L- Combination

Wednesday, March 2, 2022 10:03 AM

Combination — grouping / Selection

Permutation — Arrangement

Combination:- A Combination is a Selections of things taking some or all of them at a time. The Combination of n different things taking 'r' at a time is denoted by ${}^nC_r$ or $C(n,r)$ or $\binom{n}{r}$ and given by

$$ {}^nC_r = \frac{\lfloor n}{\lfloor n-r \cdot \lfloor r} \qquad 0 \le r \le n $$

$$ {}^nP_r = \frac{\lfloor n}{\lfloor n-r} > \frac{\lfloor n}{\lfloor n-r \cdot \lfloor r} = {}^nC_r \qquad 8 > 4 = \binom{8}{2} $$

(1) ${}^nP_r \geq {}^nC_r$

(2) $$ {}^nC_r = \frac{\lfloor n}{\lfloor n-r} \frac{1}{\lfloor r} = {}^nP_r \cdot \frac{1}{\lfloor r} $$

$$ \Rightarrow \boxed{{}^nP_r = {}^nC_r \cdot \lfloor r} $$

(3) ${}^nC_0 = {}^nC_n$ $\quad$ ${}^nC_1 = {}^nC_{n-1}$ $\quad$ ${}^nC_2 = {}^nC_{n-2}$

$0+n=n$

$$ \boxed{{}^nC_r = {}^nC_{n-r}} $$

(4) ${}^nC_p = {}^nC_q$ then either $p=q$ or $p+q=n$

) In how many ways a team of (11) players be selected out of 15 players,

(1) how many of them always have Two particular players and

(2) how many of them do not have two particular players.

No. of player = 15

No. of Teams = ${}^{15}C_{11}$

$$ = \frac{\lfloor 15}{\lfloor 15-11 \cdot \lfloor 11} $$

$$ = \frac{15 \cdot 14 \cdot 13 \cdot 12 \cdot 11}{\lfloor 4 \cdot \lfloor 11} $$

(1) No. of ways of selecting Two particular = 1

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No. of " " remaining 9 players out of 13 = $^{13}C_9$

F.P.C $1 \times {}^{13}C_9 = \frac{\lfloor 13}{\lfloor 4 \cdot \lfloor 9} = \frac{13 \cdot 12 \cdot 11 \cdot 10 \cdot \lfloor 9}{4 \cdot 3 \cdot 2 \cdot 1 \cdot \lfloor 9}$

$= 13 \times 11 \times 5 = 715$

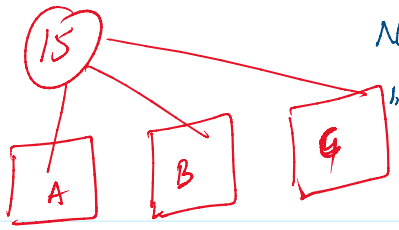
$= \frac{\lfloor 15-11 \cdot \lfloor 11}{\lfloor 4 \cdot \lfloor 11} = 15 \cdot 14 \cdot 13 \cdot 12 \cdot \lfloor 11 / 4 \cdot 3 \cdot 2 \cdot 1 \cdot \lfloor 11 = 15 \cdot 7 \cdot 13 = 1365$

(2) $= {}^{13}C_{11} = \frac{\lfloor 13}{\lfloor 2 \cdot \lfloor 11} = \frac{13 \cdot 12 \cdot \lfloor 11}{2 \cdot \lfloor 11} = 13 \cdot 6 = 78$

1317 How

There are 15 people in a committee. How many ways are there to group these 15 people into 3, 5, and 4?

a) 846
b) 2468
c) 1282
d) 1317



No. of ways 3 out of 9 =

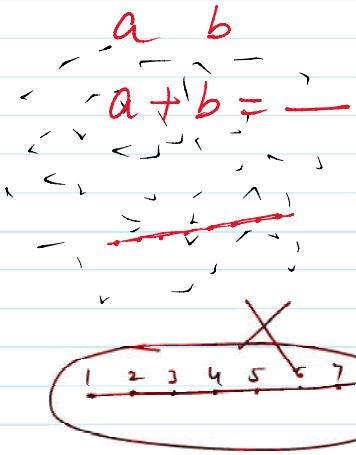
" " " 4 " " 12-4 =

$^{15}C_3 + {}^{12}C_5 + {}^{8}C_4$

12-5 = 8

(1) No. of Angular points are given = n

" " collinear " " = p



(a) How Many St. lines

No. of St. lines = $^{n}C_2 - {}^{p}C_2 + 1$

(b) No. of Triangles = $^{n}C_3 - {}^{p}C_3$

(c) No. of Quadrilateral = $^{n}C_4 - {}^{p}C_4$

$^{n}C_3 - {}^{p}C_3$