Mutually Exclusive Events

- Suppose you roll a 6 sided die.
- Let **A** be the event that the number is odd and **B** be the event that the number is even.
- Since the die is only rolled once, it is impossible for the number that lands face up is both odd and even.
- The events **A** and **B** are said to be mutually exclusive events.
- If two events cannot happen at the same time, they are said to be mutually exclusive.

Mutually Exclusive Events

- Two events are **mutually exclusive** if they cannot occur together.
- Another way of expressing mutually events is **disjoint** events.
- If two events are mutually exclusive, then the probability of them both occurring at the same time is 0. Disjoint:

$$P(A \cap B) = 0$$

Mutually Exclusive Events

- If two events are mutually exclusive, then the probability of either occurring is the sum of the probabilities of each occurring.
- Specific Addition Rule: Only valid when the events are mutually exclusive.

$$P(A \cup B) = P(A) + P(B)$$

Independent Events

- Two events are independent if the occurrence of one does not change the probability of the other occurring.
- An example would be rolling a 2 on a die and flipping a head on a coin. Rolling the 2 does not affect the probability of flipping the head.
- If events are independent, then the probability of them both occurring is the product of the probabilities of each occurring.

$$P(A \cap B) = P(A) \times P(B)$$