PROBABILITY RULES (The World)

Definition: The probability [chance] of event A is the proportion [percentage] of the time A is expected to happen when the random process is repeated over and over again.

Opposite Event Rule: The probability that event A happens is equal to one minus the probability that A doesn't happen.

Multiplication Rule: The probability that events A and B both happen is equal to the probability that A happens times the probability that B happens given that event A has occurred.

Definition: Two events are mutually exclusive when the occurrence of one prevents the occurrence of the other.

Addition Rule: The probability that event A or event B happens is equal to the probability that A happens plus the probability that B happens minus the probability that both happen. If events A and B are mutually exclusive, then the probability that event A or B happens is simply the sum of the probabilities.

Definition: Two events are independent if when one happens, the probability that the other happens is unchanged.

Fundamental Counting Principle: If event A can occur in m ways and after A occurs event B can occur in n ways, then the number of ways both events A and B can occur is m x n .

The number of ways k objects can be selected from n objects without regard to order is

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

Repeated Trials: Suppose we have n independent trials, and the probability that event E occurs in an given trial is p . Then the probability that E will occur exactly k times is

$$\frac{n!}{k!(n-k)!} \, p^k \, (1-p)^{n-k}$$