Probability Principles

1. Sample Space:

Imagine a box containing all possible outcomes of an event. This box is called the sample space (S).

- **Example:** Flipping a coin. The sample space (S) would be {Heads, Tails}.

2. Events:

An event is any collection of outcomes from the sample space. It's like picking specific items out of the box.

- **Example:** Getting heads when flipping a coin. This event (E) would be {Heads}.

3. Probability:

Probability (P) of an event is the chance of that event happening. It's a numerical value between 0 (impossible) and 1 (certain). We can calculate it in two ways:

- **Theoretical Probability:** This assumes all outcomes in the sample space are equally likely. We calculate it by dividing the number of favorable outcomes (your event) by the total number of outcomes (sample space).
    - Formula: P(E) = Favorable Outcomes / Total Outcomes
    - **Example:** Probability of getting heads (E) when flipping a fair coin (S = {Heads, Tails}) is P(E) = 1 (favorable outcome) / 2 (total outcomes) = 1/2.

- **Experimental Probability:** This is based on observations or experiments. We calculate it by dividing the number of times the event occurs by the total number of trials.
    - Formula: P(E) = Number of times event E occurs / Total number of trials
    - **Example:** Flipping a coin 10 times and getting heads 6 times. The experimental probability of heads is P(E) = 6 (heads) / 10 (trials) = 0.6.