

Permutations

Permutations – The amount of ways you can arrange n distinct items in a definite order

If you want to arrange r objects from a set of n items, it's written as nPr .

$$nPr = \frac{n!}{(n-r)!} \quad \text{or} \quad n \times (n-1) \times (n-2) \times \dots \times (n-r+1) \quad \text{or just punch it in your calculator}$$

Example 1: How many 3 letter words can be made from ABCD where each letter can be used at most once?

If the set of n items has a identical items, then there are $\frac{n!}{a!}$ ways to arrange them

Example 2: How many ways can you stack 4 Advanced Functions textbooks, 5 Calculus textbooks, and 2 Statistics textbooks?

Combinations

Combinations – Selecting from a group of objects where the order doesn't matter
(Same thing as permutation except for the fact that order is irrelevant)

If you want to choose r objects from a set of n items, it's written as nCr .

$$nCr = \frac{n!}{r!(n-r)!} \quad \text{or} \quad nCr = \frac{nPr}{r!}$$

- $\frac{nPr}{r!}$ because there are $r!$ ways to arrange the items, but this time order doesn't matter

Example 3: How many ways can we choose 3 math club members out of 10 to become executives?

Permutations vs Combinations

Example 4: How many ways can we choose 3 math club members out of 10 to become math club president, vice president, and secretary?