

Chapter → 4 } → Permutation } → select & arrange
 } → Combination } → selection

⇒ Permutation

↳ select & arrange

factorial → $n!$ or L^n

e.g. → $4! = 4 \times 3 \times 2 \times 1 = 24$
 $3! = 3 \times 2 \times 1 = 6$

$0! = 1$

$1! = 1$

$2! = 2 (2 \times 1)$

$3! = 6 (3 \times 2 \times 1)$

$4! = 24 (4 \times 3 \times 2 \times 1)$

$5! = 120 (5 \times 4 \times 3 \times 2 \times 1)$

$6! = 720$

$7! = 5040$

$8! = 40320$

$\frac{25!}{23!} = \frac{25 \times 24 \times 23!}{23!}$
 $= 25 \times 24 = 600$

for Photo

$n = \text{Total} \rightarrow 5 \text{ Persons}$

$r = \text{Select} \rightarrow 2 \text{ Persons}$

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

Shortcut

$7P_3 = 7 \times 6 \times 5 = 210$

$8P_2 = 8 \times 7 = 56$

$10P_4 = 10 \times 9 \times 8 \times 7 = 5040$

$9P_2 = 9 \times 8 = 72$

$10P_3 = 10 \times 9 \times 8 = 720$

Vowels - a, e, i, o, u
 Consonant
 odd
 even

Property :->

- ① $n \geq r$
- ② ${}^n P_n = n!$ ${}^3 P_3 = 3!$
- ③ ${}^n P_1 = n$ eog. ${}^5 P_1 = 5$
- ④ ${}^n P_0 = 1$

${}^n P_r = P(n, r)$ ${}^8 P_3 = P(8, 3)$

Arrange करने से fark पस रत है → Arrange
 ↓
 Permutation TAB - BAT

जितनी जगह है उतने हे letters लोग

And = X
 Or = +

no. and words are always in permutation

Special Place → पहले solve करे then other.

जहाँ कोई होना चाहिए → वो भी special है और
 जहाँ कोई नहीं होना चाहिए - वो भी special hai

302 032
 जितने होते है digit उतने होते है places

25 → 2 digit no 1578 → 4 digit no

अब zero मत है at first place is always for special.

Sp

Fee for special card / Permutation (no.)

Break into cases.

- 2, 3, 0, 7, 8 Even
- (i) ~~X~~ — — — 0
- (ii) ~~X~~ — — — 2
- (iii) ~~X~~ — — — 8

जिनको रखना है साथ में उनका बनाए group और बाकियों को रखे ~~बाहर~~ बाहर → entity.

always there → special person.

no. of case कम हो जाते हैं (Bcz letter repeat होते हैं)

- (i) solve like normal
- (ii) जो जितनी बार repeat हो उसको उसके factorial से divide.

Circular Permutation → $(n-1)!$
(Circle, ring)

necklace [diamond] = $\frac{(n-1)!}{2}$

~~And~~ And = X Or = +

³no Boys are never together → तो 2 तो होसकते हैं

²no Boys are adjacent → कोई भी एक साथ नहीं है

→ Combination ↻

↳ selection

Permutation

no. of case nPr

↓

select & arrange

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

Combination

no. of case nCr

↓

Select

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

Short cut trick :-

$${}^8 P_3 = 8 \times 7 \times 6$$

$${}^9 P_2 = 9 \times 8$$

Short cut trick :-

$${}^8 C_3 = \frac{8 \times 7 \times 6}{3!} = \frac{8 \times 7 \times 6}{6}$$

$${}^9 C_2 = \frac{9 \times 8}{2!} = \frac{9 \times 8}{2}$$

Properties :-

$$\textcircled{1} {}^n P_n = n!$$

$$\textcircled{2} {}^n P_1 = n$$

$$\textcircled{3} {}^n P_0 = 1$$

Properties :-

$$\textcircled{1} {}^n C_n = 1$$

$$\textcircled{2} {}^n C_1 = n$$

$$\textcircled{3} {}^n C_0 = 1$$

$$\textcircled{4} {}^n C_1 + {}^n C_2 + {}^n C_3 + \dots + {}^n C_n = 2^n - 1$$

STAT

$$\text{code} = (n-1)!$$

$$\text{necklace} = \frac{(n-1)!}{2}$$

⑤ ${}^n C_r = {}^n C_{n-r}$
 $r_1 + r_2 = n$

⑥ ${}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$

- * line \rightarrow 2 points
- Colliner \rightarrow $\forall n \in$ line $\# \dots$
- Square \rightarrow 4 points = side
- rect \rightarrow 4 points
- triangle \rightarrow 3

Points = side.

1 point points utri sides

- Quadrilateral \rightarrow 4
- Pentagon \rightarrow 5
- Hexagon \rightarrow 6
- Heptagon \rightarrow 7
- Octagon \rightarrow 8
- Nanagon \rightarrow 9
- Decagon \rightarrow 10
- Hendecagon \rightarrow 11

Polygon

Team Quest
 \approx combination

- at least \rightarrow ~~at least~~ major
- least \rightarrow 1 or more
- Max (at most) \rightarrow ज्यादा से ज्यादा
- majority \rightarrow ज्यादा