

PROBABILITY



KEY WORDS & DEFINITIONS

- Experiment** A repeatable process that results in a number of outcomes.
- Event** A collection of one or more outcomes.
- Sample Space** The set of all possible outcomes. ξ is the universal set.
- Mutually Exclusive** Events that have no outcomes in common.
- Independent** When events have no effect on another.
- Intersection** When two or more events all happen.
- Union** When one or both events happen.
- Complement** When an event does not happen.

TREE DIAGRAMS

You can use tree diagrams to show the outcome of 2 or more successive events.



Multiply ALONG the branches

Add all the favourable final probabilities.

VENN DIAGRAMS

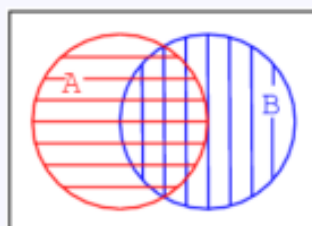
Venn diagrams can be used to show either probabilities or the number of outcomes.

$n(A)$ is the number of outcomes while $P(A)$ is the probability of an outcome

e.g. $n(\text{Aces}) = 4$ $P(\text{Ace}) = 4/52$

Use cross hatch shading to help you work out probabilities.

Focus on one condition at a time, ignoring the other condition completely when you shade.



WHAT DO I NEED TO KNOW

Probabilities of all possible outcomes add to 1
Probability values must be between 0 and 1

Intersection $A \cap B \Rightarrow A \text{ AND } B \text{ happen}$

Union $A \cup B \Rightarrow A \text{ OR } B \text{ OR BOTH happen}$

Complement of A is A' $\Rightarrow \text{NOT } A$

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

Mutually Exclusive events:

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

Independent Events:

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

Probability of B, given A has occurred:

$$P(B | A)$$

For independent events:

$$P(A | B) = P(A | B') = P(A)$$

In formulae book:

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

$$P(B | A) = \frac{P(A \cap B)}{P(A)}$$

$$\text{If } P(A) = // \text{ and } P(B) = \backslash \backslash$$

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

$$P(A \cup B) = // + \backslash \backslash + \#$$