Basic Counting Principles

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1. Multiplication Principle of Counting: If one event can occur in m ways, and a second event can occur in n ways, and a third event can occur in p ways, and so on, then the sequence of events can occur in $m \times n \times p \times \ldots$ ways.
2. Addition Principle of Counting: Suppose some event E_1 can occur in m ways and a second event E_2 can occur in n ways and the events E_1 and E_2 both cannot occur simultaneously, then E_1 or E_2 can occur in $m+n$ ways. Mutually Exclusive Events: events that have no outcome in common

Practice Exercises

Solve each of the following.

1. There are 5 questions on a True or False quiz. If all the questions are answered, in how many different ways can the quiz be completed?
2. Each of the 5 questions on a multiple-choice quiz has 4 possible choices. If all the questions are answered, in how many ways can the quiz be completed?
3. How many three-digit odd numbers can be formed from the digits 0, 1, 3, 5, 6 and 8 if each digit can be used only once?
4. Using the digits 2, 4, 5, 8, and 9 and not repeating any of the digits:
    1. how many 3-digit numbers can be formed?
    2. how many 3-digit numbers less than 700 can be formed?
    3. how many 3-digit even numbers can be formed?
    4. how many 3-digit numbers are multiples of 5?
    5. how many 3-digit numbers greater than 900 can be formed?
5. A tambiolo contains 15 balls numbered 1 to 15. A ball is drawn from the tambiolo. Find the number of ways each event can occur:
    a. The ball drawn is odd or even.
    b. The ball is numbered greater than 7 or less than 5.
    c. The ball has a number which is less or equal to 10.
6. A family of 2 boys and 3 girls are to sit in a row for a picture taking.
    a. Find the number of ways they can be seated.
    b. How many ways are there if the boys and the girls are each to sit together?

Problem Set

Solve each of the following.

1. A boutique sells shoes for young ladies. It has 8 different kinds of flat shoes, 7 different kinds of sneakers and 3 different kinds of heeled shoes. Find the number of ways Mrs. Lim can buy the following:
    a. an item for a gift
    b. one of each kind of shoes for a gift
    c. a sneaker and either a flat shoes or a heeled shoes
2. An urn contains 6 green marbles, 8 red marbles and 9 yellow marbles. If two marbles are drawn with no replacement done after the first marble is drawn, in how many ways can each event occur?
    a. Both marbles are red.
    b. The two marbles are both green or both red or both yellow.
    c. The first ball is green and the second ball is red or yellow.
    d. The first ball is yellow and the second ball is another yellow or green.
    e. A store sells shirts in 6 colors, 4 designs, and 3 sizes. Find the numbe of different shirts available.
    f. How many diferent 7-digit telephone numbers are possible if the fist digit is not zero and the last two digits are zeros?

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