

# Permutation & Combination

## Permutation

- Permutation helps us to find the total number of ways that items can be chosen when order does matter.
- Actually permutation is an arrangement of items in which order is important.

### Formula

$${}^n P_r = \frac{n!}{n-r!}$$

### Example 1:

Evaluate:

$${}^{12} P_3 = ?$$

Here  $n=12$ ,  $r=3$

Put values in formula.

$${}^{12} P_3 = \frac{12!}{(12-3)!} = \frac{12!}{9!}$$

$$= \frac{12 \times 11 \times 10 \times \cancel{9!}}{\cancel{9!}}$$

$$= 12 \times 11 \times 10$$

$$\boxed{{}^{12} P_3 = 1320}$$

## Example 2

$${}^n P_2 = 30$$

Find value of  $n$ ?

Sol

$$\text{Formula} = {}^n P_r = \frac{n!}{(n-r)!}$$

put values:

$${}^n P_2 = \frac{n!}{(n-2)!} = 30$$

$$\Rightarrow \frac{(n)(n-1)\cancel{(n-2)!}}{\cancel{(n-2)!}} = 30$$

$$\Rightarrow n(n-1) = 30$$

$$n^2 - n = 30$$

$$n^2 - n - 30 = 0$$

$$n^2 + 5n - 6n - 30 = 0$$

$$n(n+5) - 6(n+5) = 0$$

$$(n+5)(n-6) = 0$$

$$n+5=0$$

$$\boxed{n = -5}$$

$$n-6=0$$

$$\boxed{n = 6}$$

So value of

$$\boxed{n = 6}$$