

# Permutations and Combinations

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# Permutations Example

- ▶ **Problem:** Arrange 3 letters: A, B, C.
- ▶ Generate all possible orders.
- ▶ **Step-by-Step:**
  1. Result: [ABC, ACB, BAC, BCA, CAB, CBA] (6 ways).

# Combinations Example

- ▶ **Problem:** Choose 2 letters from A, B, C.
- ▶ Order doesn't matter.
- ▶ **Step-by-Step:**
  1. Result: [AB, AC, BC] (3 ways).

# Permutations and Combinations

- ▶ **Permutations:** All ordered arrangements.  $n!$  ways for  $n$  items.
- ▶ **Combinations:** Unordered selections.  $\binom{n}{k}$  ways.
- ▶ **Time Complexity:**  $O(n!)$  for permutations,  $O(\binom{n}{k})$  for combinations.
- ▶ **Space Complexity:**  $O(n)$ .