

RAM Maths Circle

September 21, 2025

Nagpur

Introduction

In this session, participants were introduced to the fundamentals of Permutations and Combinations (PnC). The focus was on understanding the basic counting principles through the rules of addition and multiplication. The session emphasized how structured reasoning and systematic counting lay the foundation for solving complex mathematical and real-life problems. Participants, though initially were confused, were able to differentiate between the rules, developing clarity in applying counting principles, and enhanced their logical problem-solving skills.

Problem 1:

Problem: How many 2-letter words start with A or B when repetition is allowed?:

Problem 2:

Problem: How many 3-letter words start with A or B? (both with repetition and without repetition)

Problem 3:

Problem: In how many ways can 3 math, 4 history, 3 chemistry, and 2 biology books be arranged so that the same subjects are together?

Problem 4:

Problem: A question paper has 2 parts, A and B. Part A consists of 6 questions and Part B consists of 7 questions. In how many ways can 10 questions be solved if it's mandatory to solve 4 questions from each part?

Task for Students

1. Consider a 10-digit number $a_1 a_2 \dots a_{10}$, where each digit is 0 or 1, and the first digit $a_1=1$. If the sum of the digits in the odd positions is equal to the sum of the digits in the even positions, i.e. $a_1 + a_3 + a_5 + a_7 + a_9 = a_2 + a_4 + a_6 + a_8 + a_{10}$, how many such 10-digit numbers are possible?

