# Multiplication Rule.

The multiplication rule of probability is especially important because it has many important applications, such as determining *redundancy* for improving the reliability of critical systems.

In this activity, you will investigate the multiplication rule, which is used for finding the probability that event A occurs in a first trial and event B occurs in a second trial.

This is written as the probability of A and B.

To determine probability of events A and B BOTH occurring, you need to consider whether these events are INDEPENDENT or DEPENDENT.

The events are considered *INDEPENDENT* if the occurrence of one event *DOES NOT* affect the probability of the occurrence of the other event.

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Now, it is time to test your knowledge.

If the two events are INDEPENDENT, then the probability of A and B occurring is the probability of A occurring multiplied by the probability of B occurring.

Let’s consider the independent events of flipping a coin two times.

Let A be the event of getting heads on the first toss and let B be the event of getting tails on the second toss.

The probability of getting heads on the first toss and then getting tails on the second toss is ½ times ½, which is equal to 1/4.

Now, it is time to test your knowledge.

HOWEVER, if the two events are *NOT* independent, then the occurrence of one event DOES affect the occurrence of the other.

In this case, the probability of events A and B is the probability of A occurring multiplied by the probability of B occurring AFTER it is assumed that event A has already occurred.

Let’s consider the dependent events of selecting two different female students from a class of five students three of whom are female.

The probability of a female on the first selection is 3/5.

There are four students available for the second selection, and two of them are female.

There is a two forth probability of a female on the second selection.

So, the probability of selecting two different females is three fifth multiplied by two forth.

The result is 6/20 or 3/10 or 0.3.

Now, it is time to test your knowledge.

Through this activity, we have demonstrated how to apply the multiplication rule when finding the probability that event *A* occurs in a first trial and event *B* occurs in a second trial.

Remember, correctly determining whether the events are INDEPENDENT or DEPENDENT is a requirement for finding the correct probability.

Congratulations, you have mastered an important concept of Statistics!

Little known fact, the multiplication rule is celebrated on independence day!