NCERT Solutions Class 11 Maths
Chapter 6: Permutations and Combinations
EXERCISE 6.4

Document Information:
Class: 11 | **Subject:** Mathematics | **Chapter:** 6 | **Exercise:** 6.4
Total Questions: 9 | **Academic Year:** 2025-26
Source: www.ncertbooks.net | **Generated:** February 21, 2026

Quick Summary: In NCERT Solutions Class 11 Maths Chapter 6 Exercise 6.4, students learn to solve advanced combination problems using the ^nC_r formula and its properties. This exercise covers binomial coefficient properties, ratio problems, and real-world applications like selecting objects and forming geometric arrangements, which are essential concepts frequently tested in CBSE board exams and competitive entrance tests.

Key Takeaways:

- Master the combination formula ^nC_r = (n!)/(r!(n-r)!) and properties like ^nC_r = ^nC_n-r
- Learn to solve ratio-based combination problems by setting up equations using ^nC_r values
- Apply combinations to geometric problems like finding chords formed by points on a circle
- Understand selection problems with multiple groups (boys/girls) and conditional constraints for colored objects

Complete Solutions

Question 1

QUESTION

If ^nC_8 = ^nC_2, find ^nC_2.

SOLUTION

This question tests our understanding of combinations and the properties of binomial coefficients. Specifically, it uses the property that if , then either or .

Step 1: Apply the property of combinations

We are given that . This implies that either (which is false) or .

Therefore, .

Step 2: Substitute the value of n into

We need to find the value of , and we now know that . So we need to calculate .

Step 3: Calculate using the formula for combinations

The formula for combinations is:

In our case, and , so we have:

Step 4: Simplify the factorial expression

We can simplify the expression as follows:

Final Answer:

This method works because it utilizes the fundamental properties of combinations. A common mistake is to incorrectly apply the formula for combinations or to forget the property that implies when .

ANSWER

^nC_2 = 45

Question 2

QUESTION

Determine n if

(i) ^2nC_3 : ^nC_3 = 12 : 1

(ii) ^2nC_3 : ^nC_3 = 11 : 1

SOLUTION

This question involves solving for using the ratio of combinations. We will use the formula for combinations: .

(i)

Step 1: Write the ratio as a fraction

We can rewrite the given ratio as:

Step 2: Expand the combinations using the formula

Using the formula , we have:

and

So, the equation becomes:

Step 3: Simplify the equation

We can simplify the fraction:

Step 4: Solve for n

Final Answer:

(ii)

Step 1: Write the ratio as a fraction

We can rewrite the given ratio as:

Step 2: Expand the combinations using the formula

Using the formula , we have:

and

So, the equation becomes:

Step 3: Simplify the equation

We can simplify the fraction (as in part (i)) to get:

Step 4: Solve for n

Final Answer:

ANSWER

(i) n = 5

(ii) n = 6

Question 3

QUESTION

How many chords can be drawn through 21 points on a circle?

SOLUTION

This question tests our understanding of combinations. We need to determine how many chords can be formed by connecting 21 distinct points on a circle.

Step 1: Understand the definition of a chord

A chord is a line segment that connects two points on a circle.

Step 2: Relate chords to combinations

To draw a chord, we need to choose two points out of the given 21 points. The order in which we choose the points does not matter (i.e., choosing point A then point B results in the same chord as choosing point B then point A). Therefore, this is a combination problem.

Step 3: Apply the combination formula

The number of ways to choose 2 points out of 21 is given by the combination formula:

In our case, (total number of points) and (number of points to choose for each chord).

So, we have:

Step 4: Simplify the expression

Step 5: State the final answer

Therefore, the number of chords that can be drawn through 21 points on a circle is 210.

Final Answer:

ANSWER

210

Question 4

QUESTION

In how many ways can a team of 3 boys and 3 girls be selected from 5 boys and 4 girls?

SOLUTION

This question tests our understanding of combinations, specifically how to select a group of items (boys and girls) from a larger set, where the order of selection doesn't matter.

Step 1: Selecting the boys

We need to select 3 boys from a group of 5. This is a combination problem, and the number of ways to do this is given by . Recall that the combination formula is: where is the total number of items, and is the number of items to choose.

So, for selecting the boys, we have: There are 10 ways to select 3 boys from 5.

Step 2: Selecting the girls

We need to select 3 girls from a group of 4. The number of ways to do this is given by . Using the combination formula: There are 4 ways to select 3 girls from 4.

Step 3: Combining the selections

Since the selection of boys and the selection of girls are independent events, we multiply the number of ways to select the boys by the number of ways to select the girls to get the total number of ways to form the team.

Total number of ways = (Ways to select boys) (Ways to select girls) =

Final Answer: The team of 3 boys and 3 girls can be selected in ways.

ANSWER

40

Question 5

QUESTION

Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.

SOLUTION

This question asks us to find the number of ways to select 9 balls from a collection of red, white, and blue balls, with the condition that we must select exactly 3 balls of each color.

Step 1: Analyze the given information

We have 6 red balls, 5 white balls, and 5 blue balls. We need to select 9 balls in total, with 3 balls of each color.

Step 2: Calculate the number of ways to select 3 red balls

We need to choose 3 red balls out of 6. This can be done in ways. Using the formula for combinations, , we have:

So, there are 20 ways to select 3 red balls.

Step 3: Calculate the number of ways to select 3 white balls

We need to choose 3 white balls out of 5. This can be done in ways:

So, there are 10 ways to select 3 white balls.

Step 4: Calculate the number of ways to select 3 blue balls

We need to choose 3 blue balls out of 5. This can be done in ways:

So, there are 10 ways to select 3 blue balls.

Step 5: Calculate the total number of ways to select 9 balls

Since the selections of red, white, and blue balls are independent events, we multiply the number of ways to select each color:

Final Answer: The number of ways of selecting 9 balls with 3 balls of each color is .

ANSWER

2000

Question 6

QUESTION

Determine the number of 5-card combinations out of a deck of 52 cards if there is exactly one ace in each combination.

SOLUTION

This question tests our understanding of combinations, specifically how to choose a subset of items from a larger set where one of the items has a specific constraint (exactly one ace).

Step 1: Identify the components

A standard deck of cards has 52 cards, which includes 4 aces and 48 non-ace cards.

Step 2: Choose one ace

We need to choose exactly one ace from the four available aces. The number of ways to do this is given by the combination formula:

So, there are 4 ways to choose one ace.

Step 3: Choose the remaining cards

Since we need a 5-card combination and we've already chosen 1 ace, we need to choose 4 more cards. These 4 cards must be chosen from the remaining 48 non-ace cards. The number of ways to do this is:

So, there are 194,580 ways to choose the remaining 4 cards.

Step 4: Combine the choices

To find the total number of 5-card combinations with exactly one ace, we multiply the number of ways to choose one ace by the number of ways to choose the remaining 4 cards:

Final Answer: The number of 5-card combinations with exactly one ace is .

ANSWER

778320

Question 7

QUESTION

In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers?

SOLUTION

We need to select a cricket team of 11 players from a pool of 17 players, with the condition that the team must have exactly 4 bowlers, and we only have 5 players who can bowl.

Step 1: Determine the number of ways to choose the bowlers

We need to select 4 bowlers out of the 5 available bowlers. This can be done in ways.

Recall that the combination formula is:

So,

Therefore, there are 5 ways to select the 4 bowlers.

Step 2: Determine the number of ways to choose the remaining players

Since we need a team of 11 players and we have already selected 4 bowlers, we need to select more players.

We started with 17 players, and 5 of them are bowlers. This means players are not bowlers.

So, we need to select 7 players from these 12 non-bowlers. This can be done in ways.

Therefore, there are 792 ways to select the remaining 7 players.

Step 3: Calculate the total number of ways to form the team

To find the total number of ways to form the team, we multiply the number of ways to choose the bowlers by the number of ways to choose the remaining players.

Total ways =

Final Answer: The total number of ways to select the cricket team is .

ANSWER

3960

Question 8

QUESTION

A bag contains 5 black and 6 red balls. Determine the number of ways in which 2 black and 3 red balls can be selected.

SOLUTION

This question tests our understanding of combinations, specifically how to select items from different groups. We need to find the number of ways to select 2 black balls out of 5 and 3 red balls out of 6, and then combine these selections.

Step 1: Selecting 2 black balls from 5

We need to choose 2 black balls from a total of 5. This is a combination problem, as the order of selection doesn't matter. The number of ways to do this is given by , which is calculated as:

So, there are 10 ways to select 2 black balls from 5.

Step 2: Selecting 3 red balls from 6

Similarly, we need to choose 3 red balls from a total of 6. The number of ways to do this is given by , which is calculated as:

So, there are 20 ways to select 3 red balls from 6.

Step 3: Combining the selections

Since we need to select both the black balls *and* the red balls, we multiply the number of ways to select each color. This is because for each way of selecting the black balls, there are multiple ways to select the red balls.

Total number of ways = (Ways to select 2 black balls) (Ways to select 3 red balls)

Total number of ways =

Therefore, the number of ways in which 2 black and 3 red balls can be selected is 200.

ANSWER

200

Question 9

QUESTION

In how many ways can a student choose a programme of 5 courses if 9 courses are available and 2 specific courses are compulsory for every student?

SOLUTION

This question tests our understanding of combinations, specifically when certain items are always included. We need to find the number of ways a student can choose 5 courses out of 9, given that 2 courses are compulsory.

Step 1: Account for the compulsory courses

Since 2 courses are compulsory, the student must choose these 2 courses. This means the student only needs to choose more courses.

Step 2: Determine the remaining courses to choose from

Out of the 9 available courses, 2 are already chosen (the compulsory ones). So, the student can choose from the remaining courses.

Step 3: Calculate the number of ways to choose the remaining courses

We need to choose 3 courses from the remaining 7. This is a combination problem, as the order in which the courses are chosen does not matter. The number of ways to choose 3 courses from 7 is given by the combination formula:

In our case, and . So we have:

Step 4: Simplify the combination

Step 5: State the final answer

Therefore, the student can choose a program of 5 courses in 35 ways.

Answer:

ANSWER

35

📚 Relevant Resources

Explore more NCERT solutions (click links to visit):

Resource	Visit Link
NCERT Exemplar Class 11 Chemistry MCQs	Practice MCQs →
NCERT Exemplar Class 11 Biology MCQs	Practice MCQs →
NCERT Class 10 Maths (Review)	View Solutions →

Key Formulas

Important Formulas for Exercise 6.4

Formula / Concept	Description
Combination (Selection)	A combination is a selection of items from a collection where the order of selection does not matter.
Combination Formula (^nC_r)	The number of combinations of 'n' different things taken 'r' at a time is given by the formula: $^nC_r = (n!)/(r!(n-r)!)$ where $0 \le r \le n$. It can also be denoted as C(n, r).
Permutation Formula (^nP_r)	A permutation is an arrangement of 'r' things from a set of 'n' things where the order matters. The formula is: $^nP_r = (n!)/((n-r)!)$
Relationship between Permutation and Combination	The number of permutations is related to the number of combinations by the formula: $^nP_r = r! \times {^nC_r}$
Factorial (n!)	The product of all positive integers up to 'n'. $n! = n \times (n-1) \times (n-2) \times \dots \times 1$ By definition, $0! = 1$.
Property 1: ^nC_n	The number of ways to choose 'n' items from a set of 'n' items is 1. $^nC_n = 1$
Property 2: $^nC_0$	The number of ways to choose 0 items from a set of 'n' items is 1. $^nC_0 = 1$
Property 3 (Symmetry)	The number of ways to choose 'r' items from 'n' is the same as choosing 'n-r' items. $^nC_r = {^nC_{n-r}}$
Property 4 (Pascal's Rule)	This property relates combinations of size 'n' to combinations of size 'n-1'. $^nC_r + {^nC_{r-1}} = {^{n+1}C_r}$

❓ Top FAQs

Q1. How many questions are in NCERT Solutions Class 11 Maths Chapter 6 Permutations and Combinations Exercise 6.4 for CBSE 2025-26?

Exercise 6.4 of NCERT Solutions for Class 11 Maths Chapter 6 Permutations and Combinations contains exactly 9 questions. These questions focus on the application of combinations and nCr formula, 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 6 Permutations and Combinations Exercise 6.4 with step by step solutions?

You can download the free PDF of NCERT Solutions for Class 11 Maths Chapter 6 Exercise 6.4 from the official NCERT website or trusted educational platforms offering step by step solutions. These PDFs are updated for the CBSE 2025-26 session and include detailed explanations of all 9 questions on combinations and nCr formula.

Q3. How many marks does Permutations and Combinations Chapter 6 Exercise 6.4 carry in CBSE Class 11 board exam 2025-26?

Permutations and Combinations (Chapter 6) carries 5 marks in CBSE Class 11 board exam 2025-26 under Unit II - Algebra. Exercise 6.4 focusing on combinations and nCr formula is an important part of this weightage and frequently appears in board examinations.

Q4. Which is the most difficult question in Exercise 6.4 of NCERT Solutions Class 11 Maths Chapter 6 Permutations and Combinations?

Questions 8 and 9 in Exercise 6.4 of NCERT Solutions for Class 11 Maths Chapter 6 are considered most difficult as they involve complex applications of nCr formula and combinations. These questions require thorough understanding of selection concepts and multiple condition problems for CBSE board exam 2025-26.

Q5. What is nCr Formula explained in NCERT Solutions Class 11 Maths Chapter 6 Permutations and Combinations Exercise 6.4?

The nCr formula in NCERT Class 11 Maths Chapter 6 Exercise 6.4 is nCr = n!/(r!(n-r)!), where n is the total number of items and r is the number of items to be selected. This combinations formula is fundamental for solving all 9 questions in Exercise 6.4 and is important for CBSE board exam 2025-26.

📚 More Exercises

Visit all exercises from Chapter 6:

EXERCISE 6.1 →

EXERCISE 6.2 →

EXERCISE 6.3 →

EXERCISE 6.4 ✓ →

🌐 **Complete Chapter:** [Class 11 Maths Ch 6: Permutations and Combinations →]
