Combinations

Definition: Combination illustrates the number of ways to arrange elements without a definite order.
ORDER DOES NOT MATTER

Two formulas are utilized to find the number of combinations.

Rule 1: Find the number of combinations of n elements taken r at a time.

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

where *n* is the number of items to choose from, and *r* is the number of items you have chosen. (No repetition, order doesn't matter)

Example 1: In how many ways can a sample of 4 chocolates be selected from a box of 12 chocolates?

$$C_4^{12} = \frac{12!}{4!(12-4)!} = \frac{12!}{4!(8)!} = 495$$

Hence, there are 495 possible ways to select 12 chocolates taken 4 chocolates at a time.

Rule 2: Find the number of combinations of n elements with n_1 elements taken r_1 at a time, n_2 elements taken r_2 at a time, etc.

$$C = n_1 C_1 \times n_2 C_2 \times ...$$