**Probability Theory**

1. **Experiment:**

An operation which can produce some well-defined outcomes is called an experiment.

1. **Random Experiment:**

An experiment in which all possible outcomes are know and the exact output cannot be predicted in advance, is called a random experiment.

**Examples:**

* 1. Rolling an unbiased dice.
  2. Tossing a fair coin.
  3. Drawing a card from a pack of well-shuffled cards.
  4. Picking up a ball of certain colour from a bag containing balls of different colours.

**Details:**

* 1. When we throw a coin, then either a Head (H) or a Tail (T) appears.
  2. A dice is a solid cube, having 6 faces, marked 1, 2, 3, 4, 5, 6 respectively. When we throw a die, the outcome is the number that appears on its upper face.
  3. A pack of cards has 52 cards.

It has 13 cards of each suit, name **Spades, Clubs, Hearts and Diamonds**.

Cards of spades and clubs are **black cards**.

Cards of hearts and diamonds are **red cards**.

There are 4 honours of each unit.

There are **Kings, Queens and Jacks**. These are all called **face cards**.

1. **Sample Space:**

When we perform an experiment, then the set S of all possible outcomes is called the **sample space**.

**Examples:**

* 1. In tossing a coin, S = {H, T}
  2. If two coins are tossed, the S = {HH, HT, TH, TT}.
  3. In rolling a dice, we have, S = {1, 2, 3, 4, 5, 6}.

1. **Event:**

Any subset of a sample space is called an **event**.

1. **Probability of Occurrence of an Event:**

Let S be the sample and let E be an event.

Then, E https://www.indiabix.com/_files/images/aptitude/1-sym-eps.gif S.

|  |  |  |
| --- | --- | --- |
| https://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif P(E) = | *n*(E) | . |
| *n*(S) |

1. **Results on Probability:**
   1. P(S) = 1
   2. 0 https://www.indiabix.com/_files/images/aptitude/1-sym-leq.gif P (E) https://www.indiabix.com/_files/images/aptitude/1-sym-leq.gif 1
   3. P(https://www.indiabix.com/_files/images/aptitude/1-sym-phi.gif) = 0
   4. For any events A and B we have : P(A https://www.indiabix.com/_files/images/aptitude/1-sym-uni.gif B) = P(A) + P(B) - P(A https://www.indiabix.com/_files/images/aptitude/1-sym-vec.gif B)
   5. If A denotes (not-A), then P(A) = 1 - P(A).