Counting example! Suppose we have a 52 card deck, pick 5 cards, without replacement, and without keeping track of the order of selection.

Know if we kept of the order of selection, there are

$$(52)(51)(50)(49)(48) = \frac{52!}{47!}$$ ways to pick the cards.

Each 5-tuple appears $5!$ times in this list. Why?

9♣ 2♣ 3♥ 3♦ 10♣

$5!$ ways to arrange them, i.e. orders in which they could have appeared.

$(5)(4)(3)(2)(1) = 5!$

So we overcounted originally by a factor of $5!$. So if we went back and ignored the order of selection, there are $\frac{52!}{47!\,5!} = \binom{52}{5}$ to pick 5 out of 52 cards without replacement and without keeping track of the order of selection.

In general, n items, choose r of them without replacement, there are $(n)(n-1)\cdots(n-r+1) = \frac{n!}{(n-r)!}$ ways to pick if we keep track of the order of selection. Know this!

Now if we ignore the order of selection, each r-tuple appears $r!$ times in a list such as the one above, so we overcounted by a factor of $r!$. So $\frac{n!}{(n-r)!\,r!} = \binom{n}{r}$ ways to pick r out of n items without replacement and without regard to the order of selection.