

## Lesson 5: Experiments with Dependent Events (Independent / Dependent Events)

**Goals:** Compare independent and dependent events.  
Determine the probability of two dependent or two independent events.  
Solve problems involving the probability of dependent or independent events.

### Independent Events

When performing an experiment with that contains two or more smaller 'events', the events are considered **independent** if the outcomes of the first event do **not** impact the probability of any event from the second trial. For example, if you flip a coin and roll a die, the result of the coin flip does not affect the probabilities associated with rolling the die. If the events are independent, we can calculate the probability of event  $A$  and event  $B$  occurring by multiplying the probabilities (as seen in Lesson 3).

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

intersecting

For independent events, the order of the trials does not matter. The probabilities are the same regardless of the sequence of the trials. You could use a **tree diagram** or a **Venn diagram** to assist with questions involving independent events.



### Dependent Events

If the outcomes of a first event **DO** impact the probabilities of a second event, we say that the events are **dependent**. Specifically, the probabilities of the outcomes of the second event *depend on* what happened in the first event. The probability of dependent events is determined by:

$$\underline{P(A \text{ and } B) = P(A) \times P(B|A)}$$

This is read as "the probability of events  $A$  and  $B$  occurring is equal to the probability of  $A$  multiplied by the probability of  $B$  **given that**  $A$  has already occurred".

You can also note that in a question involving dependent events, **the order of the events matter**. There will be a clear 'first event' and 'second event' which must happen in that order. The probabilities of the events in the second event are affected by what happened in the first event.

The recommend graphic organizer for *dependent events* is a **tree diagram**. It is easier to show a sequence of events by moving from branch to branch in a tree diagram.