order matters
(permutations)

In some situations, we may be only arranging part of a set of objects.

Example 5

There are 15 students special events committee. They are organizing a party. They need one person to get drinks, one to get food, and one to find a location. In how many ways can these roles be assigned?

15 × 14 × 13 = 2730 ways

Drinks Food Location

Example 6

How many four-digit passcodes can be created using the digits 1, 2, 3, 4, 5, 6? Repetition of the digits is not allowed.

n = 6

r = 4

$6 \times 5 \times 4 \times 3 = 360$

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

$\frac{6!}{(6-4)!} = 360$ ways

Example 7

How many four-digit passcodes can be created using the digits 1, 2, 3, 4, 5, 6? Repetition of the digits is allowed.

Repetition permitted → n^r → 6^4 =

n different objects

r = number of permutations

The number of permutations of "r" objects taken from a group of "n" objects can also be obtained by using the permutation formula:

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

Most scientific calculators include a permutation function, which is usually labelled "nPr".