

PERMUTATION AND COMBINATION

Multiplication Rule

If an event can happen in r different ways and another event can happen in s different ways, then the number of ways these successive events can happen is $r \times s$, i.e. rs .

Permutations

- The number of permutations of n different objects, taken all at a time, is $n!$, where

$$n! = n \times (n - 1) \times (n - 2) \times \dots \times 3 \times 2 \times 1$$

- The number of permutations of n different objects, taken r at a time, is ${}^n P_r$, where

$${}^n P_r = \frac{n!}{(n - r)!}$$

- The number of permutations of n different objects arranged in a circle is $(n - 1)!$
- The number of permutations of n objects with n_1 of identical objects of type 1, n_2 of identical objects of type 2, ..., n_p of identical objects of type p , is $\frac{n!}{n_1! n_2! \dots n_p!}$

Combinations

- The number of combinations of r objects, chosen from n different objects, is ${}^n C_r$, where

$${}^n C_r = \frac{n!}{(n - r)! r!}$$

- If ${}^n C_h = {}^n C_k$, then $h + k = n$