ATOMIC ENERGY CENTRAL SCHOOL

CLASS-9 PROBABILITY HANDOUT

Probability is simply how likely something is to happen.

- Probability is a measure of the likelihood of an event to occur.
- Many events cannot be predicted with total certainty.
- We can predict only the chance of an event to occur i.e. how likely they are to happen, using it.

EVENT: One or more outcomes of an experiment.

- Example Events:
- An event can be just one outcome:
- Getting a Tail when tossing a coin.
- Rolling a “6“.
- An event can include more than one outcome:
- Choosing a "King" from a deck of cards (any of the 4 Kings)
- Rolling an "even number" (2, 4 or 6)

Complementary Events

- The possibility that there will be only two outcomes which states that an event will occur or not.
- Like a person will come or not come to your house, getting a job or not getting a job, etc. are examples of complementary events.
- Basically, the complement of an event occurring in the exact opposite that the probability of it is not occurring.
- Some more examples are:
- It will rain or not rain today
- The student will pass the exam or not pass.
- You win the lottery or you don’t.

What are Equally Likely Events?

- When the events have the same theoretical probability of happening, then they are called equally likely events.

- The results of a sample space are called equally likely if all of them have the same probability of occurring.
- For example, if you throw a die, then the probability of getting 1 is 1/6.
- Similarly, the probability of getting all the numbers from 2,3,4,5 and 6, one at a time is 1/6.
- Hence, the following are some examples of equally likely events when throwing a die:
- Getting 3 and 5 on throwing a die
- Getting an even number and an odd number on a die
- Getting 1, 2 or 3 on rolling a die are equally likely events, since the probabilities of each event are equal.
- Probability can range in from 0 to 1, where 0 means the event to be an impossible one and 1 indicates a certain event.
- **The probability of all the events in a sample space adds up to 1.**

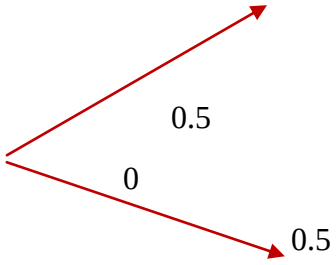
The probability formula is defined as the possibility of an event to happen is equal to the ratio of the number of favourable outcomes and the total number of outcomes.

- **Probability of event to happen P(E)**

$$= \frac{\textbf{Number of favourable outcomes}}{\textbf{Total Number of outcomes}}$$

Probability Tree

- The **tree diagram** helps to organize and visualize the different possible outcomes.
- Branches and ends of the tree are two main positions.
- Probability of each branch is written on the branch, whereas the ends are containing the final outcome.
- **For example**, when we toss a coin, either we get Head OR Tail, only two possible outcomes are possible (H, T).
- You can see below a tree diagram for the coin:



TAIL

- But if we toss two coins in the air, there could be three possibilities of events to occur, such as both the coins show heads or both shows tails or one shows heads and one tail, i.e.(H, H), (H, T),(T, T)
- We can extend the tree diagram to two tosses of a coin