## Section 9.6 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 652)
What we have a set of the set

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.

## **II. The Fundamental Counting Principle** (Page 653)

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

**Example :** 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?

*What you should learn* How to solve simple counting problems

What you should learn How to use the Fundamental Counting Principle to solve counting problems **III. Permutations** (Pages 654–656)

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  $_{n}P_{r} =$ \_\_\_\_\_.

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

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

IV. Combinations (Pages 657–658)

The number of combinations of n elements taken r at a time is

 $_{n}C_{r} =$ \_\_\_\_\_

For a combination, the order in which the elements are listed

\_\_\_\_\_ important.

**Example :** 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 permutations to solve counting problems

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

**Homework Assignment** 

Page(s)

Exercises