9.1.1 Notes, Precalculus Permutations and Combinations

Ways to find the possible orders of objects (with and without regard to order)

- Make an organized list
- Tree diagram

When one event does not affect the result of a second event, the events are ***independent.*** When events are independent, you can find the number of outcomes using the *Multiplication Counting Principle.*

Multiplication Counting Principle: If there are *m* ways to make a first selection and *n* ways to make a second selection, then there are *mn* ways to make the two selections.

This principle can be extended to three, four or more selections.

Define ***permutation.***

How many ways can you arrange a set of *n* objects, assuming you arrange all the items?

Define ***combination.***

The difference between these two terms is that fact that order matters.

Decide whether each situation is an example of a permutation or a combination; explain your reasoning.

#1) Mr. Borgman divides his chemistry class into 8 groups. Each group submits one drawing of the molecular structure of water. He will select four of the drawing to display. In how many ways can this be done?

#2) LEAF is holding a raffle in which an official will draw winners from a total of 25 tickets. The first ticket wins $100, the second ticket wins $50, and the third ticket wins $10. In how many different ways can you draw the three winning tickets?

#3) You find seven equally useful articles related to the topic of your research paper. In how many ways can you choose five articles to read?

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#4) A salad bar offer eight choices of toppings. In how many ways can you choose four topping for your salad?

Each of the above examples asks for the possible options by taking just a few from the set at a time. What is the formula the number n items of a set arranged r times, in which order matters? This is written as ${}_nP_r$.

What is the formula for the number n items of a set chosen r, written ${}_nC_r$? Using page 646, what is the more common notation for this?

How can you find the number of ***subsets*** of a set with *n* objects (including the empty (or null) set and the entire set)?