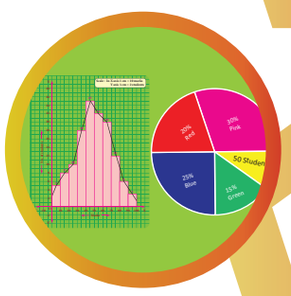
6 STATISTICS



Learning Objectives

- To recall the formation of frequency tables.
- To construct simple Pie-charts for the given data.
- To know how to draw Histogram and Frequency Polygon for grouped data.

B1K5L9

6.1 Introduction

Before we learn on Pie charts, Histograms and Frequency Polygons, let us recall what we have studied in the previous classes like data (primary and secondary) and frequency tables for ungrouped data.

Kamaraj! Go and collect II-term Math marks of all the students from our class.

Geetha! You go and note down the heights of all the students from the cumulative record.

Students, here the marks collected by Kamaraj and heights noted by Geetha are called 'Data'. Data is a collection of facts such as numbers, words, measurements and observations.

For example: Staff's age in a company 27, 51, 19, 21, 46, 35, 52, 25, 57, 29.

6.1.1 Data:

Primary data:

These are the data that are collected in person for the first time for a specific purpose. Here, Kamaraj has collected the data of math marks from the students in person. It is called primary data.

Also, (i) Census in a village

(ii) Collection of colours which the students like in a class are some examples of primary data.

Secondary data:

These are the data that are sourced from some places that has originally collected it. This kind of data has already been collected by some other persons. The statistical operation may have been performed on them already. Here, Geetha also collected the data but she took it from a record which had already collected them. This is called secondary data.

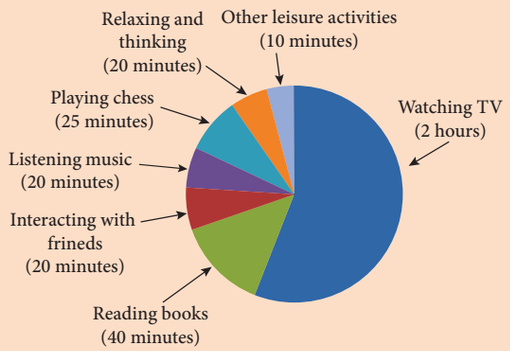
Also, (i) The details of 'PATTA' for a land can be had from the registration office.

(ii) Birth–Death details data can be got from concern office are some examples of secondary data.

From these primary and secondary data , Sometimes we can't get any specific or required information directly like, how many students have got more than 50 marks? how many students got marks between 30 and 40? how many of them are with height 125 cm? If we need answer for these questions, we have to tabulate the data.

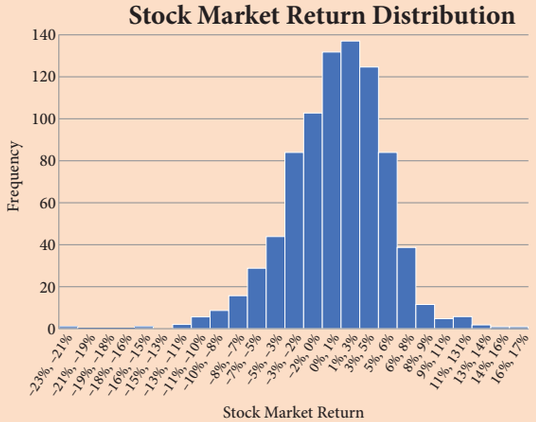
MATHEMATICS ALIVE – STATISTICS IN REAL LIFE

Leisure time on an average day



Pie charts are used in our daily life activities

Stock Market Return Distribution



Histograms are used in stock market to represent the returns of stock buyer.

6.2 Frequency Distribution Table

Frequency distribution:

A frequency distribution is the arrangement of the given data in the form of the table showing frequency with which each variable occurs.

There are two types of distribution table namely

(i) frequency distribution table for ungrouped data and

(ii) frequency distribution table for grouped data.

Note

Range: The difference between the largest and the smallest values of the data given. If 5, 15, 10, 7, 20, 18 are the data then,
Range = 20–5=15

Try these

1. Arrange the given data in ascending and descending order:
   9,34,4,13,42,10,25,7,31,4,40
2. Find the range of the given data : 53, 42, 61, 9, 39, 63, 14, 20, 06, 26, 31, 4, 57

6.2.1 Construction of frequency distribution table for ungrouped data

Ungrouped data or Discrete Data:

An ungrouped data can assume only whole numbers and exact measurement. These are the data that cannot have a range of values. A usual way to represent this is by using Bar graphs.

Examples: 1. The number of teachers in a school.

2. The number of players in a game.

Example 6.1

Form an ungrouped frequency distribution table for the weight of 25 students in STD IV given below and answer the following questions.

25, 24, 20, 25, 16, 15, 18, 20, 25, 16, 20, 16, 15, 18, 25, 16, 24, 18, 25, 15, 27, 20, 20, 27, 25.

(i) Find the range of the weights.

(ii) How many of the students has the highest weight in the class?

(iii) What is the weight to which more number of students belong to?

(iv) How many of them belong to the least weight?

Solution:

To form a distribution table, arrange the given data in ascending order under Weight column then, put a vertical mark against each variable under Tally marks column and count the number of tally marks against the variable and enter it in Frequency column as given below. Hence, the distribution table is

Weight	Tally Marks	Frequency
15	|||	3
16	||||	4
18	|||	3
20	𝍸	5
24	||	2
25	𝍸 |	6
27	||	2
	Total	25

(i) The range of the given data is the difference between the largest and the smallest value. Here, the range = 27–15 =12**.**

(ii) From this table, two of the students have the highest weight of 27 kg.

(iii) 6 students belong to 25 kg weight.

(iv) 3 students belong to the least weight of 15 kg.

So, when we tabulate the given data, it is easy to get the information at a glance, Isn't it?

Activity

1. Collect the blood group of your classmates. Complete the table and analyse.

Blood group	Tally marks	No. of students
A+		
B+		
AB+		
O+		
A-		
B-		
AB-		
O-		

2. Observe the last alphabet in the name of your classmates, tabulate them and answer the following questions.

Alphabet	Tally marks	No. of students (f)

1. In which letter do the names end the most?
2. In which letter do the names end the least?
3. What are the letters in which the names do not end with?
4. Girl names mostly end with _____ letter(s).
5. Boy names mostly end with _____ letter(s).

6.2.2 Construction of frequency distribution table for grouped data

Grouped data or Continuous Data:

A grouped data is any value within a certain interval. The data can take values between certain range with the highest and the lowest value. Continuous data can be tabulated in what is called as frequency distribution. They can be graphically represented using Histograms.

Example: 1. The age of persons in a village.
2. The height and the weight of the students of your class.

Now, we will consider a situation, if we collect data of marks for 50 students, it becomes very difficult to put tally for each and every marks of all the 50 students. Because if we arrange the marks in a table, it will be very large in length and not understandable at once. In this case, we use class intervals. In this table, consider the groups of data in the form of class intervals to tally the frequency for the given data.

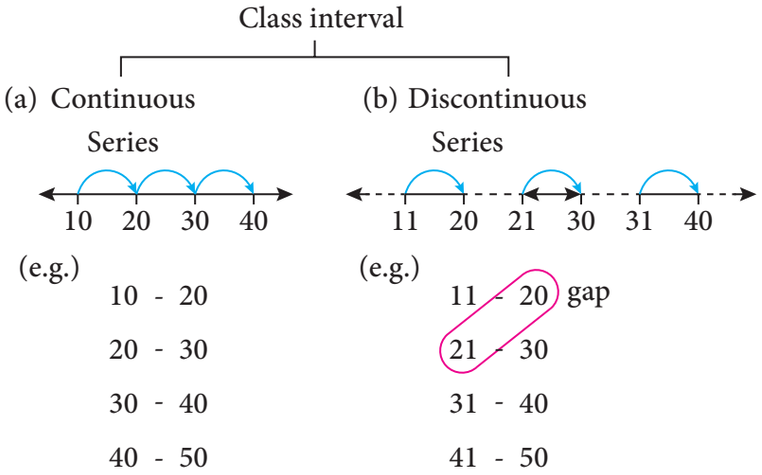
Class Interval:

The range of the variable is grouped into number of classes, and each group is known as class interval (C.I). The difference between the upper limit (U) and the lower limit (L) of the class is known as class size.

i.e. C.I = Upper limit – Lower limit

For example,

Marks for the C.I 10 to 20 can be written as 10-20, whose class size is 20–10=10



(a) While distributing the frequency, we follow the counting as given below. Suppose the classes are 10-20, 20-30, 30-40, 40-50 ..... This represent a continuous series. Here, 20 is included in the class 20-30 and 30 is included in 30-40, likewise for the other classes also.

(b) In case the given series has a gap between the limits of any two adjacent classes, this gap may be filled up by extending the two limits of each class by taking half of the value of the gap. Half of the gap is called the adjustment factor.

Conversion of a discontinuous series into continuous series:

In case the given series is a discontinuous, we can make it as continuous as follows,

Illustration 1:

11 - 20 gap
21 - 30
31 - 40
41 - 50

difference in the gap = 21 – 20
= 1

Lower boundary = lower limit –half of the gap

$$= 11 - \frac{1}{2}(1)$$

= 11 – 0.5 = 10.5

Upper boundary = upper limit + half of the gap

$$= 20 + \frac{1}{2}(1)$$

= 20 + 0.5

= 20.5 and so on for other classes too.

Therefore, the class interval can be changed into a continuous one as given in the following table,

Discontinuous series	Continuous series
11-20 (-0.5, +0.5)	10.5-20.5
21-30	20.5-30.5
31-40	30.5-40.5
41-50	40.5-50.5

Note

Inclusive series:

In the class-intervals, if the upper limit and lower limit are included in that class interval then it is called inclusive series. For example, 11-20, 21-30 , 31-40, 41-50 etc is an inclusive series.

Here, the data 11 and 20 are included in the class (11-20) and so on. Clearly, it is a discontinuous series.

Exclusive series:

In the class intervals, if the upper limit of one class interval is the lower limit of the next class interval then it is called exclusive series. For example, 10-15, 15-20, 20-25, 25-30 etc., is an exclusive series.

Here, 15 is included in the class 15-20 and 20 is included in 20-30. Clearly, it is a continuous series.

6.2.2 (i) Construction of grouped frequency distribution table – Continuous series

Example 6.2

The EB bill(in ₹) of each of the 26 houses in a village are given below. Construct the frequency table.

215	200	120	350	800	600	350	400	180	210	170	305	204
220	425	540	315	640	700	790	340	586	660	785	290	300

Solution:

Maximum bill amount = ₹ 800

Minimum bill amount = ₹ 120

Range = largest value – smallest value

Range = 800 – 120 = ₹ 680

Suppose if we want to take class size as 100, then

The number of possible class intervals = $\frac{Range}{Class\ size} = \frac{680}{100} = 6.8 \simeq 7$

Class Intervals	Tally Marks	Frequency
100-200	III	3
200-300	𝍸 I	6
300-400	𝍸 I	6
400-500	II	2
500-600	II	2
600-700	III	3
700-800	IIII	4
	Total	26

6.2.2 (ii) Construction of grouped frequency distribution table - Discontinuous series.

Example 6.3

Convert the given discontinuous series into a continuous series.

Class	0-5	6-11	12-17	18-23	24-29
Frequency(f)	7	10	9	5	12

Solution:

As told above, first we should fill the gap by extending the two limits of each class by half of the value of the gap. Here the gap is 1, so subtracting and adding half of the gap i.e 0.5 to the lower and the upper limit of each class makes it as a continuous series.

Class	-0.5-5.5	5.5-11.5	11.5-17.5	17.5-23.5	23.5-29.5
Frequency(f)	7	10	9	5	12

Try these

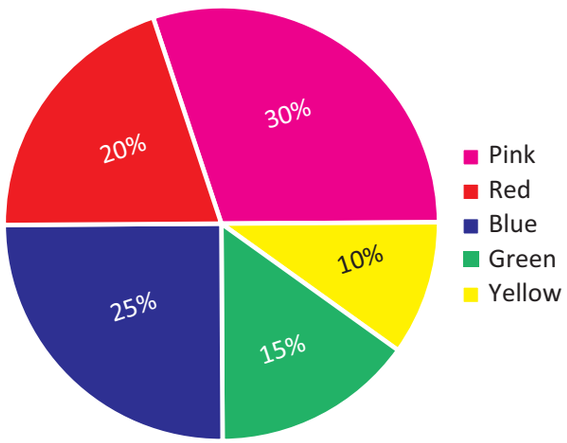
1. Prepare a frequency table for the data :
   3, 4, 2, 4, 5, 6, 1, 3, 2, 1, 5, 3, 6, 2, 1, 3, 2, 4
2. Prepare a grouped frequency table for the data :
   10, 9, 3, 29, 17, 34, 23, 20, 39, 42, 5, 12, 19, 47, 18, 19, 27, 7, 13, 40, 38, 24, 34, 15, 40

6.3 Graphical Representation of the Frequency Distribution for Ungrouped Data

A graphical representation is the geometrical image of a set of data. It is a mathematical picture. It enables us to think about a statistical problem in visual terms. A picture is said to be more effective than words for describing a particular thing. The graphical representation of data is more effective for understanding. In the previous classes, we have studied some graphical representations of ungrouped data such as Line graph, Bar graph, and Pictograph. Now, we are going to represent the given ungrouped data in the circular form namely the pie diagram or the pie chart.

6.3.1 Pie chart (or) Pie diagram

A pie chart is a circular graph which shows the total value with its components. The circle is divided into sectors and the area of the sectors is proportional to the information given. The area of a circle represents the total value and the different sectors of the circle represent the different components. In the 'pie chart' the data are mostly expressed in percentage. Each component is expressed as percentage of the total value.



The Pie diagram is so called because the entire graph looks like an American food 'pie' and the components like slices cut from 'pie'.


American food 'pie'

6.3.2 Method of constructing a pie chart:

In a pie chart, we know that the various components are represented by the sectors of a circle and the whole circle represents the sum of the value of all the components. Therefore, the total angle of 360° at the centre of the circle is divided into different sectors according to the value of the components.

$$\textbf{The central angle of a component} = \frac{value\ of\ the\ component}{total\ value} \times 360^\circ$$

Sometimes, the value of the components are expressed in percentage. In such cases,

$$\textbf{The central angle of a component} = \frac{percentage\ value\ of\ the\ component}{100} \times 360^\circ$$

Steps for construction of the pie chart:

1) Calculate the central angle for each component using the above formula and tabulate it.
2) Draw a circle of convenient radius and mark one horizontal radius in it.
3) Draw radius making central angle of first component with horizontal radius. This sector represents the first component. From this radius, draw next radius with central angle of the second component and so on, until the completion of all components.
4) For identification of each sector, shade with different colours.
5) Label each sector.

Here are given some examples, let us draw the pie chart for the given data.

Example 6.4

Draw a pie diagram to represent the following data, which shows the expenditure of paddy cultivation in 2 acres of land.

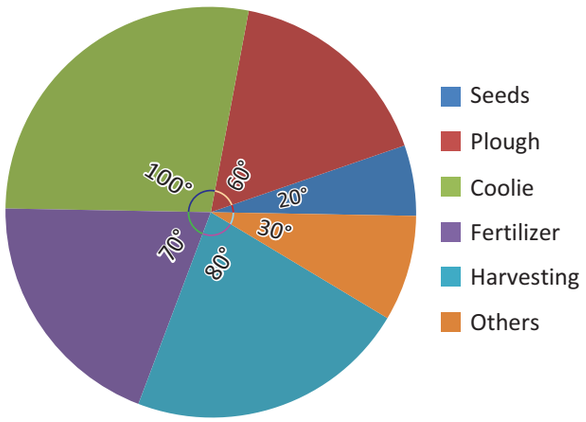
Particulars	Seeds	Ploughing	Wages	Fertilizer	Harvest	Others
Expenses (₹)	2000	6000	10000	7000	8000	3000

Also, 1. Find the percentage of the head in which more money had been spent?

2. What percentage of money was spent for seeds?

Solution:

Expenditure of paddy cultivation in 2 acres.



Particulars	Central angle $= \frac{\text{Value}}{\text{Total}} \times 360°$
Seeds	$\frac{2000}{36000} \times 360° = 20°$
Plough	$\frac{6000}{36000} \times 360° = 60°$
Coolie	$\frac{10000}{36000} \times 360° = 100°$
Fertilizer	$\frac{7000}{36000} \times 360° = 70°$
Harvesting	$\frac{8000}{36000} \times 360° = 80°$
Others	$\frac{3000}{36000} \times 360° = 30°$
Total	360°

1. More money had been spent for wages ₹10,000. Converting into percentage, We have

   $$\text{Wages} = \frac{10000}{36000} \times 100\% = 27.7\%$$

2. ₹2000 was spent for seeds. Converting into percentage, We have,

   $$\text{Seeds} = \frac{2000}{36000} \times 100\% = 5.55\%$$

Example 6.5

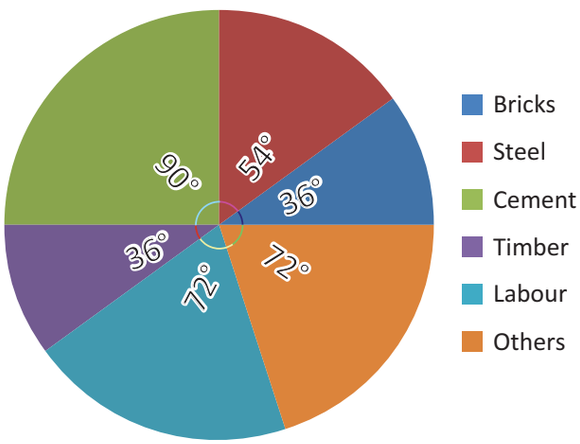
Draw a suitable pie chart for the following data relating to the cost of construction of a house.

Particulars	Bricks	Steel	Cement	Timber	Labour	Others
Expenses:	10%	15%	25%	10%	20%	20%

Also, find how much was spent on labour if ₹55000 was spent for cement.

Solution:

Cost of construction of a house.



Particulars	Central angle
Bricks	$\frac{10}{100} \times 360° = 36°$
Steel	$\frac{15}{100} \times 360° = 54°$
Cement	$\frac{25}{100} \times 360° = 90°$
Timber	$\frac{10}{100} \times 360° = 36°$
Labour	$\frac{20}{100} \times 360° = 72°$
Others	$\frac{20}{100} \times 360° = 72°$
Total	360°

If the expenses on cement is ₹ 55000 then, it represents 25 % and he spent 20 % on labour

Therefore, the expense on Labour $= \frac{20}{25} \times 55000$

$= ₹\ 44{,}000$

%	Expenses
25 ↓	55000 ↓
20	?
Direct proportion	

Note

Uses of pie chart:

1. Pie charts are widely used by the business and the media people.
2. With the help of Pie charts, one can show how the expenditure of the Government or Industry is distributed over different heads.
3. Research people use these type of charts to show their results.

Exercise 6.1

1. **Fill in the blanks:**
   (i) Data has already been collected by some other person is _____ data.
   (ii) The upper limit of the class interval (25-35) is _____.
   (iii) The range of the data 200, 15, 20, 103, 3, 196, is _____.
   (iv) If a class size is 10 and range is 80 then the number of classes are _____.
   (v) Pie chart is a _____ graph.

2. **Say True or False:**
   (i) Inclusive series is a continuous series.
   (ii) Comparison of parts of a whole may be done by a pie chart.
   (iii) Media and business people use pie charts.
   (iv) A pie diagram is a circle broken down into component sectors.

J5T9E2

3. Represent the following data in ungrouped frequency table which gives the number of children in 25 families.
   1, 3, 0, 2, 5, 2, 3, 4, 1, 0, 5, 4, 3, 1, 3, 2, 5, 2, 1, 1, 2, 6, 2, 1, 4

4. Form a continuous frequency distribution table for the marks obtained by 30 students in a X std public examination.
   328, 470, 405, 375, 298, 326, 276, 362, 410, 255, 391, 370, 455, 229, 300, 183, 283, 366, 400, 495, 215, 157, 374, 306, 280, 409, 321, 269, 398, 200.

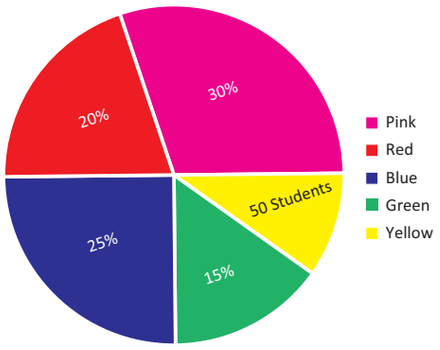
5. A paint company asked a group of students about their favourite colours and made a pie chart of their findings. Use the information to answer the following questions.
   (i) What percentage of the students like red colour?
   (ii) How many students liked green colour?

(iii) What fraction of the students liked blue?

(iv) How many students did not like red colour?

(v) How many students liked pink or blue?

(vi) How many students were asked about their favourite colours?



6. A survey gives the following information of food items preferred by people. Draw a Pie chart.

Items	Vegetables	Meat	Salad	Fruits	Sprouts	Bread
No.of people	160	90	80	50	30	40

7. Income from various sources for Government of India from a rupee is given below. Draw a pie chart.

Source	Corporation tax	Income tax	Customs	Excise duties	Service Tax	Others
Income (in paise)	19	16	9	14	10	32

8. Monthly expenditure of Kumaran's family is given below. Draw a suitable Pie chart.

Particulars	Food	Education	Rent	Transport	Miscellaneous
Expenses (in %)	50 %	20 %	15 %	5 %	10 %

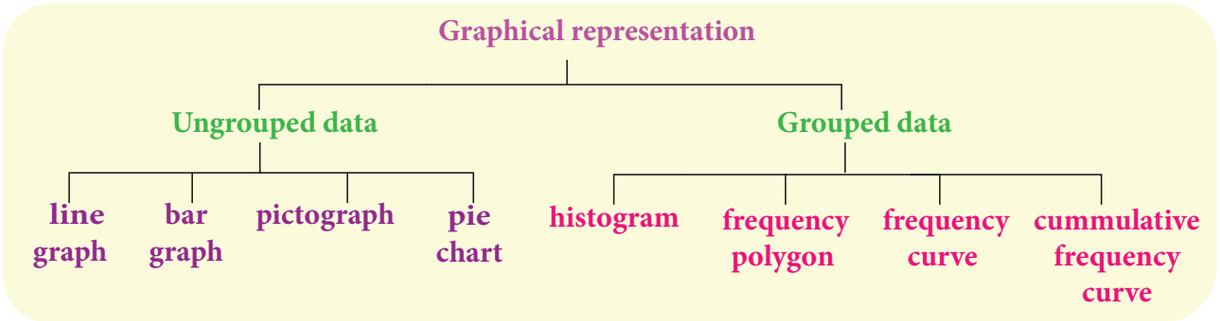
Also

1. Find the amount spent for education if Kumaran spends ₹6000 for Rent.
2. What is the total salary of Kumaran?
3. How much did he spend more for food than education?

6.4 Graphical Representation of the Frequency Distribution for Grouped Data

The Line graph, Bar graph, Pictograph and the Pie chart are the graphical representations of the frequency for ungrouped data. Histogram, Frequency polygon, Frequency curve, Cumulative frequency curves (Ogives) are some of the graphical representations of the frequency distribution for grouped data.

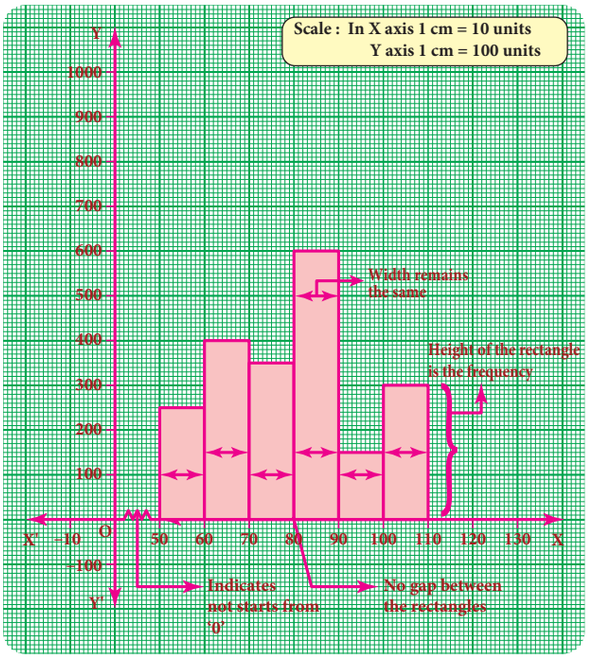
In this class, we are going to represent the grouped data frequency by Histogram and Frequency polygon only. You will learn the other type of representations in the higher classes.



6.4.1 Histogram

A histogram is a graph of a continuous frequency distribution. Histogram contains a set of rectangles, the base of which is the length of the class interval and the frequency in each class interval is its height. i.e the class intervals are represented on the horizontal axis (x- axis) and the frequencies are represented on the vertical axis (y-axis).

The area of each rectangle is proportional to the frequency in the respective class interval and the total area of the histogram is proportional to the total frequency. Because of the continuous frequency distribution, the rectangles are placed continuously side by side with no gap between adjacent rectangles.



Steps to construct a Histogram:

1. Represent the data in the continuous form (exclusive form) if it is in discontinuous form (inclusive form) by converting it using the adjustment factor.
2. Select the appropriate units along the x-axis and y-axis.
3. Plot the lower limits of all class interval on the x –axis.
4. Plot the frequencies of the distribution on the y – axis.
5. Construct the rectangles with class intervals as bases and corresponding frequencies as heights. Each class has lower and upper values. This gives us two equal vertical lines representing the frequencies. The upper ends of the lines are joined together and this process will give us rectangles.

Note

Differences between a Bar graph and a Histogram

	Bar graph	Histogram
1	Used for Ungrouped data	Used for Grouped data
2	Gap between the bars	No gap between rectangles
3	Height of each bar is important and not its width	Height and width of each rectangle are equally important

6.4.1 (i) Construction of a histogram for continuous frequency distribution:

Example 6.6

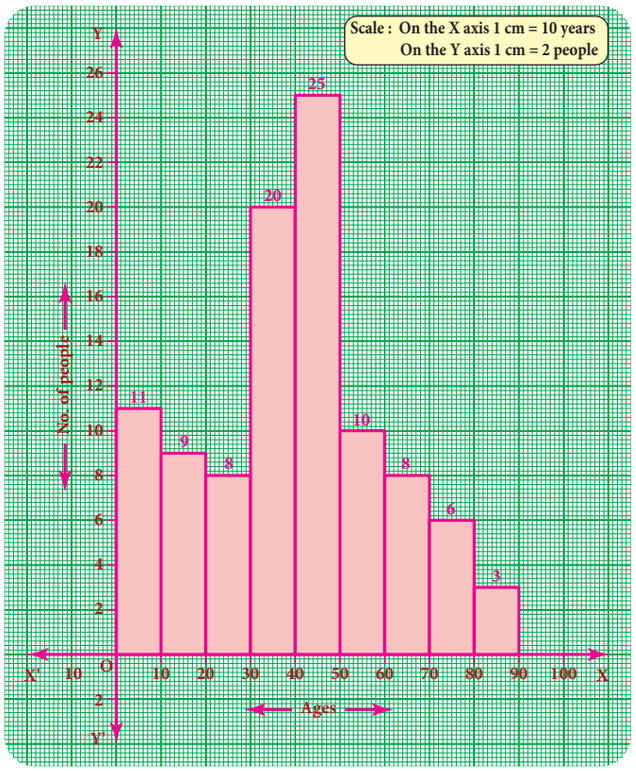
Draw a histogram for the following table which represents the age groups from 100 people in a village.

Ages	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of people	11	9	8	20	25	10	8	6	3

Solution:

The given data is a continuous frequency distribution. The class intervals are drawn on x-axis and their respective frequencies on y-axis. Classes (ages) and its frequencies (number of people) are taken together to form a rectangle.

The histogram is constructed as given below.



Note

If class intervals do not start from '0' then, it is indicated by drawing a kink (Zig-Zag) mark (⩘) on the x-axis near the origin. If necessary, the kink mark (⩘) may be made on y-axis or on both the axes. i.e it indicates that we do not have data starting from the origin (O)

6.4.1 (ii) Construction of histogram for discontinuous frequency distribution:

Example 6.7

The following table gives the number of literate females in the age group 10 to 45 years in a town.

Age group	10-15	16-21	22-27	28-33	34-39	40-45
No. of females	350	920	850	480	230	200

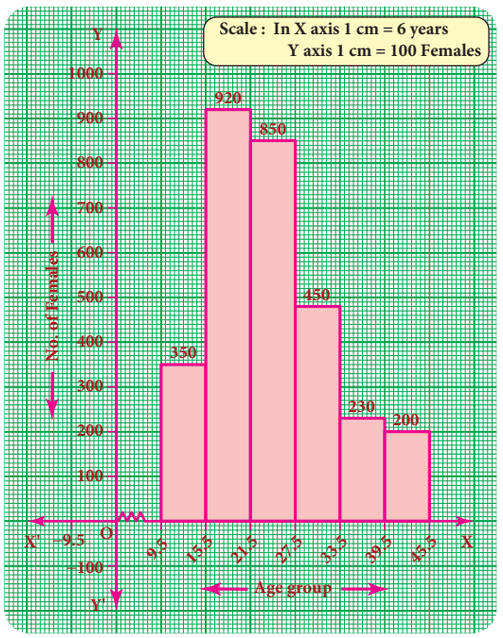
Draw a histogram to represent the above data

Solution:

The given distribution is discontinuous. If we represent the given data as it is by a graph we shall get a bar graph, as there will be gaps in between the classes. So, convert this into a continuous distribution using the adjustment factor 0.5.

The first class interval can be written as 9.5-15.5 and the remaining class intervals are changed in the same way. There are no changes in frequencies.

The new continuous frequency table is



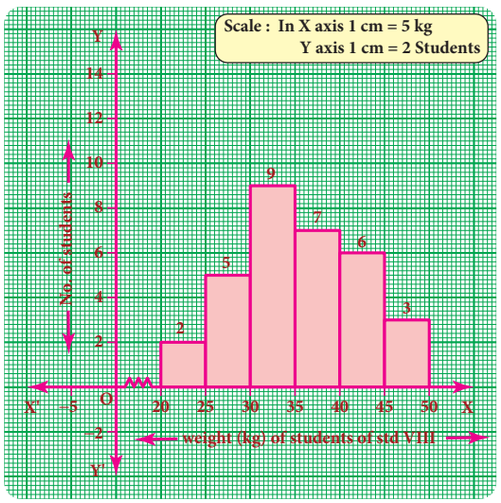
Age group	9.5-15.5	15.5-21.5	21.5-27.5	27.5-33.5	33.5-39.5	39.5-45.5
No of females	350	920	830	480	230	200

Example 6.8

Observe the given histogram and answer the following questions

Hint: Under weight: less than 30 *kg;* Normal weight: 30 to 45 *kg;* Obese: More than 45 *kg*

1. What information does the histogram represent?
2. Which group has maximum number of students?
3. How many of them are under weight?
4. How many students are obese?
5. How many students are in the weight group of 30-40 kg?



Solution:

1. The histogram represents the collection of weight from std VIII.
2. There are maximum 9 students in 30-35 kg weight.
3. There are $7(=2+5)$ students who are under weight.
4. There are 3 students who are obese.
5. There are $16(=9+7)$ students in the 30-40 kg weight group.

6.4.2 Frequency Polygon

A frequency polygon is a line graph for the graphical representation of the frequency distribution. If we mark the midpoints on the top of the rectangles in a histogram and join them by straight lines, the figure so formed is called a frequency polygon. It is called a polygon as it consists of a number of lines as the sides of a polygon.

A frequency polygon is useful in comparing two or more frequency distributions. A frequency polygon for a grouped frequency distribution can be constructed in two ways.

i) Using a histogram
ii) Without using a histogram

6.4.2 (i) To construct a frequency polygon using a histogram:

1. Draw a histogram from the given data.
2. Join the consecutive midpoints of the upper sides of the adjacent rectangles of the histogram by the line segments.
3. It is assumed that the class interval preceding the first rectangle and the class interval succeeding the last rectangle exists in the histogram and the frequency of each extreme class interval is zero. These class intervals are known as imagined class intervals.
4. To get frequency polygon, join the midpoints of these imagined classes with the corresponding midpoints of the upper sides of the first and last rectangles of the histogram.

Example 6.9

The following is the distribution of time spent in the library by students in a school.

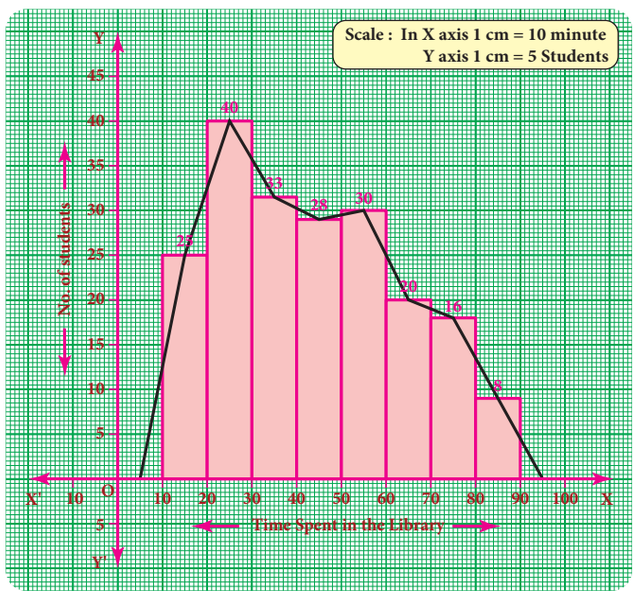
Time spent (in minutes)	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of Students	25	40	33	28	30	20	16	8

Draw a frequency polygon using histogram.

Solution:

Represent the time spent in the library along x- axis and number of students along the y–axis.

Draw a histogram for the given data. Now, mark the midpoints of the upper sides of the consecutive rectangles. Also mark the midpoints of two imagined class intervals 0-10 and 90-100 whose frequency is 0 on x- axis. Now, join all the midpoints with the help of ruler. We get a frequency polygon imposed on the histogram.



Note

Sometimes imagined class intervals do not exist. For example, in case of marks obtained by the students in a test, we cannot go below zero and beyond maximum marks on the two sides. In such cases, the extreme line segments meet at the mid points of the vertical left and right sides of first and last rectangles respectively.

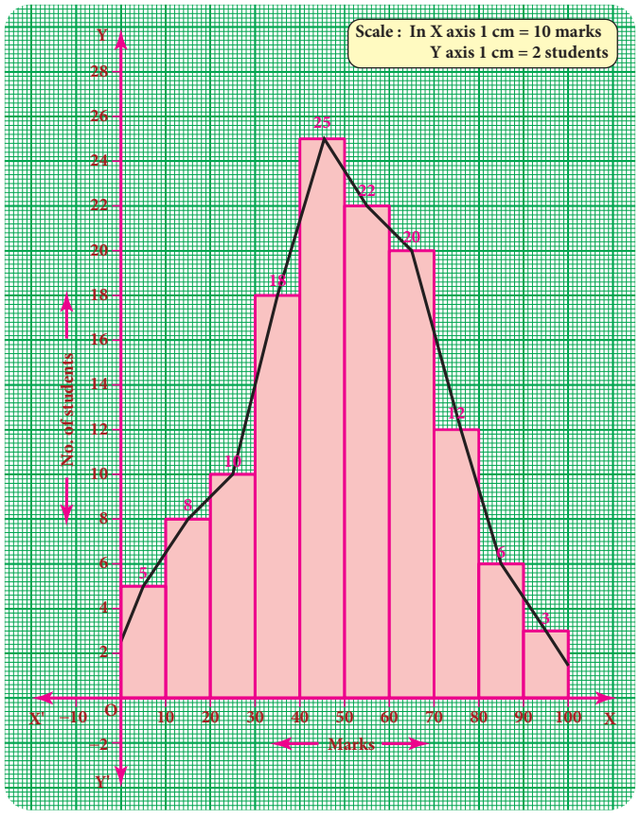
Example 6.10

Draw a frequency polygon for the following data using histogram.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Number of students	5	8	10	18	25	22	20	13	6	3

Solution:

Mark the class intervals along the x-axis and the number of students along the y-axis . Draw a histogram for the given data and mark the midpoints of the rectangles and join them by lines. We get frequency polygon. Note that the first and last edges of the frequency polygon meet at the mid points of the left and right vertical edges of first and last rectangles. Because imagined class intervals do not exist in the marks (refer the above note).



6.4.2 (ii) To draw a frequency polygon without using a histogram:

(1) Find the midpoints of the class intervals and tabulate it.

(2) Mark the midpoints of the class intervals on x-axis and frequencies on y-axis.

(3) Plot the points corresponding to the frequencies at each midpoints.

(4) Join the points using a ruler, to get the frequency polygon.

Example 6.11

Draw a frequency polygon for the following data without using histogram.

Class interval (Marks)	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	4	6	8	12	10	14	5	7

Solution:

Find the midpoint of the class intervals and tabulate it.

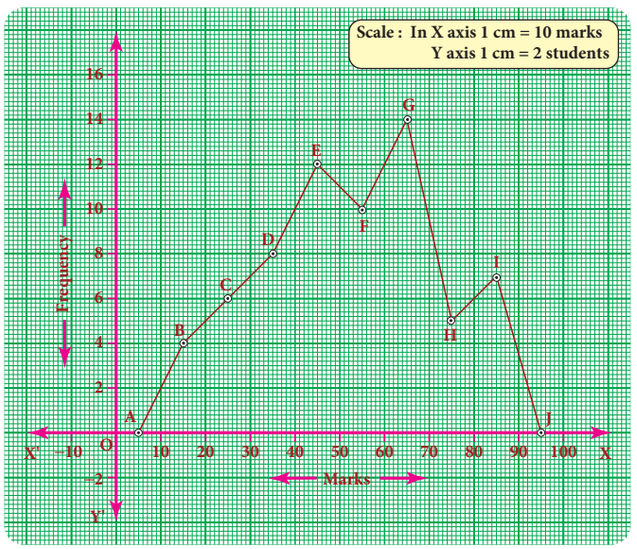
Class interval (C.I)	Mid point (x)	Frequency (f)
10 – 20	15	4
20 – 30	25	6
30 – 40	35	8
40 – 50	45	12
50 – 60	55	10
60 – 70	65	14
70 – 80	75	5
80 – 90	85	7

The points are A(5,0) B(15,4) C(25,6) D(35,8) E(45,12) F(55,10) G(65,14) H(75,5) I(85,7) J(95,0).

In the graph sheet, mark the midpoints along the x- axis and the frequency along the y- axis.

We take the imagined class as 0 – 10 at the beginning and 90 – 100 at the end , each with frequency 'zero'.

From the table, plot the points. We draw the line segments AB, BC, CD, DE, EF, FG, GH, HI, IJ to obtain the required frequency polygon ABCDEFGHIJ.



Exercise 6.2

1. Which of the following data can be represented in a histogram?
   (i) The number of mountain climbers in the age group 20 to 60 in TamilNadu.
   (ii) Production of cycles in different years.
   (iii) The number of students in each class of a school.
   (iv) The number votes polled from 7 am to 6 pm in an election.
   (v) The wickets fallen from 1 over to 50th over in a one day cricket match.

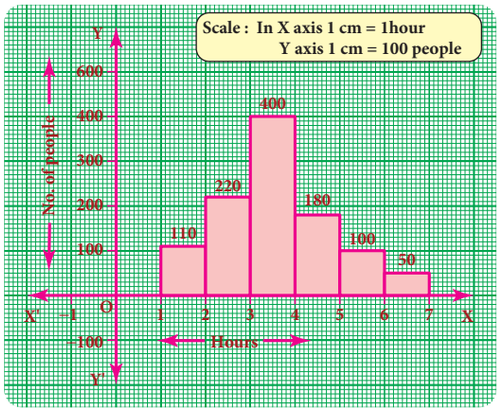
2. **Fill in the blanks:**
   (i) The total area of the histogram is _____ to the total frequency of the given data.
   (ii) A graph that displays data that changes continuously over the periods of time is _____.
   (iii) Histogram is a graphical representation of _____ data.

3. In a village, there are 570 people who have cell phones. An NGO survey their cell phone usage. Based on this survey a histogram is drawn. Answer the following questions.

(i) How many people use the cell phone for less than 3 hours?

(ii) How many of them use the cell phone for more than 5 hours?

(iii) Are people using cell phone for less than 1 hour?



4. Draw a histogram for the following data.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	5	15	23	20	10	7

5. Construct a histogram from the following distribution of total marks of 40 students in a class.

Marks	90-110	110-130	130-150	150-170	170-190	190-210
No. of Students	9	5	10	7	4	6

6. The distribution of heights (in cm) of 100 people is given below. Construct a histogram and the frequency polygon imposed on it.

Height (in cm)	125-135	136-146	147-157	158-168	169-179	180-190	191-201
Frequency	12	22	18	24	15	7	2

7. In a study of dental problem, the following data were obtained.

Ages	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of patients	5	13	25	14	30	35	43	50

Represent the above data by a frequency polygon.

8. The marks obtained by 50 students in Mathematics are given below (i) Make a frequency distribution table taking a class size of 10 marks (ii) Draw a histogram and a frequency polygon.

52	33	56	52	44	59	47	61	49	61
47	52	67	39	89	57	64	58	63	65
32	64	50	54	42	48	22	37	59	63
36	35	48	48	55	62	74	43	41	51
08	71	30	18	43	28	20	40	58	49

Objective Type Questions

9. Data is a collection of _____

(A) numbers (B) words (C) measurements (D) all the three

10. The number of times an observation occurs in the given data is called _____

(A) tally marks (B) data (C) frequency (D) none of these

11. The difference between the largest value and the smallest value of the given data is _____

(A) range (B) frequency (C) variable (D) none of these

12. The data that can take values between a certain range is called_____

(A) ungrouped (B) grouped (C) frequency (D) none of these

13. Inclusive series is a _____series.

(A) continuous (B) discontinuous (C) both (D) none of these

14. In a class interval the upper limit of one class is the lower limit of the other class. This is _____series.

(A) Inclusive (B) exclusive (C) ungrouped (D) none of these

15. The graphical representation of ungrouped data is _____

(A) histogram (B) frequency polygon (C)pie chart (D) all the three

16. Histogram is a graph of a _____ frequency distribution.

(A) continuous (B) discontinuous (C) discrete (D) none of these

17. A _____ is a line graph for the graphical representation of the continuous frequency distribution.

(A) frequency polygon (B) histogram (C) pie chart (D) bar graph

18. The graphical representation of grouped data is _____

(A) bar graph (B) pictograph (C) pie chart (D) histogram

Exercise 6.3

Miscellaneous Practice Problems

1. Draw a pie chart for the given table.

Continent	Asia	Africa	North America	South America	Europe	Australia	Antarctica
Area	30 %	20 %	16 %	12 %	7 %	6 %	9 %

2. The data on modes of transport used by the students to come to school are given below. Draw a pie chart for the data.

Mode of transport	Bus	Cycle	Walking	Scooter	Car
Percentage of students	40 %	30 %	15 %	10 %	5 %

3. Draw a histogram for the given frequency distribution.

Age	41-45	46-50	51-55	56-60	61-65	66-70	71-75
Frequency	4	9	17	25	15	8	2

4. Draw a histogram and the frequency polygon in the same diagram to represent the following data.

Weight (in kg)	50-55	56-61	62-67	68-73	74-79	80-85	86-91
No.of persons	15	8	12	17	9	10	6

Challenging problems

5. Form a continuous frequency distribution table and draw histogram from the following data.

Age (in years)	**No. of persons**
Under 5	1
Under 10	12
Under 15	19
Under 20	26
Under 25	27
Under 30	35
Under 35	38
Under 40	45
Under 45	48
Under 50	53

6. A rupee spent in a cloth manufacturing company is distributed as follows. Represent this in a pie chart.

Particulars	**Paise**
Farmer	20
Spinner	35
Dyer	15
Weaver	15
Printer	05
Salary	10

7. Draw a histogram for the following data.

Mid Value (x)	15	25	35	45	55	65	75
Frequency (f)	12	24	30	18	26	10	8

SUMMARY

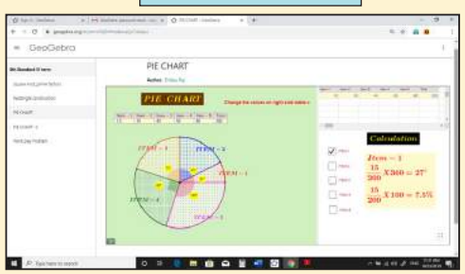
- Data is a collection of facts such as numbers, words, measurements and observations.
- A frequency distribution is the arrangement of the given data in the form of the table showing frequency with which each variable occurs.
- In the class-intervals, if the upper limit and lower limit are included in that class interval then it is called inclusive series.
- In the class intervals, if the upper limit of one class interval is the lower limit of the next class interval then it is called exclusive series.
- A pie chart is a circular graph which shows the total value with its components.
- A histogram is a graph of a continuous frequency distribution.
- A frequency polygon is a line graph for the graphical representation of the frequency distribution.

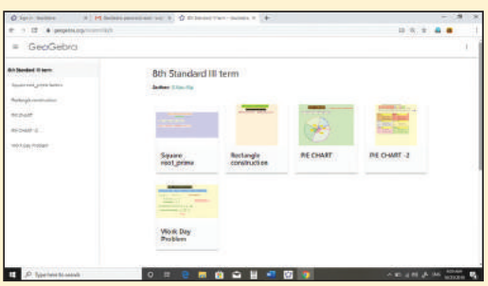
ICT CORNER

Step-1 Open the Browser type the URL Link given below (or) Scan the QR Code. GeoGebra work sheet named "8th Standard III term" will open. Select the work sheet named "PIE CHART"

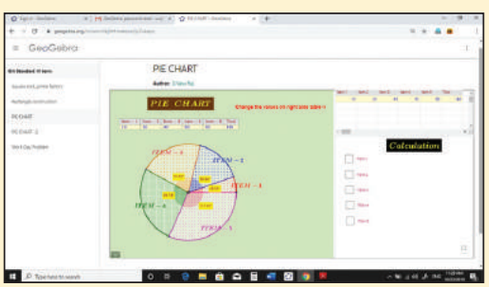
Step-2 Type your values in the check box on right side. You can observe the change in the pie chart. Click on the check boxes to see respective calculations.

Expected Outcome





Step 1



Step 2

B358_8_MATHS_EM

Browse in the link
Statistics:
https://www.geogebra.org/m/xmm5kj9r or Scan the QR Code.