

MATHEMATICS

Class-VIII

Topic-17

DATA HANDLING



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CH-17

DATA HANDLING

TERMINOLOGIES

Data, statistics, raw data, crude data, primary data, secondary data, frequency distribution tally mark, range, upper limit, lower limit, class mark, class size, class interval, bar graph, kink, pie chart, class width.

INTRODUCTION

In VII class, we have started the study of statistics with reading, interpretation and construction of pictographs and bargraphs representing any given information or data. In this chapter, we shall begin the study of statistics in a formal way we shall learn to represent a given information or data into the form of an ungrouped or a grouped frequency distribution table.

The present day society is essentially information oriented. In various fields, we need information in the form of numerical figures, called **data**.

These data may related to the profit of company during last few years, the monthly wages earned by workers in a factory, the expenditure in various sectors of a five year plan, the marks obtained by the students of a class in a certain examination, etc.

Data : The word data means information or set of given facts in numerical figures.

Statistics: It is defined as the science of collection, presentation, analysis and interpretation of numerical data.

17.1 TABULAR AND GRAPHICAL REPRESENTATION OF DATA

On the basis of methods of collection, data can be divided into two categories.

(a) Primary data

Data which are collected for the first time by statistical investigator or with help of his workers is called primary data. e.g. If an investigator wants to study the condition of the students studying in a school then for this he collects some data like their monthly income, expenditure, number of brothers, sisters, sources of income etc.

(b) Secondary data

These are the data already collected by a person or a society and these may be in published or unpublished form.

Secondary data should be carefully used, since they are collected with a purpose different from that of the investigator and may not be fully relevant to the investigation.

When the data is compiled in the same form and order in which it is collected, it is known as **Raw Data**. It is also called **Crude data**. For example, the marks obtained by 20 students of class **VIII** in Mathematics out of 10 marks are as follows :

7,	4,	9,	5,	8,	10,
6,	7,	9,	2,	0,	3,
7,	6,	2,	1,	9,	8,
3,	8,				

The raw data can be arranged in any one of the following ways :

- (i) Social order or alphabetical order (ii) Descending order

The raw data when put in ascending or descending order of magnitude is called an array or arranged data.

(c) Frequency Distribution

(i) Ungrouped Frequency Distribution : If the number of observations is large, then arranging data in an array is a tedious job. So to make it easily understandable and clear, we tabulate data in the form of a table which is called frequency distribution table.

Let the marks of 20 students in a test of mathematics out of 10 are given below and we have to form a frequency distribution table :

6, 5, 9, 6, 6, 2, 5, 9, 9, 2, 5, 6, 5, 2, 9, 5, 5, 6, 2, 5

To form a frequency distribution table we use tally marks method.

To construct a frequency distribution table, first we prepare a table with the columns, first for variable, 2nd for tally marks and third for frequency. We write all possible values of variable in first column in ascending order. We take first observation in the raw data and put a bar in the 2nd column opposite to it, then we take 2nd observation in the given raw data and put a bar opposite to it. Continue this process till all the observation in given raw data are exhausted. At last we count the number of bars in respect of each value of the variable and place it in the third column.

Marks Obtained	Tally Mark	Frequency
2		4
5		7
6		5
9		4

Illustration 17.1

In a survey of 20 families, each family is found to have the following number of children :

1, 2, 2, 3, 2, 3, 3, 4, 1, 1, 4, 4, 2, 2, 3, 1, 5, 1, 1, 2

Make a frequency distribution table.

Sol. Arrange in ascending order.

1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 4, 4, 4, 5.

Number of children	Tally Marks	No. of families
1		6
2		6
3		4
4		3
5		1
	Total	20

Illustration 17.2

Construct frequency distribution table from the following scores :

15, 18, 16, 20, 25, 24, 25, 20, 16, 15, 18, 18, 16, 24, 15, 20, 28, 30, 27, 16, 24, 24, 20, 18, 28, 27, 25, 24, 25, 18, 18, 25, 20, 16, 15, 20, 27, 28, 29, 16.

Sol. Frequency distribution of scores

Scores	Tally marks	Frequency
15		4
16		6
18		6
20		6
24		5
25		5
27		3
28		3
29		1
30		1
Total		40

(ii) Grouped Frequency Distribution Table :

Sometimes the given data is very large and the smallest and the greatest values differ largely. In that case a lot of space is required and it is difficult to handle the data. To overcome this difficulty we try to condense the data by forming groups of suitable size.

Such a distribution is called grouped frequency distribution and the data is called grouped data.

There are no hard and fast rules to divide the data into groups by choosing suitable size. The size and number of groups depend on the difference between the minimum and maximum values, called **range**.

For example, the heights (correct to centimetres) of 40 children are given below:

58, 60, 63, 74, 82, 56, 72, 59, 67, 73, 80, 59, 67, 82, 76, 68, 71, 70, 69, 59, 66, 59, 64, 62, 73, 78, 76, 58, 60, 74, 68, 67, 72, 77, 80, 69, 78, 62, 68, 73

The smallest height is 56 cm and the greatest height is 82 cm. The range is 26 cm. We can have groups:

55 – 60, 60 – 65, 65 – 70, 70 – 75, 75 – 80 and 80 – 85. Here, 55 – 60 includes all children whose heights are 55 cm and above but less than 60 cm. Where will we put the child who is 60 cm tall ? Obviously, he will be put in 60 – 65 class. If someone is 59.5 cm tall, he will be put in 55 - 60 class.

In class 55 – 60, 55 is called **lower limit** and 60 is called **upper limit**. The difference between the upper limit and the lower limit of a class is called **class size or width** of the class. The average of upper and lower limits is called **class mark**, e.g., the class mark of 55 – 60 is $\frac{55+60}{2}$ or 57.5.

Now we use the Tally Method and represent the data of Table, using classes 55 - 60, 60 - 65 etc. as below

Grouped Frequency Distributions of Heights

Class Interval	Tally Marks	Frequency
55 – 60		7
60 – 65		6
65 – 70		9
70 – 75		9
75 – 80		5
80 – 85		4
	Total	40

Illustration 17.3

The marks obtained by 40 students of class VIII in an examination are given below :

18, 8, 12, 6, 8, 16, 12, 5, 23, 2, 16, 23, 2, 10, 12, 9, 7, 6, 5, 3, 5, 13, 21, 13, 15, 20, 24, 1, 7, 21, 16, 13, 18, 23, 7, 3, 18, 17, 16, 4.

Present the data in the form of a frequency distribution using the same class size, one such class being 15 –20 (where 20 is not included).

Sol. The minimum and maximum marks in the given raw data are 1 and 24 respectively. It is given that 15-20 is one of the class intervals and the class size is same. So, the classes of equal size are 0–5, 5–10, 10–15, 15–20 and 20–25

Thus, the frequency distribution is as given below :

Frequency Distribution of Marks

Marks	Tally marks	Frequency
0-5		6
5-10		11
10-15		7
15-20		9
20-25		7
	Total	40

Illustration 17.4

The weights in grams of 50 oranges picked at random from a consignment are as follows :

131, 113, 82, 75, 204, 81, 84, 118, 104, 110, 80, 107, 111, 141, 136, 123, 90, 78, 90, 115, 110, 98, 106, 99, 107, 84, 76, 186, 82, 100, 109, 128, 115, 107, 115, 119, 93, 187, 139, 129, 130, 68, 195, 123, 125, 111, 92, 86, 70, 126

Present the data in the form of a frequency distribution using the same class size, one such class being 60 –80 (where 80 is not included).

Sol. The lowest weight of orange = 68 gm

The highest weight of orange = 204 gm

One class interval = 60–80

Class size = 20

The classes can be 60–80, 80–100, 100–120, 120 – 140, 140 – 160, 160 – 180, 180 – 200, 200 – 220

Frequency Distribution of Weights of Oranges

Weight (in gms)	Tally marks	Frequency
60-80		5
80-100		13
100-120		17
120-140		10
140-160		1
160-180		0
180-200		3
200-220		1
	Total	50

Illustration 17.5

Given below are the marks (out of 100) obtained by 20 students of a class in mathematics in an annual examination :

23, 75, 56, 42, 70, 84, 92, 51, 40, 63, 87, 58, 35, 80, 14, 63, 49, 72, 66, 61

Arrange the above data in an ascending order and find

- (i) The lowest marks obtained
- (ii) The highest marks obtained
- (iii) The range of the given data

Sol. Arranging the above data in an ascending order, we get

14, 23, 35, 40, 42, 49, 51, 56, 58, 61, 63, 63, 66, 70, 72, 75, 80, 84, 87, 92

From the above data, we make the following observations.

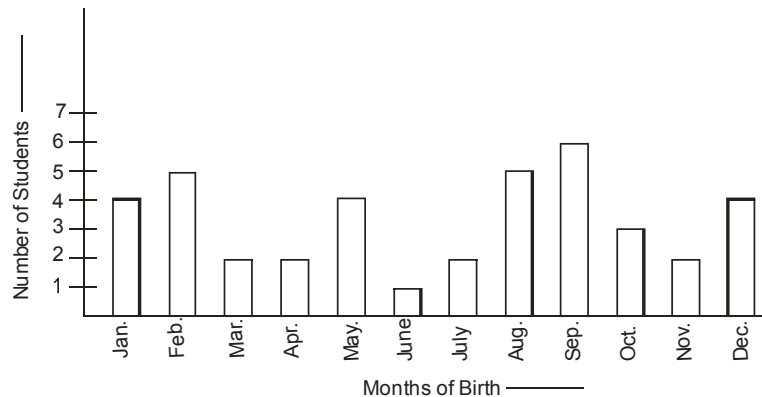
- (i) Lowest marks obtained = 14
- (ii) Highest marks obtained = 92
- (iii) Range of the given data = $(92 - 14) = 78$

(d) Graphical representation of data

In the previous section, we have studied how to arrange the given data in tabular form. However, the tabular representation of data do not always prove to be very interesting to the common man. One of the most appealing and convincing ways of presenting the data is through pictures and graphs, because graphs or pictures, if drawn attractively, are eye catching and make unwieldy data easily intelligible. Moreover, graphs are good visual aids. There are various methods of graphical representation of frequency distribution. A bar graph is a pictorial representation of data in which bars of uniform width are drawn with equal spacing between them on one axis (say, the x-axis), depicting the variable. The values of variable are shown on the axis (say, the y-axis) and the heights of the bars depend on the values of variable.

Illustration 17.6

In a particular section of Class VIII, **40** students were asked about the months of their birth and the following graph was prepared for the data so obtained :



- (i) How many students were born in the month of November ?
- (ii) In which month were the maximum number of students born ?
- (iii) In which month were the minimum number of students born ?

Sol. Note that the variable here is the 'month of birth', and the value of the variable is the 'Number of students born'.

- (i) 2 students were born in the month of November.
- (ii) The maximum number of students were born in the month of September.
- (iii) The minimum number of students were born in the month of June.

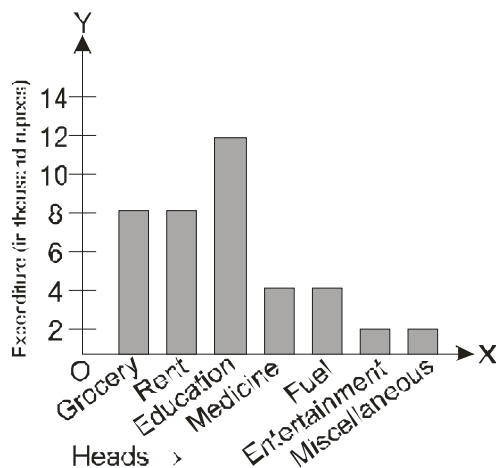
Illustration 17.7

A family with monthly income of Rs. 40,000 had planned the following expenditure per month under various heads :

Heads	Expenditure (in Rs. 1000)
Grocery	8
Rent	8
Education of children	12
Medicine	4
Fuel	4
Entertainment	2
Miscellaneous	2

Draw bar graph for the data above.

Sol.



(i) Bar graph for grouped data : We have already learnt how to draw bar graphs of ungrouped data and have learnt to read such given bar graphs. In this section we will learn to draw and interpret the bar graphs of grouped data. The bar graphs of grouped data are graphs with no spacing between the bars. To draw bar graphs of grouped data we use the following steps:

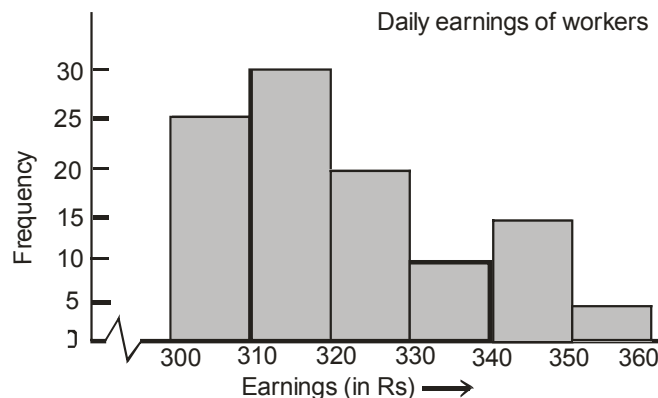
- Draw two perpendicular axes.
- Mark class boundaries on the horizontal axis.
- Mark frequencies on the vertical axis.
- Construct rectangles with the respective class intervals as the bases and the corresponding frequencies as the heights. The areas of rectangles must be proportional to the frequencies of their classes. Bar graphs of grouped data are also called histogram.

NOTE :

- Choose a suitable scale on both the axes.
- Draw slanting line segments in each rectangle or colour each rectangle with a distinct colour so that the bars look beautiful.

Illustration 17.8

The following bar graph shows the frequency distribution of daily earnings of 80 workers in a factory:



Read the above bar graph and answer the following questions :

- How many workers are in the maximum earning group?
- In which earning group are the maximum workers?
- What is the size of the classes?
- How many workers get less than Rs 330?
- How many workers get Rs 340 or more?

Sol. From the above figure we see that :

- The maximum earning group is 350-360 rupees and the height of this class corresponds to 5, i.e., 5 workers are in the maximum earning group.
- The highest rectangle corresponds to the maximum workers, i.e., 30 and they get from 310 - 320 rupees.
- Size of the classes is 10.
- Workers who get less than Rs 330 = $25 + 30 + 20 = 75$
- Workers who get Rs 340 or more = $15 + 5 = 20$.

NOTE :

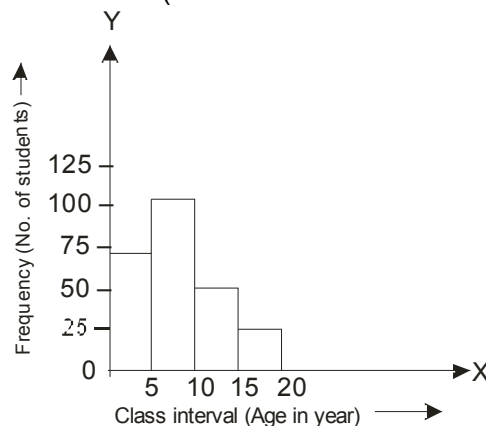
Note that there is a 'kink' before the first class interval 300 – 310 on the horizontal axis. It means that the full distance 0 to 300 is not shown. In case the lower limit of the 1st interval is 0, we start from origin.

Illustration 17.9

Draw a histogram of the following frequency distribution.

Class (Age in years)	0 – 5	5 – 10	10 – 15	15 – 20
No. of students	72	103	50	25

Sol. Here frequency distribution is grouped and continuous and class intervals are also equal. So mark the class intervals on the x-axis i.e., age in year (scale 1 cm = 5 year). Mark frequency i.e., number of students (scale 1 cm = 25 students) on the y-axis.



(ii) Pie chart : So far we have read the interpretation and drawing of bar graphs. There is another type of graph known as pie graph or pie chart which is drawn to represent a data. A diagram used to represent statistical data by dividing a circle into sectors is known as pie chart or pie graph.

Pie graphs are circular, so they are also called circle graphs. Each sector of a pie graph shows a fraction of the total. It shows the relation of the part with the whole.

Constructing a pie chart

We follow the under mentioned steps to draw pie graphs (charts)

1. From the given data, we find the total of the frequencies.
2. For each variable, we calculate the angle of the sector (i.e. angle at the centre of the circle). This angle is called central angle.

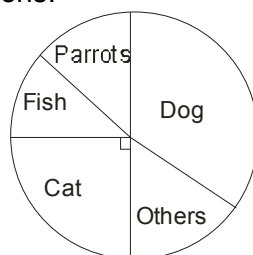
$$\text{Central angle for a variable} = \frac{\text{Frequency of the variable}}{\text{Total of frequencies}} \times 360^\circ$$

3. We draw a circle of convenient radius.
4. We draw the sectors corresponding to the central angles calculated to step 2 above.
5. Write down the names of the variables and their corresponding central angles in the sectors

Now we solve some examples below :

Illustration 17.10

The adjoining pie chart shows the pets kept by the people of a locality. Read the pie chart and answer the following questions.



- (a) Which pet is most popular?
- (b) Which two pets are equally popular?
- (c) 80 people were questioned? How many had a cat?
- (d) What percentage of people like parrots?

Sol.

- (a) Since the sector for dogs is the largest, so dog is most popular.
- (b) Parrots and fish.
- (c) The sector for cats subtends an angle of 90° at the centre.

$$\therefore \text{Number of people who keeps a cat} = \frac{90^\circ}{360^\circ} \times 80 = 20$$

- (d) The sector for parrots subtends an angle of 45° at the centre so $\frac{45^\circ}{360^\circ}$ or $\frac{1}{8}$ of the total people like parrots.

$$\therefore \text{Requires percentage} = \left(\frac{45^\circ}{360^\circ} \times 100 \right) \% = 12\frac{1}{2} \%$$

Illustration 17.11

The following table shows the colours preferred by a group of people :

Colours	Blue	Green	Red	Yellow
No. of people	18	9	6	3

Represent the above data by a pie chart.

Sol. We know that central angle for a variable = $\frac{\text{Frequency of the variable}}{\text{Total of frequencies}} \times 360^\circ$

$$\text{Total frequency} = 18 + 9 + 6 + 3 = 36$$

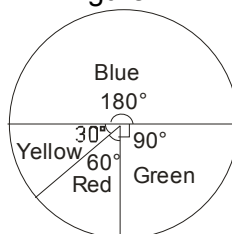
$$\text{Central angle for blue colour} = \frac{18}{36} \times 360^\circ = 180^\circ$$

$$\text{Central angle for green colour} = \frac{9}{36} \times 360^\circ = 90^\circ$$

$$\text{Central angle for red colour} = \frac{6}{36} \times 360^\circ = 60^\circ$$

$$\text{Central angle for yellow colour} = \frac{3}{36} \times 360^\circ = 30^\circ$$

Now we draw a pie chart as shown in figure



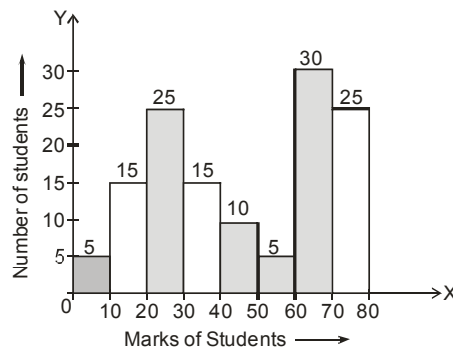
Ask yourself _____

1. The maximum daily temperature (in°C) of a city on 10 consecutive days are given below
32.4, 29.5, 26.3, 25.7, 23.4, 24.2, 22.4, 22.5, 22.8, 23.3
Find the range of the data.

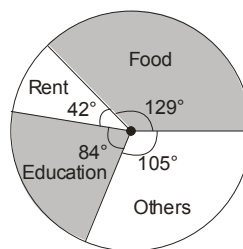
2. The scores (out of 100) obtained by 33 students in a Mathematics test are :
69, 48, 84, 58, 84, 48, 73, 83, 48, 66, 58, 66, 64, 71, 64, 66, 69, 66, 83, 66, 83, 66, 69, 71,
81, 71, 73, 69, 66, 66, 64, 58, 64, 69, 69
Construct a frequency table using class intervals of equal width.

3. Pulse rate (per minute) of 30 persons were recorded as 61, 76, 72, 73, 71, 66, 78, 73, 68,
81, 78, 63, 72, 75, 80, 68, 75, 62, 71, 81, 73, 60, 79, 72, 73, 74, 71, 64, 76 and 71
Construct a frequency table using class intervals of equal width, one class interval being
60-65.

4. (i) What information is being given by the histogram ?
(ii) Which group contains maximum students ?
(iii) Which group have same marks ?



5. The following pie chart shows the monthly expenditure of a family on various items. If total expenditure per month is Rs. 12000, answer the following questions :



- (i) How much amount is spent on rent ?
- (ii) How much amount is spent on education ?
- (iii) What is the ratio of expenses on food and education ?

Answers

1. 10

4. (ii) 60 – 70 (iii) 10 – 20 & 30 – 40 , 20 – 30 & 70 – 80 , 0 – 10 & 50 – 60

5. (i) Rs.1400 (ii) Rs. 2800 (iii) 43 : 28

Add your knowledge _____

1. Mean :

The mean of a number of observation is the sum of the values of all the observations divided by the total number of observations. It is denoted by the symbol \bar{x} , read as **x bar**.

Mean of raw data : If $x_1, x_2, x_3, \dots, x_n$ are the **n** values (or observations) then, **A.M.** (Arithmetic mean) is

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{\sum_{i=1}^n x_i}{n}$$

2. Median :

Median of a distribution is the value of the variable which divides the distribution into two equal parts.

Median of ungrouped data

(A) Arrange the data in ascending order.

(B) Count the no. of observations (Let there be 'n' observations)

(C) If n is odd then median = value of $\left(\frac{n+1}{2}\right)^{\text{th}}$ observation.

(D) If n is even then median = value of **mean** of $\left(\frac{n}{2}\right)^{\text{th}}$ observation and $\left(\frac{n}{2}+1\right)^{\text{th}}$ observation.

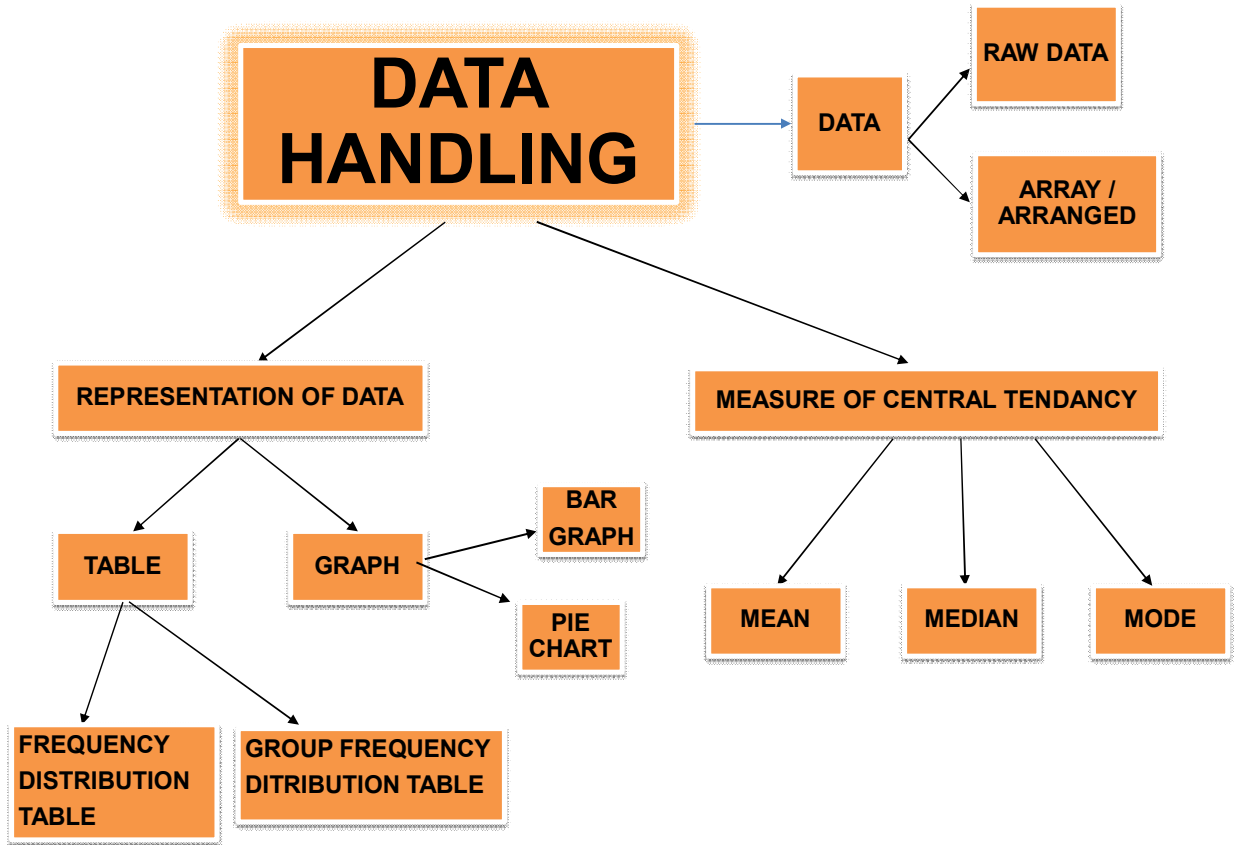
or

$$\text{Median} = \frac{\left(\frac{N}{2}\right)^{\text{th}} \text{ observation} + \left(\frac{N}{2}+1\right)^{\text{th}} \text{ observation}}{2}$$

3. Mode :

(i) Mode of ungrouped data (By inspection only) : Arrange the data in an array and then count the frequencies of each variate. The variate having maximum frequency is the mode.

Concept Map



Summary

1. Observations gathered initially are called raw data.
2. The difference between the highest and the lowest values of the observations in given data is called the range.
3. In given data, the number of times a particular observation occurs is called its frequency.
4. A table showing the frequencies of various observations of data is called a frequency distribution table or simply a frequency table.
5. When the number of observations is large, we make use of tally marks to count the frequencies.
6. Tallies are usually marked in bunches of five for ease of counting.
7. When the list of observation is very large, we usually organise the data into groups called classes or class intervals. The data so obtained is called grouped data or a grouped frequency distribution.
8. The lower value of a class interval is called its lower class limit and the upper value of a class interval is called its upper class limit.
9. The difference between the upper and lower values of a class interval is called its width or size.
10. The mid-value of a class interval is called its class mark.
11. The frequency of a class interval is called its class frequency.
12. A histogram is a graphical representation of grouped data in which class intervals are taken along the horizontal axis and frequencies along the vertical axis. For each class, a rectangle is constructed with class interval as the base and its height is determined by the corresponding frequency.

Exercise-1

SECTION -A (FIXED RESPONSE TYPE)

MULTIPLE CHOICE QUESTIONS

1. For the following table :

Marks	Frequency
0-5	6
5-10	12
10-15	50
15-20	120
20-25	225

The upper limit of the class interval 15 – 20 is :

- (A) 15 (B) 20 (C) 25 (D) 22

2. For the table given in question above, the lower limit of class interval 15–20 is :

- (A) 16 (B) 20 (C) 15 (D) 17.5

Instructions (3 to 7)

The final marks in mathematics of 30 students are as follows :

53, 61, 48, 60, 78, 68, 55, 100, 67, 90, 75, 88, 77, 37, 84, 58, 60, 48, 62, 56, 44, 58, 52, 64, 98, 59, 70, 39, 50, 60

Now answer the following :

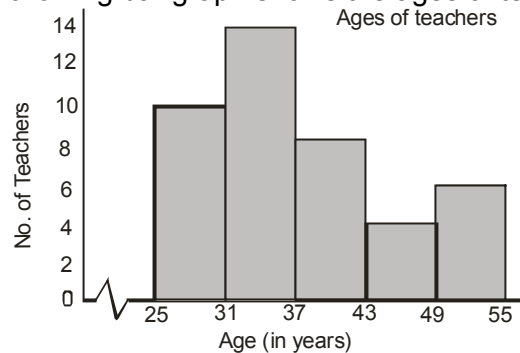
3. The highest score is :
 (A) 98 (B) 95 (C) 99 (D) None of these
4. The lowest score is :
 (A) 44 (B) 37 (C) 31 (D) 29
5. The range of data is :
 (A) 61 (B) 62 (C) 63 (D) 64
6. If 40 is the pass marks how many have failed :
 (A) 2 (B) 4 (C) 5 (D) 7
7. How many students have scored 75 or more :
 (A) 6 (B) 8 (C) 9 (D) 10
8. Following marks were obtained by 12 students in a mathematics test :
 21, 20, 25, 5, 10, 15, 30, 12, 7, 16, 9, 22
 The range of the marks is :
 (A) 20 (B) 25 (C) 21 (D) 7

9. The tally marks given below show the distribution in the subjects preferred by a sample of school children. What fraction of the sample preferred mathematics?

Mathematics	
Physics	
Chemistry	
Biology	
Sociology	

- (A) $\frac{4}{25}$ (B) $\frac{1}{2}$ (C) $\frac{25}{8}$ (D) $\frac{8}{25}$

Directions (10 to 15) : The following bar graph shows the ages of teachers of a school:

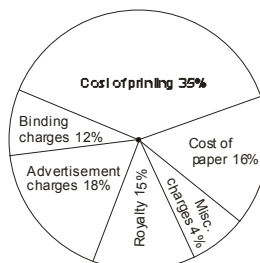


Read the above graph and select the correct answer from the given four alternative answers (10 – 15).

10. The number of teachers who are 49 years and above is :
 (A) 6 (B) 8 (C) 4 (D) 10
11. The number of teachers in the age group 37 – 43 is :
 (A) 10 (B) 6 (C) 8 (D) 14
12. The number of teachers below 37 years is :
 (A) 10 (B) 24 (C) 14 (D) 18
13. Total number of teachers in the school is :
 (A) 42 (B) 32 (C) 40 (D) 38
14. What is the class size of the given graph.
 (A) 25 (B) 55 (C) 30 (D) 6
15. In which class interval the number of teacher is maximum.
 (A) 25–31 (B) 31–37 (C) 37–43 (D) 43–49

Directions (16 to 20) :

Graph given below shows the expenditure incurred in bringing out a book by a publisher.



16. What should be the central angle of the sector for the cost of the paper :
 (A) 22.5° (B) 16° (C) 54.8° (D) 57.6°

17. If the cost of printing is Rs 17,500 the royalty is :
 (A) Rs. 8,750 (B) Rs. 7, 500 (C) Rs. 3, 150 (D) Rs. 6, 300
18. If the miscellaneous charges are Rs 6,000 then, the advertisement charges are :
 (A) Rs 90,000 (B) Rs 1, 333.33 (C) Rs 27, 000 (D) Rs 12 , 000
19. If 5500 copies are published miscellaneous expenditures amount to Rs. 1848 and publisher's profit is 25% then marked price of each copy is :
 (A) Rs 8.40 (B) Rs 12.50 (C) Rs 10.50 (D) Rs 10
20. Royalty on the book is less than the advertisement charges by :
 (A) 3% (B) 20% (C) $16\frac{2}{3}\%$ (D) None of these

FILL IN THE BLANKS

- The class marks of the class interval 38-42 is _____
- Range of data 120,118,103,115,101,131,128 is _____
- The upper value of a class interval is _____
- The information collected in unorganised form _____
- Mean of 20, 40, 35 , 42 and 45 is _____

TRUE / FALSE

- The mean of the observations 7, 8, 9 , 11 and 15 is 10.
- If the range of a data is 9 and its highest value is 81, then its least value is 73.
- The observation 20 is included in interval 20-30 and not in 10-20.
- The upper limit of one class interval is always equal to the lower limit of next class interval.
- The bars in bar graph are always drawn vertically.

MATCH THE COLUMN

- Match the cubes in column –I with their cube roots in column–II

Column–I

- (A) Data
 (B) Frequency
 (C) Class size
 (D) Class interval
 (E) Class mark
 (F) Upper limit
 (G) Lower limit

Column–II

- (p) Upper value of class interval
 (q) Lower value of class interval
 (r) Width of the class interval
 (s) Mid value of the class interval
 (t) Groups formed with equal width
 (u) No. of times an entry occurs
 (g) Information collected

SECTION -B (FREE RESPONSE TYPE)
VERY SHORT ANSWER TYPE

1. Given below are the heights (in cm) of 11 boys of a class :
146, 143, 148, 132, 128, 139, 140, 152, 154, 142, 149
Arrange the above data in an ascending order and find
(i) The height of the tallest boy
(ii) The height of the shortest boy
(iii) The range of the given data

2. Following are the marks obtained by 25 students of class VIII in a test (out of 25 marks) in mathematics:
5, 18, 18, 2, 16, 13, 8, 17, 18, 17, 13, 18, 16, 8, 5, 13 20, 8, 16, 8, 19, 13, 2, 18, 5
Find,
(i) The maximum marks obtained.
(ii) The minimum marks obtained.
(iii) The range.

3. The ages of 50 teachers working in a secondary school in a big city are as follows :

Age (in years)	Number of teachers
25-30	4
30-35	5
35-40	10
40-45	15
45-50	8
50-55	5
55-60	1
Total	Number of teachers
	50

- (i) What is the class size ?
- (ii) What is the lower limit of 40 – 45 ?
- (iii) What is the upper limit of 55 – 60 ?
- (iv) What is the class mark of the class 30 – 35 ?
- (v) What is the frequency of class interval 35 – 40 ?

4. The following are the monthly rents (in rupees) of 40 shops.
45, 50, 60, 53, 55, 51, 32, 35, 40, 42, 80, 82, 65, 63, 62, 45, 50, 51, 32, 51, 82, 89, 35, 45, 80, 65, 63, 32, 55, 53, 45, 83, 80, 75, 74, 79, 71, 72, 75, 32.
Construct a grouped frequency table for the above data.

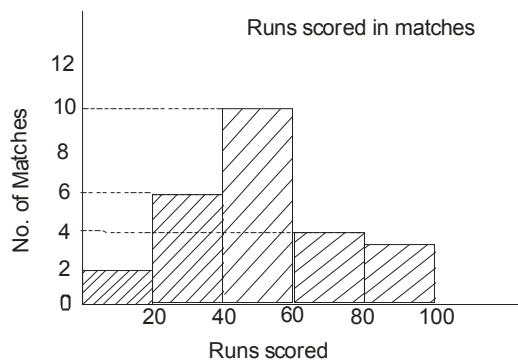
5. Represent the following data in the frequency distribution with class size 10 :
22, 11, 28, 15, 10, 7, 5, 21, 35, 42, 31, 29, 16, 24, 25, 12, 10, 18, 11, 14, 6, 3, 8, 11, 23, 25, 33, 45, 16, 49, 35, 14, 9, 22, 11, 15, 27, 30, 19, 8.

SHORT ANSWER TYPE

6. The weights of new born babies (in kg) in a hospital on a particular day are as follows :
2.3, 2.2, 2.1, 2.7, 2.6, 3.0, 2.5, 2.9, 2.8, 3.1, 2.5, 2.8, 2.7, 2.9, 2.4

- (i) Rearrange the weights in descending order.
- (ii) Determine the highest weight.
- (iii) Determine the lowest weight.
- (iv) Determine the range.
- (v) How many babies were born on that day ?
- (vi) How many babies weight below 2.5 kg?
- (vii) How many babies weight more than 2.8 kg
- (viii) How many babies weight 2.8 kg ?

7. The following bar graph shows the number of runs scored by a cricket player in one-day matches :



Read the above bar graph and answer the following questions:

- (i) How many matches did he play ?
 - (ii) How many matches were played in the highest runs group ?
 - (iii) In how many matches did he score less than 40 runs ?
 - (iv) In how many matches did he score 60 - 80 runs ?
8. In one day, the sales (in rupees) of different items of a baker's shop are given below :

Item	Sales (in rupees)
Ordinary breads	260
Cakes and Pastries	100
Biscuits	60
Fruit Breads	60

Draw a pie-chart representing the above data.

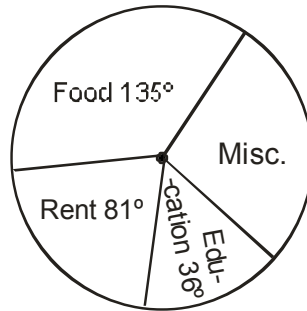
9. The main source of energy is used by each house in a street is listed below :

Source of Energy	Electricity	Solar	Gas	Oil
No. of houses	20	10	12	6

Represent the above data by a pie chart

LONG ANSWER TYPE
Directions (10 to 13) :

Ramesh spends Rs. 16,000 per month. His expenses on various items are represented by the pie diagram along side. Read the pie diagram and answer the question given below it.



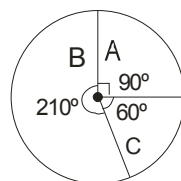
10. How much does Ramesh spend on Rent ?
11. What is the central angle for miscellaneous expenses ?
12. How much is spent on education ?
13. What is the ratio of expenses between food and rent ?
14. The following data gives the expenditure of a family on four main items :

Items	Food	Rent	Clothing	Education
Amount in (Rs.)	4500	1700	400	600

Represent the above data by a pie chart

15. Draw a histogram to represent the following data :

C.I.	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140	140 - 160	160 - 180	180 - 200
Freq.	20	40	30	50	30	20	10	40

Exercise-2
SECTION -A (COMPETITIVE EXAMINATION QUESTION)
MULTIPLE CHOICE QUESTIONS
Direction:(For Q no. 1 to 4)


Rs. 900 is divided among A, B, C. Find

- Amount received by A
 (A) Rs.225 (B) Rs.250 (C) Rs.270 (D) Rs.290
- How much % of total amount is received by C.
 (A) $16\frac{2}{3}\%$ (B) $12\frac{2}{3}\%$ (C) $22\frac{2}{3}\%$ (D) $19\frac{2}{3}\%$
- How much percent more received by A then that of C
 (A) 30% (B) 40% (C) 45% (D) 50%
- Among the given ratio which ratio is maximum
 (A) A : B (B) A : C (C) B : C (D) C : B
- The students of a class who were passed in maths subject, when represented on a pie diagram formed an angle which was 120° more then the sum of all the angles of a triangle, then the number of passed students is -
 (A) $\frac{2}{3}$ of the total students. (B) $\frac{4}{5}$ of the total students.
 (C) $\frac{5}{6}$ of the total students. (D) $\frac{3}{4}$ of the total students.

Direction:(For Q no. 6 to 10)

Read the following graph carefully and answer the following questions :

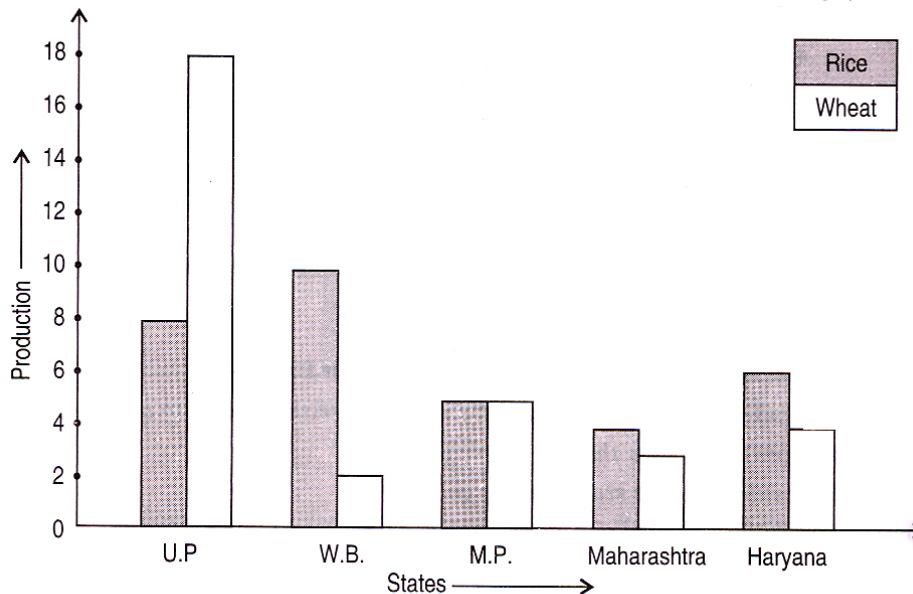


Fig. 19.4

- Which state have rice to wheat ratio maximum.
 (A) UP (B) MP (C) W.B (D) Haryana
- Which state have rice to wheat ratio minimum.
 (A) UP (B) Maharashtra (C) W.B (D) Haryana
- What Percentage of rice produced by MP of total quantity of rice.
 (A) $15\frac{5}{33}\%$ (B) $12\frac{5}{33}\%$ (C) $17\frac{5}{33}\%$ (D) $19\frac{5}{33}\%$

9. What Percentage of wheat produced by UP of total quantity of wheat.
 (A) $56\frac{1}{4}\%$ (B) $52\frac{1}{4}\%$ (C) $58\frac{1}{4}\%$ (D) $50\frac{1}{4}\%$
10. By what percentage production of rice is more of Haryana as compared to Maharashtra
 (A) 30% (B) 40% (C) 45% (D) 50%

SECTION -B (TECHIE STUFF)

11. If the arithmetic mean of 5, 7, 9, x is 9 then the value of x is :
 (A) 11 (B) 15 (C) 18 (D) 16
12. The average of 15 numbers is 18. The average of first 8 is 19 and that last 8 is 17, then the 8th number is:
 (A) 15 (B) 16 (C) 18 (D) 20
13. In an examination, 10 students scored the following marks in Mathematics 35, 19, 28, 32, 63, 02, 47, 31, 13, 98. Its range is :
 (A) 96 (B) 02 (C) 98 (D) 50
14. Find the median of the following values : 37, 31, 42, 43, 46, 25, 39, 45, 32
 (A) 31 (B) 37 (C) 39 (D) 45
15. The mode of the distribution 3, 5, 7, 4, 2, 1, 4, 3, 4 is :
 (A) 4 (B) 2 (C) 3 (D) 5

Exercise-3

(PREVIOUS YEAR EXAMINATION QUESTIONS)

1. The mean of 9 observation is 13. The mean of the first 5 observations is 11 and the mean of last 5 observations is 14, then 5th observation is **[Aryabhata-2005]**
 (A) 11 (B) 12 (C) 8 (D) 13
2. The data in increasing order is 40, 42, 45, 49, x, x + 2, 58, 62, 64, 68. **[Aryabhata-2008]**
 (i) Find the range of the data.
 (ii) Find the value of x if the mean of the data is 53.
 (iii) Find the value of x if the median of the data is 53.
3. Students at a local college were asked to many hours they slept last night. The adjoining chart shows the data. A bar graph of this data will be made on a grid that is 20 units. What scale would be most appropriate for the axis labelled "Number of Students"? **[IMO - 2010]**

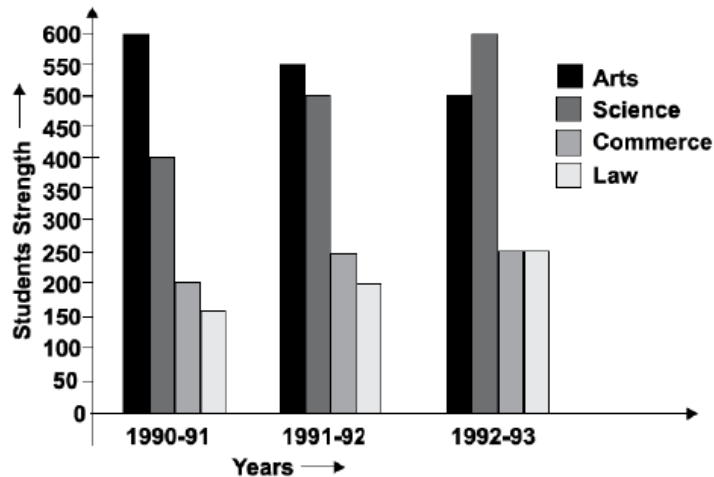
Hours of Sleep	Number of Students
6	14
7	26
8	28
9	15
More than 10	6

- (A) 1 unit = 1 students (B) 1 unit = 2 students
 (C) 1 unit = 10 students (D) 1 unit = 28 students

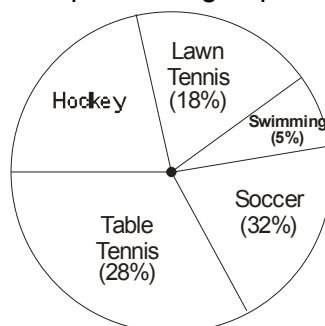
4. Of the three numbers, the first is twice the second and is half the third. If the average of three numbers is 56, the three numbers in order are : **[Aryabhata-2011]**
 (A) 48, 24, 96 (B) 48,36,96 (C) 48,12,14 (D) 24,12,48
5. The class marks of a frequency distribution are given as follows : 15, 20, 25,.. The class corresponding to the class mark 20 is **[Aryabhata-2012]**
 (A) 12.5 - 17.5 (B) 17.5 - 22.5 (C) 18.5 - 22.5 (D) 19.5 - 20.5

Direction (6 & 7) :

A bar diagram depicting the changes in the students strength of a college in four faculties from 1990-91 to 1992-93 is shown. **[IMO - 2012]**

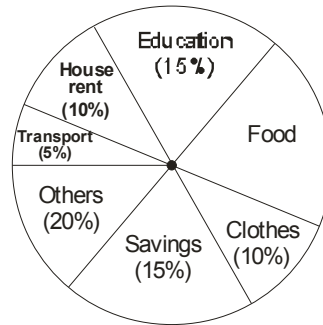


6. How many times was the total strength of the strength of Commerce students in 1991-92?
 (A) 3 times (B) 4 times (C) 5 times (D) 6 times
7. How much percent was the increase in Science students in 1992-93 over 1990-91?
 (A) 50% (B) 150% (C) $66 \frac{2}{3}$ % (D) 75%
8. M being the mean of $x_1, x_2, x_3, x_4, x_5, x_6$, find the value of $(x_1 - M) + (x_2 - M) + (x_3 - M) + (x_4 - M) + (x_5 - M) + (x_6 - M)$ **[Aryabhata-2012]**
 (A) 1 (B) 0 (C) 6 M (D) M/6
9. The pie-chart show the favourite sports of a group of students. **[NSTSE-2013]**



- If 34 students like hockey, calculate the total number of students who like lawn tennis and table tennis ?
 (A) 92 (B) 70 (C) 40 (D) 100

10. The pie-chart shows the expenditure (in percentage) on various items and savings of a family during a month.

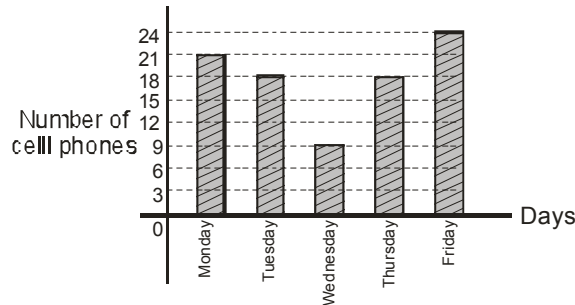


On which item was the expenditure the maximum ?

[NSTSE-2014]

- (A) Food (B) Clothes (C) Savings (D) Transport

11. The bar chart shows the number of cell phones sold by a shop on 5 days of a certain week. The difference between the highest number and the lowest number of cell phones sold is 15.



Find the number of cell phones sold on Thursday.

[NSTSE-2015]

- (A) 6 (B) 12 (C) 18 (D) 24

Answer Key

Exercise-1

SECTION -A (FIXED RESPONSE TYPE)

MULTIPLE CHOICE QUESTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	C	D	B	C	A	B	B	D	A	C	B	A	D	B	D	B	C	C	C

FILL IN THE BLANKS

1. 40 2. 30 3. upper limit 4. raw data
5. 36.4

TRUE / FALSE

1. True 2. False 3. True 4. True
5. False

MATCH THE COLUMN

1. (A) – g, (B) – u, (C) – r, (D) – t, (E) – s, (F) – p, (G) – q

SECTION -B (FREE RESPONSE TYPE)

VERY SHORT ANSWER TYPE

1. (i) 154 cm (ii) 128 cm. (iii) 26 cm
2. (i) 20 (ii) 2 (iii) 18
3. (i) 5 (ii) 40 (iii) 60 (iv) 32.5 (v) 10

SHORT ANSWER TYPE

6. (i) 3.1 , 3.0 , 2.9 , 2.9 , 2.8 , 2.8 , 2.7 , 2.7 , 2.6 , 2.5 , 2.5 , 2.4 , 2.3 , 2.2 , 2.1
 (ii) 3.1 kg (iii) 2.1 kg (iv) 1 kg (v) 15 (vi) 4 (vii) 4
 (viii) 2
7. (i) 23 (ii) 3 (iii) 8 (iv) 4

LONG ANSWER TYPE

10. Rs. 3600 11. 108° 12. Rs. 1600 13. 5 : 3

Exercise-2

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	A	A	D	C	C	C	A	A	A	D	B	C	A	C	A

Exercise-3

PREVIOUS YEAR EXAMINATION QUESTIONS

- | | | |
|--------|----------------------------|----------------------|
| 1. (C) | 2. (i) 28 (ii) 50 (iii) 52 | 3. (B) |
| 4. (A) | 5. (B) | 6. (D) 7. (A) 8. (B) |
| 9. (A) | 10. (A) | 11. (C) |