COUNTING DAY 2

23 September 2024 21:52

Que In how many ways can six persons be arranged in a row?

(A) $6!$ (B) 6^6 (C) 6^5 (D) 5^6

Que How many 5-digit odd numbers can be formed using digits 0,1,2,3,4,5 without repeating digits?

(A) $4 \times 4!$ (B) 288 (C) $5!$ (D) 300

Yesterday Summary

Arrangement

(1) 'n' different Items taken all at a time (Repetation allowed)

$\Rightarrow n \times n \times n \times \dots \times n$ times

$\Rightarrow (n)^n$

(2) 'n' different Items taken all at a time (Repetation Not allowed)

$\Rightarrow n(n-1)(n-2)\dots 1 = n!$

(3) 'n' different Items taken 'r' at a time $= {}^nP_r = \frac{\lfloor n}{\lfloor n-r}$

Order doesn't matter | Selection | Group

CASE 1: 'n' diff. Items Taken all at a time (Without Replacement, Without Repetation)

Changing the Order

A B C D E = 5 Items

B D A C E = 5 Items

E A C D B = 5 Items

Groups

$5 \times 4 \times 3 \times 2 \times 1$

Total No. of ways = 1 ways

CASE 2: n different Items Selection r at a time. (Without Replacement)

$r = 2$

A B C

3 Items ⇒ AB, AC, BC, BA, CA, CB

Order doesn't matter

Total No. of ways = 3 ways

Que ABCD 2 - at a time

Total no. of selection = 6

AB, BC, CD, AC, BD, AD, DB

n diff. Items Selection r at a time.

^nP_r → permutation

Total No. of Selection / group ⇒ $^nC_r = \frac{^nP_r}{r!}$ = No. of arrangement / Ordering of objects

Reduced Overcounting

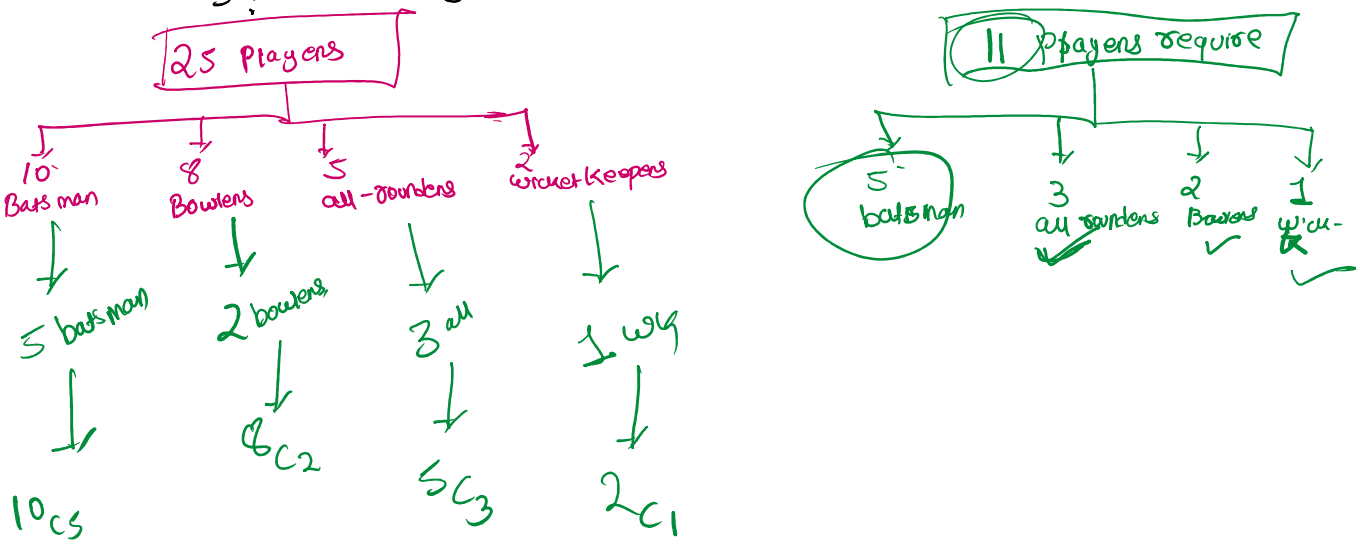
$$^nC_r = \frac{n!}{(n-r)!\,r!}$$

Combination

Que In how many ways can a cricket team be selected from a group of 25 players containing 10 batsmen, 8 bowlers, 5 all-rounders and 2 wicket keeper? Assume that the team of 11 players requires 5 batsmen, 3 all-rounders, 2 bowlers

a group of ... 5 all-rounders and 2 wicket keeper? Assume that the team of 11 players requires 5 batsmen, 3 all-rounders, 2 bowlers and 1 wicket keeper.

(A) $\frac{10!}{5!}$ (B) $\frac{14 \times 10!}{3 \times 5!}$ (C) $\frac{14 \times 10!}{5!}$ (D) $\frac{10!}{3 \times 5!}$

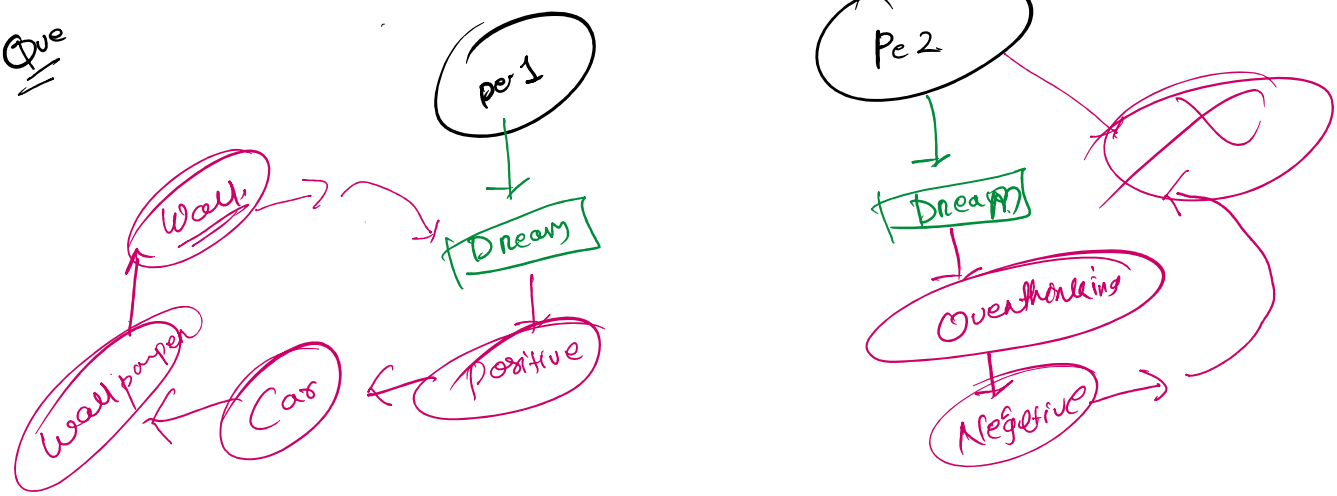


All together

$$^{10}C_5 \times {}^{8}C_2 \times {}^{5}C_3 \times {}^{2}C_1$$

$$\Rightarrow 252 \times 28 \times 10 \times 2 \Rightarrow$$

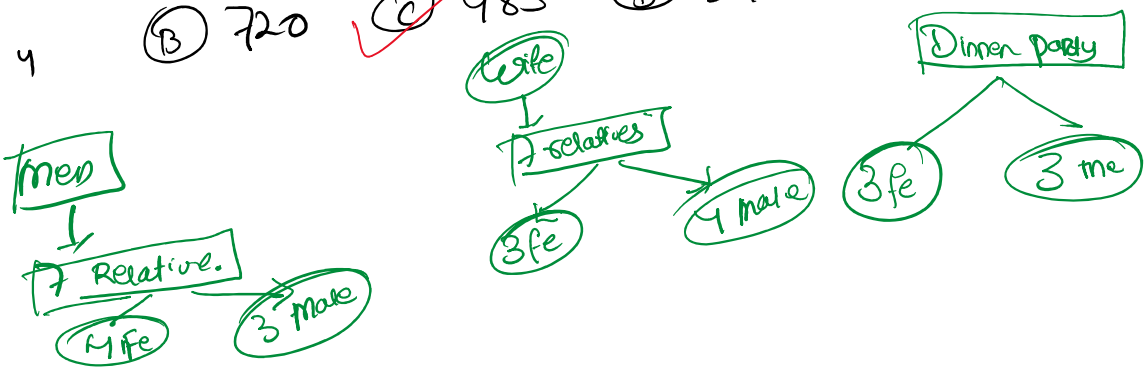
Que



Que: A man has 7 relatives, 4 of them are ladies and 3 gentlemen, his wife has 7 relatives, 3 of them are ladies and 4 gentlemen, in how many ways can he invite a dinner party of 3 ladies ... of man's relatives and

Q) his wife has 7 relatives, 3 of them ... In how many ways can he invite a dinner party of 3 ladies and 3 gentlemen so that there are 3 of man's relatives and 3 of wife's relatives.?

(A) 144 (B) 720 (C) 485 (D) 340



Man		Wife	
4 Ladies	3 Gentlemen	3 Ladies	4 Gentlemen
3	0	0	$3 \Rightarrow {}^4C_3 \times {}^3C_0 \times {}^3C_0 \times {}^4C_3 = 16$
0	3	3	$0 \Rightarrow {}^4C_0 \times {}^3C_3 \times {}^3C_3 \times {}^4C_0 = 1$
2	1	1	$2 \Rightarrow {}^4C_2 \times {}^3C_1 \times {}^3C_1 \times {}^4C_2 = 324$
1	2	2	$1 \Rightarrow {}^4C_1 \times {}^3C_2 \times {}^3C_2 \times {}^4C_1 = 144$

$16 + 1 + 324 + 144 = 485$

working all together

Q) A box contains 5 different red and 6 different white balls. In how many ways can 6 balls be selected so that are atleast two balls of each color?

Red (5)	White (6)	No. of ways
2	4	${}^5C_2 \times {}^6C_4 =$
3	3	${}^5C_3 \times {}^6C_3 =$
4	2	${}^5C_4 \times {}^6C_2 =$

4 | 2 | $5C_4 \times 6C_2 =$

5 | X | 425

Qⁿ In how many ways a team of 5 members can be selected from 4 ladies and 8 gentlemen such that selection includes atleast 2 ladies?

(A) 336 (B) 448 (C) 449 (D) 456

4 Ladies	8 Gentlemen	No. of ways
2	3	$4C_2 \times 8C_3 =$
3	2	$4C_3 \times 8C_2 =$
4	1	$4C_4 \times 8C_1 =$

456