**Sample Space (S) in Probability**

A **sample space** is the set of all **possible** outcomes in a probability experiment. It represents everything that can happen in an experiment.

**Example 1: Tossing a Coin**

* Possible outcomes: **Heads (H), Tails (T)**
* Sample space: **S = {H, T}**

**Example 2: Rolling a Six-Sided Die**

* Possible outcomes: **1, 2, 3, 4, 5, 6**
* Sample space: **S = {1, 2, 3, 4, 5, 6}**

**Example 3: Drawing a Card from a Standard Deck**

* A standard deck has **52 cards**.
* Sample space includes all **52 possible cards** (e.g., Ace of Spades, King of Hearts, etc.).

**Example 4: Two Coin Tosses**

* Possible outcomes: **HH, HT, TH, TT**
* Sample space: **S = {HH, HT, TH, TT}**

**Types of Sample Spaces**

1. **Finite Sample Space** – When the number of outcomes is limited (e.g., rolling a die).
2. **Infinite Sample Space** – When outcomes continue indefinitely (e.g., measuring time until an event occurs).
3. **Discrete Sample Space** – When outcomes are countable (e.g., number of heads in coin flips).
4. **Continuous Sample Space** – When outcomes form a range (e.g., heights of students).