Counting 3

Comparison of similar problems

When we count, we have to understand the problem situation well in order to determine the extent to which order matters. Compare the following four similar problems.

- In a club with 20 members, a committee of four is to be chosen. How many ways of doing this are there if
  - the first chosen is chair, the second vice-chair, and the third secretary?
  - the first chosen is chair, and the others are just members.
  - the first chosen is chair, the second secretary, and the others just members
  - all chosen are just members?

For which version of the problem does order matter most? Least?

Example

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In a club with 20 members, a committee of four is to be chosen. How many ways of doing this are there if the first chosen is chair?

Example

In a club with 20 members, a committee of four is to be chosen. How many ways of doing this are there if the first chosen is chair and the second secretary?

Compare the following six similar problems.

George owns six books, titled A, B, C, D, E, and F.

- In how many ways can he arrange the six books in a row on his bookshelf?
- In how many ways can he chose three books to take with him on a vacation?
- In how many ways can he chose his favorite and his second favorite book?
- In how many ways can he arrange the six books in order on a rotating circular tray?
- In how many ways can he arrange the six books in two equal stacks on his desk?
- In how many ways can exactly one book on his bookshelf be out of alphabetical order by title?

Key considerations: order matters or not, duplicates, multiplication rule or addition rule.

Example

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