

$$\begin{aligned} \text{Mrs. Hinduja's income minus ten lakh} &= 16,30,000 - 10,00,000 \\ &= 6,30,000 \text{ rupees} \end{aligned}$$

From table I

$$\begin{aligned} \text{Income tax} &= 1,12,500 + 6,30,000 \times \frac{30}{100} \\ &= 1,12,500 + 30 \times 6,300 \\ &= 1,12,500 + 1,89,000 \\ &= 3,01,500 \text{ rupees} \end{aligned}$$

On this we compute

$$1\% \text{ secondary and higher education cess} = \frac{1}{100} \times 3,01,500 = ₹ 3015$$

$$2\% \text{ education cess} = \frac{2}{100} \times 3,01,500 = ₹ 6030$$

$$\begin{aligned} \therefore \text{total income tax payable} &= 3,01,500 + 3015 + 6030 \\ &= 3,10,545 \end{aligned}$$

\therefore total income tax payable is 3,10,545 rupees

Practice set 6.2

(1) Observe the table given below. Check and decide, whether the individuals have to pay income tax.

S. No.	Individuals	Age	Taxable Income (₹)	Will have to pay income tax or not
(i)	Miss Nikita	27	₹ 2,34,000	
(ii)	Mr. Kulkarni	36	₹ 3,27,000	
(iii)	Miss Mehta	44	₹ 5,82,000	
(iv)	Mr. Bajaj	64	₹ 8,40,000	
(v)	Mr. Desilva	81	₹ 4,50,000	

(2) Mr. Kartarsingh (age 48 years) works in a private company. His monthly income after deduction of allowances is Rs. 42,000 and every month he contributes Rs. 3000 to GPF. He has also bought Rs. 15,000 worth of NSC (National Savings Certificate) and donated Rs. 12,000 to the PM's Relief Fund. Compute his income tax.

Problem set 6

- (1) Write the correct alternative answer for each of the following questions.
 - (i) For different types of investments what is the maximum permissible amount under section 80C of income tax ?
(A) 1,50,000 rupees (B) 2,50,000 rupees (C) 1,00,000 rupees (D) 2,00,000 rupees
 - (ii) A person has earned his income during the financial year 2017-18. Then his assessment year is
(A) 2016-17 (B) 2018-19 (C) 2017-18 (D) 2015-16
- (2) Mr. Shekhar spends 60% of his income. From the balance he donates Rs. 300 to an orphanage. He is then left with Rs. 3,200. What is his income ?
- (3) Mr. Hiralal invested Rs. 2,15,000 in a Mutual Fund. He got Rs. 3,05,000 after 2 years. Mr. Ramniklal invested Rs. 1,40,000 at 8% compound interest for 2 years in a bank. Find out the percent gain of each of them. Whose investment was more profitable ?
- (4) At the start of a year there were Rs. 24,000 in a savings account. After adding Rs. 56,000 to this the entire amount was invested in the bank at 7.5% compound interest. What will be the total amount after 3 years ?
- (5) Mr. Manohar gave 20% part of his income to his elder son and 30% part to his younger son. He gave 10% of the balance as donation to a school. He still had Rs. 1,80,000 for himself. What was Mr. Manohar's income ?
- (6*) Kailash used to spend 85% of his income. When his income increased by 36% his expenses also increased by 40% of his earlier expenses. How much percentage of his earning he saves now ?
- (7*) Total income of Ramesh, Suresh and Preeti is 8,07,000 rupees. The percentages of their expenses are 75%, 80% and 90% respectively. If the ratio of their savings is 16 : 17 : 12, then find the annual saving of each of them.
- (8) Compute the income tax payable by following individuals.
 - (i) Mr. Kadam who is 35 years old and has a taxable income of Rs. 13,35,000.
 - (ii) Mr. Khan is 65 years of age and his taxable income is Rs. 4,50,000.
 - (iii) Miss Varsha (Age 26 years) has a taxable income of Rs. 2,30,000.



ICT Tools or Links

Visit www.incometaxindia.gov.in which is a website of the Government of India. Click on the 'incometax calculator' menu. Fill in the form that gets downloaded using an imaginary income and imaginary deductible amounts and try to compute the income tax payable for this income.

7

Statistics



Let's study.

- Sub-divided bar-diagram
- Percentage bar-diagram
- Primary and secondary data
- Grouped and ungrouped frequency distribution
- Cumulative frequency distribution
- Mean, Median and Mode for ungrouped data



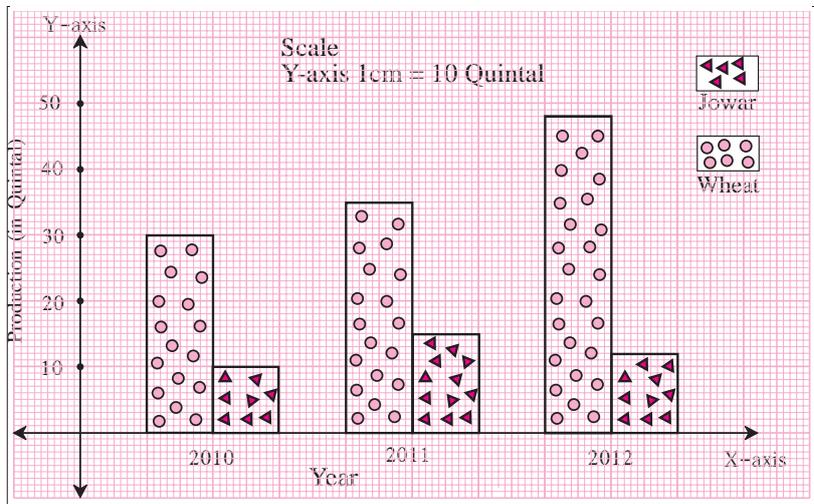
Let's recall.

In earlier standards, we have learnt how to draw a simple bar-diagram and a joint bar-diagram. Also, we have observed various graphs from newspapers, magazines, television etc. and gathered information from them.

It is very important to decide according to the nature of the data, what diagram or graph would be suitable to represent it.

A farmer has produced Wheat and Jowar in his field. The following joint bar diagram shows the production of Wheat and Jowar. From the given diagram answer the following questions :

- (i) Which crop production has increased consistently in 3 years ?
- (ii) By how many quintals the production of Jowar has reduced in 2012 as compared to 2011?
- (iii) What is the difference between the production of Wheat in 2010 and 2012?
- (iv) Complete the following table using this diagram.



Production (in Quintal) Year	Wheat	Jowar	Total
2010			
2011			
2012	48	12	60



Let's learn.

Sub-divided bar diagram

To compare the information in the given data, we can also draw another type of bar-diagram.

To draw it, we add the numerical values of the entities, decide a scale and show the total by a bar proportional to the scale. Then we divide the bar in parts, proportional to the entities we had added. Hence this type of diagram is called a sub-divided bar diagram.

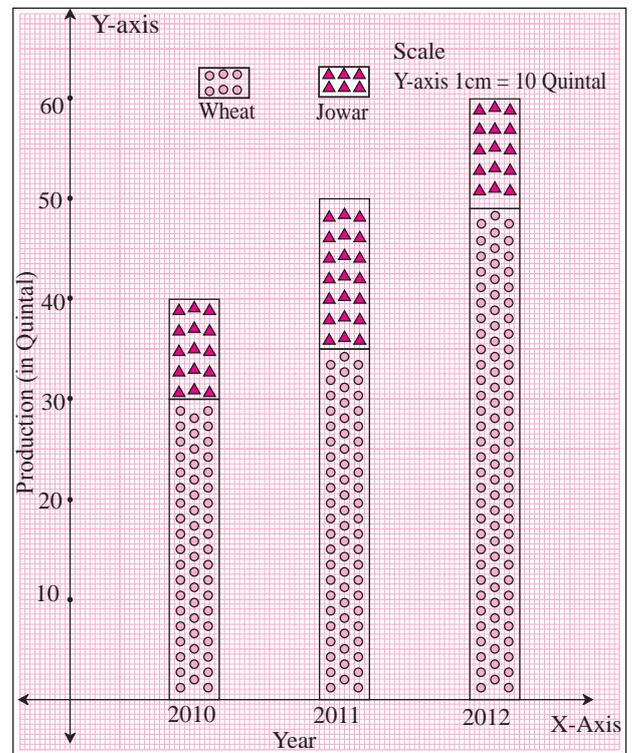
Now let us show the information in the previous example by a sub-divided bar diagram.

(i) Show the total production of the year 2010 by a bar. The height of the bar should be to the decided scale.

(ii) Show the production of wheat by lower part of the bar, the height of which is to the scale.

(iii) Obviously, remaining part of the bar denotes the production of Jowar for the year.

(iv) Similarly draw divided bars to show productions of the years 2011 and 2012.



When two quantities are compared using percentages, it is more informative. We have studied this before. For example, if there is Rs.600 profit on Rs.2,000 and Rs.510 profit on Rs.1,500; Rs.600 looks greater amount. But if we calculate their percentages they are 30% and 34% respectively. Hence it is clear that Rs.510 profit on Rs.1,500 is a more profitable transaction.

Percentage bar diagram

To compare the given information, in a different way, it is converted into percentages and then a sub-divided bar diagram is drawn. Such diagram is known as 'Percentage bar-diagram'.

The information in the previous example is converted into percentages as shown in the adjacent table.

Year	Production of Wheat (Quintal)	Production of Jowar (Quintal)	Percentage production of Wheat as compared to total production
2010	30	10	$\frac{30}{40} \times 100 = 75\%$
2011	35	15	$\frac{35}{50} \times 100 = 70\%$
2012	48	12	$\frac{48}{60} \times 100 = 80\%$

The information is shown in the percentage bar diagram by following steps

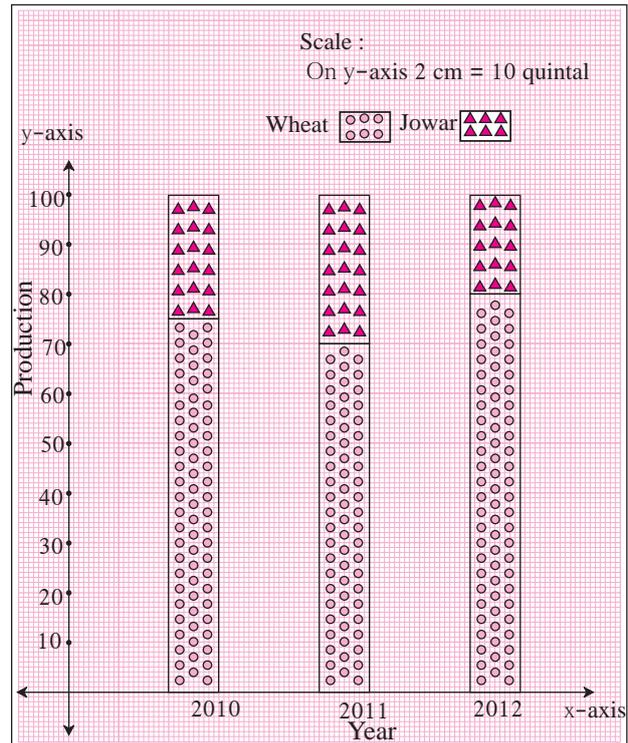
(i) Yearly productions of Wheat and Jowar are converted into percentages.

(ii) The height of each bar to scale is taken as 100.

(iii) The percentage of production of Wheat is shown by the lower part of the bar to the scale.

(iv) The remaining upper part of the bar shows percentage production of Jowar.

Information of more than two entities can be shown by a sub divided bar diagram or by a percentage bar diagram.



Solved examples :

Ex. 1. In the neighbouring figure, percentage bar-diagram is given. Percentage expenses on different items of two families are given. Answer the following questions based on it :

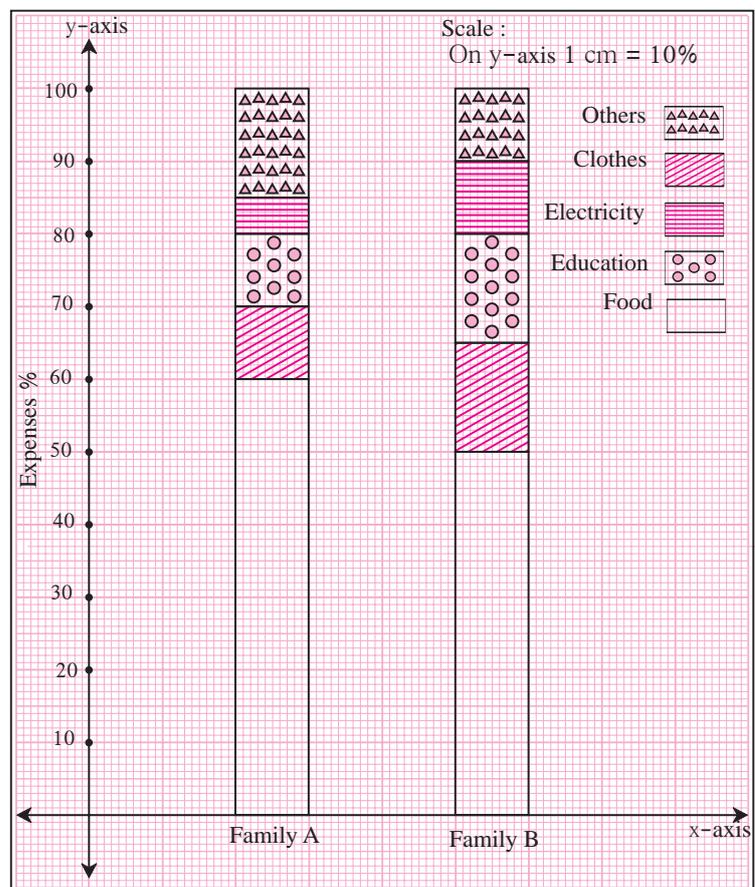
(i) Write the percentage expenses of every component for each family.

(ii) Which family spends more percent of expenses on food as compared to the other and by how much ?

(iii) What are the percentage expenses on other items ?

(iv) Which family shows more percentage expenses on electricity?

(v) Which family's percentage expense is more on education ?



Solution :

(i)

Expenses Family	Food	Clothes	Education	Electricity	Others
A	60%	10%	10%	5%	15%
B	50%	15%	15%	10%	10%

(ii) Food expenses of family A are more by 10% as compared with family B.

(iii) Other expenses of family A are 15% and that of family B are 10%.

(iv) Percentage expenses on electricity of family B is greater.

(v) Percentage expenses on education are more of family B.

Practice set 7.1

(1) The following table shows the number of Buses and Trucks in nearest lakh units. Draw percentage bar-diagram. (Approximate the percentages to the nearest integer)

Year	No. of Trucks	No. of Buses
2006-2007	47	9
2007-2008	56	13
2008-2009	60	16
2009-2010	63	18

(2) In the table given below, the information is given about roads. Using this draw sub-divided and percentage bar-diagram (Approximate the percentages to the nearest integer)

Year	Permanent Roads (Lakh km.)	Temporary Roads (Lakh km.)
2000-2001	14	10
2001-2002	15	11
2002-2003	17	13
2003-2004	20	19

Activity : In the following table, the information of number of girls per 1000 boys is given in different States. Fill in the blanks and complete the table.

States	Boys	Girls	Total	Percentage of boys	Percentage of girls
Assam	1000	960	1960	$\frac{1000}{1960} \times \frac{100}{1} = 51\%$	$100 - 51 = 49\%$
Bihar	1000	840	1840		
Punjab	1000	900			
Kerala	1000	1080			
Maha-rashtra	1000	900			

Draw percentage bar-diagram from this information and discuss the findings from the diagram.



Use your brain power!

On page 111, for the given activity, the information of number of girls per 1000 boys is given for five states.

The literacy percentage of these five States is given below.

Assam (73%), Bihar (64%), Punjab (77%), Kerala (94%), Maharashtra (83%).

Think of the number of girls and the literacy percentages in the respective states. Can you draw any conclusions from it ?



Let's discuss.

To show following information diagrammatically, which type of bar-diagram is suitable?

- (1) Literacy percentage of four villages.
- (2) The expenses of a family on various items.
- (3) The numbers of girls and boys in each of five divisions.
- (4) The number of people visiting a science exhibition on each of three days.
- (5) The maximum and minimum temperature of your town during the months from January to June.
- (6) While driving a two-wheeler, number of people wearing helmets and not wearing helmet in 100 families.



Let's learn.

Statistics

Suppose, a large group (population) is to be studied with a particular aspect. (For example, blood pressures of senior citizens in a locality) For the purpose, a sufficiently small part of the group is selected randomly. This small group represents the large group (sample). The necessary information is gathered from the representative group which, in general, is numerical in most of the cases. The analysis of the information enables us to draw conclusions. The study of this type is called 'Statistics'.

The word Statistics is originated from the Latin word 'status', which means situation of a state. This suggests that in ancient times statistics was used for administrative purposes. Today, it is used in many fields of knowledge.

Sir Ronald Aylmer Fisher (17 February 1890 - 29 July 1962) is known as Father of Statistics.

Data collection

Teacher : Suppose, you want to know how much agricultural land is owned by every family in the village. What will you do?

Robert : We will visit each house in the village and record the information about agricultural land owned by them.

Teacher : Correct, my dear students, when we collect information of a group it is called as 'data'. Generally it is numerical. We must know the purpose of collecting it. If some one collects the information personally by asking questions, taking measurements, etc. it is called as the 'Primary Data'.

Afrin : So, the data collected regarding agricultural land, as Robert said, is primary data.

Teacher : Yes, well said Afrin !

Ramesh : But what to do if we want to collect the above data in a short time ?

Teacher : What Ramesh is saying is right. In this situation we have to use another method of data collection. Think what it could be ?

Ketaki : We can go to village Talathi office and can get the information from their records.

Teacher : Correct, in some situations, because of lack of time, lack of resources, we can't collect information personally. In such cases, we have to use the information, already collected in the form of records, information published in journals, case-studies etc. The data collected from such sources is known as 'Secondary data'. So as suggested by Ketaki, the data collected from village Talathi office, regarding agricultural land is secondary data.

See the following examples :

- (i) The chart made from information published in news paper is secondary data.
- (ii) The feedback of customers in a restaurant regarding quality of the food is primary data.
- (iii) The heights of students recorded by actual measurements is primary data.

Primary data	Secondary data
<ul style="list-style-type: none">1. It requires more time.2. It is up to date and detailed information.3. It is correct and reliable.	<ul style="list-style-type: none">1. It is readily available, so needs less time2. It is taken from already collected data. It is not necessarily up to date. It may lac in details also.3. It may be less reliable.

Activity : You gather information for several reasons. Take a few examples and discuss whether the data is primary or secondary.

Practice set 7.2

- (1) Classify following information as primary or secondary data.
 - (i) Information of attendance of every student collected by visiting every class in a school.
 - (ii) The information of heights of students was gathered from school records and sent to the head office, as it was to be sent urgently.
 - (iii) In the village Nandpur, the information collected from every house regarding students not attending school.
 - (iv) For science project, information of trees gathered by visiting a forest.



Let's recall.

Classification of data

Ex.(1) The record of marks out of 20 in Mathematics in the first unit test is as follows.

20, 6, 14, 10, 13, 15, 12, 14, 17, 17, 18, 11, 19, 9, 16, 18, 14, 7, 17, 20,
8, 15, 16, 10, 15, 12, 18, 17, 12, 11, 11, 10, 16, 14, 16, 18, 10, 7, 17, 14,
20, 17, 13, 15, 18, 20, 12, 12, 15, 10

What is the above information called ?

-Primary data

What is each of the numbers in the data called ?

-A score

Answer the following questions, from the above information.

- (i) How many students scored 15 marks ?
- (ii) How many students scored more than 15 marks ?
- (iii) How many students scored less than 15 marks ?
- (iv) What is the lowest score of the group ?
- (v) What is the highest score the group ?



Let's discuss.

- (1) Was it easy to find out the answers of the above questions ? Did you refer the data frequently ?
- (2) What should we do to find answers easily ?

Shamim : We had to refer the data frequently. It was tedious and boring. If we write the data in ascending or descending order the above answers could be found easily.

According to Shamim's suggestion, let us arrange the data in ascending order.

6, 7, 7, 8, 9, 10, 10, 10, 10, 10, 11, 11, 11, 12, 12, 12, 12, 12, 13, 13,
14, 14, 14, 14, 14, 15, 15, 15, 15, 15, 16, 16, 16, 16, 17, 17, 17, 17, 17,
18, 18, 18, 18, 18, 19, 20, 20, 20, 20

Verify that the ascending order of scores helps to find the answers of the questions in Ex. (1) easily.



Let's recall.

Martin : Writing the data in a tabular form can also make the above work easy, We have studied this in previous year. This table is known as 'frequency distribution table'.

Teacher : Correct Martin ! Now let us prepare a table of the information given in example (1).

In example (1), the lowest score is 6 and the highest score is 20. Hence in the table, we write, numbers from 6 to 20 in the column of scores. In second column we record tally marks and in last column, frequency by counting the tally marks. (Complete the table.)

Frequency Distribution Table

Score	Tally Marks	Frequency (No.of students)
6		1
7		2
8		
9		
10		5
11		
12		
13		
14		
15		
16		
17		6
18		
19		
20		4
		Total N = 50

Make it sure that the sum of all frequencies, N is 50.



Let's discuss.

- (i) Is the above table is very long ?
- (ii) If the number of observations are more, is it difficult to make a table ?

Grouped frequency distribution table

Teacher : From above discussion, we conclude that, when number of observations is large, preparing a table is time consuming. What can be done to condense the data and save time ?

Rohit : In this situation, we can group the scores in the data.

Teacher : Well done Rohit! If we group the scores, that means if we make their classes, then the data will be condensed and time can be saved. Such a table is known as grouped frequency distribution table.

These are two methods of preparing a grouped frequency distribution table.

- (1) Inclusive method (2) Exclusive method

(1) Inclusive method (Discrete classes)

6, 7, 7, 8, 9, 10, 10, 10, 10, 10, 11, 11, 11, 12, 12, 12, 12, 12, 13, 13, 14, 14, 14, 14, 14, 15, 15, 15, 15, 15, 16, 16, 16, 16, 17, 17, 17, 17, 17, 17, 18, 18, 18, 18, 18, 19, 20, 20, 20, 20

In the above scores the smallest is and the largest is . The difference between largest and smallest scores is $20 - 6 = 14$. This difference is called as ‘Range of the data’.

By noticing the range, how can we classify the data into convenient classes ?

We can take classes like this.

- (i) 6 to 8, 9 to 11, 12 to 14, 15 to 17, 18 to 20 or
(ii) 6 to 10, 11 to 15, 16 to 20.

By taking classes 6 – 10, 11 – 15 & 16 – 20, let us prepare frequency distribution table.

Grouped Frequency Distribution Table (inclusive method)

Class	Tally marks	Frequency (No.of students)
6 – 10		10
11 – 15
16 – 20	20
		N = 50

While preparing this table, 6, 10 and all scores between them are included in the class 6–10 hence such classes are known as ‘Inclusive Classes’ of ‘discrete class system’ of the data.



Basic terms in statistics :

- (1) **Class :** When the observations are divided into suitable groups, each of the groups is called a ‘Class’.
- (2) **Class-Limit :** The end values of the classes are called class-limits.
For the class 6-10, the lower class limit is 6 and the upper class limit is 10.
- (3) **Frequency :** The total number of observations in to each class is called the ‘frequency’ of the that class.

In the above table, there are 20 observations in the class 11 to 15. Hence frequency of the class 11 – 15 is 20.

4. **Class width or Class Size or Class-interval :** When continuous classes are given, the difference between upper class limit and lower class limit is known as class-width.

For example, if 5 - 10, 10 - 15, 15-20, ...are given classes,

$$\text{class width of } 5-10 \text{ is } 10 - 5 = 5.$$

5. **Class mark :** The average of the lower class limit and the upper class limit for a given class is known as class mark

$$\text{Class mark} = \frac{\text{Lower class limit} + \text{Upper class limit}}{2}$$

$$\text{For example, class mark the for class 11 to 15} = \frac{\square + \square}{2} = \frac{26}{2} = 13$$

(2) Exclusive method (Continuous classes)

Ex. 6, 10, 10.5, 11, 15.5, 19, 20, 12, 13 are the given observations. By taking classes 6-10, 11-15, 16-20 prepare grouped frequency distribution table.

Solution :

Classes	Tally marks	Frequency (f)
6-10		2
11-15		3
16-20		2

In the above table, we could not include observations 10.3 and 15.7.

Because the numbers 10.3 and 15.7 cannot be included in any of the classes 6-10, 11-15, 16-20. Hence in order to include them, we have to change the structure of the classes. Therefore if we take class intervals as 5-10 10-15, 15-20 the problem will be solved. The scores 10.3 and 15.7 can be included in the classes 10-15 and 15-20 respectively. But still a question arises. In which interval the score 10 should be included ? In 5-10 or 10-20 ? To overcome the difficulty, we follow a convention. We will include the score 10 in the class 10-15 instead of 5-10. That is the upper class limit of a class should be excluded from the class. Therefore, this is called the exclusive method of classification.

Now taking classes accordingly and as per the convention of exclusion, we can prepare the table as follows.

Grouped frequency distribution table (Exclusive method)

Class interval Marks	Tally marks	Frequency (No. of students)
5-10		1
10-15		5
15-20		2
20-25		1



Remember this !

Frequency Distribution Table

Ungrouped

Ages of 9th std. students	No. of Students
14	12
15	23
16	10

Grouped

Inclusive Method (Discrete classes)

Shoe size	No. of Students
2-4	12
5-7	29
8-10	7

Exclusive Method (Continuous classes)

Height (cm)	No. of students
145-150	18
150-155	27
155-160	3

Practice set 7.3

- For class interval 20-25 write the lower class limit and the upper class limit.
- Find the class-mark of the class 35-40.
- If class mark is 10 and class width is 6 then find the class.
- Complete the following table.

Classes (age)	Tally marks	Frequency (No. of students)
12-13		<input type="text"/>
13-14		<input type="text"/>
14-15		<input type="text"/>
15-16		<input type="text"/>
		$N = \sum f = 35$

- In a 'tree plantation' project of a certain school there are 45 students of 'Harit Sena.' The record of trees planted by each student is given below :

3, 5, 7, 6, 4, 3, 5, 4, 3, 5, 4, 7, 5, 3, 6, 6, 5, 3, 4, 5, 7, 3, 5, 6, 4, 4, 3,

5, 6, 6, 4, 3, 5, 7, 3, 4, 5, 7, 6, 4, 3, 5, 4, 4, 7.

Prepare a frequency distribution table of the data.

- The value of π upto 50 decimal places is given below :

3.14159265358979323846264338327950288419716939937510

From this information prepare an ungrouped frequency distribution table of digits appearing after the decimal point.

- (7) In the tables given below, class-mark and frequencies is given. Construct the frequency tables taking inclusive and exclusive classes.

(i)

Class width	Frequency
5	3
15	9
25	15
35	13

(ii)

Class width	Frequency
22	6
24	7
26	13
28	4

- (8) In a school, 46 students of 9th standard, were told to measure the lengths of the pencils in their compass-boxes in centimeters. The data collected was as follows.

16, 15, 7, 4.5, 8.5, 5.5, 5, 6.5, 6, 10, 12,
 13, 4.5, 4.9, 16, 11, 9.2, 7.3, 11.4, 12.7, 13.9, 16,
 5.5, 9.9, 8.4, 11.4, 13.1, 15, 4.8, 10, 7.5, 8.5, 6.5,
 7.2, 4.5, 5.7, 16, 5.7, 6.9, 8.9, 9.2, 10.2, 12.3, 13.7,
 14.5, 10

By taking inclusive classes 0-5, 5-10, 10-15.... prepare a grouped frequency distribution table.

- (9) In a village, the milk was collected from 50 milkmen at a collection center in litres as given below :

27, 75, 5, 99, 70, 12, 15, 20, 30, 35, 45, 80,
 77, 90, 92, 72, 4, 33, 22, 15, 20, 28, 29, 14,
 16, 20, 72, 81, 85, 10, 16, 9, 25, 23, 26, 46,
 55, 56, 66, 67, 51, 57, 44, 43, 6, 65, 42, 36,
 7, 35.

By taking suitable classes, prepare grouped frequency distribution table.

- (10) 38 people donated to an organisation working for differently abled persons. The amount in rupees were as follows :

101, 500, 401, 201, 301, 160, 210, 125, 175, 190, 450, 151,
 101, 351, 251, 451, 151, 260, 360, 410, 150, 125, 161, 195,
 351, 170, 225, 260, 290, 310, 360, 425, 420, 100, 105, 170,
 250, 100.

- (i) By taking classes 100-149, 150-199, 200-249... prepare grouped frequency distribution table.

- (ii) From the table, find the number of people who donated rupees 350 or more.