

COMBINATIONS

A combination of n objects taken r at a time is an arrangement of r objects, without regard to order and without repetition, selected from n distinct objects. A combination is defined using the following formula.

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

The most important fact to remember is that the difference between combinations and permutations is in combinations you are counting groups (order is not important) and in permutations you are counting different ways to arrange items with regard to order.

Concept Example:

The following problem introduces the concept reviewed within this module. Use this content as a primer for the subsequent material.

Find the number of ways to take 4 people and place them in groups of 3 at a time where order does not matter.

Solution:

Since order does not matter, we are dealing with a combination problem.

Recall that a combination of n objects taken r at a time is an arrangement of r objects, without regard to order and without repetition, selected from n distinct objects, given by the formula:

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

From the problem we can define the following:

$$n = 4$$

$$r = 3$$

Plugging these values in to the equation for a combination:

$${}^4C_3 = \frac{4!}{(4-3)!3!} = \frac{24}{6} = 4$$

Therefore, there are 4 ways to arrange 4 items taken 3 at a time when order does not matter.