefficients and simplify

We have:

, , , , ,

Substituting these values, we get:

Step 4: Add the terms

Final Answer:

ANSWER

11040808032

Question 8

QUESTION

Using Binomial Theorem, evaluate 101^4.

SOLUTION

We are asked to evaluate using the Binomial Theorem. The key idea is to express 101 as a sum that makes the binomial expansion easier to compute.

Step 1: Express 101 as a sum

We can write as . Therefore, .

Step 2: Apply the Binomial Theorem

The Binomial Theorem states that for any non-negative integer :

In our case, , , and . So we have:

Step 3: Calculate the binomial coefficients

, , , ,

Step 4: Substitute the binomial coefficients and simplify

Step 5: Add the terms

Therefore, .

ANSWER

104060401

Question 9

QUESTION

Using Binomial Theorem, evaluate 99^5.

SOLUTION

We need to evaluate using the Binomial Theorem. The key idea is to express 99 as a difference from a convenient power of 10, namely 100.

Step 1: Express 99 as a difference

We can write as , or . Therefore, .

Step 2: Apply the Binomial Theorem

The Binomial Theorem states that for any non-negative integer :

In our case, , , and . So we have:

Step 3: Calculate the binomial coefficients and simplify

We have:

, , , , ,

So the expression becomes:

Step 4: Perform the arithmetic

Final Answer:

ANSWER

9509900499

Question 10

QUESTION

Using Binomial Theorem, indicate which number is larger: (1.1)^10000 or 1000.

SOLUTION

We want to determine whether is greater than 1000 using the Binomial Theorem.

Step 1: Express 1.1 as a sum

We can write as , or . This allows us to use the Binomial Theorem.

Step 2: Apply the Binomial Theorem

Using the Binomial Theorem, we have:

Step 3: Expand the first few terms

Let's expand the first few terms of the binomial expansion:

Step 4: Analyze the result

From the first three terms alone, we have: The sum of just these three terms is already much larger than 1000. Since all the terms in the binomial expansion are positive, the entire sum will be even larger.

Step 5: Conclude

Therefore, .

ANSWER

(1.1)^10000 > 1000

Question 11

QUESTION

Find (a + b)^4 - (a - b)^4. Hence, evaluate (√3 + √2)^4 - (√3 - √2)^4.

SOLUTION

This question involves expanding binomial expressions using the binomial theorem and then simplifying. We will first expand and , then find the difference, and finally substitute the given values to evaluate the expression.

Step 1: Expand using the binomial theorem

Using the binomial theorem, we have:

Step 2: Expand using the binomial theorem

Similarly, we have:

Step 3: Find the difference

Subtracting the second expansion from the first:

Step 4: Substitute and

Now, we substitute and into the simplified expression:

Final Answer:

ANSWER

8(a^3b + ab^3);\ 40√6

Question 12

QUESTION

Find (x + 1)^6 + (x - 1)^6. Hence evaluate (√2 + 1)^6 + (√2 - 1)^6.

SOLUTION

This question involves expanding binomial expressions using the binomial theorem and then simplifying. We will first expand and , then add them. Finally, we will substitute to evaluate the given expression.

Step 1: Expand and using the binomial theorem

Recall the binomial theorem: **.** We have:

Similarly,

Step 2: Add the two expansions

Adding and , we notice that the odd power terms cancel out:

Step 3: Substitute

Now, substitute into the simplified expression:

Final Answer:

ANSWER

2(x^6 + 15x^4 + 15x^2 + 1),\ 198

Question 13

QUESTION

Show that 9^n+1 - 8n - 9 is divisible by 64 whenever n is a positive integer.

SOLUTION

We need to prove that is divisible by 64 for all positive integers .

Step 1: Rewrite using the binomial theorem

We can write as . Therefore, . Using the binomial theorem:

Step 2: Substitute the binomial expansion into the expression

Substitute the expansion of into the original expression:

Step 3: Simplify the expression

Step 4: Show divisibility by 64

Notice that the first term is not necessarily divisible by 64. However, let's consider only the first two terms of the binomial expansion:

All terms from the third term onwards in the binomial expansion will have or higher powers of 8 as factors, so they are divisible by 64.

Consider the first two terms: . If we only consider up to the term with , we have . Then . We need to consider at least up to the term.

Then . So we have . Since either or is even, is always even. So for some integer . Then , which is divisible by 64.

Therefore, is divisible by 64.

ANSWER

40\sqrt{6}

Question 14

QUESTION

Prove that \sum_r=0^n 3^r \binom(n)/(r) = 4^n.

SOLUTION

This question requires us to prove an identity involving the binomial coefficients and powers of 3. We will use the Binomial Theorem to prove this.

Step 1: Recall the Binomial Theorem

The Binomial Theorem states that for any non-negative integer and any real numbers and :

Step 2: Choose appropriate values for and

We want to prove that . Notice that the left-hand side has the term and . If we set and in the Binomial Theorem, we get:

Step 3: Simplify the expression

Since for any and , the expression simplifies to:

Step 4: Evaluate the left-hand side

We have:

Step 5: Combine the results

Therefore, we have:

Which is the same as:

Final Answer:

Thus, we have proven that .

ANSWER

Answer not provided in the screenshot.

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Key Formulas

Important Formulas for Exercise 7.1

Formula / Concept	Description
Binomial Theorem for any positive integer n	For any positive integer n, the expansion of a binomial (a + b) is given by: (a+b)^n = \sum_k=0^n \binom(n)/(k) a^n-k b^k which can be written as: (a+b)^n = \binom(n)/(0)a^n + \binom(n)/(1)a^n-1b + \binom(n)/(2)a^n-2b^2 + \dots + \binom(n)/(n-1)ab^n-1 + \binom(n)/(n)b^n
Binomial Coefficients	The coefficients \binom(n)/(k) (read as "n choose k") in the binomial expansion are called binomial coefficients. They are calculated using the formula: \binom(n)/(k) = C(n,k) = (n!)/(k!(n-k)!) where n! (n factorial) is the product of all positive integers up to n.
General Term Formula	The (r+1)^th term in the expansion of (a+b)^n is called the general term and is denoted by T_r+1. It is given by the formula: T_r+1 = \binom(n)/(r) a^n-r b^r This formula is used to find any specific term in the expansion without having to write out the entire expansion.
Pascal's Triangle	A triangular array of numbers where each number is the sum of the two numbers directly above it. The numbers in the n^th row of Pascal's triangle correspond to the binomial coefficients \binom(n-1)/(k) for k = 0, 1, 2, \dots, n-1. It provides a simple way to find the binomial coefficients for smaller values of n.
Properties of Binomial Expansion	• The total number of terms in the expansion of (a+b)^n is n+1. • In each term of the expansion, the sum of the powers of a and b is equal to n. • The binomial coefficients of terms equidistant from the beginning and the end are equal, i.e., \binom(n)/(k) = \binom(n)/(n-k).

❓ Top FAQs

Q1. How many questions are in NCERT Solutions Class 11 Maths Chapter 7 Binomial Theorem Exercise 7.1 for CBSE board exam 2025-26?

Exercise 7.1 of NCERT Solutions for Class 11 Maths Chapter 7 Binomial Theorem contains exactly 14 questions. These questions focus on applying the Binomial Theorem for positive integers and finding general terms, which are crucial for CBSE board exam 2025-26 preparation.

Q2. Where can I download free PDF of NCERT Solutions for Class 11 Maths Chapter 7 Binomial Theorem Exercise 7.1 with step by step solutions?

You can download the free PDF of NCERT Solutions for Class 11 Maths Chapter 7 Binomial Theorem Exercise 7.1 from the official NCERT website or various educational platforms offering step by step solutions. These PDFs are updated according to the latest CBSE syllabus 2025-26 and include detailed explanations for all 14 questions in Exercise 7.1.

Q3. How many marks does Binomial Theorem Chapter 7 Exercise 7.1 carry in CBSE Class 11 Maths board exam 2025-26?

The Binomial Theorem (Chapter 7) carries approximately 5 marks in the CBSE Class 11 Maths board exam 2025-26 as part of Unit II - Algebra. Exercise 7.1 covers fundamental concepts like Binomial Theorem for positive integers and general term formula, which are essential for scoring full marks in this unit.

Q4. Which is the most difficult question in NCERT Solutions Class 11 Maths Chapter 7 Binomial Theorem Exercise 7.1 for CBSE 2025-26?

Questions 11 to 14 in Exercise 7.1 of Class 11 Maths Chapter 7 Binomial Theorem are considered the most difficult as they involve finding specific terms and coefficients using the general term formula. These questions require strong conceptual understanding and practice with step by step solutions to master for CBSE board exam 2025-26.

Q5. What is Binomial Theorem for Positive Integer explained in NCERT Class 11 Maths Chapter 7 Exercise 7.1 with examples?

The Binomial Theorem for positive integer n states that $(a+b)^n = {}^nC_0a^n + {}^nC_1a^{n-1}b + {}^nC_2a^{n-2}b^2 + \ldots + {}^nC_nb^n$, as explained in NCERT Class 11 Maths Chapter 7 Exercise 7.1. This theorem helps expand binomial expressions and forms the foundation for all 14 questions in this exercise, essential for CBSE board exam 2025-26.

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