

Chapter 07

PERMUTATIONS AND COMBINATIONS

PERMUTATIONS OF ALIKE OBJECTS:

Number of permutations of 'n' things taken all together when the things are different, is $n!$.

But see that if the objects are not all different then what will happen?

Suppose a, b, c are three different letters then number of possible arrangements taken all the three at a time when repetition is not allowed = $3! = 6$.

abc, acb, bca, bac, cab, cba.

But now let us say two objects are identical like a,a,c. Then how many arrangements are possible?

aac, aca, caa, aac, caa, caa.

We note that it has actually reduced to three different arrangements aac, aca, caa.

Thus total no. of arrangements of 3 – objects when

two of them are alike = $\frac{3!}{2!} = 3$.

EXAMPLE- 1:

Let us take a word 'MEET'. Here two E's are alike.

All the four letters are not different (two E's are alike).

So number of arrangements = $\frac{4!}{2!} = 12$.

EXAMPLE- 2:

Let us take up another word '**SHEEE**'. Here three E's are alike.

$$\text{So, number of arrangements} = \frac{5!}{3!} = \frac{5 \times 4 \times 3!}{3!} = 20.$$

EXAMPLE- 3:

Let us take a word '**MATHEMATICS**',

Total number of letters = 11.

A A

C

E

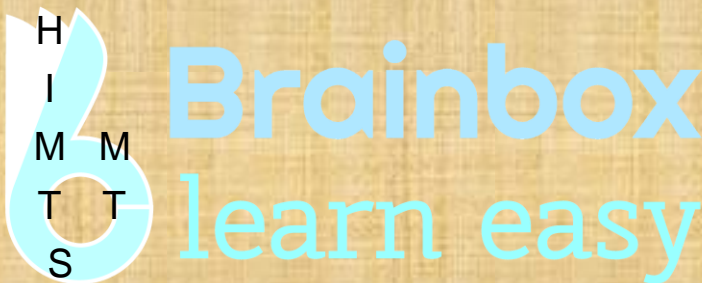
H

I

M M

T T

S



$$\text{Total number of arrangements} = \frac{11!}{2! 2! 2!}$$