

You MUST use good notation  
and show appropriate work.

**Math 102**  
(Section 12.2)

Name \_\_\_\_\_

**12.2 The Fundamental Counting Principle**

1. The luncheon special at a certain restaurant consists of a beverage, a sandwich, and a salad. How many different luncheon specials can be ordered if one must choose from four sandwiches, three salads and three types of beverages? (one of each must be selected.)  
  
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2. In how many ways can the positions of president, vice-president, and secretary be filled in a club of 12 members, if no person can hold more than one position?  
  
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3. In a city election there are three candidates for mayor, four candidates for vice-mayor, six candidates for treasurer and two candidates for secretary. In how many ways can these three offices be filled?  
  
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4. A security system has five switches, each of which can be open or closed. The state of the system is described by indicating for each switch whether it is open or closed. How many different states of the system are possible?  
  
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5. Assume a student completes an eight question multiple-choice exam where each question has three possible choices. In how many different ways can a student complete the exam, if exactly one response is given to each question?  
  
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6. In how many ways can a set of five different mathematics books and three different physics books be placed on a shelf with space for eight books, if all books on the same subject are to be kept together?  
  
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7. How many different ordered arrangements can be formed on a shelf with space for three books, if there are six different books available?  
  
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8. In how many ways can 4 boys and 5 girls be seated in a row of nine seats if boys and girls are to occupy alternate seats?

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9. Let  $N = \{1, 2, 3, 4, 5\}$  and  $L = \{A, B, C\}$ .

a) How many 3 digit numbers are possible using digits (only) from the set  $N$  if the digits

*i)* can be repeated in a number?

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*ii)* can not be repeated in a number?

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*iii)* can not be repeated and the 3 digit number must be even.

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b) How many license plates could be formed starting with a letter from  $L$  and following the letter with four digits selected from  $N$ , if the digits

*i)* can be repeated on a license plate?

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*ii)* can not be repeated on a license plate?

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10. In how many ways can 7 people sit in a row of 7 seats, if a certain group of 4 insist on sitting together?

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