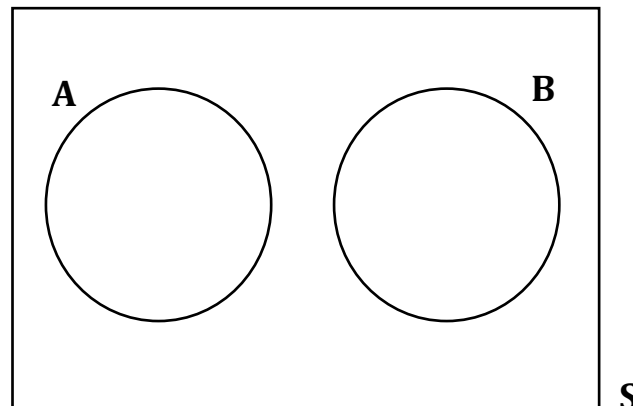




## Mutually Exclusive Events

Two events (A and B) are said to be mutually exclusive if they cannot happen at the same time.

From the *Venn* diagram below, we can see that  $A \cap B = \emptyset$ . Therefore,  $P(A \cap B) = 0$



If A and B are mutually exclusive events, then the probability of A happening **OR** the probability of B happening is  $P(A) + P(B)$ . So, when considering **mutually exclusive** events,

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

**Example:**

Consider rolling a six sided die.

Event A: rolling a 1.  $A = \{1\}$

Event B: rolling a 6.  $B = \{6\}$

The set of possible outcomes is  $S = \{1, 2, 3, 4, 5, 6\}$

$$P(A) = P(B) = \frac{1}{6}$$

Given 2 generic events, A and B,  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

As A and B are mutually exclusive events,  $P(A \cap B) = 0$ .

$$\text{So, } P(A \cup B) = P(A) + P(B) = \frac{1}{6} + \frac{1}{6} = \frac{1}{3}$$