

Probability is the chances of something happening. Probability varies from 0 to 1, or 0% to 100%.

- **Addition for Mutually Exclusive Events**

When two events are mutually exclusive, to compute the probability of either one event or another, you add the two probabilities. The formula is: **$P(A \text{ or } B) = P(A) + P(B)$**

- **Addition for Non-Mutually Exclusive Events**

One or more non-mutually exclusive events can occur at the same time. The occurrence of one does not preclude the other from occurring.

The formula is: **$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$**

- **Multiplication for Independent Events**

When events are independent, one outcome has no effect on other outcomes. The probability of two events occurring are the probability of the first, times the probability of the second.

$$P(A \text{ and } B) = P(A) * P(B)$$

- **Multiplication for Dependent events**

Events are dependent when one outcome does affect other outcomes. This is represented with the given symbol, |. So, for dependent events:

$$P(A \text{ and } B) = (PA) * (P(B | A))$$

- **Counting Principles**

- **Multiplication Formula**

When an experiment has multiple steps, or a certain way of doing one thing and another way or ways of doing another, you use the multiplication formula to determine the total number of outcomes. Using the multiplication formula, the total number of outcomes is: $(\text{Outcome}_1 * \text{Outcome}_2)$

- **Combination Formula**

The combination formula allows you to compute how many ways r items can be selected from a larger group, n . The combination formula:

$${}_nC_r = \frac{n!}{r!(n-r)!}$$

- **Permutation Formula**

The permutation formula computes how many combinations of r are possible from n when the order is important. The permutation formula:

$${}_nP_r = \frac{n!}{(n-r)!}$$