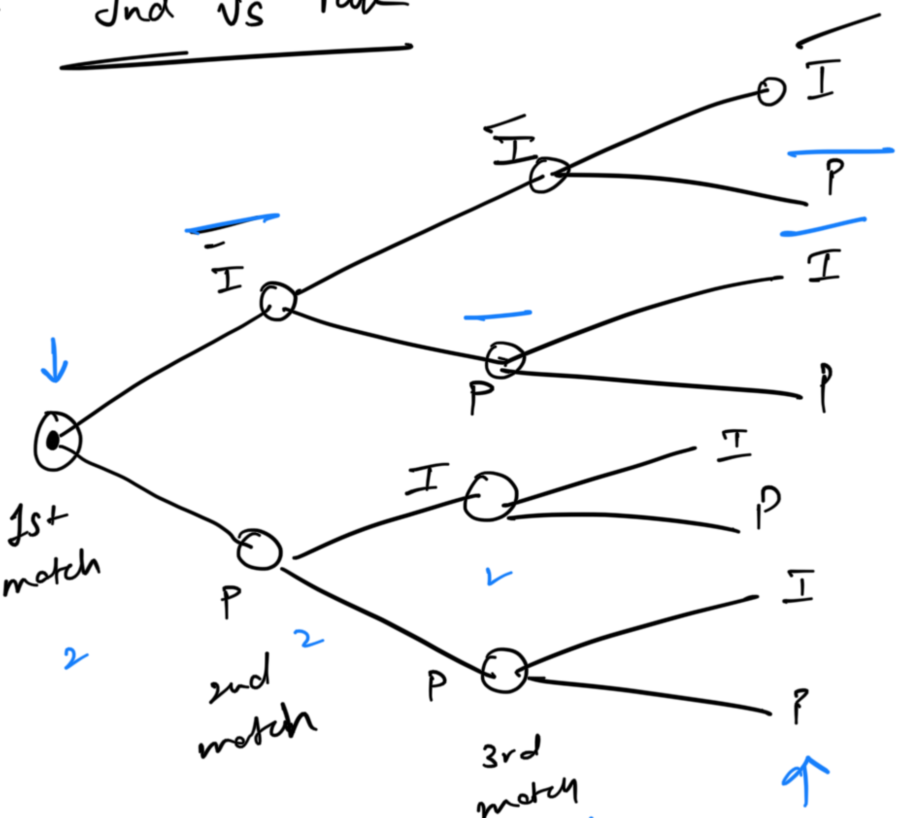
$\boxed{\text{Combinatorics}}$ → P&C

Q 1. Ind vs Pak



$\boxed{2\times2\times2}$

$2^3 = 8$

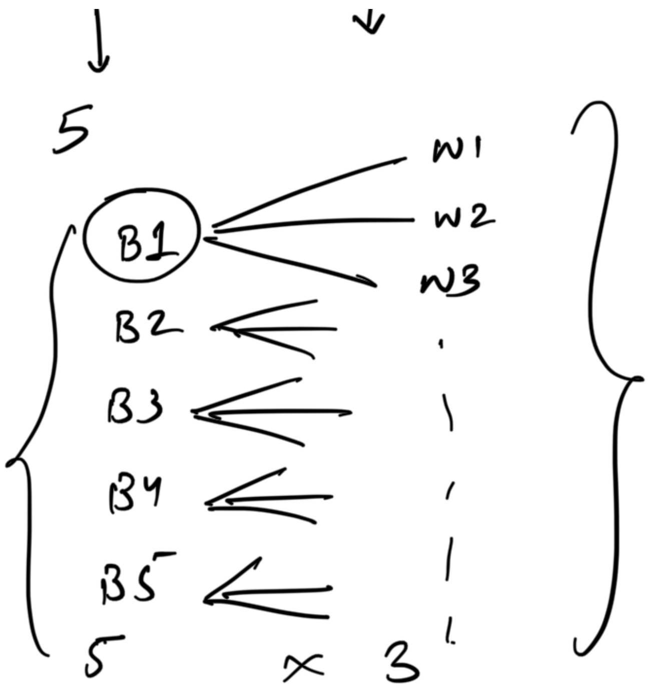
1st 2nd

2 → II, IP, PI, PP } 4

HH, HT, TH, TT } 4

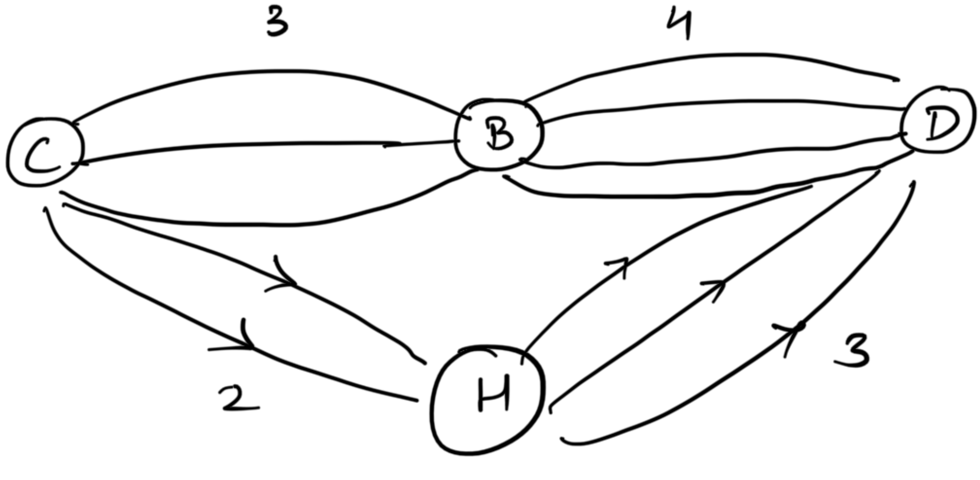
3 → III ... } 2^3 → 8

5B 3W



$5 \times 3 = 15$

Q3



via BLR $\rightarrow$ $3 \times 4 = 12$

$\boxed{\text{OR}} \leftarrow +$

via HYD $\rightarrow$ $2 \times 3 = 6$

$= \underline{18}$ ways.

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1 1B and 1S $\Rightarrow$ $3 \times 5 = 15$

OR

(2) 1F and 1D $\Rightarrow$ $7 \times 3 = 21$

OR

(3) 1 Pizza $\Rightarrow$ 3

$15 + 21 + 3 = \underline{\underline{39}}$

Q

$\underline{\underline{(A, B, C)}}$

B	A	C
1st	2nd	1st
3	× 2	× 1

$= \boxed{3 \times 2 \times 1} = \underline{\underline{6}}$

$\rightarrow 3!$ (3 factorial)

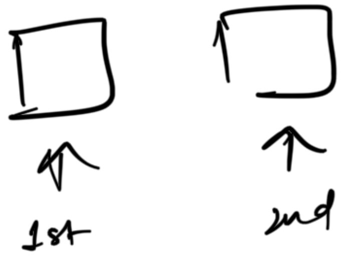
Q: $\underline{\underline{A, B, C, D}}$ (4)

$\rightarrow 4! = \underline{\underline{4 \times 3 \times 2 \times 1}} = \underline{\underline{24}}$

Q

5 diff. chars. | $\rightarrow$ In how many ways can you arrange them

in 2 places



$$ {}^{5}P_{2} \rightarrow \underline{5} \times \underline{4} = \underline{\underline{20}} \Rightarrow 5 \times (5-1) $$

Q: → $\underline{\underline{N \text{ objects}}}$ ⟶ Arranged in K slots

$$ {}^{N}P_{3} \longrightarrow N \times (N-1) \times (N-2) $$

$$ \Downarrow $$

$$ {}^{N}P_{K} \Rightarrow \frac{N \times (N-1) \times \cdots \times (N-(K-1)) \times (N-K) \cdots 3 \times 2 \times 1}{(N-K)(N-K-1) \cdots 3 \times 2 \times 1} $$

$$ \Rightarrow \boxed{ {}^{N}P_{K} = \frac{n!}{(n-k)!} } $$

⇒ "N objects need to be arranged in K slots"

Combinations → A way of choosing a subset of things without considering the arrangement (order) or sequence in which they are chosen.

4 choose 3

$$\left.\begin{matrix} P1 & P2 & P3 \\ P2 & B3 & P4 \\ P1 & P3 & P4 \\ P1 & P2 & P4 \end{matrix}\right\} 4$$

If order mattered ⇒ $^4P_3 = \dfrac{4!}{(4-3)!} = \dfrac{4!}{1!} = 4! = 24$

Order doesn't matter ⇒ $\dfrac{24}{6} = 4$

?

3!

Arrangement of the selected 3 players

→ $^4C = \dfrac{^4P_3}{\;} = 4$

$\Rightarrow \quad 3 \qquad 3!$

Generalise for N objects & K subset

$$\boxed{{}^{N}C_{K} = \frac{{}^{N}P_{K}}{K!} = \frac{N!}{(N-K)!\,K!}}$$

Q:

3 Colors → Baleno (B)

3 colors → swift (S)

① B S B S B S

3 3 2 2 1 1

OR $\quad 2 \times \boxed{3! \times 3!} \rightarrow \underline{\underline{72}}$

② S B S B S B

$$(3! \times 3!) + (3! \times 3!) = \underline{\underline{72}}$$

Portfolio Management

Problem : $ 10000

5 different stocks (A, B, C, D, E)

Constraint 1 ⟶ 3 stock

Goal : Maximise the result.

Data :

	Stocks		Expected Return
1.	Stock A	:	10 %
2.	B	:	7 %
3.	C	:	12 %
4.	D	:	5 %
5.	E	:	9 %

$\frac{10+12+9}{3}$

10.33 %

Sol^n ⟹

Possible combinations $= {}^5C_3 \Rightarrow 10$

ABC

ABD

⋮

CDE

Expected returns for

2nd step calculate avg. of expected [illegible] selected stocks.

ABC > ACE

ACE

Avg. return

ACE → 10.33 %

$ 10000

3000 4000 3000

A C E

10000

$$\frac{3000}{10000} \times 10\% + \frac{4000}{10000} \times 12\% + \ldots$$

Weight

=)