CPI Review

Lesson 65 Combinations

4.4.8 C.1 Apply the multiplication principle of counting: concept of combinations (e.g., number of possible delegations of 3 out of 23 students).

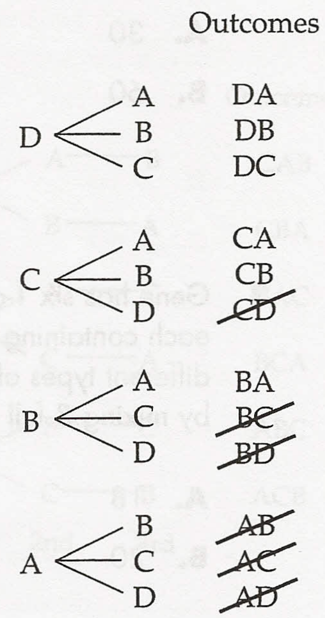
4.4.8 C.3 Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.

Combinations are selections in which order of arrangement is not important. For example, the combination of John and Rose as class representatives is the same as Rose and John. In other words, the combination AB is the same as the combination BA.

The **Fundamental Counting Principle** is used to find the number of possible outcomes of an event by multiplying the number of outcomes from each stage of the event. You can use an organized list, a tree diagram, or the Fundamental Counting Principle to find the number of possible combinations for the elements of a set.

> Mr. Zane needs to divide four of his students (Andrea, Ben, Chris, and Devon) into two groups of two. How many different combinations of partners are possible?

Make a tree diagram of outcomes and eliminate repetitions.



Step 1 **Draw a tree diagram to create an organized list of outcomes.**

Let A = Andrea, B = Ben, C = Chris and D = Devon.

Step 2 **Cross out the repeated combinations of partners, and count the number of different combinations.**

These partners are the same: DA = AD, DB = BD, DC = CD, CA = AC, CB = BC, BA = AB.

Only 6 different combinations are possible.

Step 3 **Use the Fundamental Counting Principle to check your work.**
There are 4 possible ways to choose the 1st person in the group. After the 1st person is chosen, there are 3 possible ways to choose the 2nd group member. That means there are $4 \times 3 = 12$ different ways to choose the 2 group members, but 6 of the combinations are repetitions.

$12 - 6 = 6$

There are 6 different combinations of partners possible.