**Fundamental Principle of Counting**

The Fundamental Counting Principle (also called the counting rule) is a way to figure out the number of outcomes in a probability problem. Basically, you multiply the events together to get the total number of outcomes.

For example, if the first event can occur 3 ways, the second event can occur 4 ways, and the third event can occur 5 ways, then you can find the number of unique choices by multiplying: 3 \* 4 \* 5 = 60 unique choices in total.

**Example**

How many couples can be made from the letters a,b,c,d,e,f if identical couples are not permitted? (i.e. (c,a) but NOT (c,c) )

**Solution:** There are 6choices for the first component { a,b,c,d,e,f}. For each first component, there are 5 choices for the corresponding second component.

Therefore, there 6 x 5 = 30 such couples.

**Example**

If there is a 6 course meal at a restaurant, you might have 3 appetizer choices, 2 soup choices, and 4 salad choices, along with 5 main course choices, 10 beverage choices, and 3 dessert choices. To find out how many unique 6-course meals you can make, multiply the number of possibilities for each course as follows:

3 \* 2 \* 4 \* 5 \* 10 \* 3 = 3,600 possible unique meals

**Example**

Another situation might be the creation of license plates. Again, you have 6 slots to fill. The first two slots must be letters (26 choices) and the remaining 4 slots must be numbers (10 choices each). If you fill in the 6 'slots' with the number of choices and multiply you get the number of licence plates you can make.

26 \* 26 \* 10 \* 10 \* 10 \* 10 = 6,760,000