

1.6 More Counting: Does Order Matter?

Sometimes when your picking from a group, the order in which you pick doesn't matter! We can't really directly use permutations for this. Check out the example below:

In Lotto 6/49, you pick 6 numbers out of 49. What is the probability the numbers you choose will be the winning numbers?

Does the order in which you pick the numbers matter??

A. Combinations

A collection of chosen objects for which order doesn't matter. Choose r objects from a set of n total objects

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

Note: 'this is read as n choose r '. Sometimes $C(n, r)$ is written as ${}_nC_r$ and is read as OR even better: $\binom{n}{r}$

This is also a button on most scientific calculators!

Combinations are closely related to permutations: $C(n, r) = \frac{P(n, r)}{r!}$

Example 1: In a card game, you are dealt a hand of 5 cards. How many possible hands can you be dealt in a 52 card deck?
Does order matter?

Example 2: There are 12 players on the school basketball team. Only 5 players can start the game.

a) How many different groups of starting players can the coach make? *Does order matter?*

b) How many different lineups can the coach make (positions matter)! *Does order matter?*

Example 3: In how many ways can 6 people be selected from a group that consists of 4 adults and 8 children. The group selected must contain **at least 2** adults.

Example 4: A track club, a swim club and a cycling club are forming a committee to organize a triathlon. The committee will have 2 members from each club. In how many ways can the committee be formed if 10 runners, 8 swimmers and 7 cyclists volunteer to serve on it?

Example 5: In a game where you are dealt 5 cards from a deck of 52,

a) How many ways can you be dealt a royal flush (10-J-Q-K-A of the same suit)?

b) How many ways can you be dealt a straight (5 cards in order)?

c) How many ways can you be dealt four of a kind?

d) What is the probability of getting each of these hands when dealt 5 cards?

Homework: Pg 263 #1-10, 17, Challenge: 19