

# Probability And Statistics

**Probability And Statistics** are the two important concepts in Maths. Probability is all about chance. Whereas statistics is more about how we handle various data using different techniques. It helps to represent complicated data in a very easy and understandable way. Statistics and probability are usually introduced in Class 10, Class 11 and Class 12 students are preparing for school exams and competitive examinations. The introduction of these fundamentals is briefly given in your academic books and notes. The statistic has a huge application nowadays in data science professions. The professionals use the stats and do the predictions of the business. It helps them to predict the future [profit or loss](#) attained by the company.

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## What is Probability?

Probability denotes the possibility of the outcome of any random event. The meaning of this term is to check the extent to which any event is likely to happen. For example, when we flip a coin in the air, what is the possibility of getting a head? The answer to this question is based on the number of possible outcomes. Here the possibility is either head or tail will be the outcome. So, the probability of a head to come as a result is  $1/2$ .

The probability is the measure of the likelihood of an event to happen. It measures the certainty of the event. The formula for probability is given by;

**$P(E) = \text{Number of Favourable Outcomes} / \text{Number of total outcomes}$**

**$P(E) = n(E)/n(S)$**

Here,

$n(E)$  = Number of event favourable to event E

$n(S)$  = Total number of outcomes

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## What is Statistics?

Statistics is the study of the collection, analysis, interpretation, presentation, and organization of data. It is a method of collecting and summarising the data. This has many applications from a small scale to large scale. Whether it is the study of the population of the country or its economy, stats are used for all such data analysis.

Statistics has a huge scope in many fields such as sociology, psychology, geology, weather forecasting, etc. The data collected here for analysis could be quantitative or qualitative. Quantitative data are also of two types such as: discrete and continuous. Discrete data has a fixed value whereas continuous data is not a fixed data but has a range. There are many terms and formulas used in this concept. See the below table to understand them.

## Terms Used in Probability and Statistics

There are various terms utilised in the probability and statistics concepts, Such as:

- Random Experiment
- Sample Space
- Random variables
- Expected Value
- Independence
- Variance
- Mean

Let us discuss these terms one by one.

### Random Experiment

An experiment whose result cannot be predicted, until it is noticed is called a random experiment. For example, when we throw a dice randomly, the result is uncertain to us. We can get any output between 1 to 6. Hence, this experiment is random.

### Sample Space

A sample space is the set of all possible results or outcomes of a random experiment. Suppose, if we have thrown a dice, randomly, then the sample space for this experiment will be all possible outcomes of throwing a dice, such as;

Sample Space = { 1,2,3,4,5,6 }

### Random Variables

The variables which denote the possible outcomes of a random experiment are called random variables. They are of two types:

1. Discrete Random Variables
2. Continuous Random Variables

Discrete random variables take only those distinct values which are countable. Whereas continuous random variables could take an infinite number of possible values.

## Independent Event

When the probability of occurrence of one event has no impact on the probability of another event, then both the events are termed as independent of each other. For example, if you flip a coin and at the same time you throw a dice, the probability of getting a 'head' is independent of the probability of getting a 6 in dice.

## Mean

Mean of a random variable is the average of the random values of the possible outcomes of a random experiment. In simple terms, it is the expectation of the possible outcomes of the random experiment, repeated again and again or  $n$  number of times. It is also called the expectation of a random variable.

## Expected Value

Expected value is the mean of a random variable. It is the assumed value which is considered for a random experiment. It is also called expectation, mathematical expectation or first moment. For example, if we roll a dice having six faces, then the expected value will be the average value of all the possible outcomes, i.e. 3.5.

## Variance

Basically, the variance tells us how the values of the random variable are spread around the mean value. It specifies the distribution of the sample space across the mean.