10.5 Independent & Dependent Events

**Independent Events**: the occurrence of one does not affect the likelihood of another.

- Example: drawing a blue marble and flipping a tails.

  \[ P(A \text{ and } B) = P(A) \cdot P(B) \]

**Dependent Events**: the occurrence of one event does affect the likelihood of the others.

- Example: drawing a red marble twice.

  \[ P(A \text{ and } B) = P(A) \cdot P(B \text{ after } A) \]

**Example 1**: Independent Events. You spin a spinner and flip a coin. What is the probability of spinning a prime number and flipping tails?

- Prime numbers: \( \frac{3}{5} \)
- Total: \( \frac{5}{5} \)

  \[ P(\text{prime}) = \frac{3}{5} \quad \text{and} \quad P(\text{tails}) = \frac{1}{2} \]

  \[ P(\text{prime and tails}) = P(\text{prime}) \cdot P(\text{tails}) = \frac{3}{5} \cdot \frac{1}{2} = \frac{3}{10} \text{ or } 30\% \]
**Example 2: Dependent Events.**

People are randomly chosen to be game show contestants, from an audience of 100 people. You are with 5 of your relatives and 6 other friends. What is the probability that one of your relatives is chosen first, then one of your friends is chosen second?

\[
P(\text{relative}) = \frac{5}{100} = \frac{1}{20} \quad P(\text{friend after relative}) = \frac{6}{99} = \frac{2}{33}
\]

\[
P(\text{relative then friend}) = \frac{1}{20} \cdot \frac{2}{33} = \frac{2}{660} = \frac{1}{330}
\]