

Agenda

Combinatorics

Permutations

Combinations

Questions

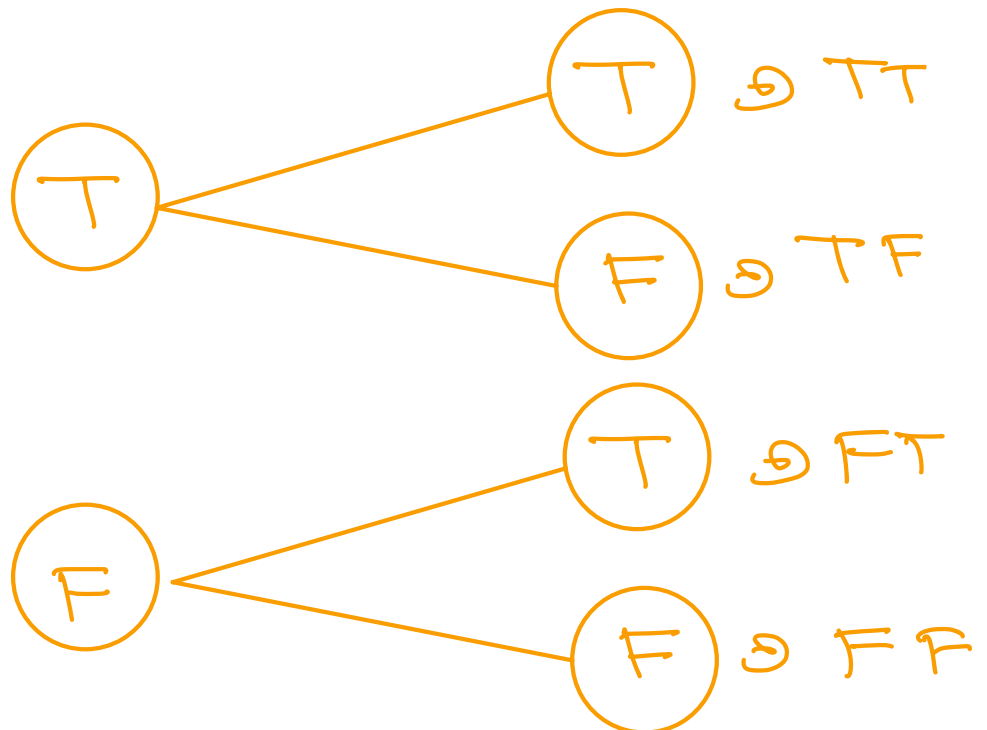


How many different type of answers you can submit

Answers

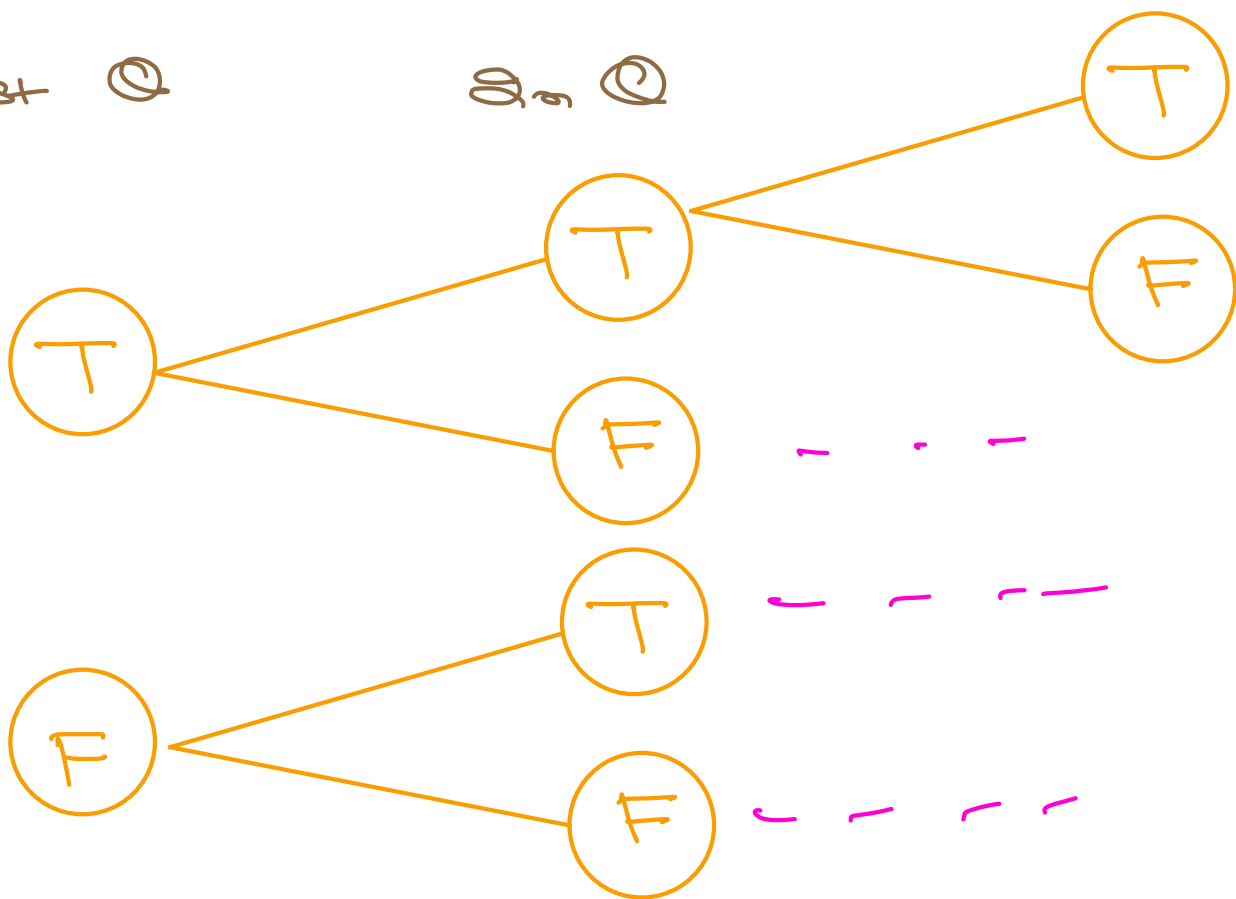
1st Q

2nd Q



1st Q

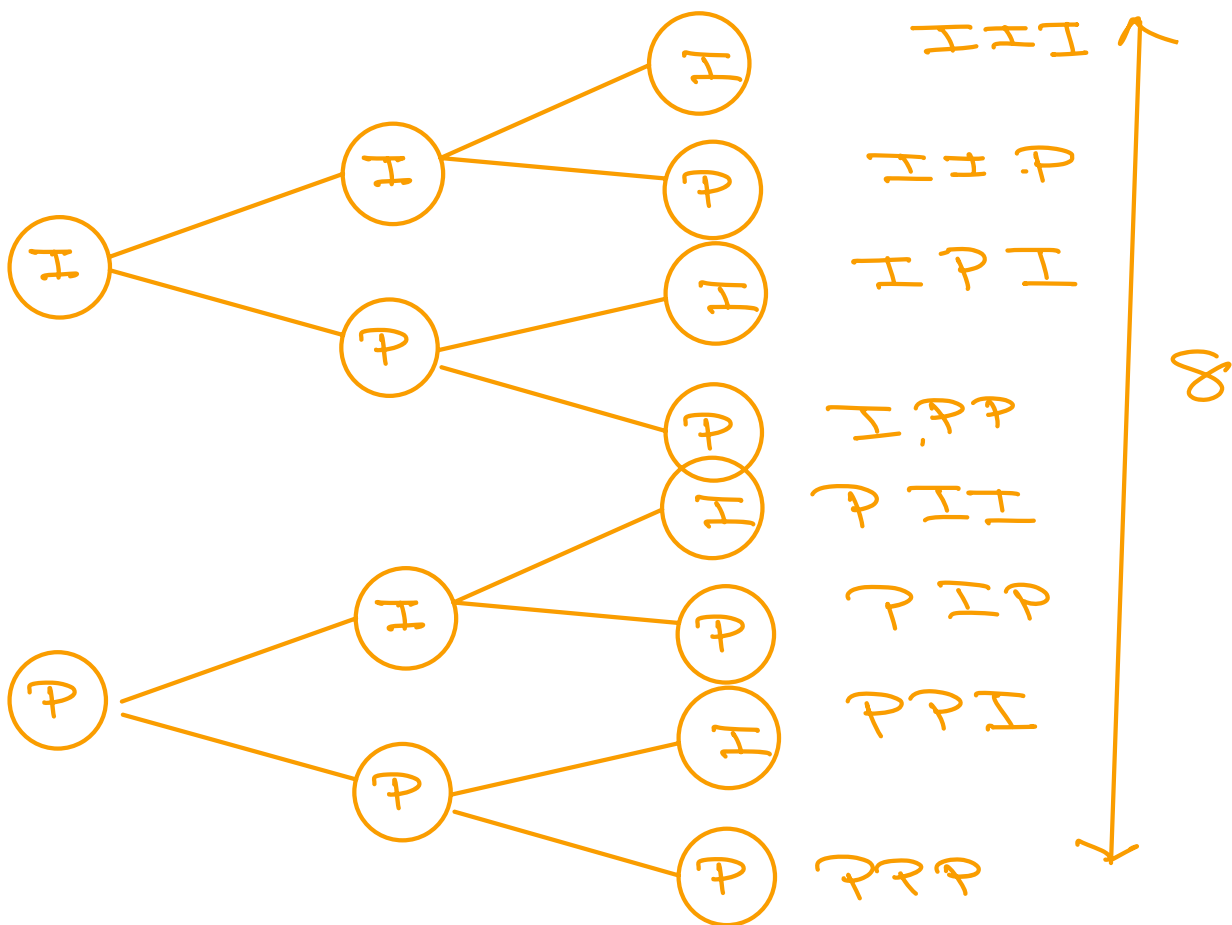
2nd Q



Match 1

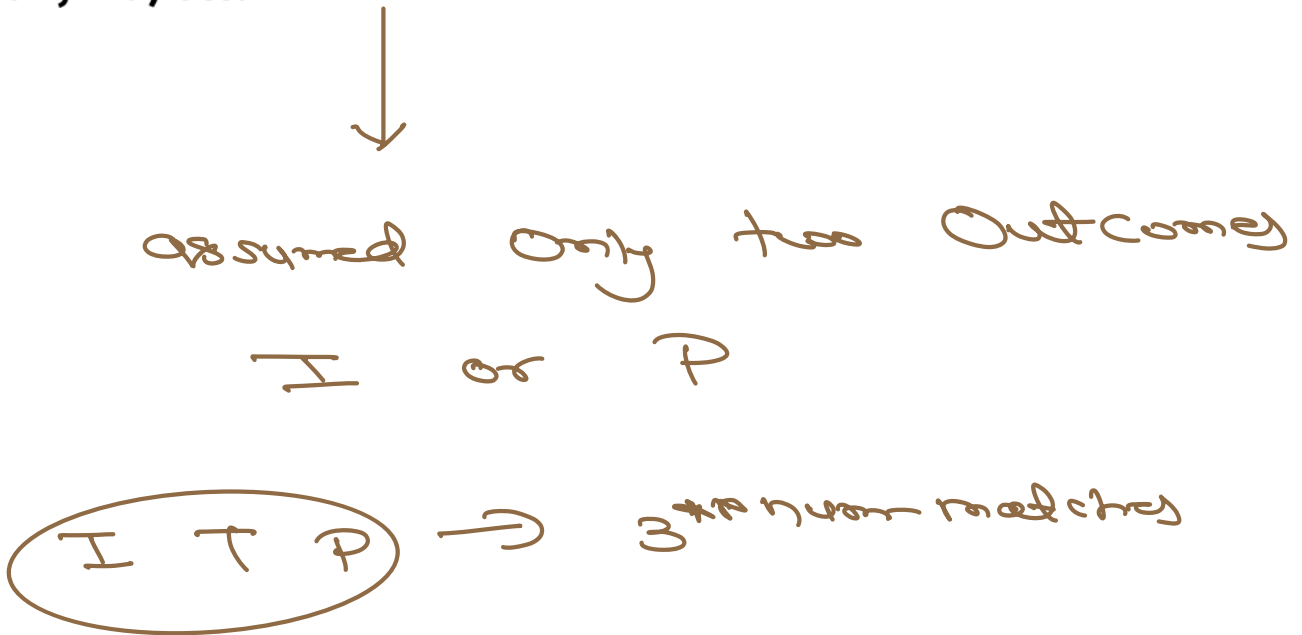
Match 2

Match 3

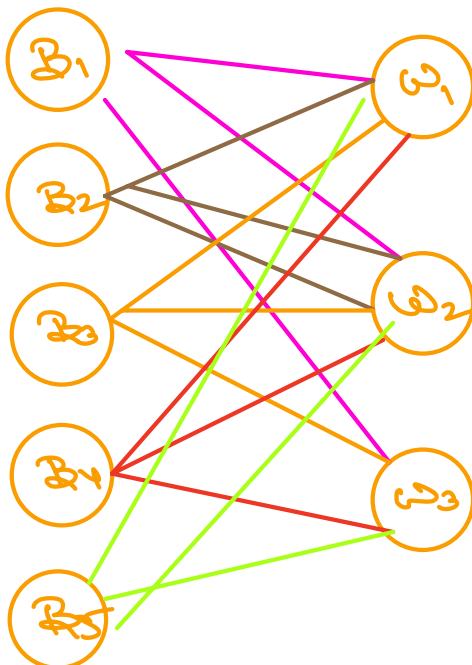


India and Pakistan play a 3-match series. How many results are possible (total number of outcomes)?

Note that we consider (Ind, Ind, Pak) different from (Ind, Pak, Ind) etc.



In a bowl-out, for a specific ball you have to choose a bowler and a wicket keeper. Suppose you have 5 bowlers and 3 wicket keepers. How many ways can you select for a ball?



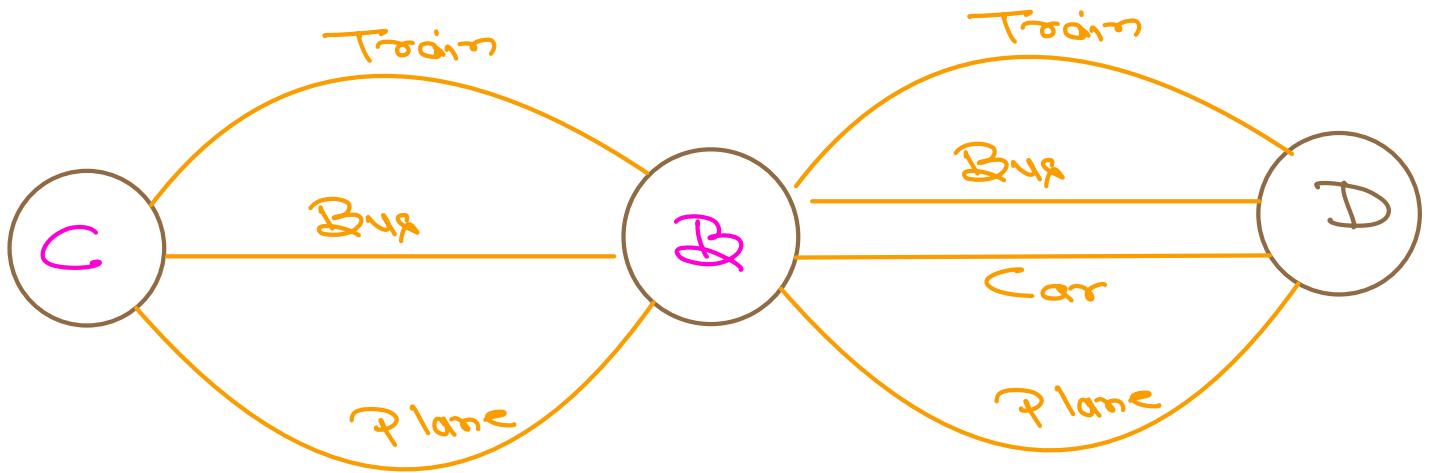
B₁W₁
B₁W₂
B₁W₃
B₂W₁
B₂W₂
B₂W₃

5 × 3 = 15

or 5 +
and 3 ×

There are 3 ways to move from Chennai to Bangalore.
There are 4 ways to move from Bangalore to Delhi. In
how many ways can one reach from Chennai to Delhi
via BLR?

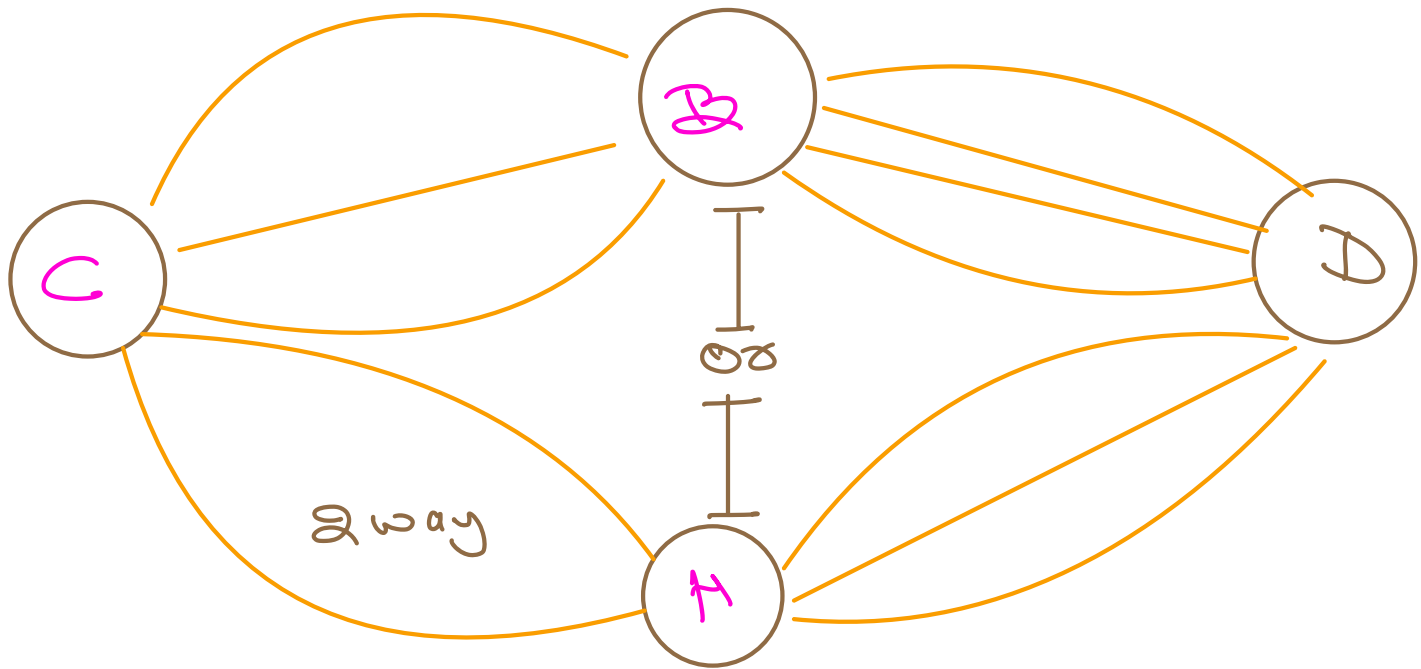
4 options



$$4 \times 3 = 12$$

There are 3 ways to move from Chennai to Bangalore,
and 4 ways to move from Bangalore to Delhi.

There are 2 ways to move from Chennai to Hyderabad,
and 3 ways to move from Hyderabad to
Delhi. In how many ways can we move from Chennai
to Delhi?



C B D \rightarrow 12

C H D \rightarrow 6

C \rightarrow D

12 + 6

B or H

A fast food outlet has the following types of items in their menu:

- Burgers: 3
- Pizzas: 3
- Drinks: 3
- Sandwiches: 5
- Fruits: 7

From these items, you can choose one of the following combos:

- 1 Burger and 1 Sandwich
- 1 Fruit and 1 Drink
- 1 Pizza

How many different combos can you order ?

Burger and Sandwich $\Rightarrow 3 \times 5 = 15$

or

Fruit and Drink $\Rightarrow 7 \times 3 = 21$

or

1 pizza $\Rightarrow 3 \Rightarrow 3$

$$15 + 21 + 3 \Rightarrow 39$$

Permutation vs Combination

Arrangement

Order matters

$IPP \neq PIP \neq PPI$

$ab \neq ba$

Selection

Order Doesn't
matter

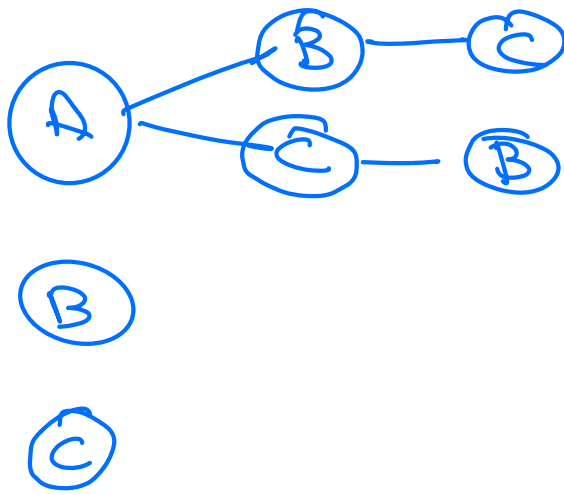
$IPP = PIP$
...

$ab = ba$

What are the number of ways of ARRANGING three characters A, B and C, such that there is no repetition?

$$\underline{3} \quad \underline{2} \quad \underline{1} \quad \Rightarrow 3 \times 2 \times 1 = 6$$

$3!$



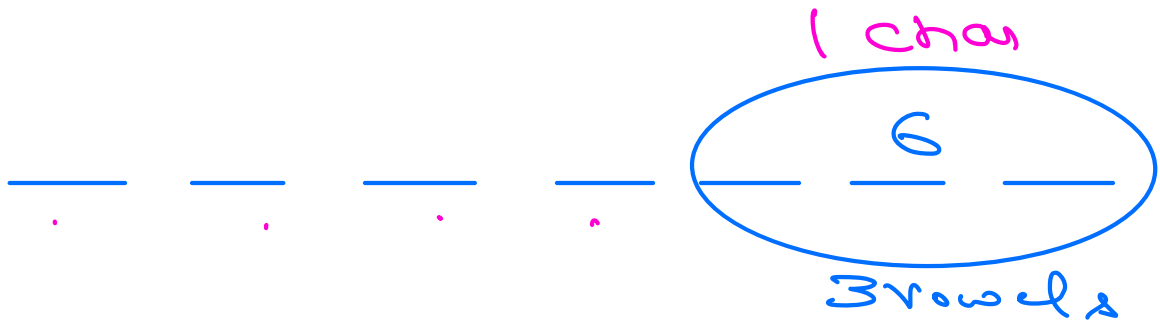
In how many ways can the letters of the word "COMPUTE" be arranged such that the vowels always come together?

No Rep allowed

4 options

Vowels O O E U

3 1 0 6



5! x 6 x 3! x 3!

120 x 6 x 720

5 chars 2 slots

5 4 5 4 3 2 1

Given 5 different characters, in how many ways can we arrange them in 2 places, without repetition?

4 options

Active Duration (Most preferred: 30 seconds)

Appears for

60 Secs



A

5

B

10

C

20

D

120

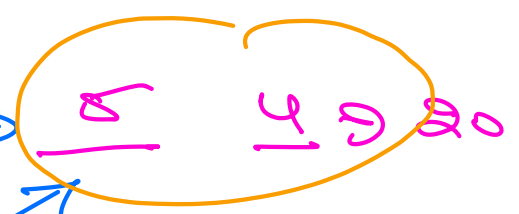
Permutation

* Given n objects, arrange them in k places

$${}^n P_k = (n) * (n-1) * (n-2) \dots (n-k+1)$$

S words

2



$S P_2 \circ$

$$S * (N - k + 1)$$
$$S \times 4$$

*

S letter \circ len 3 words

$$S P_3 \circ N \times (N - 1) \times (N - 2) \quad S \times 4 \times 3$$
$$S \times 4 \times 3$$

$$S P_k \circ \frac{S \cdot (N - k + 1)}{(N - k + 1)}$$



$$S \times (N - 1) \times \dots \times (N - k + 1) \quad \frac{S \cdot (N - k + 1)}{(N - k + 1)} \times 3 \times 2 \times 1$$

$$\frac{(N - k + 1)}{(N - k + 1)}$$

There are 4 players P1, P2, P3, and P4 who can play in the top-order batting positions of 1, 2, and 3. many arrangements of top-order can we make from 3 of these 4 players, keeping in mind the order in which these batsmen come?

4 batsman

3 pick

4 P3 0

$$\frac{4!}{(4-3)!} \Rightarrow \frac{4!}{(4-1)!}$$

$$0 \frac{4!}{1!} 0 \frac{4 \times 3 \times 2 \times 1 \times 0 \times 0}{1}$$

$$\underline{4} \quad \underline{3} \quad \underline{2} \quad 0 \quad 4 \times 3 \times 2 \times 0 \times 0$$

2nd

3rd

4th Comb

P1, P2, P3	P1, P2, P4	P1, P3, P4	P2, P3, P4
P1, P3, P2	P1, P4, P2	P1, P4, P3	P2, P4, P3
P2, P1, P3	P2, P1, P4	P3, P1, P4	P3, P2, P4
P2, P3, P1	P2, P4, P1	P3, P4, P1	P3, P4, P2
P3, P1, P2	P4, P1, P2	P4, P1, P3	P4, P2, P3
P3, P2, P1	P4, P2, P1	P4, P3, P1	P4, P3, P2

1 combination

24 permutation Available

4 combination

3 players in each permutation

$$\begin{array}{ccc} \textcircled{P_i} & P_j & P_k \\ \hline 3 & 2 & 1 \end{array}$$

$3! = 6$ ways

Combination $\Rightarrow \frac{24 \text{ permutations}}{6}$

$${}^4C_3 \Rightarrow \frac{{}^4P_3}{3!}$$

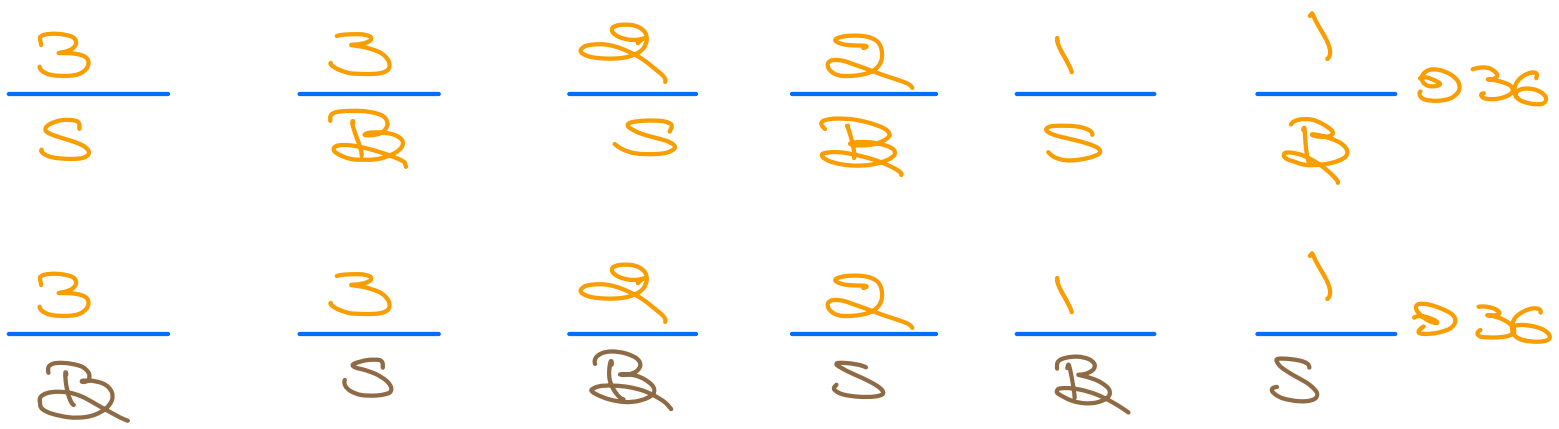
$${}^nC_k \Rightarrow \frac{{}^nP_k}{k!} = \frac{n!}{(n-k)!k!}$$

① With Rep

② Without Rep but order matters

③ Without Rep order Doesn't matter

A Maruti Showroom has 3 colours in their “Baleno” model and 3 different colours in the “Swift” model. In how many ways can they place these 6 cars, such that Baleno and Swift are kept in alternate slots?



$$3 \times 3 \times 2 \times 2 \times 1 \times 1 \Rightarrow 36 + 36 \Rightarrow 72$$

Suppose you're making a list of **three digit** numbers.

Answer the following questions:

i) How many three digit numbers are there that **do not contain 5**?

ii) Which contain 5 **at least** once?

iii) Which contains 5 **at most** once?

0 or Total - (At 2 5)

Total 3 digits Numbers

Total Digits 10

9 10 10 0 900 Numbers

①

8 9 9 0 648
~~5~~ ~~5~~ ~~5~~
~~5~~
 No 5's

②

900 - 648 =

③ Atleast two 5's

① How many numbers hat 3 5's

5 5 5 ①

② How many numbers hat 2 5's

5 5 0 9 Numbers

5

5 5 0 9

 5 5 0 8

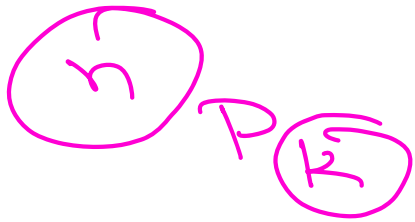
~~XX~~

26	+	1
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2 Fives 3 Fives

900 — Atleast two 5's

900 - 27 0



→

Pick k
data point
from n total