

Key Terms

An **experiment** is a repeatable process that gives rise to a number of **outcomes**.

An **event** is a collection of one or more outcomes.

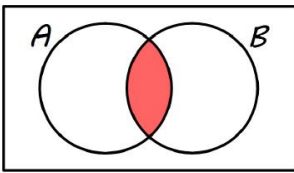
A **sample space** is the set of all possible outcomes.

All events have a **probability** between 0 (impossible) and 1 (certain), usually given as fractions or decimals.

Venn Diagrams

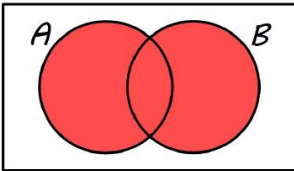
For two events  $A$  and  $B$ ,

*Intersection ( $A \cap B$ )*



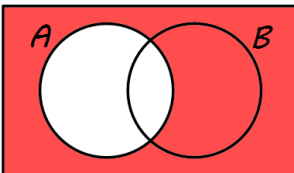
This event is called the intersection of  $A$  and  $B$ , denoted  $A \cap B$ .  
It represents the event that both  $A$  and  $B$  occur.

*Union ( $A \cup B$ )*



This event is called the union of  $A$  and  $B$ , denoted  $A \cup B$ .  
It represents the event that either  $A$  or  $B$  (or both) occur.

*Complement ( $A'$ )*



This event is called the complement of  $A$ , denoted  $A'$ .  
It represents the event that  $A$  does **not** occur.

$$P(A') = 1 - P(A)$$

For any two events,

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

Mutually Exclusive Events

When events have no outcomes in common, they are called **mutually exclusive** (they can't both occur).

For mutually exclusive events, the Venn diagram does not overlap:

$$P(A \cap B) = 0 \text{ therefore } P(A \cup B) = P(A) + P(B) \text{ for mutually exclusive events}$$

Independent Events

When one event has no effect of the outcome of another, they are **independent**.

For independent events, the probability of  $A$  happening is the same whether or not  $B$  happens (and vice versa).

$$P(A \cap B) = P(A) \times P(B) \text{ for independent events}$$

You can use this **multiplication rule** to determine whether events are independent.