

Fundamental Counting Principle

- 1.) There are 72 girls in a school with 108 students. How many of these students are boys? What is the name given to these two problems?
- 2.) Using the numbers 1, 2, 3, 5, 6, 8, 0 with no repetitions allowed, how many four digit numbers can be constructed if:
 - a.) there is no other restriction except no repeated digits?
 - b.) the number is even
 - c.) each digit is even?
 - d.) the number is divisible by 5?
- 3.) Winnipeg Stadium has five gates. In how many ways can you enter the stadium and leave the stadium:
 - a.) by a different gate?
 - b.) by any gate?
- 4.) In how many ways can a school president, vice-president, and a secretary be selected from 23 students comprising the student council?
- 5.) In how many ways can 5 different books be arranged on a bookshelf?
- 6.) In how many ways can 4 women and 3 men be seated on a bench if the men and women must alternate seats?
- 7.) In how many ways can 4 women and 4 men be seated on a bench if the men and women must alternate seats?
- 8.) In how many ways can 2 letters be posted in 5 mailboxes?
 - a.) the two letters must be posted in different mailboxes?
 - b.) the letters may be posted in any mailbox?
- 9.) A nickel and dime are tossed on a table. In how many ways can they land?
- 10.) If there are twelve runners in a race, in how many ways can first, second, and third be awarded?

- 11.) Pizza Hut offers three choices of salad, 20 kinds of pizza, and 4 different desserts. How many different three-course meals can be ordered?
- 12.) A freshman student must take a modern language, a natural science, a social science, and English. If there are four different modern languages, five natural sciences, three social sciences, but each student must take the same English course, how many different ways can he select his course of study?
- 13.) Suppose that the executive of the Manitoba Association of Mathematics Teachers consists of 3 women and 2 men, In how many ways can a president and a secretary be chosen if:
- the president is to be female and the secretary male?
 - the president is to be male and the secretary female?
 - the president and secretary are to be of opposite sex?
- 14.) Mr. and Mrs. McDonald want a family picture taken with their children, Hannah, Flora, and James. In how many ways can all five line up in a straight line for the picture if:
- there are no restrictions?
 - the parents must be at either end of the line?
 - baby James must be in the middle?
 - the children alternate with the adults?
- 15.) How many four-letter words can be formed using the letters of the word PRODUCT if none of the letters are repeated?

Answers

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| 1.) 36 | 7.) 1152 | 14a.) 120 |
| 2a.) 720 | 8a.) 20 | b.) 12 |
| b.) 420 | b.) 25 | c.) 24 |
| c.) 18 | 9.) 4 | d.) 12 |
| d.) 220 | 10.) 1320 | 15.) 840 |
| 3a.) 20 | 11.) 240 | |
| b.) 25 | 12.) 60 | |
| 4.) 10626 | 13a.) 6 | |
| 5.) 120 | b.) 6 | |
| 6.) 144 | c.) 12 | |