Q MATHS. Permutations & Combinations. $n!$ or $\lfloor n$ 1

Permutations

→ Selection + arrangement

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

Combinations

→ to choose or to select a number of items from given no. of items.

$${}^nC_r = \frac{n!}{r!\,(n-r)!} \quad n \geq r$$

1. ${}^nC_0 = 1 \Rightarrow \frac{n!}{0!\,n!} = 1$
2. ${}^nC_n = 1 \Rightarrow \frac{n!}{0!\,n!} = 1$
3. ${}^nC_r = {}^nC_{n-r}$ $[r+n-r=n]$ ${}^{15}C_6 = {}^{15}C_9$
4. ${}^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$ ${}^{15}C_4 + {}^{15}C_3 \to {}^{16}C_4$
5. ${}^nC_r = \frac{{}^nP_r}{r!}$ [Relation b/w P & C]

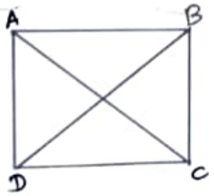
* Hand - shakes

$\boxed{{}^nC_2}$ or $\frac{n(n-1)}{2}$

= no of handshakes

* No of diagonals

${}^nC_2 - n$ or $\frac{n(n-3)}{2}$



* No of Straight lines :

→ Let there be n points in a plane

Case I → No two points are Collinear

$\boxed{{}^nC_2}$

Case II → out of n points, r points are collinear

$\boxed{{}^nC_2 - {}^rC_2 + 1}$

* No of Triangles

→ Let there be n points in a plane

I> No two points are collinear

$\boxed{{}^nC_3}$

II> when r points are collinear

$\boxed{{}^nC_3 - {}^rC_3}$

* No of parallelograms.

→ Let there be m & n horizontal & vertical parallel Lines respectively

→ then no of parallelograms

$= {}^nC_2 \times {}^mC_2$