Permutation refers to the arrangement of a set of items or elements in a specific order. Total arrangement $n!$

* ${}^{n}P_m = P(n,m)$ * ${}^{n}P_n = \frac{n!}{(n-r)!}$

* 1, 2, 3, 4, 5 ⟶ Now 3 ⟶ $5 \times 4 \times 3 = 60$

* ${}^{5}P_3 = \frac{n!}{(n-m)!} = \frac{5!}{(5-3)!} =$

Combination: refers to the selection of items from a larger set where the order of selection does not matter.

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

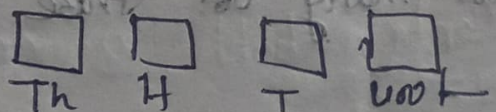
Q-1: How many 4 digits numbers can formed by using the digits 2, 4, 6, 8. when repetation are allowed.

Soln: unit place can be selected in 4 ways.

Total 4 digit number $= 4 \times 4 \times 4 \times 4 = 256$

Q-2: How many 4 digits even number can be formed by using the digits 1, 3, 4, 6, 8 when repetition of digit are allowed?

Soln: 4 digits even number.



Unit place can be selected in 3 ways
Ten's place can be selected in 5 ways.
Hundred place can be selected in 5 ways.
Thousand " " " in 5 ways

Total 4 digits numbers $= 5 \times 5 \times 5 \times 3 = 375$

Q-3:

Find the number of permutation that can be made out of the letters a. MISSISSIPPI b. ASSASSINATION

Soln:

a. MISSISSIPPI

Total letter = 11

'S' repeated in 4 times

I repeated in 4 times

P repeated in 2 time

(total / repeat)

Total permutation $= \frac{11!}{4!4!2!}$

$= 34650$

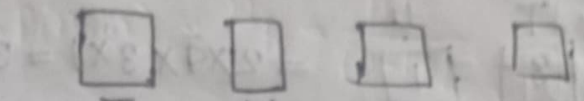
Q-4: How many four digit number can be formed out of digit 1, 2, 3 ... 9 :

a. No repetation is permitted.

b. How many of these will be greter than 3000,

(i) Four digit Numbers $= {}^{9}P_4 = 9 \times 8 \times 7 \times 6 = 3024$

ii. Number greater than 3000 (4 digit)



(3,4...9)

Thousand place = 7 ways

Hundred place = 8 ways

Ten place = 7 ways

place = 6 ways

$= 7 \times 8 \times 7 \times 6$

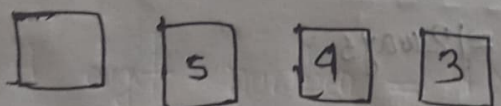
$= 2352$

Q-5: Repetitions are not permitable, how many four digit number can be formed from six digit 1, 2, 3, 5, 7, 8.

Sol:

(i) Four digit number $= {}^{6}P_4 = 6 \times 5 \times 4 \times 3 = 360$

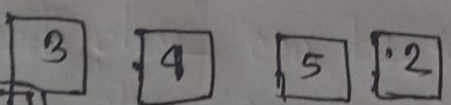
ii. How many of such number are less than 4000?



1, 2, 3

Number are less than $4000 = 3 \times 5 \times 4 \times 3 = 180$

ii. How many in (i) is even?



even $= 3 \times 4 \times 5 \times 2$ (2078)

iv. How many (ii) are odd?

Number less then 4000 (odd) 1, 2, 3, 5, 7, 8

Case 1:

Th	H	T	U
2	4	3	1
1 or 2			3

$= 2 \times 4 \times 3 \times 1 = 24$

Case 2:

Th	H	T	U
2	4	3	1
2 or 3			1

$= 2 \times 4 \times 3 \times 1 = 24$

Case 3:

Th	H	T	U
3	4	3	2
1, 2, 3			5 or 7

$= 3 \times 4 \times 3 \times 2 = 72$

Number less than 4000 (odd) $= 24 + 24 + 72$

v. How many in (i) Contain both 3 and 5.

3 positions available $= 4$

5 " " $= 3$ $\quad 4 \times 3 = 12$ ways

Two remaing position can be occupy $= 4 \times 3 = 12$

Contain both 3 and 5 $= 12 \times 12 = 144$.

vi. How many (i) are devided are 10?

Sol^n: None.

Q-6: How many three digits numbers can be formed from the digits 2, 3, 5, 6, 7 and 9 which are divisible by 5 and none of the digits is repeated?

Sol^n:

1	5	1
H	T	U

$1 \times 5 \times 1 = 20$

Q-7: suppose license plate contains 2 English letter followed by 4 digit.

(i) How many different license plate can be manufactured if repetion of letters and digit are allowed?

Sol^n: Total digit = 10

Total letter = 26

letter	letter	digit	digit	digit	digit
26	26	10	10	10	10

$26 \times 26 \times 10 \times 10 \times 10 \times 10 = 6760000$

ii. How many plate are posible if only the letter are repeted

letter	letter	digit	digit	digit	digit
26	26	10	9	8	7

$= 3407040$

Q-8: How many seven digit number can be formed using digit 1, 7, 2, 7, 6, 7, 6?

Soln:

$$\frac{\text{total digit}}{\text{repetation}} = \frac{7!}{3!\,2!} =$$

Q-9: How many ways can these letter A, B, C, D, E, F be arranged in a circle?

Soln:

Number of ways of circle $= (n-1)! = (6-1)! = 5!$

Q-10: How many permutation can be made out of the letter of world 'COMPUTER'? How many of these

Soln:

No. of permutation $= {}^8P_8 = 8!$

i. begin with C → $\underset{1}{C}\ \underset{7}{\text{-------}} = 1 \times {}^7P_7 = 1 \times 7!$

ii. end with R → $\text{-------}\ \underset{1}{R} = 1 \times {}^7P_7 = 7!$

iii. Begin with C and end with R

$$\underset{1}{C}\ \text{-----}\ \underset{1}{R} = 1 \times 1 \times {}^6P_6 = 6!$$

iv. C and R occupy the End place!

$$\text{------}\ \underbrace{C\ R}_{2 \text{ ways}}$$

$$= {}^6P_6 \times {}^2P_2 = 6! \times 2!$$

$=$

Combination

* $^{n}C_{n} = \frac{n!}{n!(n-n)!}$ * $^{5}C_{2} = \frac{5\times4}{1\times2}$

P	C
A	S

Q-1: Find the value of n if i) $^{n}C_{n-2} = 10$

Sol^{n}: $\frac{n!}{(n-2)!(n-(n+2))!} = 10$

$\Rightarrow \frac{n!}{(n-2)!(n-n+2)!} = 10$

$\Rightarrow \frac{n!}{(n-2)!\,2!} = 10$

$\rightarrow \frac{n\times(n-1)(n-2)}{(n-2)!} = 20$

$\Rightarrow n(n-1) = 20$

$\Rightarrow n^2 - n - 20 = 0$

$\Rightarrow (n-5)(n+4) = 0$

$\therefore n = 5, n \neq -4$

Q-2: A committee of 5 people is to be formed from a group of 4 men and 7 women. How many possible committees can be formed in it at least 3 women are on the committe?

Sol^{n}:

Committee of 5 people:

Men = 4

women = 7

No of committe = $^{7}C_{3}\,^{4}C_{2} + {}^{7}C_{4}\,^{4}C_{1} + {}^{7}C_{5}\,^{4}C_{0}$

$= \frac{7\times6\times5}{1\times2\times3}\times\frac{4\times3}{1\times2} + \frac{7\times6\times5\times4}{1\times2\times3\times4}\times4 + \frac{7\times6\times5\times4\times3}{1\times2\times3\times4\times5}\times$

$= 210 + 140 + 21 = 371$

Q-3: How many automobile license plate can be made if each plate contains two different letters followed by three different digits. Solve the problem if the first digit can not be zero.

Soln:

letter 1st position: $^{26}C_1 = 26$

letter 2nd position $^{25}C_1 = 25$

1st digit (non zero): $^{9}C_1 = 9$

2nd digit: $^{9}C_1 = 9$

3rd digit: $^{8}C_1 = 8$

No. of L.P $= 26 \times 25 \times 9 \times 9 \times 8$

$= 421200$

Q-4: From 10 programmers in how many ways can 5 be selected when (i) A particular programmer is included everytime (ii) A particular programmer is not included at all

Sol: (i) A particular programmer is included everytime

$$= {}^{9}C_4 = \frac{9 \times 8 \times 7 \times 6}{1 \times 2 \times 3 \times 4} = 126$$

(ii) $^{9}C_5 = 126$

5.4, 5.5

8 & 11

9 → 9.3

Q-5: Out of 5 male and 6 female, a committe of 5 is to form. Find the number of ways in which it can be formed so that among the person chose in the committee there are.

(i) Exactly 3 male and 2 female.

Soln: (i) Exactly 3 male and 2 female $= {}^5C_3 \times {}^6C_2 = 150$

(ii) At least 2 male and one feral $= {}^6C_2\,{}^6C_3 + {}^5C_3\,{}^6C_2 + {}^5C_4\,{}^6C_1$

$=$

Q-6: A club has 25 member:

i. How many ways are there to choose four member of clube to serve on an executive.

Soln: $25C_4 = \frac{25 \times 24 \times 23 \times 22}{1 \times 2 \times 3 \times 4} = 12650$.

ii. How many ways are there to choose a president, vice president, secretary, treasurer of the clube, where no person can hold more than one office?

Soln: ${}^{25}C_1\ {}^{24}C_1\ {}^{23}C_1\ {}^{22}C_1$

$= 25 \times 24 \times 23 \times 22$

$= 303600$.