

## PROBABILITY



### KEY WORDS & DEFINITIONS

1. **Experiment** A repeatable process that results in a number of outcomes.
2. **Event** A collection of one or more outcomes.
3. **Sample Space** The set of all possible outcomes.  $\xi$  is the universal set.
4. **Mutually Exclusive** Events that have no outcomes in common.
5. **Independent** When events have no effect on another.
6. **Intersection** When two or more events all happen.
7. **Union** When one or both events happen.
8. **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.

### WHAT DO I NEED TO KNOW

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

**Intersection**  $A \cap B \Rightarrow A$  AND  $B$  happen

**Union**  $A \cup B \Rightarrow A$  OR  $B$  OR BOTH happen

**Complement of A is A'**  $\Rightarrow$  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:**

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

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

### VENN DIAGRAMS

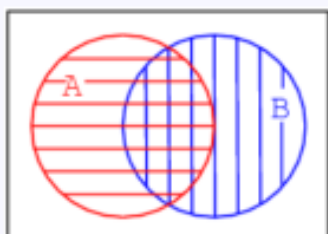
Venn diagrams can be used to show either probabilities or the number of outcomes.

$n(A)$  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.



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

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

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