

Permutations

Factorial Formula for Permutations:

The number of **permutations**, or *ordered selections (arrangements)*, of r objects chosen from a set of n objects is given by

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

Permutations can be used any time we need to know the number of ordered selections of r objects that can be selected from a collection of n objects.

We use permutations only in cases that satisfy these conditions:

1. ***Repetitions are not allowed.***
 2. ***Order is important.***
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Combinations

Factorial Formula for Combinations:

The number of **combinations**, or *unordered selections (subsets)*, of r objects chosen from a set of n objects is given by

$${}_nC_r = \frac{{}_nP_r}{r!} = \frac{n!}{r!(n-r)!}$$

Another commonly used notation for combinations is

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

Combinations share an important feature with permutations in that repetitions are not allowed, yet they differ from permutations in one key way, which is that order is *not* important with combinations.

Combinations are applied only in these situations:

- 1. Repetitions are not allowed, and**
 - 2. Order is not important.**
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