Permutations on the Calculator

Permutation and **combination** are both counting techniques, useful in determining the number of possible outcomes in order to calculate probability. Each is a method for calculating the number of ways a subgroup of size r can be chosen from a group of n items.

Permutations

- There are **n different** items from which to choose.
- We are selecting **r items** without replacement.
- Different arrangements (orderings) of the items are considered to be different selections; i.e., **order is important.**

Permutations can be calculated using this formula or in a calculator

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

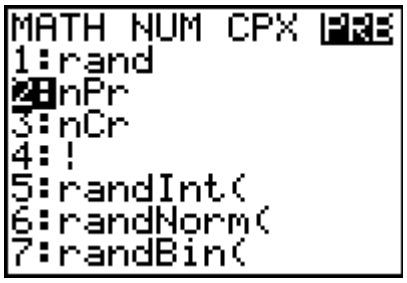
Permutation Example

A barbecue competition has 10 entrants, and judges will determine 1st, 2nd, and 3rd place winners. How many different ways can 1st, 2nd, and 3rd places be awarded?

Solution: This problem is an application of **permutations**, and we know this because **order is important**. Awarding Bob 1st place, Sally 2nd place, and Jim 3rd place would be different than awarding Sally 1st place, Jim 2nd place, and Bob 3rd place, even though the same three people were chosen.

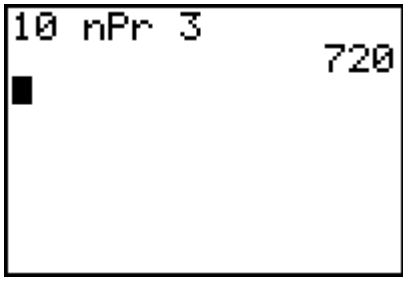
To calculate the result, we use n = 10 (total number of entrants) and r = 3 (the number of place values to be awarded)

Entering on a TI 83+ or 84+ Calculator



1. Enter the value of **n.**

2. Press the **MATH** key, then use the **right arrow** to go to the *PRB* menu, use the **down arrow** to choose the second selection, *nPr*, and press **ENTER.**



3. Enter the value of **r**. Press **ENTER** to execute the command.

The key difference between permutations and combinations is whether order is important or not. Permutations are to be used when order is important, while combinations are to be used when order is not important.

Combinations

Permutation and **combination** are both counting techniques, useful in determining the number of possible outcomes in order to calculate probability. Each is a method for calculating the number of ways a subgroup of size r can be chosen from a group of n items.

Combinations

- There are **n different** items from which to choose.
- We are selecting **r items** without replacement.
- Different arrangements (orderings) are NOT considered to be different selections; i.e., **order is not important.**

Combinations can be calculated using this formula or in a calculator

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

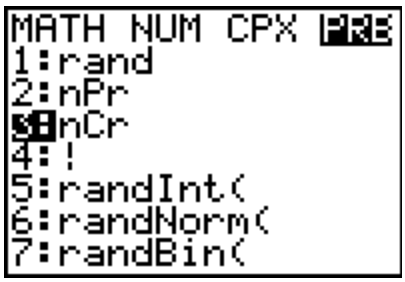
Combination Example

A manager must select 4 of his 9 employees to serve on a committee. How many different committees of 4 can be formed from his 9 employees?

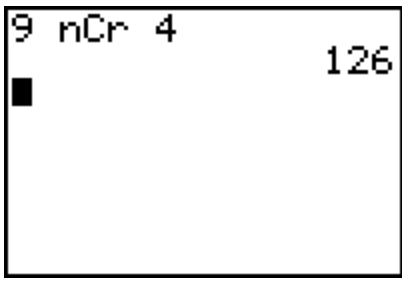
Solution: This problem is an application of **combinations**, and we know this because **order is not important**. The committee will be the same regardless of the order in which its members are picked.

To calculate the result, we use n = 9 (total number of employees) and r = 4 (the number of employees on the committee)

Entering on a TI 83+ or 84+ Calculator



1. Enter the value of **n.**
2. Press the **MATH** key, then use the **right arrow** to go to the *PRB* menu, use the **down arrow** to choose the third selection, *nr*, and press **ENTER.**
3. Enter the value of **r**. Press **ENTER** to execute the command.



The key difference between permutations and combinations is whether order is important or not. Permutations are to be used when order is important, while combinations are to be used when order is not important.