

MATHEMATICS

Class-VII

Topic-09

DATA HANDLING



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TERMINOLOGIES

Statistics, Data, Primary Data, Secondary Data, Organization of Data, Range, Ungrouped Data, Frequency, Frequency Distribution, Ungrouped Frequency Distribution, Lower Limit, Upper Limit, Class Interval, Class Mark, Mean, Median, Mode, Bar Graph, Pie Graph.

INTRODUCTION

Data handling is one of the central activities through which we can organize and present data in such a way that its analysis and interpretation becomes easier. Importance of Data: Expressing facts with the help of data is of great importance in our day-to-day life. For example, instead of saying that India has a large population, it is more appropriate to say that the population of India, based on the census of 2001 is one billion and twenty eight million.

Statistics may be defined as the science of collection, presentation, analysis and interpretation of numerical data.

9.1 TABULAR AND GRAPHICAL REPRESENTATION OF DATA

(a) Data

A collection of numerical figures give some particular type of information is called data. On the basis of methods of collection, data can be divided into two categories.

(i) Primary data :

Data which are collected for the first time by statistical investigator or with help of his workers is called **primary data**.

For example : If an investigator wants to study the condition of the students studying in a school. For this he collects some data like their number of brothers, sisters, their marks in various exams etc.

(ii) Secondary data :

Data which are already collected by a person or a society and these may be in published or unpublished sources are known as **secondary data**. These data should be carefully used.

(b) Organization of Data

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 VII in Mathematics out of 10 marks are as follows :

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

The raw data can be arranged in the following way :

Ascending or descending order :

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

(c) Range

The **range** is the difference between the highest and lowest scores of a distribution. It is the simplest measure of dispersion. It gives a rough idea of dispersion. This measure is useful for ungrouped data.

If ℓ and h are the lowest and highest scores in a distribution then the **Range** = $h - \ell$.

Illustration 9.1

Find the range of the following distribution:

15, 33, 24, 47, 91, 40, 82, 73, 34, 26 and 19.

Sol. $h = 91, \ell = 15$

\therefore Range = $h - \ell = 91 - 15 = 76$.

(d) Frequency

The number of times an observation occurs in the given data, is called the **frequency** of the observation.

(e) Frequency Distribution

This is a method to present raw data in the form which one can easily understand the information contained in the raw data. There are generally two type of frequency distributions.

(i) Ungrouped Frequency Distribution : If the data is large and not classified in groups then for there representation we use tally marks according to there frequency this distribution is known as **ungrouped frequency distribution**.

Construction of ungrouped frequency distribution table : To construct a frequency distribution table, first prepare a table with the columns, first for variable, 2nd for tally marks and third for frequency. Write all possible values of variable in first column in ascending order. Take first observation in the raw data and put a bar in the 2nd column opposite to it, then 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 count the number of bars in respect of each value of the variable and place it in the third column.

Illustration 9.2

The marks of 20 students in a test of mathematics out of 50 are given below :

6, 32, 10, 17, 22, 28, 0, 17, 22, 6, 26, 10, 32, 22, 28, 22, 28, 17, 17, 22

Make a frequency distribution table.

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

Marks Obtained	Tally Mark	Frequency
0		1
6		2
10		2
17		4
22		5
26		1
28		3
32		2

(ii) **Grouped Frequency Distribution** : When the list of observations is long, the data is usually organized into groups called class intervals and the data so obtained is called a grouped data.

Lower Limit and Upper Limit : The lower value of a class interval is called its **lower limit** and the upper value of class interval is called its **upper limit**.

The size or the Width of the Class Interval : The difference between the upper and the lower class limits is called the size or width of the class interval.

For example :

The size of the class intervals = Upper Limit – Lower Limit

Class Mark : The mid value of a class interval is called its **class mark**. It is obtained by adding its upper and lower limit and dividing by 2.

$$\text{Class Mark} = \frac{\text{Upper limit} + \text{lower limit}}{2}$$

Construction of grouped frequency distribution table : First determine the maximum and minimum value of the variable, then find the range of data and divide it by the number of classes to be formed to determine the class intervals. Now take each observation from the data, one at a time and put a tally marks against the class to which the observation belongs. At last write the frequencies in third column.

Illustration 9.3

In an examination the marks obtained by 20 students of class VII are given below :
14, 2, 7, 12, 15, 16, 22, 13, 24, 2, 26, 5, 29, 18, 31, 36, 38, 1, 47, 4.

Make a frequency distribution table of same class size and one such class being 0 - 10.

Sol.

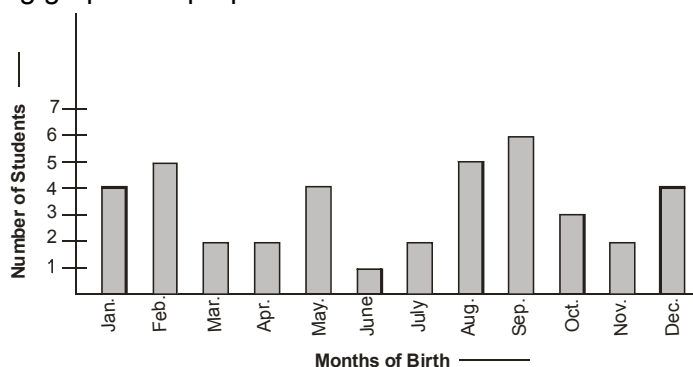
Marks	Tally Marks	No. of Students
0 – 10		6
10 – 20		6
20 – 30		4
30 – 40		3
40 – 50		1
	Total	20

(f) Graphical representation of data

Bar Graphs : 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 9.4

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 :



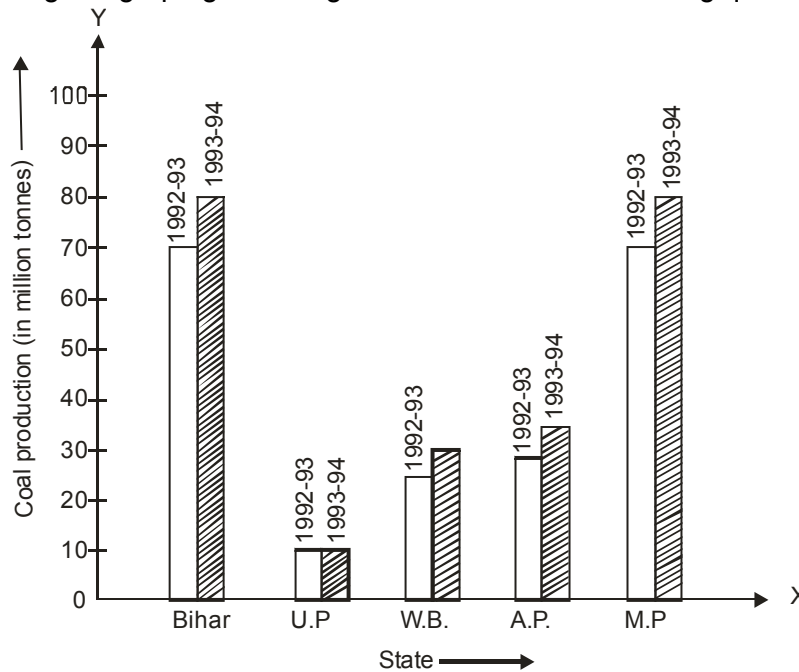
- (i) How many students were born in the month of November ?
 (ii) In which month were the maximum number of students born ?
 (iii) In which month were the minimum number of students born ?

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 9.5

Read the following bar graph given in figure and answer the following questions.



- (i) What information is given by this bar graph ?
 (ii) Which two states have same production in 1993-1994.
 (iii) Name the state having same production in both the years ?
 (iv) Which state has minimum production ?

Sol. (i) The given bar graph gives the information about the production of coal in million tonnes in two consecutive years, namely 1992-1993 and 1993-94 in various states.
 (ii) M.P. and Bihar have same production in 1993-1994.
 (iii) U.P. has the same production in both the years.
 (iv) U.P.

Illustration 9.6

The results of pass percentage of class X and XIIth C.B.S.E. examination for 5 years are given in the following table.

Year	1994-95	1995-96	1996-97	1997-98	1998-99
X	90	95	90	80	98
XII	95	80	85	90	95

Draw bar graphs to represent the data.

Sol. We go through the following steps to construct the bar graphs.

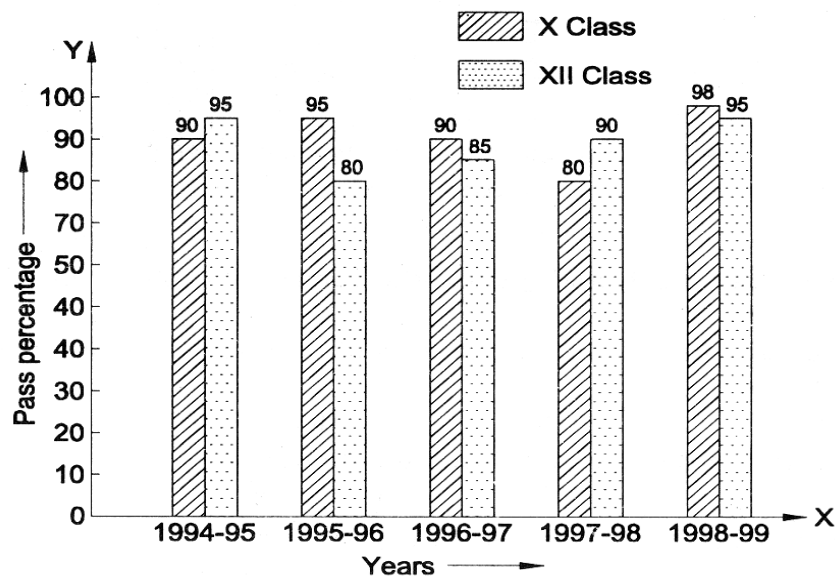
Step-I We draw two lines perpendicular to each other on a graph paper and call them horizontal and vertical axes as shown in Fig.

Step-II Along the horizontal axis, we mark the 'years' and along the vertical axis, we mark the pass percentage.

Step-III We choose a suitable scale to determine the heights of bars. Here, we choose the scale as 1 big division to represent 10.

Step-IV First we draw the bars for Class X results and then bars for Class XII results for different years.

Bars for X and XII class results are shaded separately and the shading is shown in the top right corner of the graph paper.



Ask yourself



- The range of data: 12,15,11,10,16,18,28,38,45
- Define :
 - Raw data
 - Array
- A die is thrown 10 times and following outcomes were recovered:5,3,2,4,2,4,6,4,3,3
Arrange the above data in ascending order and prepare frequency table
- Thirty children were asked about the number of hours they watched T.V. programs in the previous week. The results were found as follows :

1,	6,	2,	3,	5,	12,	5,	8,	4,	8
10,	3,	4,	12,	2,	8,	15,	1,	17,	6
3,	2,	8,	5,	9,	6,	8,	7,	14,	12

 Make a grouped frequency distribution table for this data, taking class width 5 and one of the class intervals as 5-10.

5. Given below a table which shows the yearwise strength of a school. Represent this data by a bar graph.

Year	2001- 02	2002 - 03	2003 - 04	2004 - 05	2005 - 06
No. of students	800	975	1100	1400	1625

Answers

1. 35

9.2 MEASURES OF CENTRAL TENDENCY

The commonly used measure of central tendency are

- (a) Mean (b) Median (c) Mode

(a) 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**.

(i) **Mean of ungrouped data** : If $x_1, x_2, x_3, \dots, x_n$ are the n values (or observations) then

$$\text{A.M. (Arithmetic mean) is } \bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{\sum_{i=1}^n x_i}{n}$$

$$n\bar{x} = \text{Sum of observation} = \sum_{i=1}^n x_i$$

i.e. Product of mean & no. of items gives the sum of observation.

Illustration 9.7

Find the mean of the first five multiple of 3.

Sol. First five multiple of 3 are 3, 6, 9, 12 & 15.

$$\bar{x} = \frac{3+6+9+12+15}{5}$$

$$\bar{x} = \frac{45}{5} = 9.$$

Illustration 9.8

If the mean of 6, 4, 7, P and 10 is 8 find P.

Sol. $\frac{6+4+7+P+10}{5} = 8$

$$\Rightarrow 27 + P = 40$$

$$\Rightarrow P = 40 - 27$$

$$\Rightarrow P = 13.$$

(ii) When the data is given in the form of frequency distribution :

Method to calculate mean when the data is given in the form of frequency distribution. Let each observation is represented by x and frequency by f . Then, to find mean adopt the following steps:

- (a) Multiply each observation (x) by its corresponding frequency (f) and denote it by (f × x).
 (b) Find the sum of all products obtained above and denote it by (∑fx) read as “sigma f into x”.
 (c) Find sum of all the frequencies and denote it by ∑f.
 (d) Divide the sum of all the products by the sum of all the frequencies, i.e., ∑fx by ∑f.

Hence, mean = $\frac{\sum fx}{\sum f}$

NOTE :

∑ Stands for sum.

Illustration 9.9

The following table shows the weights of the students of a class. Find the mean weight.

Weight (in kg)	25	27	28	30	32	33
No. of students	5	4	5	6	3	2

Sol.

Weight (in kg) (x)	Frequency (f)	Product (f × x)
25	5	125
27	4	108
28	5	140
30	6	180
32	3	96
33	2	66
Sum	∑f = 25	∑f × x = 715

∴ Mean = $\frac{\sum fx}{\sum f} = \frac{715}{25}$ or 28.6 kg.

(b) Median :

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

(i) 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 $\left(\frac{n+1}{2}\right)^{\text{th}}$ obs.

(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.

Illustration 9.10

Find the median of the following values : 3, 1, 4, 3, 6, 5, 9, 5, 2

Sol. Arranging the data in ascending order, we have

1, 2, 3, 3, 4, 5, 5, 6, 9

Here the number of observations $n = 9$ (odd)

\therefore Median = Value of $\left(\frac{9+1}{2}\right)^{\text{th}}$ observation

\Rightarrow Median = Value of 5th observation \Rightarrow Median = 4.

Illustration 9.11

Find the median of the observation :

11, 25, 14, 19, 12, 23, 35, 30, 32, 8.

Sol. Arranging the data in ascending order, we have

8, 11, 12, 14, 19, 23, 25, 30, 32, 35

Here, the number of observations $n = 10$.

Since n is even, therefore

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{\text{th}} \text{ observation} + \left(\frac{n}{2} + 1\right)^{\text{th}} \text{ observation}}{2} \Rightarrow \text{Median} = \frac{5^{\text{th}} \text{ observation} + 6^{\text{th}} \text{ observation}}{2}$$

$$\Rightarrow \text{Median} = \frac{19 + 23}{2} \Rightarrow \text{Median} = \frac{42}{2} \Rightarrow \text{Median} = 21.$$

(ii) Uses of Median :

(A) Median is the only average to be used while dealing with qualitative data which cannot be measured quantitatively but can be arranged in ascending or descending order of magnitude.

(B) It is used for determining the typical value in problems concerning wages, distribution of wealth etc.

(c) 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**.

Illustration 9.12

Find the mode of the following array of an individual series of scores : 7, 7, 10, 12, 12, 12, 11, 13, 13, 17.

Number	7	10	11	12	13	17
Frequency	2	1	1	3	2	1

\therefore Mode is 12

(ii) Uses of Mode : Mode is the average to be used to find the ideal size, e.g., in business forecasting, in manufacture of ready-made garments, shoes etc.



Ask yourself _____

- Find the mean of the factors of 10.
- Following table shows the weights of 12 students.

Weight (in kgs)	67	70	72	73	75
Number of student	4	3	2	2	1

Find the mean of the above table.

- Find the mode of the following data :
25, 16, 19, 48, 19, 20, 34, 15, 19, 20, 21, 24, 19, 16, 22, 16, 18, 20, 16, 19.
- Find the median of following data 38, 70, 48, 34, 42, 55, 63, 46, 54, 44.
- The median of the observation 11, 12, 14, 18, $x + 2$, $x + 4$, 30, 32, 35, 41 arranged in ascending order is 24. Find the value of x .

Answers

1. 4.5 2. 70.25 3. 19 4. 47 5. 21



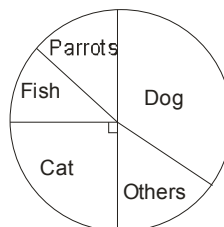
Add your knowledge _____

Students!!!!!!!!!!!! after studying this chapter ... the question which comes to one's mind is whether there is any relation between mean, mode, median or not. Answer is **yes**.

- Empirical Relation between Mode, Median & Mean :**
Mode = 3 Median – 2 Mean.
- Concept of PIE Chart**

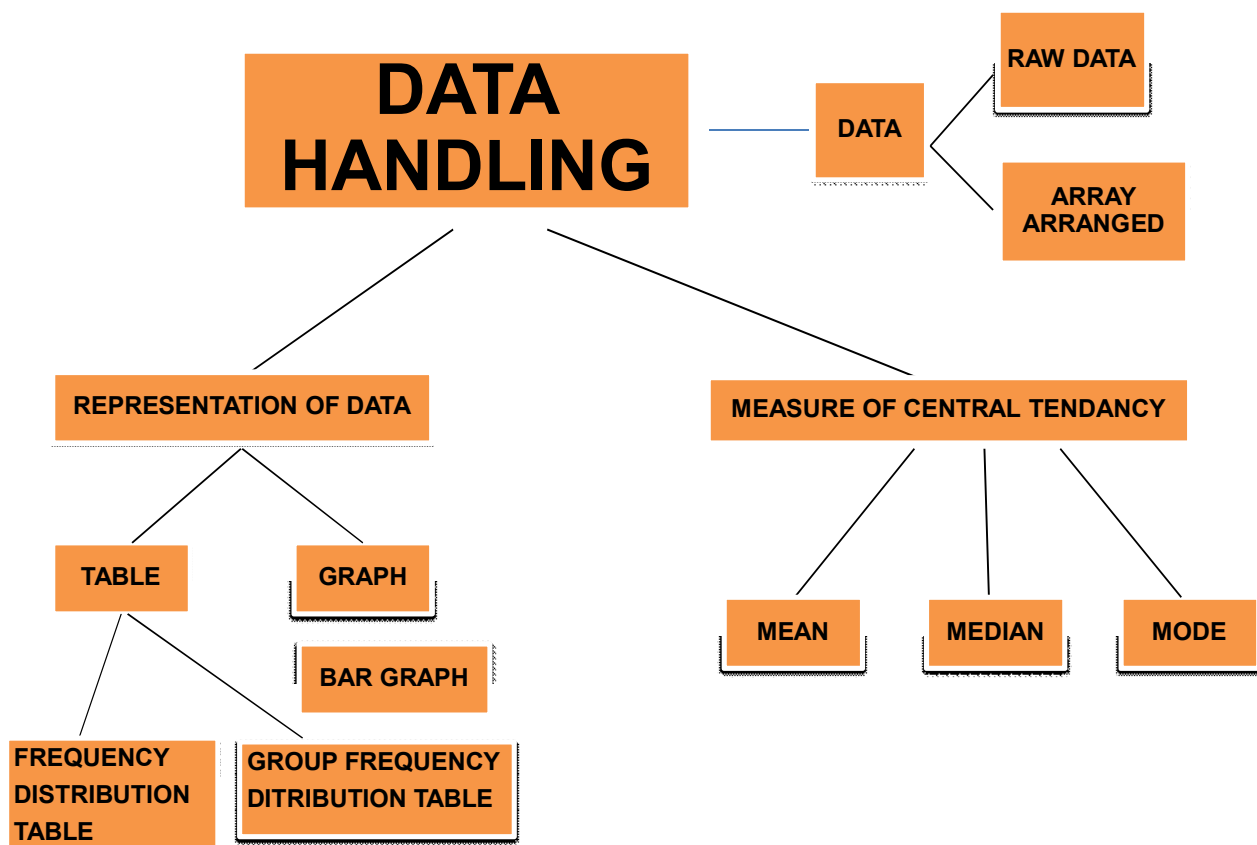
A diagram used to represent statistical data by dividing a circle into sectors is known as pie chart or pie graph.

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.



For example by looking at this pie chart depicting percentage of pets liked by common man., one can easily tell which pet is more popular , or equally important

Concept Map



Summary

1. Statistics may be defined as the science of collection, presentation, analysis and interpretation of numerical data.
2. A collection of numerical figures give some particular type of information is called data.
3. Data which are collected for the first time by statistical investigator or with help of his workers is called **primary data**.
4. Data which are already collected by a person or a society and these may be in published or unpublished sources are known as **secondary data**.
5. 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**
6. The **range** is the difference between the highest and lowest scores of a distribution.
7. The number of times an observation occurs in the given data, is called the **frequency** of the observation.
8. Class Marks = $\frac{\text{Upper Limit} + \text{Lower Limit}}{2}$
9. Class interval = $\frac{\text{Range}}{\text{Number of classes}}$
10. 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**.
11. If $x_1, x_2, x_3, \dots, x_n$ are the n values (or observations) and $f_1, f_2, f_3, \dots, f_n$ are corresponding frequencies, then A.M. (Arithmetic mean) is :

$$\bar{x} = \frac{f_1x_1 + f_2x_2 + \dots + f_nx_n}{f_1 + f_2 + f_3 + \dots + f_n} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i}$$
12. **Median** of a distribution is the value of the variable which divides the distribution into two equal parts.
 - (i) When n , the number of observation is odd, Median is the $\left(\frac{n+1}{2}\right)^{\text{th}}$ observation.
 - (ii) when n is even, median is the average of $\left(\frac{n}{2}\right)^{\text{th}}$ and $\left(\frac{n}{2} + 1\right)^{\text{th}}$ observations.
13. Mode is the value which occurs most.

EXERCISE

01

SECTION -A (FIXED RESPONSE TYPE)

MULTIPLE CHOICE QUESTIONS

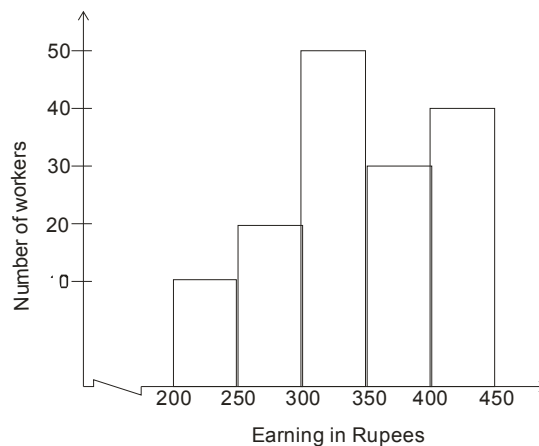
- The difference between the maximum and the minimum value observations in the data is called :
 (A) cumulative frequency (B) class interval
 (C) range (D) frequency

- Some integers are marked on a board. What is the range of these integers.

0	6	15
-11	-17	
-4	20	

- (A) 31 (B) 37 (C) 20 (D) 3
- 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
 - The number of times a particular observation occurs is called its
 (A) data (B) frequency (C) range (D) information
 - Following are the marks of 30 students in a class, then the frequency of students having marks 22 is :
 20, 22, 22, 25, 26, 26, 0, 10, 0, 25, 22, 23, 22, 24, 22, 24, 25, 23, 21, 25, 28, 29, 30, 27, 22, 24, 22, 25, 0, 10.
 (A) 4 (B) 5 (C) 6 (D) 7

Direction (6 to 8) : Each question from 6 to 8 is based on the histogram given in the adjacent figure.



- What is the upper limit of the class-interval 200-250 :
 (A) 200 (B) 250 (C) 225 (D) None of these
- In which class interval of wages there is the least number of workers ?
 (A) 400-450 (B) 350-400 (C) 250-300 (D) 200-250

8. What is the number of worker earning Rs. 300 to 350 ?
 (A) 50 (B) 40 (C) 45 (D) 130
9. Frequency of the class interval 4 – 8 is :

Class	0 – 4	4 – 8	8 – 12	12 – 16	16 – 20
Cumulative Frequency (f)	6	15	23	27	30

- (A) 15 (B) 4 (C) 9 (D) 8
10. In the class intervals 0-20 and 20-40, the number 20 is included in :
 (A) 0-20 (B) 20-40 (C) both the intervals (D) None of these
11. If the mean of 6, 5, 7, p and 10 is 9, find the value of p.
 (A) 21 (B) 17 (C) 15 (D) None of these
12. If the mean of five observations x , $x + 2$, $x + 4$, $x + 6$, $x + 8$, is 11. Find the mean of first three observations.
 (A) 9 (B) 7 (C) 11 (D) None of these
13. Akshay secured 76, 83, 70 and 83 marks in four tests. What is the least number of marks he has to secure in his next test, if he has to have a mean score of 80 marks in five tests ?
 (A) 82 (B) 84 (C) 86 (D) 88
14. If the mean of 7, 14, p, 9 and 16 is 11.5, then the value of p will be :
 (A) 7 (B) 9 (C) 10 (D) 11.5
15. The mean of first five multiples of 4 is :
 (A) 10 (B) 11 (C) 12 (D) 14
16. The mean of 10 observations was found to be 50, later, it was detected, that one observation 94 was misread as 49. Find the correct mean.
 (A) 50.5 (B) 54.5 (C) 52.2 (D) 53.2
17. If the mean of four consecutive even numbers is 15. Then first number will be ?
 (A) 10 (B) 8 (C) 12 (D) 6
18. The mean of six numbers is 15. If 2 is taken away from every number, the new mean would be
 (A) 13 (B) 4 (C) 17 (D) 8
19. The mean of 15, 20, 28, 32, 23, 43, 21, 28, 25 and 'a' is 27. Find the value of 'a'.
 (A) 40 (B) 42 (C) 43 (D) 35
20. Mean of salary of 10 employees is Rs. 5000. If salary of employees are Rs. 3000, Rs. 4000, Rs. 5000, Rs. 6000, Rs. x, Rs. 7000, Rs. 8000, Rs. 3800, Rs. 2200 and Rs. 9000 then value of x is:
 (A) 2000 (B) 3000 (C) 4000 (D) 5000
21. The arithmetic mean of 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 is :
 (A) 5.0 (B) 4.5 (C) 5.5 (D) 4.0
22. Median of the values 37, 31, 42, 43, 46, 25, 39, 45, 32 is :
 (A) 29 (B) 39 (C) 37 (D) None of these

23. If the observations 20, 22, 23, 25, $(x + 1)$, $(x + 3)$, 36, 38, 39 and 41 have median 30, then the value of x is:
 (A) 28 (B) 29 (C) 30 (D) 32
24. If the mean of the no. 6, 4, 3, 8, 10, 11, 10, 10, 5 and 'a' is 7.2 and the median of number 11, 10, b, 8, 6, 10, a, 4, 3, and 10 is 8.5, then the value of b is :
 (A) 8 (B) 9 (C) 10 (D) 7
25. Find the mode of the following data :
 1, 1, 2, 4, 3, 2, 1, 2, 2, 4
 (A) 1 (B) 2 (C) 2.5 (D) None of these
26. The mode of 7, 4, 4, 36, 13, 13, 36, 12, 12, 12, 26, 41, 12, and 8 is :
 (A) 4 (B) 12 (C) 13 (D) 36
27. Mode of following frequency distribution is :

Heights (incm)	152	153	155	156	160	162
No.of students	6	10	12	18	4	3

- (A) 18 cm (B) 156 cm (C) 162 cm (D) 3 cm

FILL IN THE BLANKS

- Data which are collected for the first time by statistical investigator or with help of his workers is called _____
- Arranging the observations of a data in ascending or descending order is _____
- Range of data 120,118,103,115,101,131,128 is _____
- No of times a particular observation occurs is _____
- The upper value of a class interval is _____
- Mean of 20, 40, 35 , 42 and 45 is _____
- The median of the data: 50,48,68,99,88,60,94 is _____
- Mode of the data: 22,23,27,22,25,26,23,22 is _____

TRUE / FALSE

- 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 bars in bar graph are always drawn vertically.
- Mean is also called average.
- The mean of the observations 7, 8, 9 , 11 and 15 is 10.
- Mean of the observation can never be less than each observation.
- Mean, Median, Mode may be the same for some data

MATCH THE COLUMN

1. 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) Mode
 (F) Range
 (G) event

Column -II

- (a) Difference between largest and smallest observation
 (b) Possible outcomes of a trial
 (c) Width of the class interval
 (d) Value of the item that occurs most frequently
 (e) Groups formed with equal width
 (f) No. of times an entry occurs
 (g) Information collected

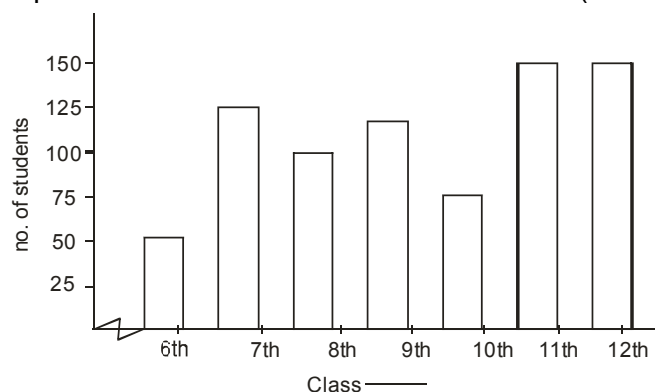
SECTION -B (FREE RESPONSE TYPE)

VERY SHORT ANSWER TYPE

1. What is
 (i) Range (ii) Frequency
2. Given below are the marks (out of 100) obtained by 20 students of a class in mathematics in an annual examination :
 14, 23, 35, 40, 42, 49, 51, 56, 58, 61, 63, 63, 66, 70, 72, 75, 80, 84, 87, 92.
 Find :
 (i) The lowest marks obtained. (ii) The highest marks obtained.
 (iii) The range of the given data.
3. If the arithmetic mean of 5, 7, 9, x is 9, then find the value of x.
4. Find the mean of the factors of 10
5. The weights (in kg) of 15 students of a class are :
 38, 42, 35, 37, 45, 50, 32, 43, 43, 40, 36, 38, 43, 38, 47
 (i) Find the mode and median of this data.
 (ii) Is there more than one mode ?

SHORT ANSWER TYPE

6. Following Bar Graph shows the no. of students in the class. (6th to 12th)



- (i) What is the mean of class 8th to 10th students.
 (ii) What is the Range of the given graph.
 (iii) Which class has least no. of students.
 (iv) Which class has more than 100 no. of students.
7. The relative humidity (in %) of a certain city for a month of 30 days are as follows :
 98.1, 98.6, 99.2, 90.3, 86.5, 95.3, 92.9, 96.3, 94.2, 95.1, 89.2, 92.3, 97.1, 93.5, 92.7, 95.1,
 97.2, 93.3, 95.2, 97.3, 96.2, 92.1, 84.9, 90.2, 95.7, 98.3, 97.3, 96.1, 92.1, 89.
 (i) What is the range of this data ?
 (ii) Construct a grouped frequency distribution table with classes 84 - 86, 86 - 88, etc.
8. The ages in years of 10 teachers in a school are 32, 41, 28, 54, 35, 26, 23, 33, 38, 40.
 (i) What is the age of the oldest teacher and that of the youngest teacher ?
 (ii) What is the range of the ages of the teachers ?
 (iii) What is the mean age of these teachers ?
9. The number of minutes customers wait at the payment counters at two super markets is recorded as under.
Mega super market : 3, 4, 2, 7, 6, 4, 5, 8, 5, 4, 5, 7
Deluxe super market : 6, 6, 8, 7, 8, 4, 5, 3, 6, 2
 Which super market had the least mean waiting time ?
10. Find the mean of 50 observations. It is given that the mean of first 32 of them is 28 and the mean of remaining 18 observations is 30.
11. Find the median for the following data :
 5, 0, 3, 8, 15, 3, 4, 6, 9, 7, 4, 5, 8, 16
12. A family with monthly income of Rs. 20,000 had planned the following expenditure per month under various heads. Draw bar graph for the data given below :

Heads	Expenditure (in Rs. 1000)
Grocery	4
Rent	5
Education of children	5
Medicine	2
Fuel	2
Entertainment	1
Miscellaneous	1

LONG ANSWER TYPE

13. The marks obtained by 40 students of class VII 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).

14. Given below is a table which shows the year wise strength of a school. Represent this data by a bar graph.

Year	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
No. of students	800	975	1100	1400	1625	1800

15. The mean of 7 numbers is 25. If one more number is included, mean of the new set of numbers becomes 27. Find the included number.
16. Calculate the mean for the following data :

Heights (in cm)	140	142	143	145	148	150
No. of boys	2	6	10	15	4	3

17. Mean monthly temperature of a town for a year was 30°C . If the mean temperature from January to July was 33°C and that of July to December was 28°C , find the temperature of July.

EXERCISE 02

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

1. The mean of marks scored by 100 students was found to be 40. Later on it was discovered that a score of 53 was misread as 83. Find the correct mean.
 (A) 40.3 (B) 40 (C) 39.7 (D) 39.3

2. Find the missing value of P for the following distribution whose mean is 12.58

x	5	8	10	12	P	20	25
y	2	5	8	22	7	4	2

- (A) 524 (B) 629 (C) 18 (D) 15

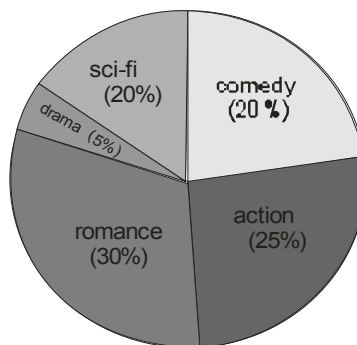
3. If the first five elements of a set replaced by $(x_i + 5)$, where $i = 1, 2, 3, \dots, 5$ and the next five elements are replaced by $(x_j - 5)$, where $j = 6, \dots, 10$ then the mean will change by
 (A) 25 (B) 10 (C) 5 (D) 0
4. Devang earned scores of 97, 73 and 88 respectively in her three examinations. If he scored 80 in the fourth examination, then his average score will be
 (A) 81 (B) 84.5 (C) 100 (D) 71
5. Which of the following has the same mean, median and mode?
 (A) 6, 2, 5, 4, 3, 4, 1 (B) 4, 2, 2, 1, 3, 2, 3 (C) 2, 3, 7, 3, 8, 3, 2, (D) 4, 3, 4, 3, 4, 6, 4

6. The average of n numbers $x_1, x_2, x_3, \dots, x_n$ is A . If x_1 is replaced by $(x + a)x_1$, x_2 is replaced by $(x + a)x_2$, ..., x_n is replaced by $(x + a)x_n$; then the new average is :
- (A) $\frac{(n+1)A + x_n}{n}$ (B) $\frac{(x-1)A + nx_n}{n}$ (C) $\frac{nA + 1(n+1)x_n}{n}$ (D) $(x + a)A$
7. The average age of group of eight members is the same as it was 3 years ago, when a young member is substituted for an old member. The incoming member is younger to the outgoing member by :
- (A) 11 years (B) 24 years (C) 28 years (D) 16 years
8. 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
9. A student got marks in 5 subjects in a monthly test is given below :
2, 3, 4, 5, 6, in these obtained marks, 4 is the
- (A) Mean and median (B) Median but no mean
(C) Mean but no median (D) Mode
10. The median of 21 observations is 18. If two observations 15 and 24 are included to the observation, then the median of new series is :
- (A) 15 (B) 18 (C) 24 (D) 16
11. The mean of a set of observation is a . If each observation is multiplied by b and each product is decreased by c , then the mean of new set of observation is.
- (A) $\frac{a}{b} + c$ (B) $ab - c$ (C) $\frac{a}{b} - c$ (D) $ab + c$
12. Let L be the lower class boundary of a class in a frequency distribution and m be the mid point of the class. Which one of the following is the upper class boundary of the class ?
- (A) $m + \frac{m+L}{2}$ (B) $L + \frac{m+L}{2}$ (C) $2m - L$ (D) $m - 2L$

SECTION -B (TECHIE STUFF)

13. The median and mode of a frequency distribution are 525 and 500 then find mean of same frequency distribution.
- (A) 537.5 (B) 527.5 (C) 517.5 (D) 507.5

Direction:(For Q.no. 14 to 16)



Total 200 people went to movie theater and above is the percentage of people visited for different categories

14. How many people opted for comedy
 (A) 20 (B) 40 (C) 60 (D) 80
15. How many people opted for action
 (A) 20 (B) 25 (C) 40 (D) 50
16. Determine the central angle represent by people opted for sci-fi.
 (A) 36° (B) 60° (C) 72° (D) 108°

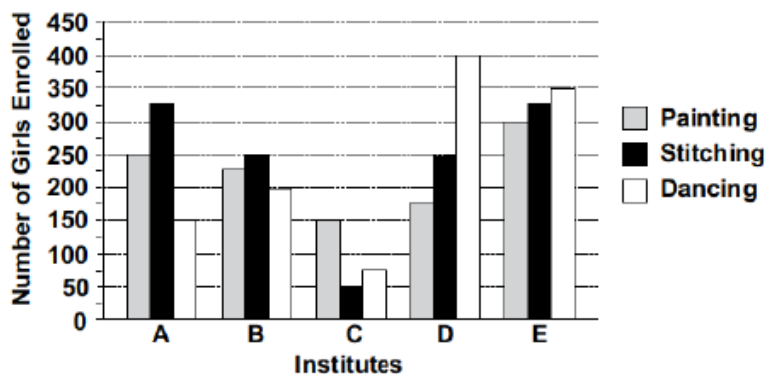
EXERCISE 03

(PREVIOUS YEAR EXAMINATION QUESTIONS)

1. The mode of a set of observations is the value which : **[NSTSE 2009]**
 (A) occurs most frequently (B) is central
 (C) is between maximum and minimum (D) none of these
2. The average of the even numbers from 1 to 30 is : **[NSTSE 2010]**
 (A) 15 (B) 16 (C) 17 (D) 19
3. Leela looked at several different flower arrangements before purchasing one. The arrangements varied in price from Rs.15.62 to Rs.37.50. Which measure of data can be used to describe the variation in price of the different arrangements? **[IMO-2010]**
 (A) Mean (B) Mode (C) Range (D) Median

Direction (Q.4 - 5): Study the graph carefully to answer the following questions.

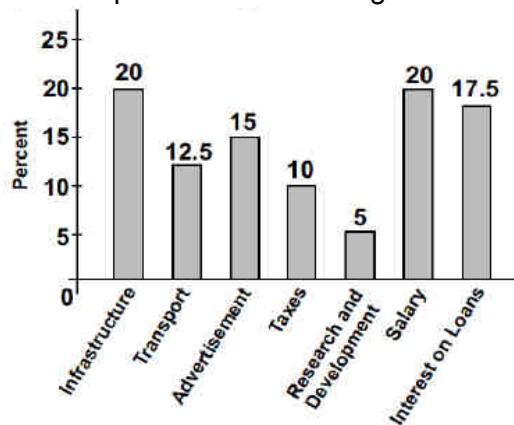
Number of Girls Enrolled in Different Hobby Classes in Various Institutes in a Year



4. What is the difference between the total number of girls enrolled in stitching and dancing from all institutes together? **[IMO-2010]**
 (A) 50 (B) 25 (C) 75 (D) 85
5. What is the total number of girls enrolled in painting from all the institutes together? **[IMO-2010]**
 (A) 1150 (B) 1200 (C) 1275 (D) 1100
6. The average of a list of 10 numbers is "0". If 72 and - 12 are added to the list , the new average will be : **[IMO-2010]**
 (A) 0 (B) 5 (C) 6 (D) 60

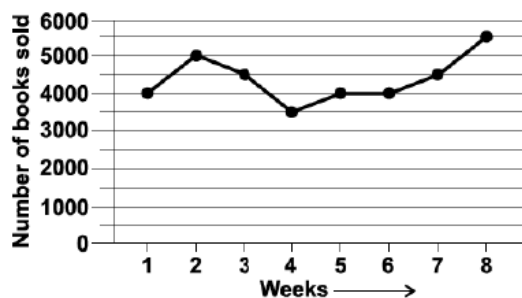
7. The mean of the data a_1, a_2, \dots, a_n is p then the mean of the data $a_1 + p, a_2 + p, \dots, a_n + p$ is : **[NSTSE 2011]**
 (A) p (B) p^2 (C) $2p$ (D) $p(n + 1)$
8. The data 29,32,48,50,2x,2x+4,72,79,84,95 is in ascending order and has median 64. Find the value of 'x' is : **[NSTSE 2011]**
 (A) 62 (B) 31 (C) 124 (D) 68
9. If your classroom has 38 pupils and 1 was absent on Monday, 2 on Tuesday, 4 on Wednesday, 0 on Thursday and 3 on Friday. What was the average daily attendance ? **[NSTSE 2011]**
 (A) 32 (B) 28 (C) 36 (D) 30
10. Akshay secured 76 , 83 , 70 , and 83 marks in four tests . What is the least number of marks he has to secure in his next test , if he has to have a mean score of 80 marks in five tests? **[NSTSE 2012]**
 (A) 82 (B) 84 (C) 86 (D) 88

Direction (11 & 12) : The given bar graph shows the percentage distribution of total expenditures of a company under various expenses heads during 2011.



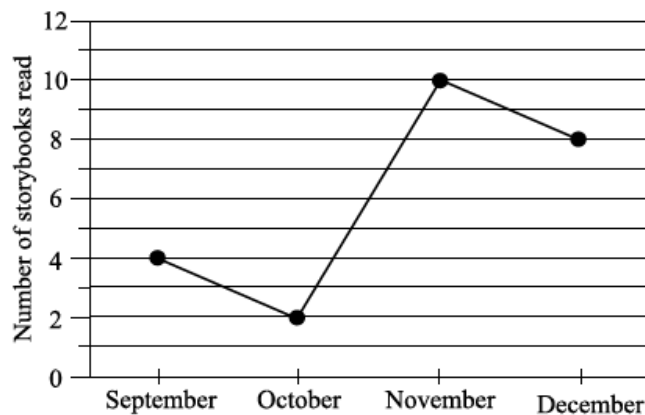
11. The total amount of expenditures of the company is how many times the expenditure on research and development? **[IMO-2012]**
 (A) 27 (B) 20 (C) 18 (D) 8
12. If the interest on loans amounted to Rs.2.45 crores, then the total amount of expenditure on advertisement, taxes & research and development is _____. **[IMO-2012]**
 (A) Rs.7 crores (B) Rs.5.4 crores (C) Rs.4.2 crores (D) Rs.3 crores

Direction (13-14): The given graph shows the number of books sold by Megha's book store in the first 8 weeks of the year. **[IMO-2012]**



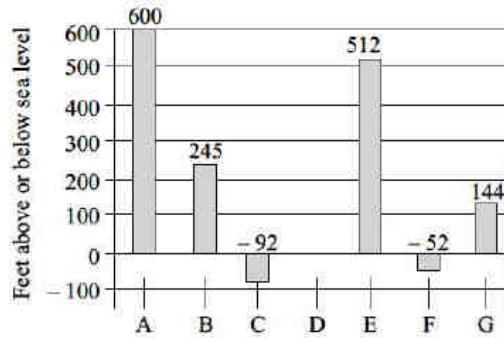
13. What was the average number of books sold in 8 weeks?
 (A) 4875 (B) 4375 (C) 5892 (D) 2945
14. What is the range of the given data?
 (A) 2000 (B) 1000 (C) 1500 (D) 2500
15. Two figures are congruent, if they have the same **[IMO-2012]**
 (A) Shape (B) Size (C) Both (A) and (B) (D) None of these
16. The mean of five numbers is 27 . If one of the numbers is excluded , the mean gets reduced by 2 . What is the excluded number ? **[NSTSE 2013]**
 (A) 35 (B) 27 (C) 25 (D) 40
17. A teacher has list of marks as given in the box.
13,17,5,10,14,9,12,16
 Which two marks can be removed without changing the mean ? **[NSTSE 2013]**
 (A) 12 and 17 (B) 5 and 17 (C) 10 and 12 (D) 10 and 14
18. Find the mean and median respectively in this group of test results. **[IMO-2013]**
 60, 43, 47, 61, 35, 53, 49, 32, 59
 (A) 49, 47 (B) 46.87, 49 (C) 48.69, 43 (D) 48.77, 49
19. The average of 4 numbers is 25. The average of the first 3 numbers is 22. What is the value of the 4th number? **[IMO-2013]**
 (A) 23 (B) 34 (C) 44 (D) 47

Direction (20-21) : The line graph shows the number of story books Armaan read in the last 4 months of a year



20. The ratio of story books he read in September to November is **[IMO-2013]**
 (A) 1 : 4 (B) 4 : 1 (C) 2 : 5 (D) 5 : 2
21. The number of story books that he read in October as a fraction of the total number of story books read is **[IMO-2013]**
 (A) $\frac{1}{12}$ (B) $\frac{3}{4}$ (C) $\frac{1}{2}$ (D) $\frac{5}{12}$

22. The given bar graph shows heights of selected lakes. Find the difference in elevation for Lake E and Lake C. [IMO-2013]

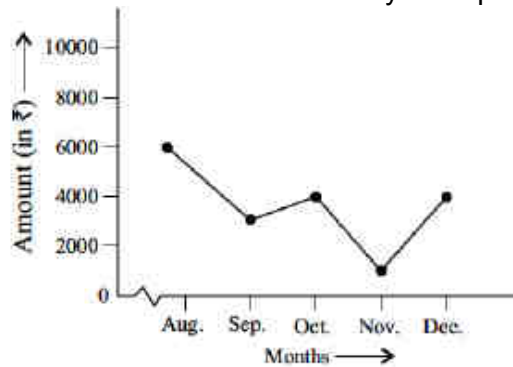


- (A) 420 (B) 604 (C) 504 (D) 692
23. The table gives the weight (in kg) of 50 boys of class 7 ? [NSTSE 2014]

weight (in kg)	48	49	50	51	52
Number of boys	6	8	9	14	13

Find their mean weight

- (A) 52 kg (B) 48 kg (C) 50.4 kg (D) 49 kg
24. Priya earned Rs. 25000 in a month. The given graph shows the amount of money saved by Priya in five months. What was the amount of money she spend in five months? [IMO-2014]



- (A) 970000 (B) 100000 (C) 107000 (D) 117000
25. The mean of three numbers is 40. All the three numbers are different natural numbers. If lowest is 19, what could be highest possible number of remaining two numbers? [IMO-2014]

- (A) 81 (B) 40 (C) 100 (D) 71

26. The number of toffees in 30 gift packs are given as follows : [IMO-2014]

5,6,4,5,3,4,4,2,5,4,1,2,11,9,2,5,4,8,7,6,5,1,2,5,7,8,1,9,7,8

Find the average number of toffees in gift packs.

- (A) 4 (B) 5 (C) 6 (D) 7

27. The choices of the fruits of 42 students in a class are as follows: [IMO-2014]

A, O, B, M, A, G, B, G, A, G.
B, M, A, G, M, A, B, G, M, B.
A, O, M, O, G, B, O, M, G, A.
A, B, M, O, M, G, B, A, M, O, M, O.

where A, B, G, M and O stands for Apple, Banana, Grapes, Mango and Orange respectively.

Which two fruits are liked by an equal number of students?

- (A) A and M (B) M and B (C) B and O (D) B and G

ANSWER KEY >>

EXERCISE >> 01

SECTION -A (FIXED RESPONSE TYPE)

MULTIPLE CHOICE QUESTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	C	B	B	B	D	B	D	A	C	B	B	A	D	D	C
Ques.	16	17	18	19	20	21	22	23	24	25	26	27			
Ans.	B	C	A	D	A	C	B	A	B	B	B	B			

FILL IN THE BLANKS

1. primary data 2. array 3. 30 4. frequency
5. upper limit 6. 36.4 7. 68 8. 22

TRUE / FALSE

1. False 2. True 3. False 4. True 5. True
6. True 7. True

MATCH THE COLUMN

1. (A) – g, (B) – f, (C) – c, (D) – e, (E) – d, (F) – a, (G) – b

SECTION -B (FREE RESPONSE TYPE)

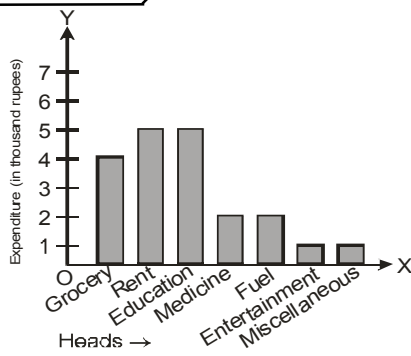
VERY SHORT ANSWER TYPE

2. (i) 14 (ii) 92 (iii) 78 3. 15 4. 4.5
5. (i) mode 38 and 43, median 40 (ii) Yes

SHORT ANSWER TYPE

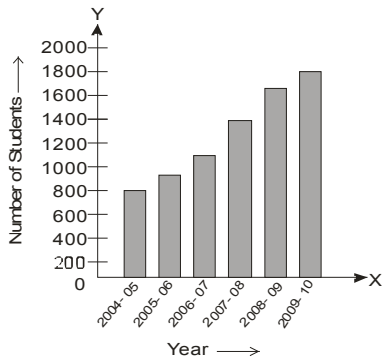
6. (i) 100 (ii) 100 (iii) 6th class (iv) 7th, 9th, 11th, 12th
7. (i) 14.3
8. (i) 23 years. (ii) 31 years (iii) 35 years
9. mega super market 10. 28.72 11. 5.5

12.



LONG ANSWER TYPE

14.



15. 41 16. 144.475 cm 17. 39°C

EXERCISE

02

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

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

SECTION -B (TECHIE STUFF)

Ques.	13	14	15	16
Ans.	A	B	D	C

EXERCISE

03

(PREVIOUS YEAR EXAMINATION QUESTIONS)

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	A	B	C	B	D	B	C	B	C	D	B	C	B	A	C
Ques.	16	17	18	19	20	21	22	23	24	25	26	27			
Ans.	A	D	D	B	C	A	B	C	C	A	B	D			