Concepts and Formulas

Easy to understand difference:

Permutation

- Permutation is the arrangement of items in which **order matters**
- Number of ways of **selection and arrangement of items** in which Order Matters

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

Combination

- Combination is the selection of items in which **order does not matters** .
- Number of ways of **selection of items** in which Order does not Matters

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

For other important formulas see different case formulas and concepts.

Important Concepts
Permutation and Combination

Permutation and Combination Formulas

- Number of all **permutations** of n things, taken r at a time, is given by
  $^nP_r = \frac{n!}{(n-r)!}$nPr = (n−r)!n!
- Number of all **combinations** of n things, taken r at a time, is given by
  $^nC_r = \frac{n!}{(r)!(n-r)!}$nCr = (r)!(n−r)!n!

Points to remember

- Factorial of any negative quantity is not valid.
- If a particular thing can be done in m ways and another thing can be done in n ways, then
  - Either one of the two can be done in ***m + n*** ways and
  - Both of them can be done in ***m × n*** ways
- 0! = 1
- 1! = 1
- If from the total set of n objects and 'p_1' are of one kind and 'p_2' and 'p_3' and so on .... till p_r are others respectively then
  $^nP_r = \frac{n!}{p_1! \times q_2! \times \ldots\ldots\ p_r!}$nPr = p1!×q2!×....... pr!n!
- ^nP_n = n!
- ^nc_n = 1
- $^nc_0$ = 1
- ^nc_r = $^nc_{(n-r)}$
- $^nc_0$+$^nc_1$+$^nc_2$+$^nc_3$+...^nc_n = 2^n

Distribution of		How many balls boxes can contain			
k Balls	into n Boxes	No Restrictions	≤ 1 (At most one)	≥ 1 (At least one)	= 1 (Exactly one)
Distinct	Distinct	n^k (formula 1)	^nP_k (formula 2)	S(k,n) × n! (formula 3) **(Not Imp)**	^nP_n = n! if k = n 0 if k ≠ n (formula 4)
Identical	Distinct	$^{(k+n-1)}C_{(n-1)}$ (formula 5)	^nC_k (formula 6)	$^{(k-1)}C_{(n-1)}$ (formula 7)	1 if k = n 0 if k ≠ n (formula 8)