

Permutations and Combinations — Assignment 2

Class 11 Maths · Higher-difficulty challenge set + integrated problems · Answer key included · Narayan Gurukul Academy

Instructions: (1) Attempt all questions; start with the topic-wise challenge set, then attempt the integrated (multi-topic) problems.
(2) Give all answers with correct SI units. $g = 10 \text{ m/s}^2$ unless stated.
(3) A final answer key is provided at the end — try the full set before checking it.

Part A — Topic-wise challenge questions

Fundamental Principle of Counting

1. A password consists of 2 letters followed by 2 digits. How many passwords are possible (repetition allowed)?
2. In how many ways can a person choose one book from 5 English and 4 Hindi books?
3. Find the number of ways a 3-digit number can be formed from the digits 1–9 with and without repetition.

Factorials and Permutations

1. Evaluate $8P3$.
2. Evaluate $4! - 3!$.
3. Find the value of n if $nP2 = 30$.

Permutations of Objects Not All Distinct

1. Find the number of distinct permutations of the letters of 'ALLAHABAD'.
2. In how many ways can the letters of 'INDIA' be arranged?
3. Find the number of distinct permutations of the letters of the word 'MISSISSIPPI'.

Circular Permutations

1. In how many ways can 6 people sit around a round table?
2. In how many ways can a garland be made from 6 different flowers?
3. In how many ways can 5 boys and 5 girls sit around a round table such that boys and girls alternate?

Combinations

1. Evaluate $8C3$.
2. In how many ways can a committee of 4 be chosen from 10 people?
3. In how many ways can a committee of 5 be chosen from 6 men and 4 women so as to include exactly 2 women?

Key Properties and Relations

1. If $nC2 = 15$, find n .
2. Prove that $nCr + nC(r-1) = (n+1)Cr$.
3. Find n if $2nC3 : nC2 = 12 : 1$.

Part B — Integrated problems (multi-topic)

1. Evaluate $8P3$ and $8C3$ and state the relation between them.
2. In how many ways can the letters of 'INDIA' be arranged?
3. In how many ways can 6 people sit around a round table?
4. In how many ways can a committee of 5 be chosen from 6 men and 4 women so as to include exactly 2 women?
5. If $nC2 = 15$, find n .

Answer Key

Fundamental Principle of Counting

$26 \times 26 \times 10 \times 10 = 67600$ passwords. $5 + 4 = 9$ ways. 3-digit with repetition $9^3 = 729$; without repetition $9P3 = 504$.

Factorials and Permutations

$8P3 = 336$. $4! - 3! = 24 - 6 = 18$. $nP2 = n(n-1) = 30 \Rightarrow n = 6$.

Permutations of Objects Not All Distinct

ALLAHABAD: $9!/(4! 2!) = 7560$. INDIA: $5!/2! = 60$. MISSISSIPPI: $11!/(4! 4! 2!) = 34650$.

Circular Permutations

6 people round a table: $(6-1)! = 120$. Garland of 6 flowers: $(6-1)!/2 = 60$. 5 boys and 5 girls alternating: $2 \times 4! \times 5! = 5760$.

Combinations

$8C3 = 56$. Committee of 4 from 10 = 210. Exactly 2 women from 4 and 3 men from 6: $4C2 \times 6C3 = 6 \times 20 = 120$.

Key Properties and Relations

$nC2 = 15 \Rightarrow (n-1)/2 = 15 \Rightarrow n = 6$. Pascal-type identity $nCr + nC(r-1) = (n+1)Cr$. $2nC3 : nC2 = 12 : 1 \Rightarrow n = 6$.

Integrated problems

1: $8P3 = 336$, $8C3 = 56$, $8P3 = 3! \times 8C3$. 2: 60. 3: 120. 4: 120. 5: $n = 6$.