

Probability Section 3.5 Counting

Combinations and Permutations

In English we use the word "combination" loosely. We say things like:

- "My fruit salad is a combination of apples, grapes and bananas"
- "The combination to the safe is 472".

When the order doesn't matter, it is a **Combination**.

When the order does matter it is a **Permutation**.

Permutations and Combinations: Consider having the letters A, B, C, D. Let's choose two of the letters.

In how many different ways can we arrange two of the 4 letters? In how many different ways can we combine two of the 4 letters?

Permutations: We use permutations when n is the number of things to choose from, and we choose r of them, no repetitions, order matters.
Formula:

Calculator instructions:

Example 1. A volleyball team has 10 players, how many 6 player starting line up are possible?

Combinations We use combination when n is the number of things to choose from, and we choose r of them, no repetition, order doesn't matter.

Formula:

Calculator instructions:

Example 2. Four lawyers are to be selected from a group of 30 lawyers to work on a project.

1. How many different ways can the lawyers be selected to work on the project?
2. In how many ways can the group of 4 be selected if a certain lawyer must work on the project?

Example 3. In a student club with 9 sophomores and 11 freshman members, a 5- member committee will be randomly chosen. How many ways can a committee be chosen with 3 sophomores and 2 freshmen?