

Section 6.3

Addition Principle

When choosing among r disjoint alternatives, if alternative 1 has n_1 possible outcomes, alternative 2 has n_2 possible outcomes, ..., alternative r has n_r possible outcomes, then you have a total of $n_1 + n_2 + \cdots + n_r$ possible outcomes.

Multiplication Principle

When making a sequence of choices with r steps, if step 1 has n_1 possible outcomes, step 2 has n_2 possible outcomes, ..., step r has n_r possible outcomes, then you have a total of $n_1 \times n_2 \times \cdots \times n_r$ possible outcomes.

Problem 1. The menu of at a fancy restaurant offers a choice of main ingredients in their entrees: seafood, beef, or vegetarian. There are eight menu items that have seafood, six that have beef, and four that are vegetarian. How many choices are there for an entrée at this restaurant?

Problem 2. The same restaurant as in problem 1 also offers three different desserts. If a meal consists of an entrée and a dessert, how many different meals are possible at this restaurant?

Problem 3. An experiment requires a sequence of three steps. The first step can result in two possible outcomes, the second in three possible outcomes, and the third in five possible outcomes. What is the total number of outcomes possible?

Problem 4. When Baskins-Robbins was founded in 1945, it made 31 different flavors of ice cream. If you had a choice of having your ice cream in a cone, a cup, or a sundae, how many different desserts could you have?

Problem 5. Professor Easy's final examination has 10 true-false questions followed by 2 multiple-choice questions. In each of the multiple-choice questions, you must select the correct answer from a list of six. How many answer sheets are possible?

Problem 6. A test requires that you answer first Part A and then either Part B or Part C. Part A consist of 5 true-false questions, Part B consists of 3 multiple-choice questions with 1 correct answer out of 4, and Part C consists of 3 questions with 1 correct answer out of 5. How many different completed answer sheets are possible?

Problem 7. "A computer byte" consists of 8 bytes each byte either being 0 or a 1. If characters are represented using a code that uses a byte for each character, how many different characters can be represented?

Problem 8. a) How many zip codes are possible?

b) How many zip codes are possible that don't start with 0?

c) How many zip codes are possible if no two numbers are repeated at all in the code?

d) How many zip codes are there if all the letters of the alphabet except I and O are also used?

Homework for this section: Read the section and watch the videos/tutorials. Then do these problems in preparation for the quiz: #3, 13, 16, 19, 26, 28, 30