

# Permutation Combination And Probability: Basic To Advanced

## Permutation, Combination, and Probability: A Comprehensive Guide from Basic to Advanced

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★★★★★ 5 out of 5

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The fundamental concepts of permutation, combination, and probability are essential tools in diverse fields such as mathematics, statistics, computer science, and engineering. Understanding these concepts enables problem-solving, decision-making, and predicting outcomes in various real-world scenarios. This comprehensive guide provides a thorough to permutation, combination, and probability, covering basic to advanced topics.

## Permutation: Arranging Objects

### ### Definition

A permutation refers to the arrangement of objects in a specific order. The number of permutations of  $n$  objects taken  $r$  at a time is denoted as  $P(n, r)$ .

### ### Formula

$$P(n, r) = n * (n-1) * \dots * (n-r+1)$$

### ### Example

Suppose you have 5 books and want to arrange them on a shelf. The number of permutations for arranging these books is:

$$P(5, 5) = 5 * 4 * 3 * 2 * 1 = 120$$

## ## Combination: Selecting Objects

### ### Definition

A combination refers to the selection of objects without regard to their order. The number of combinations of  $n$  objects taken  $r$  at a time is denoted as  $C(n, r)$ .

### ### Formula

$$C(n, r) = P(n, r) / r!$$

where  $r!$  represents the factorial of  $r$ , defined as  $1 * 2 * 3 * \dots * r$ .

### ### Example

Suppose you have 8 different types of sandwiches and want to select 3 sandwiches for lunch. The number of combinations for selecting these sandwiches is:

$$C(8, 3) = \frac{P(8, 3)}{3!} = 56$$

## ## Probability: Predicting Outcomes

### ### Definition

Probability measures the likelihood of an event occurring. It is expressed as a number between 0 and 1, where 0 represents impossibility and 1 represents certainty.

### ### Basic Rules

- The probability of an event A occurring is denoted as  $P(A)$ . -  $0 \leq P(A) \leq 1$



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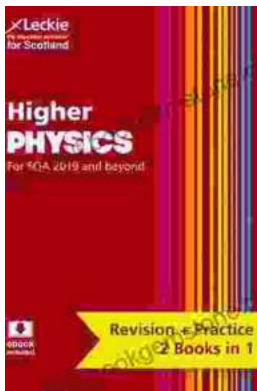
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