**1.There are 5 novels and 4 biographies. In how many ways can 4 novels and 2 biographies can be arranged on a shelf?**

**Solution:**

**4 novels can be selected out of 5 in 5C45C4 ways.**

**2 biographies can be selected out of4 in 4C24C2 ways.**

**Number of ways of arranging novels and biographies:**

**=5C4×4C2=30**

**=5C4×4C2=30**

**After selecting any 6 books (4 novels and 2 biographies) in one of the 30 ways, they can be arranged on the shelf in 6!=7206!=720 ways.**

**By the Counting Principle, the total number of arrangements**

**=30×720**

**=30×720**

**= 21600**

**2.From 5 consonants and 4 vowels, how many words can be formed using 3 consonants and 2 vowels?**

#### Solution:

**From 5 consonants, 3 consonants can be selected in 5C35C3 ways.**

**From 4 vowels, 2 vowels can be selected in 4C24C2 ways.**

**Now with every selection, number of ways of arranging 5 letters is 5P55P5**

**Total number of words =5C3×4C2×5P5**

**=5C3×4C2×5P5**

**= 7200**

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**Solving a permutation or combination problem involves two steps:**

**1. Recognizing the problem type: permutation vs. combination.**

**2. Using formulas or models to count the possibilities.**

**We have three questions to ask ourselves in order to identify the problem type:**

**Check any two typical arrangements with the same combination. If the two arrangements are counted only once, it is a combination problem. Otherwise, it is a permutation.**

#### Example 1:

**If you are asked for a lock code, then 321 and 123 could be two possibilities, and the two numbers are formed from the same combination (Same number of 1’s, 2’s, and 3’s). So, lock codes must be permutations.**

#### Example 2:

**For another example, suppose you have 5 balls numbering 1 through 5. If you are asked to select 3 out of the 5 balls and you are only interested in the numbers on the balls, not the order in which they are taken, then you have a combination problem.**

**Tip:-**

**1.Generally, "arrangements" refer to permutations, and "selections" refer to combinations. These words often flag the problem type.**

**2.Other words indicating permutations are "alteration," "shift," "transformation," and "transmutation," all of which connote ordering.**

**3. Some words indicating combinations are "aggregation," "alliance," "association," "coalition," "composition," "confederation," "gang," "league," and "union," (all of which have nothing to do with arrangements but instead connote selections.)**

**Tip:2:**

**Check whether, based on the problem description, the results of a permutation/combination can have repetitions.**

#### Example:

**If you are to list countries in a coalition, you can hardly list a country twice.**

**(Here, repetition automatically is not allowed unless specified otherwise.)**

**If you have 3 doors to a room, you could use the same door for both entering and exiting.**

**(Here, repetition is automatically allowed.)**

A box contains 20 electric bulbs, out of which 4 are defective. Two bulbs are chosen at random from this box. The probability that at least one of these is defective is

A)4/19  
B)7/19  
C)12/19  
D) 21/95

Solution:-

Option B

Probability( None is defective) = 16C2 / 20C2 = 12/19.  
Probability (at least one is defective) = (1- 12/19) = 7/19.

22) Ravi has a bag full of 10 Nestle and 5 Cadbury chocolates. Out of these, he draws two chocolates. What is the probability that he would get at least one Nestle chocolate?

A) 19/21  
B) 3/7  
C) 2/21  
D) 1/3

**Solution**

**Option A**

Probability of getting atleast one nestle chocolate = [(10C1 x 5C1) + 10C2] / 15C2  
[(10 x 5) + (10 x 9)/2] / [(15 x 14)/2] = 19/21.  
Hence, the required probability is 19/21