Algebra 2B Name: _____

Comparing Combinations and Permutations

The difference

- In ***permutations*** a 'position' is significant: 1, 2, 3 is different than 2, 3, 1.
- In ***combinations***, there is no specific 'position': 1, 2, 3 is the same as 2, 3, 1.

Examples

- **Permutation**: How many possible ways can 6 actresses be chosen for 3 specific parts in a play?

$$_6P_3 = \quad 6 \bullet 5 \bullet 4 = 120 \text{ possibilities}$$

- **Combination**: There are 6 actresses. How many different groups of 3 actresses can be chosen?

  For this, you can't choose A,B,C **and** B,A,C because this would be the same three actresses.

  Solution:

Permutations

Three members of the student senate must be chosen to serve as President, Secretary and Treasurer. There are only nine people interested. How many possible ways could 9 people hold these 3 positions?

President	Treasurer	Secretary
Al	Bob	Carl
Al	Carl	Bob

These are DIFFERENT possibilities.

The position the student is holding is important so we want to count all arrangements.

$$_9P_3 = \quad 9 \bullet 8 \bullet 7 = 504$$

Combination

How many three-person committees can be formed from this board?

Solution:

Summarize:

In your own words, summarize how you can tell the difference between a permutation and a combination:

Identify the type of problem (permutation, combination, or fundamental counting principal) explain your reasoning. Then solve the problem.

1. For each game, two co-captains must go speak with the referees at center court. How many different ways can the 10-members on the basketball team be co-captains?

2. There are 24 students in my class. I want to send 3 of you to the library. How many different sets of 3 students could I send?

3. How many ways can I arrange the 6 posters on my back wall?

4. There are 6 kids in Jared's family. They need one child to wash the car and one to dry it. How many different ways could this happen?

5. I am going to the beach and I have 3 books, 4 sodas and 2 beach bags. If I choose one of each to take with me, how many different ways could I choose my items?