# CHAPTER 16

# **Data Handling**

16.1 We generally see around us many types of data, tables and graphs in newspaper, magazines and in doordarshan. These things give us some information. You can also get information by collecting data from your surroundings. Before collecting data we should know what we want to study. Let us assume you want to know, what is the average height of your classmate?

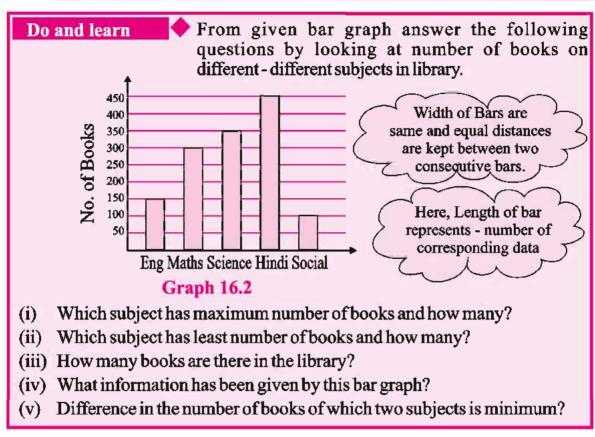
To know this you have to collect data related to height of your classmates. For making sense what does data tell, we represent it by graph. You have studied different types of graphs in previous classes, let us see them again.

(i) **Pictograph** – after looking at figure given below, answer the following question-

= An indicator – manufacturing of 1000						
April						
March						
February						
January						

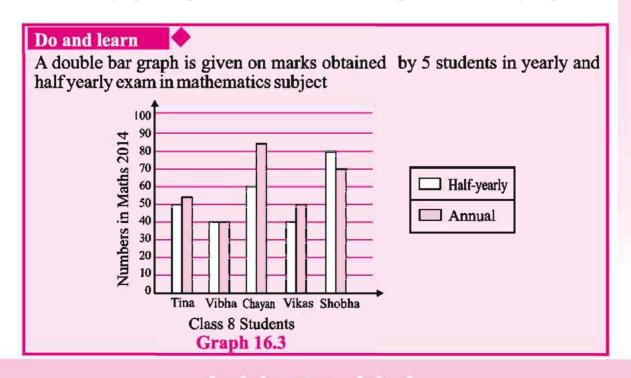
# Graph 16.1

- (i) How many cycles were produced in month of March?
- (ii) Production of which two months is same?
- (ii) Bar graph- In bar graph width of each bar is same and they are at equal distance. Height of bar is in accordance to data on scale this we can say as proportional to corresponding data.



#### (iii) Double Bar Graphs

Double bar graphs are plotted when we have to compare data of two groups.



Answer the following questions on basis of graph

- (i) Whose performance was similar in annual and half yearly examination?
- (ii) Whose performance was better in annual as compared to half yearly?
- (iii) How many students scored more than 50 in annual examination?
- (iv) Which information is given in this double bar graph?
- (v) What is the average of marks of half yearly? Is that less than average of annual examination?

# Do and learn



Draw different graphs to show given information

Year	2010	2011	2012	2013	2014
Number of books bought for library	170	150	190	180	210

Name of village	Makadi	Akola	Ravaliya Khurd	Siwadiya
Number of men	1800	1700	1800	1500
Number of women	1600	1700	1900	1600

In mathematics examination for class VIII marks obtained by students out of 50 marks are

In this example each number is an observation. In this way group of observation is called raw data. For extracting meaningful conclusions, these data needed to be arranged in order (ascending or descending).

Like - data of marks obtained by students of class 8 out of 50

Here difference between maximum and minimum marks obtained is 37-1 = 36. This difference 36 is called range of the above data.

#### 16.2.1 Frequency distribution

Which marks are obtained by maximum number of students and which marks are obtained by minimum number of students. For this by using tally marks, following table is formed.

Marks obtained	tally	frequency
1		1
8		2
10		1
14		1
15		2
18		1
20		1
25		1
27		2
28	1111	5
36		1
37		2
	Total	20

**Table 16.1** 

From tally marks in front of marks obtained we came to know about number of students who obtained those marks. This number shows frequency of the marks. Frequency of an entry is the number, of times that entry comes in data.

Frequency of marks 28 is 5 and frequency of each mark 8, 15, 27 and 37 is 2. Table formed as above is called frequency distribution table. From this table we determine how many times an entry has appeared

#### 16.2.2 Classification of data (In the form of class interval)

Sometimes we have such data which are diversified like – think about marks obtained by 35 students of class

If we make frquency distribution table for each observation (marks obtained) then it is very long and sometimes useless. So for convenience we make some class intervals like 0-5, 5-10, 10-15 etc. In this way for the above mentioned data frequency distribution table can be as follows.

Class interval	Tally marks	Frequency
0 - 5	<b>##</b>	5
5 - 10	## II	7
10 - 15	三美美美	17
15 - 20	IIII	4
20 - 25	II	2
_	Total	35

**Table 16.2** 

In this table all observations are included by dividing marks obtained by all 35 students into class of interval five (0-5, 5-10 etc.). In this each group is called class interval and in short, class.

When data are written in this form then they are called grouped data and obtained distribution is called grouped frequency distribution. This helps in extracting meaningful conclusions. Like,

- (i) 12 students have obtained marks between 0 and 10.
- (ii) Most of the students have obtained marks between 10 and 15.
- (iii) 4 students have obtained 15 out of 20 marks in examination of marks 20.
- (iv) Mode for this data is class interval 10-15.

See carefully observation 5 is included in both intervals 0-5 and 5-10. In this way observation 10 and 20 are included in two groups. But one observation can't be included in both groups simultaneously. To escape from this problem we include the common observation in highest class. That Means observation 5 is included in interval 5-10 not in interval 0-5. Similarly 10 is included in interval 10-15 (not in 5-10).

Here to define each group, there are two numbers like in interval 5-10 there are two limits 5 and 10 out of which 5 is the lowest limit and 10 is the highest limit of the group. Can you tell lowest and highest limit in interval 15-20.

Difference of two limits of a class interval is called class size or class width. Here class interval of 5-10 is 5. What is the class size of the class intervals 20-25 and 15-20?

#### Do and learn

- •
- 1. Study the following frequency distribution table given below and answer the following questions
- (i) What is measure of class interval?
- (ii) Which is upper limit of class interval 300-350?
- (iii) Frequency of which group is maximum?
- (iv) Frequency of which two groups is same?
- Class interval Frequency 100 -150 45 150 - 200 25 200 - 25055 125 250 - 300 300 - 350 140 350 - 400 65 400 - 450 45 Total 500

**Table 16.3** 

- 2. Marks obtained by 40 students in science out of 50 marks is as follows 38, 35, 44, 30, 30, 33, 38, 40, 35, 45, 48, 40, 35, 45, 38, 35, 44, 33, 40, 42, 45, 38, 35, 33, 34, 37, 47, 49, 37, 47, 40, 31, 38, 43, 31, 37, 41, 38, 45, 40
- (i) Make a frequency distribution table of given data taking interval as 30-35, 35-40 etc.......
- (ii) What are the class limits of class interval 35-40?
- (iii) What is class measure of class interval?

# 16.3 Histogram - graphical representation of data

Consider the given mathematics test frequency distribution table of 40 student, about their marks obtained out of 36.

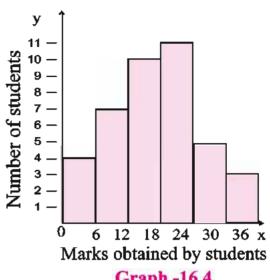
Class interval	Frequency
0-6	4
6 - 12	7
12 - 18	10
18 - 24	11
24 - 30	5
30 - 36	3
Total	40

**Table 16.4** 

In graph 16.4, above frequency distribution is shown.

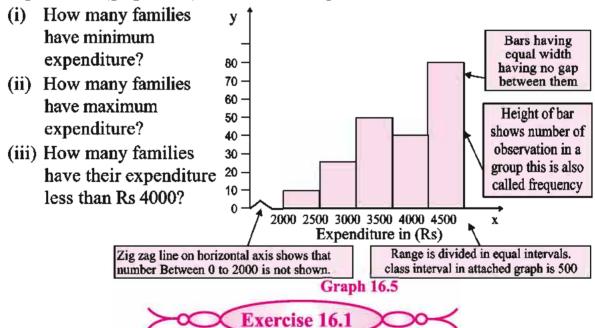
Is this bar graph different from those graphs which you plotted in previous class? Clearly there is no gap between bars because there is no gap between class intervals Class intervals are represented on horizontal axis and length of bar represents frequency of class interval.

Such graphical representation of data is called histogram.



Graph -16.4

Given below is a histogram between number of families and their expenditure (graph 16.5). From this histogram 16.5 we can tell-



- To show which type of data you will need a histogram? 1.
  - Quantity of different types of cereals available at home. (i)
  - (ii) Height of all students of your school.
  - (iii) Number of cars manufactured by 5 companies.
  - (iv) Number of vehicles passing a busy cross road between 8:00 A.M. to 2:00 P.M.

- (v) Distance between home to school of all students of your class. (in meters)
- 2. Rakesh distinguishes his clothes on basis of colours and indicate like this-White (W), Red (R), Black (B), Yellow (Y), and Others (X). list formed is as follows-

R R X W R B Y R B W W X X R B Y Y X W R B Y Y B R R X W W R W X X R Y W B Y X X

Using tally marks form a frequency distribution table. To represent it use a bar graph.

3. Payment of the Wage for a week in rupees to 30 NREGA workers of Khatwara village

830, 835, 890, 810, 815, 816, 814, 845, 898, 890, 819, 860, 832, 817, 855, 845, 804, 808, 812, 816, 885, 835, 815, 812, 878, 840, 868, 890, 806, 828

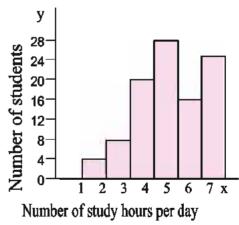
Prepare a frequency distribution table having class interval as 800-810, 810-820 using tally marks. Draw a histogram using table.

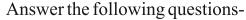
4. Number of mobiles sold in 30 days by Ms. Raja Electronics

222, 228, 238, 215, 225, 219, 217, 230, 218, 237, 214, 210, 235, 222, 220, 214, 212, 220, 237, 212, 238, 218, 210, 216, 217, 234, 233, 237, 219, 239

Prepare a frequency distribution table having class interval as 210-215, 215-220 using tally marks. Draw a histogram using table and answer the following questions.

- (i) Number of mobiles sold in which class interval are maximum?
- (ii) How many days 230 or more mobiles were sold?
- (iii) On how many days less than 230 or mobiles were sold?
- 5. In holidays number of study hours every day of students of class 8 is shown in the graph-





- (i) How many hours did most of students studied?
- (ii) How many students studied for 5 or less than 5 hours?
- (iii) How many students studied in vacations?
- (iv) Frequency of which class interval is maximum?

#### 16.4 Circular Graph or Pie Chart

Some data are given in circular form as follows, look at them. To compare various parts of a total, a pie chart is used. Circle shows total.

How did you search for answers of above questions?

You know that angles formed at centre of a circle is  $360^{\circ}$  In graph (i) education field is making minimum angle at the centre whereas in graph (ii) field of entertainment is making maximum angle. Whole circle is segregated in sectors. Size of each sector is proportional to information represented by it. Circle represented in this form is called circlular graph or pie chart.

# 16.4.1 Formation of pie chart

In Graph 16.7 (i) following data

1500
750
2250
4500
9000

Come, let us represent the data in the form of pie chart and understand the steps **Step (i)** first of all add all the observations

$$1500 + 750 + 2250 + 4500 = 9000$$

Step (ii) each part of circle (part of total) representing each observation is determined.

Like part in total for expenditure on food

$$= \frac{\text{expense on food}}{\text{monthly income}} = \frac{1500}{9000} = \frac{1}{6}$$

So expense on food is drawn in  $\frac{1}{6}$  th part of whole circle.

It is easy to make  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,.... etc. part of a circle. If we have to make  $\frac{1}{6}$  or  $\frac{1}{10}$  parts then which method should be used?

Step (iii) angular measurement for each expense of total central angle (  $360^{\circ}$ ) is determined.

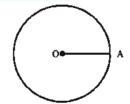
As shown in table 16.6

Budget	expense	part of whole	part of 3600
Food	1500	$\frac{1500}{9000} = \frac{1}{6}$	$360 \times \frac{1}{6} = 60^{\circ}$
Study	750	$\frac{750}{9000} = \frac{1}{12}$	$360 \times \frac{1}{12} = 30^{\circ}$
Others	2250	$\frac{2250}{9000} = \frac{1}{4}$	$360 \times \frac{1}{4} = 90^{\circ}$
saving	4500	$\frac{4500}{9000} = \frac{1}{2}$	$360 \times \frac{1}{2} = 180^{\circ}$

**Table 16.6** 

Step (iv) draw a circle of any radius.

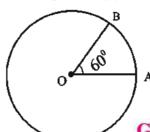
Mark its centre as O and radius as OA.



Step (v) angle of sector for expense on food is 60°

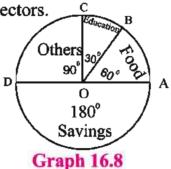
With help of a protractor draw

$$AOB = \angle 60^{\circ}$$



Graph 16.7

Step (vi) mark angles of rest of the sectors with the help of protractor. Whole circle will be distributed in sectors.



**Example 1** attached pie chart (graph 16.9) represents expenses on different items in construction of house.

- (i) Which item has maximum expense?
- (ii) Expense of which two items is half of total expense?
- (iii) If expenses on bricks is Rs 30,000 then what is the expense on iron?

Solution (i) other items have maximum expense

Cement Iron 20% Bricks 15%
Others 15%
Labour 25%

Graph 16.9

- (ii) Cement and other expense contribute to half expense.
- (iii) : 15% represents = Rs 30,000

∴ 1% will represent = Rs 
$$\underline{30,000}$$
  
So 10% will represent = Rs  $\underline{30,000} \times 10 = \text{Rs } 20,000$ 

Example 2 Attendance of students in a school on a special day is as follows

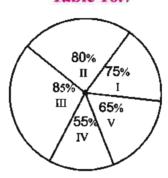
Group	I	П	III	ΙV	V
Number of Students	15	16	17	11	13

Draw a pie chart for the following data

**Solution** we find out central angle of each sector. Here total 72 students are there. From this we obtain following table.

Class	No. of Students	Part of total	Part of 360⁰
I	15	<u>15</u> 72	$360 \times \frac{15}{72} = 75^{\circ}$
п	16	<u>16</u> 72	$360 \times \frac{16}{72} = 80^{\circ}$
ııı	17	<u>17</u> 72	$360 \times \frac{17}{72} = 85^{\circ}$
IV	11	<u>11</u> 72	$360 \times \frac{11}{72} = 55^{\circ}$
v	13	<u>13</u> 72	$360 \times \frac{13}{72} = 65^{\circ}$
V	13	72	$360 \times \frac{13}{72} = 65^{\circ}$

**Table 16.7** 



Graph 16.10

#### Do and learn



(1) Sweets liked by students of a school is given below. Draw a pie chart on the basis of data.

Sweets	jalebi	laddu	peda	gulab jamun	others
Number of students	40%	20%	25%	10%	5%

(2) write down number of members in families of your 5 friends and show it by pie chart.

# Exercise 16.2

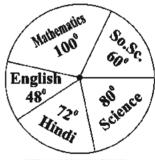
1 Number of text books of any school is given below. Represent this data through pie chart.

Subject	Science	Maths	English	Hindi	Social Science	Total
Books	200	120	190	170	40	720

2. Description of daily activities of a child is as follows. Represent this data in the form of pie chart.

Time Spent	School	Sleep	Play	Others
Hours	8 Hours	6 Hours	2 Hours	8 Hours

- 3. Pie chart 16.11 shows marks obtained by student in various subjects Hindi, English, mathematics, social science and science. If total marks obtained by these students are 900 then answer the following questions-
  - (i) In which subject did student have 250 marks?
  - (ii) That student obtained how many marks more in mathematics as compared to Hindi?
  - (iii) Check whether total marks obtained in social science and mathematics is more than total of marks obtained in English and Hindi?



Graph 16.11

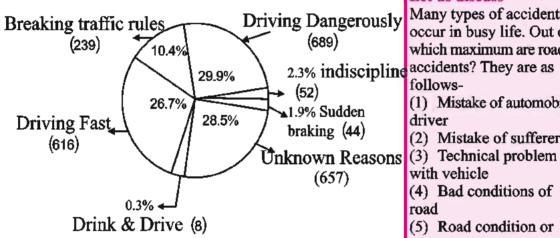
4. Draw a pie chart showing following information. This table shows games liked by student of a class

Game	Kho-kho	Kabbadi	Football	Cricket
Number of Students	5	6	7	18

5. In accordance to Jan Dhan Yojana of Indian government number of accounts opened by following banks in one month in Kota city is as follows:

Name of bank	SBBJ	SBI	IDBI	BOI
Number of accounts opened	21000	18000	6000	9000

- Various mistakes of automobile drivers are shown in pie chart. With the help of pie chart answer the following questions-
- (i) Percentage of accidents by driving vehicles with fast speed?
- (ii) Due to which mistake of automobile driver maximum accidents take place?
- (iii) How many accidents occur due to driving of automobile in drunken state?
- (iv) How many people underwent accident due to disobedience of traffic rules?



# Graph 16.12

# 16.5 Chance and probability 16.5.1 Meaning of Chance

#### Let us discuss

Many types of accidents occur in busy life. Out of which maximum are road 2.3% indiscipline accidents? They are as follows-

- (1) Mistake of automobile driver
- (2) Mistake of sufferer
- with vehicle
- (4) Bad conditions of road
- (5) Road condition or bad road shape
- (6) Unawareness / others Let us discuss with teacher and make a project.

Vishal said to Ravi – I used to keep an umbrella while going to school from home daily but it doesn't rain. Today due to mistake I didn't bring umbrella. Now it is raining.

Ravi said- Oh friend it happens to me also, for going to school when I reach bus stand on time then bus arrives late, the day on which I reach late bus departs on time.

Rakesh said-It usually happens to me when I didn't complete my homework by chance teacher didn't check homework.

Many times such situations come when by taking support of chance you are to perform work but it doesn't take place in manner you want. Can you give some more example like this?

When a person purchases lottery ticket then his chance of success or failure are not equal. Means chance of victory is less and chance of losing is more. But here we will talk about some experiments whose chances of winning and losing is similar.

#### 16.5.2 Calculation of possibilities on throwing a dice or coin

Lavina and Neema were playing; Lavina said to Neema in a dice 6 comes least time when tossed. What do you think? Does that happen?

To know whether 6 comes less times in comparison to other numbers 1,2,3,4,5 or not. Lavina and Neema threw dice for 30-30 times. A frequency table of numbers so obtained is prepared.

#### Table for dice thrown 30 times by Lavina

1	2	3	4	5	6
WH III	JAH I	III	111	II IIII	101

Take a dice and see after throwing it for 30 times how does table appears for the numbers obtained. Is it not necessary that a number appears less times or more times. Possibility of appearance of any number on the dice is same.

This type of experiment is called random experiment.

There are 6 results 1, 2, 3, 4, 5, 6 for the experiment.

When a coin is thrown, what possible results do you get? No doubt, head and tail. Assume that you are the captain of a team and your friend is the captain of other team. You throw a coin and ask

your friend to speak head or tail.

Can you control the result of the throw?

Can you have head? Or can you have tail? No, it is not possible. This type of experiment is called random experiment. Head and tail are two outcomes of the experiment.

# 16.5.3 Equally likely events

Divide students your class in 3-4 groups and give one coin to each group. Tell them to throw coins several times and note down whether head appears or tail.

Each group can note down these data in two columns as per the table 1. Come let us see results of table where we are increasing number of throws.

Number of throws	tally marks	number of heads	tally marks	number of tails
40	ער ער ער וו ער	22	WWWW	18
50	ער ער ער ווו ער	23	W W W	27
60		29		31
70		33		37
80		38		42
90		44		46

**Table 16.8** 

See carefully when you increase number of throws then number of heads and number of tail appears to be same.

This is same for a dice which is thrown several times. All six results tend to have same numbers.

In this situation we can say that different results of an experiment are equally probable. Chance of occurrence of appearance of each result is same.

# 16.5.4 Calculation of favorable probability-

When we throw a coin then possibility of getting head is 1 out of 2 possible outcomes (head and tail). In other word, we can say probability of appearance of head  $= \frac{1}{2}$  what is the probability of getting a tail? Both of these results are equally likely.

Now, if you throw a dice then what would be the results? clearly, any one out of 1, 2, 3, 4, 5, 6. Here 6 is equally likely. What is the probability of getting 3.

The probability is  $\frac{1}{6} \rightarrow =$  number of results giving 3 = number of equally likely events

Collection of results of experiment is called event. means in throwing of a coin, to get head is an event and to get tail is also an event. To get 1, 2, 3, 4, 5, 6 while throwing a dice is an event.

Like, probability of getting an even number  $=\frac{3}{6}$ 3= number of results forming the event (2, 4, 6) 6=total number of results.

#### Do and learn



- 1. When a dice is thrown, what are the possible 6 events?
- 2. What will be the possible results, when you rotate a wheel? Formalist.

(here result means sector at which pointer stops after rotating.)



3. You have a bag and there are similar balls having different colours. you can draw a ball without looking at this. Write the results obtained.



**Example 3** If you have rotating wheel having 5 green sectors and 3 red sectors then (i) what is the probability of getting red sector? (ii) what is the probability of getting such sector which is not red?

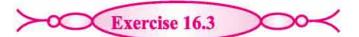


Solution here total results of the event = (5+3)=8. To get red sector there are 3 results.

So probability to get red sector is  $\frac{3}{8}$ 

Number of such sectors which are not red=5

So probability of getting such sectors which are not red is  $\frac{5}{8}$ 



- 1. What is the probability of getting head on throwing a coin?
- 2. There are 6 white, 11 red and 7 yellow balls in a bag. What is the probability of getting a white ball from the bag?
- 3. What is the probability of getting a queen from a pack of well shuffled cards?
- 4. Find the probability of each below mentioned event when a dice is thrown-
  - (i) A prime number

(ii) No prime number

(iii) Number more than 3

(iv) Number not more than 5

- (v) An odd number
- 5. Number from 1 to 15 is written on 15 different slips (one number on each slip). They are mixed keeping in box. A slip is taken out without looking into box. What is the probability of following?
  - (i) Obtaining number 5
  - (ii) Obtaining a number having two digits
  - (iii) Obtaining a number having one digit

# ₩e learnt 🔀

- 1. The unorganized data available with us is called raw data
- 2. Data needs to be arranged in an order for getting meaningful conclusions out of it.
- 3. Frequency is that number which shows number of times a special entry appears in data
- 4. Data received can be arranged in groups. They can be represented as classified frequency distribution in ordered form.
- 5. Classified data can be represented with the help of a histogram. Histogram is a type of bar graph in which class interval is represented on horizontal axis and bar length shows frequency of class intervals. There is no gap between bars as there is no gap between the class intervals.
- 6. Data can be represented using pie chart or circle charts. A circular graph shows relation between a whole and its part.
- 7. There are some experiments in which there is equal chance of result.
- 8. Random experiment is that experiment in which results can't be correctly forecasted.
- 9. Results of an experiment are called equally likely if chance of their is appearance is equal.
- 10. Probability of an event =  $\frac{\text{number of results forming event}}{\text{number of results of an experiment}}$
- 11. One or more results of an experiment is called event.