

Study Guide

The Counting Principle

If the outcome of one event does not affect the outcome of another event and vice versa, the events are called **independent** events. If their outcomes do affect one another, they are **dependent** events.

Fundamental Counting Principle

If event M can occur in m ways and is followed by event N that can occur in n ways, then the event M followed by the event N can occur in $m \cdot n$ ways.

Example: How many 3-digit numbers can be formed from the digits 1, 2, 3, 4, and 5 if each digit can be used repeatedly?

The use of a digit in one place-value position does not affect whether it may be used in another. There are 5 ways to choose a digit to occupy each of the three place-value positions. Therefore, by the fundamental counting principle, the total number of three-digit numbers possible is $5 \cdot 5 \cdot 5$, or 125.

Solve.

1. The letters A , B , C , and D are used to form four-letter passwords for entering a computer file. How many passwords are possible if letters can be repeated any number of times?
2. How many ways can the first five letters of the alphabet be arranged if each is used only once?
3. A restaurant serves 5 main dishes, 3 salads and 4 desserts. How many different meals could be ordered if each has a main dish, a salad, and a dessert?
4. How many different ways can 4 different books be arranged on the shelf?
5. How many 5-digit even numbers can be formed using the digits 4, 6, 7, 2, 8 if digits can be repeated any number of times?
6. How many 4-digit positive even integers are there?
7. How many license plate numbers consisting of three letters followed by three numbers are possible when repetition is allowed?
8. How many combinations are possible using the information in problem 7 if no repetition is allowed?

