

DM 1 Counting

1.1 How many words can be obtained by permutating letters in words: a) *computer*, b) *mathematics*?

1.2 How many ways are there to put stamps on the envelope if the values of stamps are 4\$, 6\$ and 10\$ and the total value on the envelope is to be 18\$. Order of stamps is important.

1.3 How many palindromes of length n are there? (assume there are 26 letters)

1.4 How many 4-digits numbers can be made of digits 1, 2, 3, 4, 5, and how many of digits 0, 1, 2, 3, 4 ?

1.5 How many 5-digits numbers look the same up-side-down? Assume the following digits correspond the each other 0 – 0, 1 – 1, 6 – 9, 8 – 8, 9 – 6.

1.6 How many ways are there to distribute 5 (identical) apples, 6 oranges, 4 pineapples among 3 people a) without restriction, b) with each person getting at least one apple.

1.7 A committee has to be chosen from a set of 7 women and 4 men. How many ways are there to form the committee if

- the committee consists of 5 people: 3 women and 2 men,
- the committee can be any positive size but must have equal number of women and men,
- the committee consists of 4 people and at least 2 of them are women,
- the committee consists of 4 people and one of them must be Mr Smith?

1.8 a) How many ways are there to assign 100 different diplomats to five different continents? b) How many ways are there if 20 diplomats must be assigned to each continent?

1.9 How many numbers greater than 3 000 000 can be formed by permutations of 1, 2, 2, 4, 6, 6, 6?

1.10 How many ways are there to distribute 15 identical objects into four different boxes?

1.11 How many ways are there to distribute 20 different toys among 5 children a) without restriction, b) with each child getting 4 toys?

1.12 Six men are to be seated round a circular table. How many ways are there to achieving this?

1.13 In how many ways 6 cards can be taken from one deck, in such a way that cards of all colors are chosen?

1.14 How many 6-digits numbers of even sum of digits are there?

1.15 How many ways are there to choose three pairs to play chess out of n players?

1.16 Prove that mn -element set can be partitioned in n -element sets in $\frac{(mn)!}{m!(n!)^m}$ ways.

1.17 How many numbers between 0 and 10^n are there with no identical consecutive digits?

1.18 How many possible results of a competition are there if there are 10 participants in 3 disciplines? (every participant takes one discipline).

- 1.19 There are k kinds of postcards in a shop.
- How many ways are there to set postcards to n friends, one each?
 - What if everyone is to get different postcard?
 - What if everyone is to get two different postcards?

1.20 There are k different postcards. How many ways are there to send all of them to n friends if every friend can get any number of postcards (including zero)? What if every friend is to get at least one postcard?

1.21 How many arrangements of ten 0's and five 1's are there with no consecutive 1's?

1.22 How many k -element subsets of the set $\{1, 2, \dots, n\}$ containing no two consecutive elements are there?

1.23 There are 12 books on a shelf. How many ways are there to choose 5 of them, but no two consecutive ones?

1.24 How many n -digits numbers are there such that digits are in non-decreasing order?

1.25 There are 12 people sitting at a round table. How many ways are there to choose 5 of them, but without a pair sitting next to each other?