Permutation & Combination and Probability

Permutation and Combination are not that important for the purpose of exam Because Question are rarely asked from This Topic but We have to learn them anyway because Question of probability can't be solved without learning permutation and combination. So will give you all a little hint about what is permutation and what is combination and then we will move on to Probability.

But Before That Just Look at A very Important Concept Without Which You can't solve a single Question of permutation/combination or probability.
And that Factorial Notation.
It's represented by (!) and it is read as Factorial.
So if i write 5! it will be read as Five Factorial.
And what it means ? It means to simply multiply all the numbers in decreasing order till 1.
Like if i write 6! it means 6*5*4*3*2*1 = 720
Or 7! = 7*6*5*4*3*2*1 = 5040
For Fast Calculation You all must learn the value of factorial till 10.
Just Learn these values
1! = 1
2! = 2
3!= 6
4! = 24
5! = 120
6! = 720
7! = 5040
8! = 40320
9! = 362880
10! = 3628800

Well Before I Start Explaining Permutation and combination one thing i want to tell and that is It's the easiest topic that you will find in maths. Most people are unable to understand it and that's why people think it's complex and all type of misconceptions but trust me it's the easiest topic in the whole mathematics and It's not actually even maths, It's less about Calculation and more about Logical Thinking. Well We all can't Calculate Fast but we all can think fast.

So what is permutation?
In Simple words it's arrangement or No. of ways things can be arranged.
Suppose there are 3 words ABC and if it's asked How many ways these three can be arranged then all yu or What are the no. of permutations Possible. Then all you have to do is Arrange this things in as many ways it's Possible.
Let's try to arrange them now. SO There is ABC, ACB, BAC, BCA, CAB, CBA Are there any more ways these can be arranged ? try it ? No These are the all possible arrangements. So The answer to the above Question will be 6. That is ABC can be arranges in different ways.

Now there were only 3 alphabets What if there were more like You have to Arrange ABCDEFGHI. Now for 3 alphabets it was easy you easily arranged them But Arranging these 9 letters will take you days and even then you will not be able to get a certain answer.

So what we should do here. No need to worry our mathematicians were genius they created a very simple formula for that.
And Formula is like this.
N Different things can be arranged in N! ways.
So in above Question there were 9 alphabets so the no. of possibele arrangements will be 9! = 362880.
So that was out basic concept Now let's move on to another basic concept.

So in the above questions It was Asked in how many ways ABCDEFGHI Can be arranged. In this question they were asking the possible arrangements of all the 9 Alphabets, They can also Ask In how many ways 4 alphabets from above 9 alphabets can be arranged.

In such type of Questions there is another formula Which is very very very important because it will be used in almost every question.
So the formula is Out of n things r things can be arranged in nPr ways. and

$$nPr = n!/(n-r)!$$

So in the above Question it is asked that in how many ways 4 alphabets from the total 9 alphabets can be arranged.
So apply the formula nPr = 9P4 = 9!/(9-4)! = 9*8*7*6*5*4*3*2*1/5*4*3*2*1 =9*8*7*6 = 3024.

Now there is a trick to easily calculate nPr by which you won't have to do any division work.
Like if it say 9P3 then you just have to multiply Starting from 9 in decreasing order till the next 2 digit i.e 9P3 = 9*8*7. Why we multiply till 7 only ? that is because the value of r is 3 and total multiplication should contain the value of r.
Another example if it 7P2 then you will just do 7*6[2 number because r = 2 ok]
if it's 7P4 then the answer will be 7*6*5*3[4 no. because value of r=4]
So If it's 10P5 then the value will be 10*9*8*7*6 [5 digit because value of r = 5]

I think you understand my point now. Now move on to the cases.
Actually there are infinite cases in Permutation and Combination 100's of different type of question can be formed So i will only discuss the cases that are important for the exam, And if you have any problem in any other case then you can ask me personally.

What is the meaning of Combination.
Combination is a simple act of Choosing or Selection.
Like When it is asked What are no. of possible ways Word TITAN can be arrange You have to find The Permutation.
But if it is asked what are no. of possible ways You can Select 2 alphabet from the word TITAN, It means you have to find Combination.

The act of selection or Choosing is called COMBINATION.
Now you all must know what is nPr so it's time to move towards nCr
Like nPr = n!/(n-r)!

nCr is somewhat simillar but that is just an extra r! in the denominator
$$\text{So } nCr = n!/[(n-r)!*r!]$$
nCr means r things has to be selected out of n things.
Like in the above Question No. of possible ways 2 alphabets can be selected from the word TITAN
So total no. of alphabets n = 5
no. of alphabets which we have to select r = 2
So the answer will be 5C2 = 5!/(5-2)!*2! = 5!/3!*2! = 5*4/2*1 = 10

Now i told you have to calculating nPr in a simple way Just like that we can also calculate nCr in a simple way All you have to do is Follow the method of nPr and In division you have to also multiply in increasing order from 1
Like 6C3 = 6*5*4/1*2*3
And 9C2 = 9*8/1*2
and 10C4 = 10*9*8*7/1*2*3*4
7C5 = 7*6*5*4*3/1*2*3*4*5

This much knowledge of combination is enough for solving the Questions of Probability.
So without wasting Time just move on to our main Topic ie Probability.

Probability

So what is Probability ?

Probability is Just the chances have happening of an event. Like what are the chances that You will Become a PO or An Income Tax Inspector or a Clerk. What are the chances that you will find the love of you life (That chance of that is very rare)
These all chances are just the game of Probability. Our Life is Also The sum of all these chances, the chances we take Like What are the chances that you will study after 12 instead of gossiping on whatsapp.
So how de we find the probability of happening of an event. In mathematical terms probability = Number of favourable Outcomes/ Total outcomes
No. of favourable outcomes means the outcomes which we want.
Total outcomes Means the total possible outcomes (That's the reason we studied Permutation and Combination so that we can find total outcomes]
Let me give you a very realistic example. What is the probability that You will Become a PO in SBI ?
So We have to find the favourable outcomes here That will be the No. of Posts in SBI[because if you get any of the post in the total post you will be a PO]
So total no. of Posts In SBI this time is 2000

And what are the total outcomes or What are the total no. of Applicants = 20,00,000

So what is the probability that You will be 1 of them Simple Probability of You getting selected = favourable Outcomes/ total outcomes = 2,000/20,00,000 = 1/1000

That is Your Chances. Or in other words 1 in a thousand Aspirant can become a PO in SBI.

So i think Now you have the basic Idea what is PROBABILITY.

So now Lets Move On to Questions.

But before that.VERY VERY VERY VERY VERY IMPORTANT

AND = Multiplication(*)

OR = Addition (+)

If anywhere and I mean Anywhere you see a question which say what is the probabilty of getting X or Y, It simply means that you have to find probabilty of X and Probability of Y and ADD them, The word OR means Addition Always Keep in Mind that.

And if It is asked what is the prbability of getting X and Y, It simply means that you have to find the probability of X and Y and Multiply them, The word AND means Multiplication Always remember that.

At least = Minimum We require [Or kam se kam Kitna hone chahiye Usase jyada bhi ho sakta hai but usase kam nahi hona chahiye]

Example If we want at least 2that measn Minimum we need 2 We can have 3 or 4 or 5 It doesn't matter but Should not be less than 2.

At Most = Maximum We Require[Jyada se Jyada Kitna ho sakta hai, Usase Kam ho sakta hai farak nahi padta but usase jyada ahi hona chahiye]

Example if we want AT MOST 2 That means we can have 2 we can have 1 and we can have 0 also any less value it doesn't But we can can't have anything greater than 2.

These cases will be more clear to you when we will solve some Questions.