Data Handling

Mean of Data Sets

Application of Mean in Real Life

The runs scored by the two opening batsmen of a team in ten successive matches of a cricket series are listed in the table.

Player A	24	50	34	24	20	96	105	50	13	27
Player B	26	22	30	10	42	98	40	54	10	122

Using this data, we can compare the performances of the players for each individual game. For example, player B performed better than player A in the first match, player A then performed better than player B in the second match, etc.

This method, however, is not useful in trying to determine the overall performances of the two players and comparing them. For this we need to calculate the average or mean score of each player. The player having the better average or mean score has the better overall performance.

In this lesson, we will learn how to find the mean of a data set.

Mean of a Data Set

Did You Know?

1. Arithmetic mean (AM), mean or average are all the same.

2. Mean is used in calculating average temperature, average mark, average score, average age, etc. It is also used by the government to find the average individual expense and income.

3. Mean cannot be determined graphically.

4. Mean is supposed to be the best measure of central tendency of a given data.

5. Mean can be determined for almost every kind of data.

Properties of Mean

1. Sum of the deviations taken from the arithmetic mean is zero.
If the mean of *n* observations x1,x2,x3....xnx1,x2,x3....xn is x¯x¯ then (x1−x¯)+(x2−x¯)+(x3−x¯)+...+(xn−x¯) =0x1-x¯+x2-x¯+x3-x¯+...+xn-x¯=0.

2. If each observation is increased by *p* then the mean of the new observations is also increased by *p*.
If the mean of *n* observations x1,x2,x3....xnx1,x2,x3....xn is x¯x¯ then the mean of (x1+p), (x2+p), (x3+p), ..., (xn+p)x1+p, x2+p, x3+p, ..., xn+p is (x¯x¯ + *p*).

3. If each observation is decreased by *p* then the mean of the new observations is also decreased by *p*.
If the mean of *n* observations x1,x2,x3....xnx1,x2,x3....xn is x¯x¯ then the mean of (x1−p), (x2−p), (x3−p), ..., (xn−p)x1-p, x2-p, x3-p, ..., xn-p is (x¯x¯ − *p*).

4. If each observation is multipled by *p*(where p≠0p≠0) then the mean of the new observations is also multiplied by *p*.
If the mean of *n* observations x1,x2,x3....xnx1,x2,x3....xn is x¯x¯ then the mean of px1, px2, px3, ..., pxnpx1, px2, px3, ..., pxn is *p*x¯x¯.

5. If each observation is divided by *p*(where p≠0p≠0) then the mean of the new observations is also divided by *p*.
If the mean of *n* observations x1,x2,x3....xnx1,x2,x3....xn is x¯x¯ then the mean of x1p, x2p, x3p, ..., xnpx1p, x2p, x3p, ..., xnp is x¯px¯p.

Solved Examples

Easy

Example 1:

The amounts of money spent by Sajan during a particular week are listed in the table.

Day	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
Money spent (in rupees)	270	255	195	230	285	225	115

Find the average amount of money spent by him per day.

Solution:

$$\text{Average amount of money spent by Sajan per day} = \frac{\text{Total money spent}}{\text{Total number of days}}$$
$$= \text{Rs}\frac{270+255+195+230+285+225+115}{7}$$
$$= \text{Rs}\frac{1575}{7}$$
$$= \text{Rs}\,225$$

Example 2:

The average weight of the students in a class is 42 kg. If the total weight of the students is 1554 kg, then find the total number of students in the class.

Solution:

Let the total number of students in the class be *x*.

$$\text{Average weight of the students} = \frac{\text{Total weight of the students}}{\text{Total number of students}}$$
$$\Rightarrow \text{Total number of students} = \frac{\text{Total weight of the students}}{\text{Average weight of the students}}$$
$$\Rightarrow \therefore x = \frac{1554}{42}$$
$$= 37$$

Thus, there are 37 students in the class.

Medium

Example 1:

For what value of *x* is the mean of the data 28, 32, 41, *x*, *x*, 5, 40 equal to 31?

Solution:

$$\text{Mean of the given data set} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$\Rightarrow 31 = \frac{28+32+41+x+x+5+40}{7}$$

$$\Rightarrow 217 = 2x+146$$

$$\Rightarrow 2x = 71$$

$$\Rightarrow \therefore x = 35.5$$

Thus, for $x = 35.5$, the mean of the data 28, 32, 41, x, x, 5, 40 is 31.

Example 2:

The numbers of children in five families are 0, 2, 1, 3 and 4. Find the average number of children. If two families having 6 and 5 children are included in this data set, then what is the new mean or average?

Solution:

$$\text{Mean of the given data set} = \frac{\text{Sum of all observations}}{\text{Number of observations}}$$

$$\therefore \text{Mean of the initial data set} = \frac{0+2+1+3+4}{5} = \frac{10}{5} = 2$$

Thus, the average number of children for the five families in the initial data set is 2.

Two families are added to the initial set of families.

$$\therefore \text{Mean of the new data set} = \frac{0+2+1+3+4+6+5}{7} = \frac{21}{7} = 3$$

Thus, the average number of children for the seven families in the new data set is 3.

Example 3:

The mean of fifteen numbers is 7. If 3 is added to every number, then what will be the new mean?

Solution:

Let $x_1, x_2, x_3, \ldots, x_{15}$ be the fifteen numbers having the mean as 7 and x¯x¯ be the mean.

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n}$$
$$\Rightarrow 7 = \frac{x_1 + x_2 + x_3 + \ldots + x_{15}}{15}$$
$$\Rightarrow x_1 + x_2 + x_3 + \ldots + x_{15} = 15 \times 7$$
$$\Rightarrow x_1 + x_2 + x_3 + \ldots + x_{15} = 105 \qquad \ldots(1)$$

The new numbers are $x_1 + 3,\ x_2 + 3,\ x_3 + 3,\ \ldots,\ x_{15} + 3$.

Let $\overline{X}$ be the mean of the new numbers.

$$\overline{X} = \frac{(x_1 + 3) + (x_2 + 3) + \ldots + (x_{15} + 3)}{15}$$
$$\Rightarrow \overline{X} = \frac{(x_1 + x_2 + \ldots + x_{15}) + 3 \times 15}{15}$$
$$\Rightarrow \overline{X} = \frac{105 + 45}{15} \qquad \text{(By equation 1)}$$
$$\Rightarrow \overline{X} = \frac{150}{15}$$
$$\Rightarrow \therefore \overline{X} = 10$$

Thus, the mean of the new numbers is 10.

Hard

Example 1:

The average salary of five workers in a company is Rs 2500. When a new worker joins the company, the average salary is increased by Rs 100. What is the salary of the new worker?

Solution:

Let the salary of the new worker be Rs *x*.

Before the joining of the new worker, we have:

$$\text{Mean salary of the five workers} = \frac{\text{Sum of the salaries of the five workers}}{5}$$
$$\Rightarrow 2500 = \frac{\text{Sum of the salaries of the five workers}}{5}$$
$$\Rightarrow \therefore \text{Sum of the salaries of the five workers} = 2500 \times 5 = 12500 \qquad ...(1)$$

After the joining of the new worker, we have:

Number of workers = 5 + 1 = 6

Average salary = Rs (2500 + 100) = Rs 2600

$$\text{Mean salary of the six workers} = \frac{\text{Sum of the salaries of the six workers}}{6}$$
$$\Rightarrow 2600 = \frac{\text{Sum of the salaries of the five workers} + \text{Salary of the new worker}}{6}$$
$$\Rightarrow 2600 = \frac{12500 + x}{6} \qquad \text{(By equation 1)}$$
$$\Rightarrow 15600 = 12500 + x$$
$$\Rightarrow \therefore x = 15600 - 12500 = 3100$$

Thus, the salary of the new worker is Rs 3100.

Example 2:

Find two numbers that lie between $\frac{2}{5}$ and $\frac{1}{2}$.

Solution:

The given numbers are $\frac{2}{5}$ and $\frac{1}{2}$.

Mean of the two numbers = $\dfrac{\frac{2}{5}+\frac{1}{2}}{2} = \dfrac{\frac{4+5}{10}}{2} = \dfrac{9}{10 \times 2} = \dfrac{9}{20}$

Now, we know that the mean of any two numbers lies between the numbers.

Hence, $\frac{2}{5} < \frac{9}{20} < \frac{1}{2}$

Mean of $\frac{9}{20}$ and $\frac{1}{2}$ = $\frac{\frac{9}{20}+\frac{1}{2}}{2} = \frac{\frac{9+10}{20}}{2} = \frac{19}{20\times 2} = \frac{19}{40}$

Hence, $\frac{9}{20} < \frac{19}{40} < \frac{1}{2}$

And $\frac{2}{5} < \frac{9}{20} < \frac{19}{40} < \frac{1}{2}$

So, two numbers that lie between $\frac{2}{5}$ and $\frac{1}{2}$ are $\frac{9}{20}$ and $\frac{19}{40}$.

Example 3:

If $\bar{x}$ is the mean of the *n* observations $x_1, x_2, x_3, ..., x_n$, then prove that

$$\frac{\sum_{i=1}^{n}\left(x_i - \bar{x}\right)}{n} = 0$$

Solution:

It is given that $\bar{x}$ is the mean of the *n* observations $x_1, x_2, x_3, ..., x_n$.

Thus,

$$\bar{x} = \frac{x_1 + x_2 + x_3 + ... + x_n}{n}$$

$$\Rightarrow x_1 + x_2 + x_3 + ... + x_n = n\bar{x} \qquad ...(1)$$

Now,

$$\frac{\sum_{i=1}^{n}\left(x_i-\bar{x}\right)}{n}=\frac{\left(x_1-\bar{x}\right)+\left(x_2-\bar{x}\right)+\left(x_3-\bar{x}\right)+\ldots+\left(x_n-\bar{x}\right)}{n}$$

$$=\frac{\left(x_1+x_2+x_3+\ldots+x_n\right)-\left(\bar{x}+\bar{x}+\bar{x}+\ldots+\bar{x}\right)}{n}$$

$$=\frac{n\bar{x}-n\bar{x}}{n} \qquad \text{(By equation 1)}$$

$$=\frac{0}{n}$$

$$=0$$

Thus, the given result is proved.

Range Of A Data Set

Let us consider the following example.

Mohit and Rohit are the opening batsmen for their school cricket team. The following table shows the runs scored by them in the last 10 innings.

Mohit	74	5	55	48	99	105	30	17	33	54
Rohit	42	101	51	38	53	100	105	44	72	41

Can you say who is a better batsman by observing the table?

From the given table, we observe that both of them scored a maximum of 105 runs in a match. However, this does not tell us anything.

Now, we can see that the highest runs scored by Mohit are 105, while the lowest runs scored by him are 5.

Therefore, the difference between the highest and the lowest runs scored by Mohit is

105 – 5 = 100 runs.

Hence, the range of runs scored by Mohit is 100 runs.

The difference between the highest and the lowest values of a data set is called the range of the data set.

Similarly, the range of the runs scored by Rohit is

Highest score − Lowest score

= 105 − 38

= 67 runs

Thus, we can see that while their maximum scores were equal, the range of Rohit's scores was lesser than the range of Mohit's scores. What does this tell us? This tells us that Rohit was more consistent than Mohit, scoring a minimum of 38 runs in each match.

Now, let us discuss some more examples based on the above concept.

Example 1:

Find the range of the following data:

210, 150, 162, 190, 26, 175, 200, 216, 50, 127, 116, 100

Solution:

Here, highest value = 216

Lowest value = 26

∴ The range of the given data = 216 − 26

= 190

Example 2:

The weekly temperature of Delhi is shown below.

Days	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**

Temperature (in °Celsius)	49	45	40	35	42	46	48

What is the range of temperatures?

Solution:

Here, the highest temperature is 49°C and the lowest temperature is 35°C.

Therefore, range of temperatures = Highest temperature − Lowest temperature

= 49°C – 35°C

= 14°C

Mode Of A Data Set

Bhangra's is a very popular shop that sells watches of foreign brands in Delhi's posh Connaught Place market. The owner of the shop decided to stock the brand whose watches were selling the most. He decided to look at the previous month's sales, which is listed as

Brand	**Number of watches sold**
Alpha	17
Townzen	23
Tag Heuim	7
Twatch	13

Based on this information, the owner decided to stop keeping Tag Heuim watches because very few people buy them. He also decided to keep more varieties of Townzen watches because most people were buying this brand.

In this data set, the highest occurring event (23) corresponds to Townzen watches and is known as the **mode** of this data set. Just like mean and range, mode is another measure of central tendency of a group of data. It can be defined as

The value of a set of data that occurs most often is called the mode of the data.

Here, the data set did not contain too many terms and could thus be easily arranged in ascending order. However, in case of very large data, it is not always easy to arrange it in ascending or descending order. Therefore, in such cases, it is better to arrange the data set in the form of a table with tally marks.

A collection of data can have more than one mode. The data sets having one mode or two modes or more than 2 modes are said to have **uni-mode** or **bi-mode** or **multi-mode**.

Let us now look at some more examples to understand this concept better.

Example 1:

Find the mode of the following numbers.

2, 6, 7, 5, 4, 2, 6, 7, 9, 7, 8, 3, 2, 11

Solution:

The given set of numbers can be arranged in ascending order as

2, 2, 2, 3, 4, 5, 6, 6, 7, 7, 7, 8, 9, 11

Here, 7 and 2 occur most often (3 times). Therefore, both 7 and 2 are the modes of the given set of numbers.

Example 2:

Find the mode of the following data set.

1000, 200, 700, 500, 600, 160, 270, 300, 360, 950

Solution:

The increasing order of the given numbers is

160, 200, 270, 300, 360, 500, 600, 700, 950, 1000

Here, every number is occurring only once.

Thus, the given data has no mode.

Note: The above example shows that the mode of a data may or may not be unique. Also, there are some data sets which do not have any mode.

Example 3:

Determine whether the data 35, 30, 32, 35, 40, 30, 25, 30, 22, 30 has uni-mode, bi-mode or multi-mode.
Solution:
From the data, we observe that 30 repeats maximum times (4 times). Thus, the mode of this data is 30. Since there is only one mode of this data, so the given data has uni-mode.

Example 4:
Find the type of mode of the data 25, 23, 23, 25, 27, 26, 23, 24, 23, 25, 28, 25.
Solution:
From the data, we observe that 23 and 25 repeats maximum times (4 times). Thus, the mode of this data is 23 and 25. Since there are two modes of this data, so this data has bi-mode.

Example 5:
Which type of mode is represented by the data as shown below?

Data	Frequency
0	5
8	6
16	9
24	9
32	9
40	8

Solution:
From the frequency table, we observe that 16, 24 and 32 repeats maximum times (9 times). Thus, the mode of this data is 16, 24, and 32. Since there are three modes of this data, so this data has multi-mode.

Median Of A Group Of Data

Along with the mean, we have another representative value of a data set and that is the median. So, what are you waiting for! Watch the video to learn about the median of a group of data.

Let us solve some examples to understand the concept better.

Example 1:

Find the median of the following data set.

54, 65, 20, 78, 101, 55, 16, 27, 89, 75, 92, 99, 45, 66, 77

Solution:

The given group of data can be arranged in ascending order as

16, 20, 27, 45, 54, 55, 65, 66, 75, 77, 78, 89, 92, 99, 101

This group of data contains 15 terms. The middle term of this data set is the 8^{th} term, which is 66.

Thus, the median of the given group of data is 66.

Example 2:

Find the median of the following group of data and compare it with the mean.

23, 12, 16, 27, 5, 10, 15, 7, 11, 17, 22

Solution:

The given group of data can be arranged in ascending order as

5, 7, 10, 11, 12, 15, 16, 17, 22, 23, 27

This group of data contains 11 terms. The middle term of this data set is the 6^{th} term, which is 15.

Thus, the median of the given group of data is 15.

Mean $= \frac{\text{Sum of all observations}}{\text{Number of observations}} = \frac{23+12+16+27+5+10+15+7+11+17+22}{11}$

$= \frac{165}{11} = 15$

Thus, the values of the mean and the median are same for the given group of data.

Construction Of Double Bar Graphs

Many times in daily life, we come across such situations where we have certain data which we have to compare. In such conditions, it is always better to compare the data graphically.

We know how to draw a bar graph with the given data. Now, one method can be to draw the graphs of each data separately and then compare it. But this is not a fruitful method as one has to look at both the graphs separately and the comparison is also not easy.

Thus, to solve such problems, we will now study the concept of double bar graphs. In double bar graphs, we draw the graphs for both the data on the same axis and then comparison becomes easier.

Let us take an example to see how this is done. So look at the given video to understand the concept of double bar graphs.

Let us solve another example.

Example 1:

The following table shows the number of boys and girls in a class who like different kinds of fruits.

Name of fruit	Number of boys	Number of girls
Apple	25	15
Banana	35	25
Mango	12	25
Pineapple	15	15
Orange	20	25

Draw a double bar graph representing the given data.

Solution:

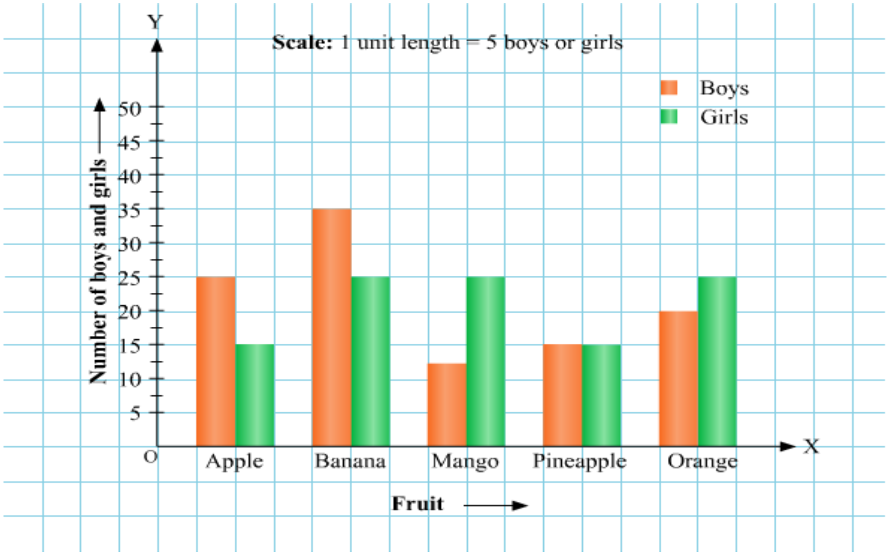
In this case, we take the scale as

1 unit = 5 boys or girls.

The number of boys and girls are represented on the y-axis and the fruits are represented on the x-axis.

The green coloured bars represent the number of girls and the orange coloured bar represents the number of boys.

The double bar graph can be drawn as follows.



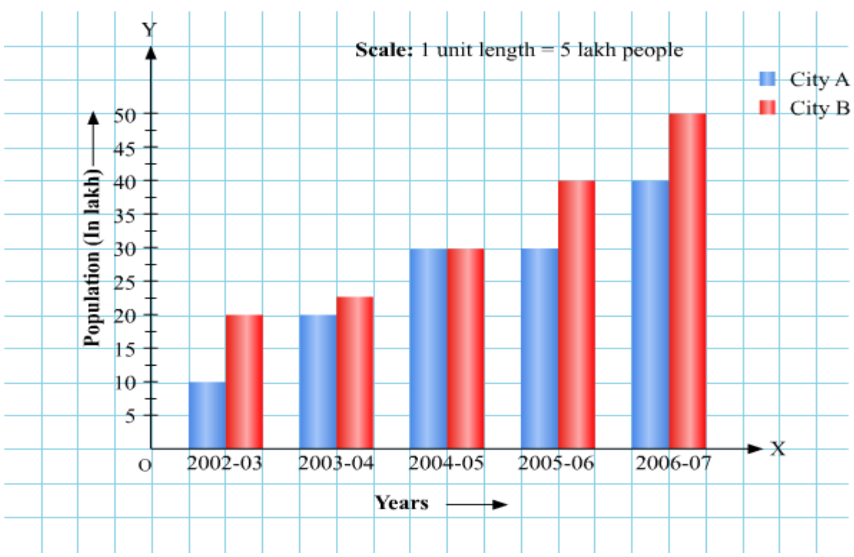
Interpretation of Double Bar Graphs

We know how to construct a double bar graph but do you know that we can get much information from a double bar graph. Let us have a look at the video to see what information we can obtain from a double graph.

Let us now look at some more examples.

Example 1:

Look at the double bar graph given below and answer the following questions.



1. **What information is represented in the bar graph?**
2. **In which year was the population of city B the largest?**

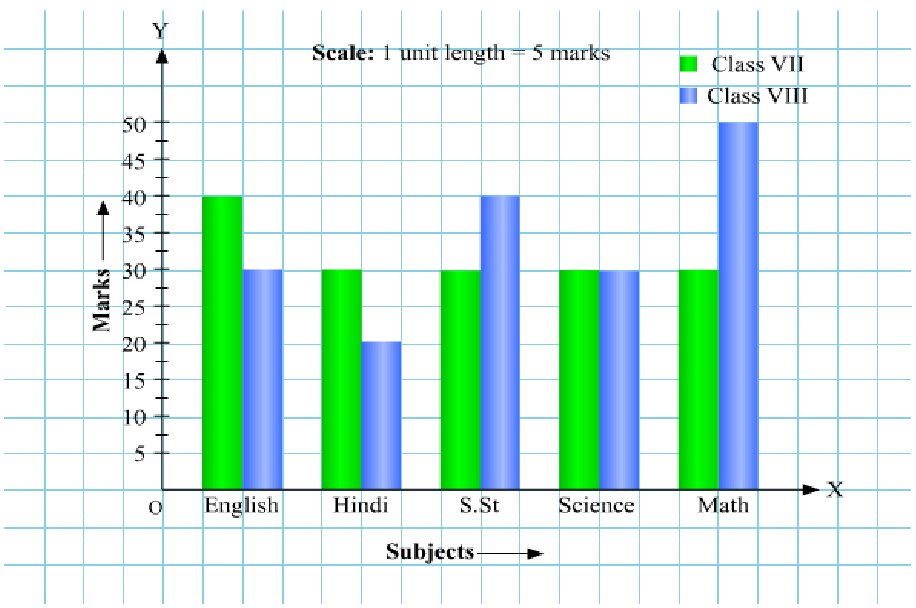
3. **In which year was the population of city A same as that of city B?**
4. **Can you estimate the population of city A in the year 2003-04 and also in the year 2005-06?**

Solution:

1. The bar graph represents the population of two cities A and B for five consecutive years from 2002-03 to 2006-07.
2. Since the bar representing city B is biggest in the year 2006-07, the population of city B was the largest in the year 2006-07.
3. The population of the two cities was same in the year 2004-05, since the length of both the bars are the same in this year.
4. As seen from the graph in the year 2003-04, the population of city A was 20 lakhs and in the year 2005-06, the population of city A was 30 lakhs.

Example 2:

The following graph shows the marks obtained by Ritesh in class VII and VIII in five subjects.



Observe the graph and answer the following questions.

1. **In which subject was the performance of Ritesh same in both classes?**
2. **In which subject did the performance deteriorate?**
3. **In which subject was there the maximum difference in marks?**
4. **How many marks did Ritesh score in English in both the classes?**

Solution:

1. The performance of Ritesh in Science was same in both the classes, since the length of the bar is same for both classes.
2. The performance deteriorated in Hindi and English both, since the blue bar is smaller than the green bar in these two subjects.
3. The maximum difference of marks can be seen in Maths as we can see that the difference between the heights of the blue and green bars is maximum for Maths.
4. Ritesh got 40 marks in English in class VII and 30 marks in class VIII.
    5. Concept of Chance and Probability
    6. In our daily life, various incidents happen and sometimes we know in advance that these incidents will happen. For example, the day after Saturday will be Sunday or the Sun will rise from the east. These are the events which are certain to happen. Similarly, there are events which are impossible such as March comes before February in a year, the apple goes up when dropped from the tree etc.
    7. However, most of the events in our daily life have chances to happen in a particular way and there can be one or more ways in which an event can happen.
    8. For example, India is going to play a cricket match against Bangladesh. Here, the result of this event can occur in various ways whether India will win, lose or draw the game.
    9. Now, can we say India will win the match? Though match between India and Bangladesh is in favour of India, still we cannot say that India will win the match nor can we say that it will lose. This is again a matter of **chance**. We can only say that there is a chance for India to win the match.
    10. Consider one more example now.
    11. Suppose there are five balls of five different colours in a bag - blue, red, yellow, green, and black. Sonu is asked to draw a ball from the bag without looking into it. Can he be certain that he would draw a blue ball? No, it might be any one of the five balls.
    12. Thereafter, Sonu draws one ball at a time without looking into the bag and records the colour of the ball. He then puts that ball inside the bag and again draws a ball. He performs this experiment 20 times and prepares the following table:

Times of drawing a ball	**Colour of the ball**
1	Green
2	Red
3	Green
4	Black
5	Blue
6	Red
7	Red
8	Red
9	Green

10	Green
11	Red
12	Black
13	Blue
14	Red
15	Yellow
16	Red
17	Yellow
18	Yellow
19	Green
20	Black

13. Can you say that after drawing a green ball, the next ball is always red in colour?
14. No, the table does not follow any pattern. It is a matter of chance that which colour will come after a particular colour.
15. In mathematics, we use probability to find the chance that a particular event can happen by considering all the cases which are possible.
16. The word probability is often used in day to day conversation also. People often use this word when they talk about the chances of an event to happen. We can often hear people saying that probably he is going to be our next Prime Minister or probably it will rain today. In these sentences, we are talking about the chances of an event to happen.
17. We can define probability as follows:
18. **Probability is the measure or estimation of likelihood of happening of an event in a particular way.**
19. Probability for an event to happen in a particular way depends upon all possible ways in which that event can happen.
20. For example, when a dice is rolled, the possible ways (positions) in which we get its top face are six such as 1, 2, 3, 4, 5 and 6. The probability to get any of these numbers on top face depends on all these six ways.
21. Similarly, probability is applicable in various situations and it can be very helpful to predict the future results.
22. Let us have a look at the following example.
23. **Example:**
24. **Which of the following are certain events, impossible events, or matters of chance?**
25. **(i) Water always falls down.**
26. **(ii) When a coin is tossed, the outcome is Head.**
27. **(iii) Harry is older than his father.**
28. **(iv) In the musical chair game, Isha will get the chair.**
29. **(v) The size of the Sun is smaller than the size of the Earth.**
30. **(vi) When a dice is thrown, any one of the numbers among 1, 2, 3, 4, 5, and 6 shows up on the top face.**

31. **Solution:**
32. The events **(i)** and **(vi)** are certain.
33. Water always falls down. It does not go up. A dice contains the number 1, 2, 3, 4, 5, and 6. Thus, when a dice is thrown, any one of the above numbers must show up on the top face.
34. The events **(iii)** and **(v)** are impossible to happen.
35. A son cannot be older than his father and the size of the Sun is greater than that of Earth.
36. The events **(ii)** and **(iv)** are matters of chance.
37. When a coin is tossed, the outcome may either be Head or Tail. In the musical chair game, Isha may or may not get the chair.

Probabilities in Simple Experiments without Using Formula

Suppose there are two pens of different colors in a box. One is blue and the other is black. **If you draw a pen from the box, without looking at the colour, then can you say that it will be the blue pen or the black pen surely?**

You can never say with surety whether the pen will be of blue color or black color. Thus, there are two possible outcomes and there is an equal chance of both the possible outcomes to occur.

Since the two possible outcomes have equal chances of occurrence, the chance for each outcome to occur is half. Thus, the probability of drawing a blue pen or a black pen from the box will be same and equal to $\frac{1}{2}$.

Now, consider the case that the box contains one blue pen and two black pens.

Here, the probability of drawing a black pen will be more than the probability of drawing a blue pen. This is because the number of black pens is more than the number of blue pens in the box.

Further, the number of black pens is twice the number of blue pens. Thus, the probability of drawing a black pen is twice the probability of drawing a blue pen.

The probability of drawing a blue pen is $\frac{1}{3}$ and the probability of drawing a black pen is $\frac{2}{3}$.

Let us consider one more example to understand the concept better.

Sanjana throws a dice. She can get any of the numbers: 1, 2, 3, 4, 5, or 6 on the top face of the dice. There is no other possibility. Moreover, there is an equal chance of getting these numbers, i.e., the probability of getting any of these numbers is the same. Since the number of possible outcomes is 6, the probability of getting any of these numbers is $\frac{1}{6}$.

Now, when she throws a dice, can she get the number 7 on the top face of the dice?

Observe that when a dice is thrown, then we cannot get the number 7. Thus, the probability of getting the number 7 is nothing but zero.

Thus, **the probability of the event which has no possibility to occur is 0.**

Also, observe that the probability of getting any of the numbers 1, 2, 3, 4, 5, and 6 on the top face of the dice is 1 as we will surely get any one of the numbers from 1 to 6 upon throwing a die.

Thus, we can say that **the probability of the event which is sure to occur is always 1.**

From the above examples, we conclude the following facts:

1) ***The probability of occurrence of any event always lies between 0 and 1.***

2) ***The probability of such an event which has no possibility to occur is 0*.**

3) ***The probability of such an event which is sure to occur is 1.***

Let us look at some more examples now.

Example 1:

When a coin is tossed, what is the probability of getting a head?

Solution:

When a coin is tossed, there are two possible outcomes – head or tail. The possibility of occurrence of both of them will be the same. Therefore, the probability of getting a head is equal to the probability of getting a tail. Thus, the probability of getting a head is equal to $\frac{1}{2}$.

Example 2:

A dice is thrown. What is the probability of getting

1. **the number 2**
2. **any one of the number among 1, 2, 3, 4, 5, and 6**

3. **the number 7**

   Solution:

1. When a dice is thrown, there are six possible outcomes: 1, 2, 3, 4, 5, and 6 and all of them will have the same possibility of occurrence as any of them can come when a dice is thrown.

   Thus, the probability of getting the number 2 is $\frac{1}{6}$.

2. When a dice is thrown, we can get any one of the numbers 1, 2, 3, 4, 5, and 6.

   Thus, the probability of getting any one of the numbers among 1, 2, 3, 4, 5, and 6 is 1.

3. When a dice is thrown, there is no possibility of getting the number 7, as the number 7 is not there on the dice.

   Thus, the probability of getting the number 7, when a dice is thrown, is 0.

Example 3:

Which of the following cannot be the probability of an event?

(i) $\frac{1}{9}$

(ii) −0.5

(iii) $\frac{13}{11}$

Solution:

We know that the probability of an event *E* always lies between 0 and 1.

$0 \leq P(E) \leq 1$

(i) $\frac{1}{9}$ = 0.11

$0 \leq 0.11 \leq 1$

Thus, $\frac{1}{9}$ can be the probability of an event.

(ii) −0.5 does not lie in the range of $0 \le P(E) \le 1$.

Thus, it cannot be the probability of an event.

(iii) $\frac{13}{11} = 1.18$, which does not lie in the range of $0 \le P(E) \le 1$.

Thus, it cannot be the probability of an event.