

Chapter 07

PERMUTATIONS AND COMBINATIONS

Division and Distribution of distinct objects into groups of equal size:

Consider division of 4 distinct objects a, b, c and d into two groups each containing 2 objects.

Consider the following table for the objects contained by group 1 and group 2.

SI NO	Group 1	Group 2
1.	a, b	c, d
2.	a, c	b, d
3.	a, d	b, c
4.	b, c	a, d
5.	b, d	a, c
6.	c, d	a, b

Clearly in the above table options 1 and 6 gives same divisions. Similarly, options (2 and 5) and (3 and 4) give same divisions. So, we have 3 ways of division.

Hence, number of ways of division is not same as that

given by formula $\frac{4!}{2! 2!} = 6$.

In fact, it is $\frac{4!}{2! 2! 2!} = 3$. Here we are dividing by $2!$ as

each pair of groups(say ab and cd) is occurring twice, i.e., the order in which groups are formed is considered here.

Now number of ways of distribution of 4 distinct objects

between two persons if each gets 2 objects is $\frac{4!}{2! 2! 2!} \times 2!$.

EXAMPLE:

Find the number of ways of dividing 52 cards amongst four players equally.

SOLUTION:

First divide 52 cards equally into four groups, the number

of ways is $\frac{52!}{(13!)^4 (4!)}$.

Now this four groups can be distributed among four players in $4!$ ways. Then total number of ways of dividing

among four players equally is $\frac{52!}{(13!)^4 (4!)} \times 4! = \frac{52!}{(13!)^4}$.