

# M A T H E M A T I C S



POST CLASS NOTES

## PROBABILITY



# Topics



- 1. Basic Terminology
- 2. Types of Probability
  - 2.1 Theoretical Probability
- 3. Types of Events
- 4. Important Formulae





# 1. Basic Terminology

## Random Experiment

- ❖ Has more than one possible outcomes.
- ❖ It is impossible to predict any outcome in advance.
- ❖ Examples:



Tossing a coin



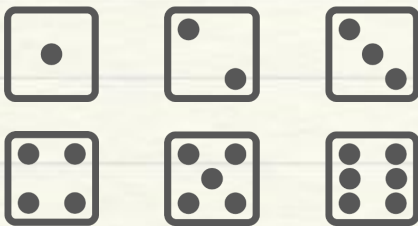
Rolling a dice



Drawing a card from a well-shuffled deck

## Outcome

- ❖ A possible result of an experiment or a trial.
- ❖ Examples:



Six outcomes for rolling a dice: 1, 2, 3, 4, 5, 6

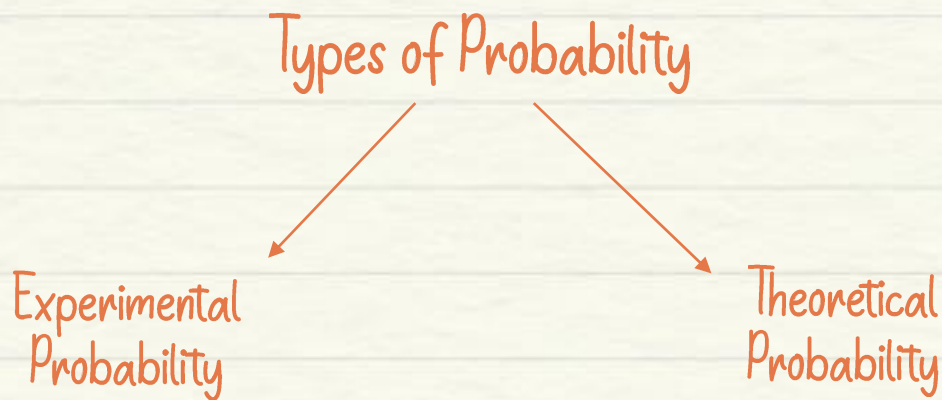


Two outcomes for coin toss:  
Heads, Tails

## Event

- ❖ A set of one or more outcomes for a random experiment.
- ❖ Example:
  - Getting a tail when a coin is tossed.
  - Getting an odd number when a dice is rolled.

## 2. Types of Probability



### 2.1 Theoretical Probability

$$P(E) = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

When a coin is tossed:

- ❖ The probability of getting a **head** is  $\frac{1}{2}$
- ❖ The probability of getting a **tail** is  $\frac{1}{2}$



The probability  $P(E)$  of an event will be a number such that,

$$0 \leq P(E) \leq 1$$

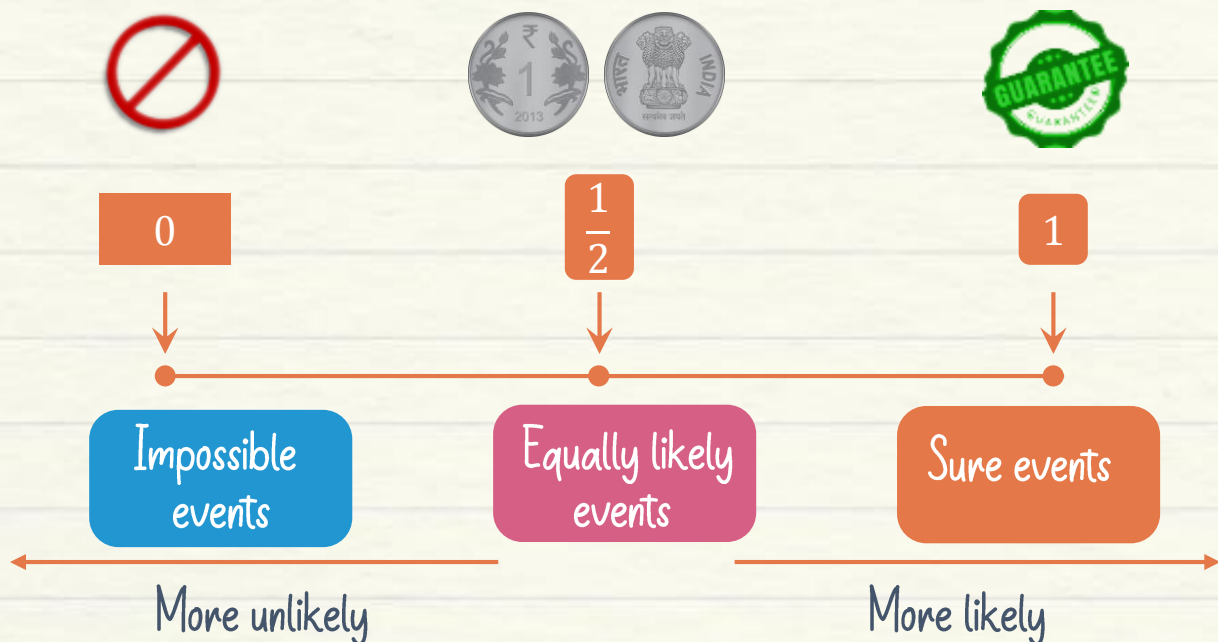
### 3. Types of Events

#### Elementary Event

- ❖ Has as **only one outcome**.
- ❖ Sum of all the elementary events for an experiment = 1

#### Equally likely Event

- ❖ When all the outcomes of an experiment have the **same chance of occurring**.
- ❖ **Example:** Tossing a coin



#### Impossible Event

- ❖  $P(E) = 0$ .
- ❖ **Example:** Getting a 7 when rolling a die

#### Sure/Certain Event

- ❖  $P(E) = 1$ .
- ❖ **Example:** Christmas being celebrated on the 25<sup>th</sup> of December

### 3. Types of Events

#### Complementary Events

- ❖ IF  $E$  denotes happening of an event, then  $\bar{E}$  denotes NOT happening of that event.
- ❖  $E$  and  $\bar{E}$  are said to be **complementary events**.
- ❖  $\bar{E}$  is the **complement** of  $E$ .

$$P(\bar{E}) = 1 - P(E)$$

For an event of getting a number less than four on rolling a dice:

**$E$**



**$\bar{E}$**



## 4. Important Formulae

### Theoretical Probability

$$P(E) = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

### Probability of an event

$$0 \leq P(E) \leq 1$$

For two complementary events,  $E$  and  $\bar{E}$ ,

$$P(\bar{E}) = 1 - P(E)$$



