**PROBABILITY**

**Concept of probability:**

* In ‘Statistic’, the term “Probability’ is used as a measure of uncertainty.
* Probability is designed to estimate the degree of uncertainty regarding the happening of a phenomenon.

EX: 1) There are many chances that the price of L.P.G will

rise.

2) It may rain.

3) Do you have doubt that he will not get success in his

business?

* The words ‘chance’, ‘may’, ‘doubt’ …. etc are used the uncertainty.
* The definition of probability was given by “***Pierre Simon Laplace”*** in 1795

**Terms used in Probability:**

* Any operation that results in two or more outcomes is called an “***Experiment***”.

Ex: Tossing a coin

Rolling a die

* An experiment in which all possible outcomes are known and the exact outcome can’t be predicted in advance is called “***A Random Experiment***”.

Ex: Picking up a ball from a bag of balls of different colours

Tossing a fare coin.

* Performing of an experiment is called “***Trial***”.
* The outcomes that ensure the occurrence of an event are called “***Favourable outcomes***”.
* If any outcomes can’t be expected in preference to the other, we say that outcomes are “***Equally likely outcomes***”.
* Any possible result or outcome of an experiment is called an “***Event***”

EX: Selecting one card from a well shuffled deck of cards.

An event is said to be occurred when the outcome of an experiment satisfied the given condition of the event.

* Two or more events are considered to be ***equally likely***, if one of them can’t be expected in preference to be other
* Two or more events are called “***Mutually exclusive events***”, if they can’t be having any common outcome.
* An event which is sure or certain to occur is called “***Sure or Certain event***”.
* An event which is impossible to occur is called “***Impossible event”***.
* An event having only one outcome is called an “***Elementary event***”.
* An event having more than one outcome is called a “***Compound event***”.
* For any event ‘E’, the non-occurring (not E) event is called “***Complementary event***”. It is denoted as Ē or Ec .
* The set of all possible outcomes in a trial is called “***Sample space***”.

Ex: If a coin tossed then sample space

S = {T, H}

If a die is thrown then sample space

S = {1, 2, 3, 4, 5, 6}

**Throwing two dice simultaneously:**

* If we throw a die, then there are six possible outcomes. Then the sample space is

S = {1, 2, 3, 4, 5, 6}

* If we throw two dice, then there are totally 36 outcomes possible. Then the sample space is

S = {(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6),

(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6),

(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6),

(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6),

(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6),

(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}

* If we throw ‘n’ dice, then

the number of possible outcomes is **6n.**

**Tossing two coins simultaneously:**

* If we toss a coin, we have a total of 2 possible outcomes. Then the sample space is

S = { H, T}

* If we toss two coins, we have a total of 4 possible outcomes. Then the sample space is

S = {(T, T), (T, H), (H, T), (H, H)}

* If we toss three coin, we have a total of 8 possible outcomes. Then the sample space is

S = {(T,T,T), (T,T,H), (T,H,T), (T,H,H),

(H,T,T), (H,T,H), (H,H,T), (H,H,H)}

* If we toss ‘n’ coins, we have a total of **2n** possible outcomes.

**Drawing a card from a well shuffled deck of cards:**

* A deck of Playing cards has in all 52 cards.
* It has 13 cards each of four suits, namely spades, club, hearts and diamond.
* The spades and clubs are in black colour. That means there are 26 black cards.
* The hearts and diamonds are in red colour. That means there are 26 red cards.
* In each suit, the cards have either the numbers 2, 3, 4, 5, 6, 7, 8, 9, 10 or the letters J, Q, K, A.
* The cards J,Q and K are called ‘***Face cards***’’.
* In a deck of cards, there are totally 12 face cards.

**Probability of an event:**

* The probability of occurrences of an event E is denoted by p(E) and defined as

p(E) =

* The probability of a sure event is 1
* The probability of an impossible event is 0
* If p(E) is the probability of an event then 0 ≤ p(E) ≤ 1.
* The probability of an event is a proper fraction.
* p(E) + P(Ē) = 1.