

## Section 11.6 Counting Principles

**Objective:** In this lesson you learned how to solve counting problems using the Fundamental Counting Principle, permutations, and combinations.

Course Number

Instructor

Date

### Important Vocabulary

Define each term or concept.

#### Fundamental Counting Principle

#### Permutation

#### Distinguishable permutations

#### Combination

### I. Simple Counting Problems (Page 824)

If two balls are randomly drawn from a bag of six balls, numbered from 1 to 6, such that it is possible to choose two 3's, the random selection occurs \_\_\_\_\_. If two balls are drawn from the bag at the same time, the random selection occurs \_\_\_\_\_, which eliminates the possibility of choosing two 3's.

#### *What you should learn*

How to solve simple counting problems

### II. The Fundamental Counting Principle (Page 825)

The Fundamental Counting Principle can be extended to three or more events. For instance, if  $E_1$  can occur in  $m_1$  ways,  $E_2$  in  $m_2$  ways, and  $E_3$  in  $m_3$  ways, the number of ways that three events  $E_1$ ,  $E_2$ , and  $E_3$  can occur is \_\_\_\_\_.

#### *What you should learn*

How to use the Fundamental Counting Principle to solve counting problems

**Example 1:** A diner offers breakfast combination plates which can be made from a choice of one of 4 different types of breakfast meats, one of 8 different styles of eggs, and one of 5 different types of breakfast breads. How many different breakfast combination plates are possible?

**III. Permutations** (Pages 826–828)

The number of different ways that  $n$  elements can be ordered is \_\_\_\_\_.

The number of ways of ordering a subset of a collection of elements, called a permutation of  $n$  elements taken  $r$  at a time, is given as  ${}_nP_r =$  \_\_\_\_\_.

**Example 2:** In how many ways can a chairperson, a vice chairperson, and a recording secretary be chosen from a committee of 14 people?

**Example 3:** In how many distinguishable ways can the letters COMMITTEE be written?

***What you should learn***  
How to use permutations to solve counting problems

**IV. Combinations** (Pages 829–830)

The number of combinations of  $n$  elements taken  $r$  at a time is  ${}_nC_r =$  \_\_\_\_\_.

For a combination, the order in which the elements are listed \_\_\_\_\_ important.

**Example 4:** In how many ways can a research team of 3 students be chosen from a class of 14 students?

***What you should learn***  
How to use combinations to solve counting problems

**Homework Assignment**

Page(s)

Exercises