

# Chp. Permutation & Combinations

$$\boxed{\text{OR}} = \text{Add.}$$

$$\boxed{\text{AND}} = \text{Multiply.}$$

$$\left. \begin{array}{l} \star 0! = 1 \\ \star 1! = 1 \end{array} \right\} \text{value.}$$

Permutation's  $\rightarrow$  Arrangement  
Combination's  $\rightarrow$  Selection.

$$\textcircled{1} {}^n P_r = \frac{n!}{(n-r)!} \rightarrow \text{arrangement}$$

$$\textcircled{2} {}^n C_r = \frac{n!}{r!(n-r)!} \rightarrow \text{Selection}$$

$$\ast \boxed{{}^n P_r = {}^n C_r \times r!}$$

Shortcut

$\rightarrow$  5 object

5 people

5 arrangement

} 5

In permutation repetition is not allowed.

Shortcut for sum of numbers.

\* (sum of the given digits)  $\times$  (no of digits  $- 1$ )  $\times$  1111...

\* (1111..... no of digits we have to make.) as to be form.

1 3 5 7

eg:  $(1 + 3 + 5 + 7) \times (4 - 1!) \times 1111$

$$16 \times 3! \times 1111$$

$$16 \times 3 \times 2! \times 1111$$

$$= 106656.$$

$$(n+1)! - n! = n \cdot n!$$

$$(n+1)! \times n! = n!$$

$$(n+1) \times n! - n! =$$

$$(n-3)! (n-4)$$

$$n! (n+1 - 1)$$

$$\boxed{n! \cdot n}$$

eg  $\rightarrow 8! - 7!$

$$(n+1) - n! = \underline{\underline{7 \cdot 7!}}$$

\* Two things are not occurring together.

$$(n-2)(n-1)!$$

\* When  $r$  things never comes together.

$$\rightarrow n! - (n-r)! \cdot r!$$

$$* nCr = \frac{nPr}{r!}$$

$$\frac{6 \times 5 \times 4 \times 3 \times 2}{2! \times 2!}$$

$$* nPr = nCr \times r!$$

Shortcut for combination

$$\text{eg: } 52C5 = \frac{52 \times 51 \times 50 \times 49 \times 48}{5!}$$

Properties of combination

$$1) nCr = nC_{n-r}$$

$$\text{eg: } 5C3 = 5C2$$

$$\frac{5!}{2! \cdot 3!} = \frac{5!}{3! \cdot 2!}$$

$$\frac{5!}{2! \cdot 3!} = \frac{5!}{3! \cdot 2!}$$

$$52C_5 = \frac{52!}{5! \cdot 47!}$$

52x

$$2) \quad {}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$$

$$\star \quad {}^n P_r + {}^n P_{r-1} = {}^{n+1} P_r$$

Equal distribution  $\rightarrow r$

$\star$  (1) 'n' things  $\times$  (3) identical boxes or group.

$$\rightarrow \frac{n!}{\left(\frac{n}{3}!\right)^3}$$

(2) no. of person in a group =  $\left(\frac{n}{3}\right) \div 3$  by 3

$$\rightarrow \frac{21!}{\left(\frac{21}{3}!\right)^3} = \frac{21!}{(7!)^3}$$

eg:- 20 things 4 identical box.  
 $\frac{20!}{(5!)^4} = 207360000$

$$\text{eg.} \rightarrow \frac{21!}{(3!)^7 \cdot 7!}$$

Case 2  
② n things into r different boxes

$$\rightarrow \frac{n^r}{r!}$$