Permutation
&
Combination

Things can be linearly arranged - $n!$

Things can be arranged circularly - $(n-1)!$

P&C
C - Select
P - Select & arrange

$$n_{Cr} = \frac{n!}{r! (n-r)!} \qquad n_{P_r} = \frac{n!}{r!(n-r)!} \times r! = \frac{n!}{(n-r)!}$$

1) In Danya's bag there are 3 books History, 4 books Science and 2 book Math. In how many ways she can arrange so that same subject are together?

make them into 3 groups
H   M   S   .   3! - They can be arranged in 3!
/   /   \
3!   2!   4!

So everything can be arranged s.l.
$3! (3! \times 2! \times 4!) = 1728$ ways

2.) In how many ways can we arrange the word 'FUZZTONE' so that vowels remain together

$$FZZTN - 5$$
$$UOE - 3 - grouped\ into\ 1 - 3!$$

$$5 + 1\ grp$$
$$6! \times 3! \qquad\qquad - we\ have\ duplication\ of\ z$$
$$\frac{6!}{2!} \times 3! = 2160\ ways \qquad\qquad n - 1\ duplication$$
$$\frac{n}{A}$$

3.) If Suraj doesn't want vowels together, then in how many way they can arrange 'MARKER'

$$MRKR - 4$$
$$A \cdot E - 2 \quad - grouped\ 1 - 2!$$

Total ways = Together + not together

Not together : Total ways - together

There are 6 in total with a duplication
$$\frac{6}{2!} - together$$

for together

$$4 * 1\ grp\ (2!)$$
$$\frac{5! \times 2!}{2!} = 120$$

not together = 120 ways

4.) without repitition, using digits 2,3,4,5,6,8,0 how many number can be made between 500 & 1000

by logic

- - - .

They want more th 500 so their only 3 availabr options 5,6,8   3

Since no repetition, reducing value for subsequent digits - 3 & 5 = 90

by formula

$$3_{c_4} \times 6_{c_4} \times 5_{c_4} = 90 \text{ ways}$$

$$\frac{3!}{1! \times 2!} \times \frac{6!}{1! \times 5!} \times \frac{5!}{1! \times 4!}$$

5.) A members form a group out of total 8 members

i.) how many ways we can make a group if 2 particular needs to included.

ii.) 2 members must not be included.

we have to make grp of 1 which is filled by 2 already we we can select from remaining 8-2-6

$$6_{c_2} = \frac{6!}{2! \cdot 4!} = 15 \text{ ways}$$

ii) They ain't included so we have $8-2 = 6$ we have
to sele from this ↑

$$6_A : \frac{6!}{4!2!} \times 15 \text{ ways}$$

6.) There are 8 routes from london to Delhi. There
are 6 from Delhi to tokyo. How many different
ways he con revel

8 different option for Delhi.
6 for Tokyo.

$8 \times 6 = 48$ choices

7.) There are 35 people in grp. Containing
12 girls, 10 boys, 5 sr. citizens 8 babies.
organizers wants to select school girl or boy
as leader. In how many ways he can select

i) he eventually wants only girl and
boy so $12 + 10 = 22$, we need 1 leader so

$$22_{C_1} = \frac{22!}{1! \times 21!} = 22$$

by logic

$10 + 12 = 22$ ways   we need 1 leads

so

8.) In a class of 15 students. During Christmas party each shook hands with each other once. Find total number of handshake

we need 2 people for handshake
Total n=15

$$15_{C_2} = \frac{15!}{2! \times 13!} = 105$$

9.) A bank has 6 digit account number with no repitition. first and last digit are 4 and 7 how many total numbers are possible

No repitition, already 2 given total of 10
10-2=8

SO $8 \times 7 \times 6 \times 5 = 1680$

10.) A trekking group is to be formed 6 members. They are to selected 3 girls, 4 boys and 5 teachers. In how many ways group can be formed with 3 teacher and 3 boys or 2 girls and 4 teachers

3T & 3B (or) 2g & 4T   6 - 0 =
                          or - t

Select 3T and 3B from avai los

$$\frac{5}{3! \, 2!} \times \frac{4}{3! \, 1!} + \frac{3}{2! \times 1!} \times \frac{5}{4! \times 1!} = 55 \text{ ways}$$

11.) on a railway line 20 stops. A ticket is need to travel between 2 stops. How many diff tickets govt needs to cater?

we need tickets for 2 stops out of 20

$$20C_2 = \frac{20!}{2! \times 18!} = 190 \text{ tickets}$$

going back & ferth
190×2= 380 tickets

12.) 17 students are present in a class. In how many ways can they be made to stand in 2 circles of 8 and 9

out of 17 we are selecting 9
remaining will be left so -8
They can be arranged.
$$17 C_9 \times 8! \times 7!$$

$nt - - -$
$(n-1)! - 0$

13.) A locker in bank has 3 digit lock. Mohsyh forgot his password. He took 5 seconds for each try. The problem was each digit took 0 to 9. How much time it needed?

There are 10 possibilities with 3 digit pin

$$10 \times 10 \times 10$$

$$1000 \times 6 \text{ sec} = 6000 \text{ sec} = 600 \text{ minutes}$$

14.) In a room there are 2 green chairs
3 yellow chairs and 4 B chairs. In how
ways Ray choose 3 chairs so that atleast
one chair is yellow

Total ways = choosing yellow + not choosing yellow

Total ways - not choosing = choosing yellow
out 9 chairs i need 3

$$9C_3 - 6C_3 = \text{choosing yellow}$$

$$84 - 20$$
$$64 = \text{choosing yellow}$$

15) how many combinations are possible
while selecting 4 letters from 'Smart Jorb'
with condition J must appear

J is already occupied so

J _ _ _

There are 3 k samples include
J k k — 6c, from Jeff 6 we have total
J k _ — 6c
J _ _ _ — p c3

$$6c_1 + 6c_1 + c_3 = 41$$