

# How can combinations and permutations be calculated in R?

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Combinations and permutations refer to the mathematical concepts of selecting a certain number of elements from a given set, without replacement and with replacement, respectively. In R, combinations and permutations can be calculated using built-in functions such as "choose()" and "permn()" respectively. The "choose()" function calculates the number of possible combinations, while "permn()" generates all possible permutations of a given set. These functions take in parameters such as the total number of elements and the desired number of elements to be selected. Additionally, the "combn()" function can also be used to generate all possible combinations of a given set of elements. By understanding and utilizing these functions, one can easily calculate and manipulate combinations and permutations in R for various mathematical and statistical purposes.

## Calculate Combinations & Permutations in R

You can use the following functions to calculate combinations and permutations in R:

**#calculate total combinations of size  $r$  from  $n$  total objects**

**choose( $n$ ,  $r$ )**

**#calculate total permutations of size  $r$  from  $n$  total objects**  
**choose( $n$ ,  $r$ ) \* factorial( $r$ )**

The following examples show how to use each of these functions in practice.

### Example 1: Calculate Total Combinations

**Combinations represent ways of selecting a sample from a group of objects in which the *order of the***

***objects does not matter.***

**For example, suppose we have a bag of four marbles: red, blue, green, and yellow. Suppose we'd like to select two marbles randomly from the bag, without replacement.**

**Here are the different combinations of marbles we could select:**

**{red, blue}{red, green}{red, yellow}{blue, green}{blue, yellow}{green, yellow}**

**There are 6 total combinations.**

**Here is how to calculate the total number of combinations in R:**

```
#calculate total combinations of size 2 from 4 total  
objects  
choose(4, 2)
```

**6**

**Our answer matches the number of combinations that we calculated by hand.**

## Example 2: Calculate Total Permutations

Permutations represent ways of selecting a sample from a group of objects in which the *order of the objects does matter*.

For example, suppose we have a bag of four marbles: red, blue, green, and yellow.

Suppose we'd like to select two marbles randomly from the bag, without replacement.

Here are the different permutations of marbles we could select:

{red, blue}, {blue, red}{red, green}, {green, red}{red, yellow}, {yellow, red}{blue, green}, {green, blue}{blue, yellow}, {yellow, blue}{green, yellow}, {yellow, green}

There are 12 total permutations.

Here is how to calculate the total number of permutations in R:

**#calculate total permutations of size 2 from 4 total objects**

**choose(4, 2) \* factorial(2)**

**12**

**Our answer matches the number of permutations that we calculated by hand.**

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