KD EDUCATION ACADEMY [9582701166] Street no. 21 A-1 block Bengali colony sant nagar burari delhi -110084

Time : 6 hour

STD 9 Maths
kd sir 90+ questions ch- 12 Statistics

Total Marks : 160

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*   Choose the right answer from the given options. [1 Marks Each]   **[48]**

1.   The mean of 100 items was found to be 64. Later on it was discovered that two items were misread as 26 and 9 instead of 36 and 90 respectively. The correct mean is:

   (A) 64.91   (B) 65.31   (C) 64.61   (D) 64.86

   Ans. :
   a.   64.91
   Solution:
   Mean of 100 items = 64
   Sum of 100 items = 64 × 100 = 6400
   Correct sum = (6400 + 36 + 90 - 26 - 9) = 6491
   Correct mean $= \frac{6491}{100} = 64.91$

2.   The mean of six numbers is 23. If one of the numbers is excluded, the mean of the remaining numbers becomes 20. The excluded number is:

   (A) 36   (B) 37   (C) 39   (D) 38

   Ans. :
   d.   38
   Solution:
   The mean of the six numbers is 23.
   So the sum of six numbers is 23 × 6 = 138
   After excluding one number, the mean of the remaining numbers is 20.
   So the sum of five numbers is 20 × 5 = 100
   The difference between them is
   138 - 100 = 38

3.   If the arithmetic mean of 7, 5, 13, x and 9 is 10, then the value of x is:

   (A) 12   (B) 10   (C) 14   (D) 16

   Ans. :
   d.   16
   Solution:
   The given data is 7, 5, 13, x and 9. They are 5 in numbers.
   The mean is $\frac{7+5+13+x+9}{5} = \frac{34+x}{5}$
   But, it is given that the mean is 10. Hence, we have
   $\frac{34+x}{5} = 10$
   ⇒ 34 + x = 50
   ⇒ x = 50 - 34

$\Rightarrow x = 16$

4. In the following distribution:

Wages(in Rs)	No of workers
More than 140	12
More than 130	27
More than 120	60
More than 110	105
More than 100	124
More than 90	141
More than 80	150

The number of workers having wage range (in Rs.) 110-120 is:

(A) 45   (B) 50   (C) 55   (D) 40

Ans. :
   a. 45

   Solution:

Wages(in Rs)	No of workers
140–150	12
130–140	15
120–130	33
110–120	45
100–90	19
90–100	17
80–90	9

Therefore, the number of workers having a wage range (in Rs.) 110-120 is 45

5. The empirical relation between mean, mode and median is:

(A) Mode = 3 Median - 2 Mean.   (B) Mode = 2 Median - 3 Mean.   (C) Median = 3 Mode - 2 Mean.   (D) Mean = 3 Median - 2 Mode.

Ans. :
   a. Mode = 3 Median - 2 Mean.

   Solution:

   The empirical Relation between mean, median and mode is:

   Mode = 3 Median - 2 mean.

6. The mean of n observations is $\overline{X}$. If each observation is multiplied by k, the mean of new observations is:

(A) $k\overline{X}$ (B) $\frac{\overline{X}}{k}$ (C) $\overline{X} + k$ (D) $\overline{X} - k$

Ans. :
   a. $k\overline{X}$

   Solution:

   $\text{Mean} = \overline{X} = \frac{\text{Sum of all observations}}{\text{Total number of observations}}$

   $= \frac{\text{Sum of all observations}}{n}$

   if each observation is multiplied by k, then

$$\text{New Mean, } \overline{X'} = \frac{(\text{Sum of all observations})k}{n}$$

$$\Rightarrow \overline{X'} = k\overline{X}$$

7. Write the correct answer in the following:

   To draw a histogram to represent the following frequency distribution:

Class interval	5-10	10-15	15-25	25-45	45-75
Frequency	6	12	10	8	15

   The adjusted frequency for the class 25-45 is:

   (A) 6   (B) 5   (C) 3   (D) 2

   Ans. :

   d.   2

   Solution:

   The adjusted frequency for the class 25 - 45 is

   $$= \frac{\text{Frequency of the class}}{\text{Class width}} \times \text{Minimum width} = \frac{8}{20} \times 5 = 2$$

8. The median of the data 78, 56, 22, 34, 45, 54, 39, 68, 54, 84 is:

   (A) 54   (B) 56   (C) 45   (D) 49.5

   Ans. :

   b.   56

   Solution:

   First, we arrange the given observations in ascending order as follows

   22, 34, 39, 45, 54, 54, 56, 68, 78 and 84

   Here, total number of observation, n = 10

   Since, n is even, so we use the formula for median,

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

   $$= \frac{\left(\frac{10}{2}\right)\text{th observation} + \left(\frac{10}{2}+1\right)\text{th observation}}{2} \text{ [put n = 10]}$$

   $$= \frac{5\text{th observation} + 6\text{th obsevation}}{2} = \frac{54+54}{2} = \frac{108}{2} = 54$$

   Hence, the median of given data is 54.

9. $\text{Mode} + \frac{2}{3}(\text{Mean - Mode}) =$

   (A) Mode   (B) None of these   (C) Mean   (D) Median

   Ans. :

   d.   Median

   Solution:

   Since, 3 Median = Mode + 2 Mean

   $$\Rightarrow \text{Median} = \frac{\text{Mode}}{3} + \frac{2}{3}\text{Mean}$$

   $$= \frac{\text{Mode}}{3} + \frac{2}{3}\text{Mean} - \frac{2}{3}\text{Mode} + \frac{2}{3}\text{Mode}$$

   $$\text{Median} = \text{Mode} + \frac{2}{3}(\text{Mean - Mode})$$

10. The mean of 50 observations is 39. If one of the observations which was 23 was replaced by 43, the resulting mean will be:

(A) 38.4   (B) 39   (C) 40.3   (D) 39.4

Ans. :

    d.   39.4

    Solution:

    The mean of 50 observations is 39.

    So sum of these 50 observations is 50 × 39 = 1950

    After replacing the observation value 23 by 43,

    Sum becomes 1970

    So the mean is $\frac{1970}{50} = 39.4$

11. In a histogram, each class rectangle is constructed with base as:

    (A) Size of the class   (B) Frequency   (C) Class interval   (D) Range

    Ans. :

        c.   Class interval

        Solution:

        Class interval is the difference between the upper limit and lower limit of a class, also called as class width.

        Hence it forms the base of the rectangle in histogram.

12. There are 50 numbers. Each number is subtracted from 53 and the difference between the mean of the numbers so obtained is found to be -3.5. The mean of the given number is:

    (A) 49.5   (B) 53.5   (C) 56.5   (D) 46.5

    Ans. :

        c.   56.5

        Solution:

        Let the mean of the initial sequence is x.

        Given that, after subtracting 53 from each number, the difference between the means is 3.5

        So, x - 53 = 3.5

        Mean of the number is x = 53 + 3.5 = 56.5

13. The mean weight ofa six boys in a group is 48kg. The individual weights of five of them are 51kg, 45kg, 49kg, 46kg and 44kg. The weight of the 6th boy is:

    (A) 52kg.   (B) 52.8kg.   (C) 53kg.   (D) 47kg.

    Ans. :

        b.   53kg.

        Solution:

        Let the weight of the 6th boy be x kg.

$$\frac{51+45+49+46+44+x}{6} = 48$$

$$\Rightarrow 51 + 45 + 49 + 46 + 44 + x = 48 \times 6$$

$$\Rightarrow 235 + x = 288$$

$$\Rightarrow x = 53kg$$

        So, the weight of the 6th boy is 53kg.

14. If the mean of five observations x, x + 4, x + 6 and x + 8 is 11 then the value of x is:

(A) 5   (B) 6   (C) 7   (D) 8

Ans. :

     c.   7

Solution:

Mean of 5 observations = 11

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Total number of observation}}$$
$$\Rightarrow 11 = \frac{x+x+2+x+4+x+6+x+8}{5}$$
$$\Rightarrow 11 = \frac{5x+20}{5}$$
$$\Rightarrow 55 = 5x + 20$$
$$\Rightarrow 5x = 35$$
$$\Rightarrow x = 7$$

15. The mean of 30 observations is 12. If 25 is subtracted from the sum of observations, then remaining sum is:

(A) 385   (B) 335   (C) 365   (D) 375

Ans. :

     b.   335

Solution:

Let sum of all the 30 observations be x.

The mean is equal to the sum of all the values in the data set divided by the number of values in the data set.

$$\frac{x}{30} = 12$$
$$x = 360$$
$$360 - 25 = 335$$

16. If the mode of the data is 45 and the median is 33, then the mean is:

(A) 33   (B) 27   (C) None of these   (D) 30

Ans. :

     b.   27

Solution:

Since, 3 Median = 2 Mean + Mode

∴ 3 × 33 = 2 Mean + 45

⇒ 2 Mean = 99 - 45

⇒ 2 Mean = 54

⇒ Mean = 27

17. In a grouped frequency distribution, the class intervals are 1-20, 21-40, 41-60,.... then the class width is:

(A) 19   (B) 20   (C) 30   (D) 10

Ans. :

     b.   20

Solution:

The class width is the difference between the upper- or lower-class limits of consecutive classes.

In this case, class width equals to the difference between the lower limits of the first two classes.

Let, W be the class width

W = 21 - 1 = 20

So class width is 20

18. For which set of data does the median equal the mode?

(A) 3, 3, 4   (B) 3, 3, 4, 5   (C) 3, 4, 5, 6, 6   (D) 3, 3, 4, 5, 6

Ans. :

   a.   3, 3, 4

Solution:

The median is the middle score for a set of data that has been arranged in ascending or descending order of magnitude.

Mode in a list of numbers refers to the integers that occur most number of times.

For list 3, 3, 4

Both median and mode are 3.

19. A grouped frequency distribution table with classes of equal sizes using 63-72 (72 included) as one of the class is constructed for the following data 30, 32, 45, 54, 74, 78, 108, 112, 66, 76, 88, 40, 14, 20, 15, 35, 44, 66, 75, 84, 95, 96, 102, 110, 88, 74, 112, 14, 34, 44. How many classes can we have?

(A) 12   (B) 11   (C) 10   (D) 9

Ans. :

   c.   10

Solution:

The given frequency varies from 14 to 112.

So the class intervals are:

13-22, 23-32, 33-42, 43-52, 53-62, 63-72, 73-82, 83-92, 93-102, 103-112.

Number of class interval = 10.

20. The mean of the marks scored by 50 students was found to be 39. Later on it was discovered that a score of 43 was misread as 23. The correct mean is:

(A) 39.4   (B) 39.8   (C) 39.2   (D) 38.6
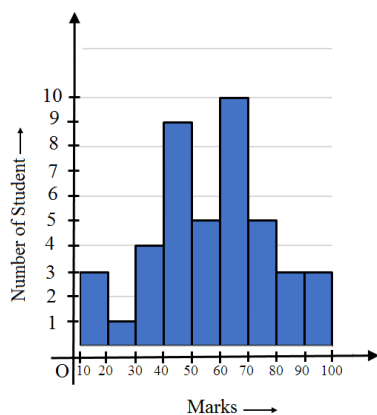
Ans. :

   a.   39.4

Solution:

Mean of the marks scored by 50 students = 39

Sum of the marks scored by 50 students = (39 × 50) = 1950

Correct sum = (1950 + 43 - 23) = 1970

∴ Mean = 19750 = 39.4

21. In the given graph, the number of students who scored 60 or more marks is:

(A) 19   (B) 20   (C) 21   (D) 22

Ans. :

c.   21

Solution:

Add the values corresponding to the height of the bar from 60 to 100

10 + 5 + 3 + 3 = 21

22. $\text{Mode} + \frac{3}{2}(\text{Median - Mode}) =$

(A) Mode   (B) Median   (C) None of these   (D) Mean

Ans. :

d.   Mean

Solution:

3 Median = 2 Mean + Mode

$\Rightarrow$ 3 Median – Mode = 2 Mean

$\Rightarrow \text{Mean} = \frac{3}{2}\text{Median} - \frac{\text{Mode}}{2}$

$\Rightarrow \text{Mean} + \frac{3}{2}\text{Median} - \frac{\text{Mode}}{2} - \text{Mode} = \text{Mean}$

$\Rightarrow \text{Mean} + \frac{3}{2}(\text{Median - Mode}) = \text{Mean}$

23. Median of a data is given by:

(A) $l + \left(\frac{\frac{n}{2}-cf}{f}\right) \times h$ (B) $l + \left(\frac{\frac{n}{2}-f}{cf}\right) \times h$ (C) $l - \left(\frac{\frac{n}{2}-cf}{f}\right) \times h$ (D) $l + \left(\frac{\frac{n}{2}-cf}{f}\right) \div h$

Ans. :

a. $l + \left(\frac{\frac{n}{2}-cf}{f}\right) \times h$

Solution:

Where, l = lower limit of the median class

F = frequency of the median class

CF = cumulative frequency of the class preceding the median class

N = number of observations

H = size of the class interval (assuming all class sizes to be equal)

24. A student collects information about the number of school going children in a locality consisting of a hundred households. The data collected by him is:

(A) Arrayed data   (B) Grouped data   (C) Primary data   (D) Secondary data

Ans. :

c. Primary data

Solution:

Data obtained through the information collected by the investigator herself or himself with defininte objective in his/ her mind is called as primary data.

25. The median of the data arranged in ascending order 8, 9, 12, 18, (x + 2), (x + 4), 30, 31, 34, 39, is 24. The value of x is:

(A) 22   (B) 21   (C) 20   (D) 24

Ans. :

b. 21

Solution:

The data is given to be in an ascending order,

Here, n = 10, which is even

$\therefore$ Median = mean of $\left(\frac{10}{2}\right)^{th}$ and $\left(\frac{10}{2}+1\right)^{th}$ term

= mean of 5th and 6th terms

$= \frac{1}{2}\Big[(x+2)+(x+4)\Big]$

$= \frac{1}{2}\big[2x+6\big]$

But median = 24

$\Rightarrow \frac{1}{2}\big[2x+6\big] = 24$

$\Rightarrow 2x+6 = 48$

$\Rightarrow 2x = 42$

$\Rightarrow x = 21$

26. The median of the following data: 0, 2, 2, 2, -3, 5, -1, 5, 5, -3, 6, 6, 5, 6 is:

(A) 0   (B) 2   (C) 3.5   (D) -1.5

Ans. :

c. 3.5

Solution:

The given data is 0, 2, 2, 2, -3, 5, -1, 5, 5, -3, 6, 6, 5 and 6.

Arranging the given data in ascending order, we have

-3, -3, -1, 0, 2, 2, 2, 5, 5, 5, 5, 6, 6, 6

Here, the number of observation n = 14, which is an even number.

Hence, the median is

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

$$= \frac{\left(\frac{14}{2}\right)^{th} \text{observation} + \left(\frac{14}{2}+1\right)^{th} \text{observation}}{2}$$

$$= \frac{7^{th} \text{observation} + 8^{th} \text{observation}}{2}$$

$$= \frac{2+5}{2}$$

$$= \frac{7}{2}$$
$$= 3.5$$

27. Vihaan has marks of 92, 85, and 78 in three mathematics tests. In order to have an average of exactly 87 for the four math tests, he should obtain:

(A) 90 marks   (B) 93 marks   (C) 92 marks   (D) 91 marks

Ans. :

b. 93 marks

Solution:

Let, Vihaan obtains x marks in the fourth test.
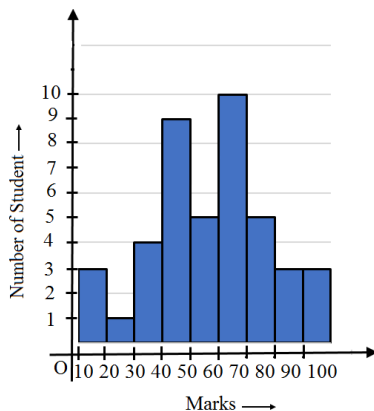
So,

$$\frac{92+85+78+x}{4} = 87$$

$$\frac{255+x}{4} = 87$$

255 + x = 348

x = 348 - 255

x = 93 marks

28. In the given graph, the number of students who scored 60 or more marks is:

(A) 22   (B) 20   (C) 21   (D) 19

Ans. :

c. 21

Solution:

Add the values corresponding to the height of the bar from 60 to 100

10 + 5 + 3 + 3 = 21

29. The median of the numbers 84, 78, 54, 56, 68, 22, 34, 45, 39, 54 is:

(A) 45   (B) 49.5   (C) 54   (D) 56

Ans. :

c. 54

Solution:

Arranging the points in an ascending order,

We have:

22, 34, 39, 45, 54, 56, 68, 78, 84

Here, n = 10, Which is even

$\therefore$ median = mean of $\left(\frac{10}{2}\right)^{\text{th}}$ and $\left(\frac{10}{2}+1\right)^{\text{th}}$ terms

= mean of $\left(\frac{10}{2}\right)^{\text{th}}$ and $\left(\frac{12}{2}\right)^{\text{th}}$ term

= mean of 5th and 6th terms

$= \frac{1}{2}(54 + 54)$

$\frac{1}{2} \times 108$

$= 54$

30. The mean of 100 observations is 50. If one of the observations which was 50 is replaced by 150, the resulting mean will be:

(A) 52   (B) 50.5   (C) 51.5   (D) 51

Ans. :

    d.   51

Solution:

Mean of 100 observation = 50

$\therefore$ Total of 100 observation = 100 × 50 = 5000

If one of the observation 50 is replaced by 150 than total of new observation is = 5000 - 50 + 150 = 5100

Hence the mean of new 100 observation $= \frac{5100}{100} = 51$

31. If the mean of five observations x, x + 2, x + 4, x + 6 and x + 8 is 11 then the value of x is:

(A) 6   (B) 8   (C) 7   (D) 5

Ans. :

    c.   7

Solution:

Mean of 5 observations = 11

We know:

$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Total number of observations}}$

$\Rightarrow 11 = \frac{x+x+2+x+4+x+6+x+8}{5}$

$\Rightarrow 11 = \frac{5x+20}{5}$

$\Rightarrow 5x + 20 = 55$

$\Rightarrow 5x = 35$

$\Rightarrow x = 7$

32. Class mark of a particular class is 9.5 and the class size is 6, then the class interval is:

(A) 6.5 - 12.5   (B) 15.5 - 27.5   (C) 3.5 - 15.5   (D) 12.5 - 18.5

Ans. :

    a.   6.5 - 12.5

Solution:

$\text{Class mark} = \frac{\text{upper limit} + \text{lower limit}}{2}$

2 × 9.5 = upper limit + lower limit

19 = upper limit + lower limit

Class size = upper limit - lower limit

6 = upper limit - lower limit

Solving above two equations we get,

2 × upper limit = 25

upper limit = 12.5

Hence, lower lower limit = 12.5 - 6 = 6.5

So, the class interval is 6.5 - 12.5.

33. Out of sixteen observations arranged in an ascending order, the 8th and 9th observations are 25 and 27. Then, the median is:

(A) 26.5   (B) 25   (C) 26   (D) 27

Ans. :

    c.   26

Solution:

The median is the middle score for a set of data that has been arranged in ascending or descending order of magnitude.

If the number of observation is even (as in this example), then the median is the average of two middle numbers

Hence, the average of 25 and 27 is $\frac{25+27}{2} = 26$

So the median is 26.

34. If the mean of x, x + 3, x + 5, x + 7, x + 10 is 9, the mean of the last three observation is:

(A) $10\frac{1}{3}$ (B) $10\frac{2}{3}$ (C) $11\frac{1}{3}$ (D) $11\frac{2}{3}$

Ans. :

    c. $11\frac{1}{3}$

Solution:

Mean of 5 observations = 9

$$\text{Mean} = \frac{\text{Sum of all observations}}{\text{Total number of observation}}$$
$$\Rightarrow 9 = \frac{x+x+3+x+5+x+7+x+10}{5}$$
$$\Rightarrow 9 = \frac{5x+18}{5}$$
$$\Rightarrow 45 = 5x + 18$$
$$\Rightarrow 5x = 20$$
$$\Rightarrow x = 4$$

So, the mean of the last three observations

$$= \frac{x+5+x+7+x+10}{3}$$
$$= \frac{4+5+4+7+4+10}{3}$$
$$= \frac{34}{3}$$
$$= 11\frac{1}{3}$$

35. The median and mode of distribution are 20 and 18, then the mean is:

(A) 22　　　　　　(B) 21　　　　　　(C) 20　　　　　　(D) 18

Ans. :

　　b.　　21

　　　Solution:

　　　3 Median = 2 × Mean + Mode

　　　⇒ 3 × 20 = 2 × Mean + 18

　　　⇒ 2 × Mean = 60 - 18 = 42

　　　⇒ Mean = 21

36.　If x is the mean of $x_1, x_2, ... x_n$, y is the mean of $y_1, y_2, ... x_n, ...y_n$, then z the mean of $x_1, x_2, ...x_n, y_1, y_2, ...yn$ is equal to:

(A) $\frac{x+y}{2}$　　　　(B) $\frac{x+y}{n}$　　　　(C) $\frac{x+y}{2n}$　　　　(D) $x+y$

Ans. :

　　a.　　$\frac{x+y}{2}$

　　　Solution:

　　　Since x^- and y^- are two numbers, though being means, their arithmetic mean is given by:

　　　$z = \frac{x \text{ and } y}{2}$

37.　To analyse the election results, the data is collected from a newspaper. The data thus collected is known as:

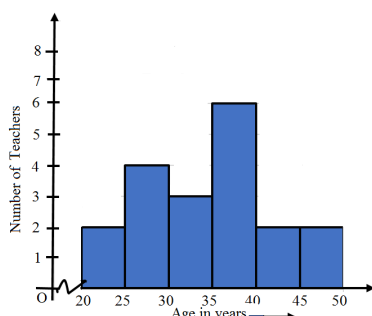(A) Raw data.　　　(B) Secondary data.　　　(C) Primary data.　　　(D) Grouped data.

Ans. :

　　b.　　Secondary data.

　　　Solution:

　　　Secondary data is the readily available data collected by someone else & published in newspapers or journals etc.

38.　The graph given below shows the frequency distribution of the age of 22 teachers in a school. The number of teachers whose age is less than 40 years is:

(A) 17　　　　　　(B) 16　　　　　　(C) 15　　　　　　(D) 14

Ans. :

　　c.　　15

　　　Solution:

　　　Add the values corresponding to the height of the bar before 40.

　　　6 + 3 + 4 + 2 = 15.

39.　If each observation of the data is increased by 5, then their mean.

(A) Remains the same. (B) Is increased by 5. (C) Is decreased by 5. (D) Becomes 5 times the original mean.

Ans. :

b. Is increased by 5

Solution:

Is increased by 5

Then old mean x old $= \dfrac{\sum\limits_{i=1}^{n} x_i}{n}$

Now, adding 5 in each observation, the new mean becomes

$\overline{x}_{New} = \dfrac{(x_1+5)+(x_2+5)+....+(x_n+5)}{n}$

$\Rightarrow \overline{x}_{New} = \dfrac{(x_1+x_2+....+x_n)+5n)}{n}$

$\Rightarrow \overline{x}_{New} = \dfrac{\sum\limits_{i=1}^{n} x_i}{n} + 5 = \overline{x} \, old + 5$

$\Rightarrow \overline{x}_{New} = \overline{x}_{old} + 5$

40. The runs scored by 11 members of a cricket team are.

15, 34, 56, 27, 43, 29, 31, 13, 50, 20, 0.

The median score is:

(A) 31   (B) 20   (C) 29   (D) 27

Ans. :

c. 29

Solution:

Arranging the weight of 10 students in ascending order, we have:

0, 13, 15, 20, 27, 29, 31, 34, 43, 50, 56

Here, n is 11, which is an odd number. Thus, we have:

Median = Value of $\left(\dfrac{n+1}{2}\right)$th observation median score

= Value of $\left(\dfrac{11+1}{2}\right)$th term

= Value of 6th term

= 29

41. The mean of the following data is 8.

x	3	5	7	9	11	13
y	6	8	15	p	8	4

Then, the value of p is:

(A) 23   (B) 24   (C) 25   (D) 21

Ans. :

c. 25

Solution:

For calculating the mean, we prepare the table below:

x_i	f_i	$x_i \times f_i$
3	6	18
5	8	40
7	15	105
9	p	9p
11	8	88
13	4	52
	$\sum f_i = (41 + p)$	$\sum (x_i \times f_i) = (303 + 9p)$

$\text{Mean} = \frac{\sum (x_i \times f_i)}{\sum f_i} = \frac{303 + 9p}{41 + p}$

But mean = 8

$= \frac{303 + 9p}{41 + p} = 8$

$\Rightarrow 303 + 9p = 8(41 + p)$

$\Rightarrow 303 + 9p = 328 + 8p$

$\Rightarrow p = 25$

42. The mean of 50 observations is 39. If one of the observations which was 23 was replaced by 43, the resulting mean will be:

(A) 40.3   (B) 39.4   (C) 38.4   (D) 39

Ans. :

    b.   39.4

Solution:

The mean of 50 observations is 39.

So sum of these 50 observations is 50 × 39 = 1950

After replacing the observation value 23 by 43,

Sum becomes 1970

So the mean is $\frac{1970}{50} = 39.4$

43. If the mean of five observations x, x + 2, x + 4, x + 6, x + 8, is 11, then the mean of first three observations is:

(A) 9   (B) 11   (C) 13   (D) None of these.

Ans. :

    a.   9

Solution:

Mean of first five observations $= \frac{x+x+2+x+4+x+6+x+8}{5} = 11$

$\Rightarrow 5x + 20 = 55$

$\Rightarrow x = 7$

$\Rightarrow$ First three numbers are 7, 9, 11

$\text{Mean} = \frac{7+9+11}{3} = \frac{27}{3} = 9$

44. The mean of a set of seven numbers is 81. If one of the numbers is discarded, the mean of the remaining numbers is 78. The value of discarded number is:

(A) 99   (B) 101   (C) 98   (D) 100

Ans. :

   a.   99

   Solution:

   Given that the mean of 7 numbers is 81. Let us denote the numbers by $X_1, ...X_7$.

   If $\overline{X}$ be the mean of the n observations $X_1, ... X_n$, then we have

   $\overline{X} = \frac{1}{2} \sum_{i=1}^{n} x_i$

   $\Rightarrow \sum_{i=1}^{n} x_i = n\overline{X}$

   Hence the sum of 7 numbers is

   $\sum_{i=1}^{7} x_i = 7 \times 81 = 567$

   If one number is discarded then the mean becomes 78 and the total numbers become 6.

   Let the number discarded is x.

   After discarding one number the sum becomes 567 - x and then the mean is

   $\frac{567-x}{6}$

   But it is given that after discarding one number the mean becomes 78.

   Hence we have

   $\frac{567-x}{6} = 78$

   $\Rightarrow$ 567 - x = 468

   $\Rightarrow$ 567 = x + 468

   $\Rightarrow$ x = 468 = 567

   $\Rightarrow$ x = 567 - 468

   $\Rightarrow$ x = 99

   Thus the excluded number is 99.

45.   Sheila received x marks in two of her tests and y marks in three other tests. Her average score in all the five tests in terms of x and y is:

   (A) $\frac{3x+2y}{5}$ 　　　　(B) $\frac{2x+3y}{5}$ 　　　　(C) $\frac{2x+3y}{2}$ 　　　　(D) $\frac{3x+2y}{3}$

   Ans. :

   b. $\frac{2x+3y}{5}$

   Solution:

   Average is equal to the sum of all the values in the data set divided by the number of values in the data set.

   Average $= \frac{x+x+y+y+y}{5}$

   Average $= \frac{2x+3y}{5}$

46.   The mean of five observations is 15. If the mean of first three observations is 14 and that of last three is 17, then the third observation is:

   (A) 31 　　　　(B) 18 　　　　(C) 29 　　　　(D) 32

   Ans. :

   b.   18

   Solution:

The mean of five observations is 15

So the sum of these five observations is 15 × 5 = 75

The mean of first three observations is 14

So the sum of the first three observations is 14 × 3 = 42

So the sum of the last two numbers is 75 - 42 = 33

The mean of the last three observations is 17.

So sum of last three observations is 17 × 3 = 51

So the middle number is 51 - 33 = 18.

47. The median of the data arranged in ascending order 8, 9, 12, 18, (x + 2), (x + 4), 30, 31, 34, 39 is 24. The value of x is:

(A) 20   (B) 21   (C) 24   (D) 22

Ans. :

b.   21

Solution:

The given data is in ascending order.

Here, n is 10, which is an even number. Thus, we have:

Median = mean of $\left(\frac{n}{2}\right)$th and $\left(\frac{n}{2}+1\right)$th observations $= \frac{1}{2}$ (5th observation + 6th observation)

$= \frac{1}{2}(x + 2 + x + 4) = (x + 3)$

= 24

Also, x + 3 = 24

⇒ x = 21

48. Mode of the data 15, 17, 15, 19, 14, 18, 15, 14, 16, 15, 14, 20, 19, 14, 15 is:

     a.   14
     b.   15
     c.   16
     d.   17

Ans. :

b.   15

Solution:

Arranging the marks in an ascending order,

We have:

14, 14, 14, 14, 15, 15, 15, 15, 16, 17, 18, 19, 19, 20

Clearly, 15 occurs maximum number of times.

Hence, mode = 15

*   A statement of Assertion (A) is followed by a statement of Reason (R).   [5]
Choose the correct option.

49. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The mode of the given data: 4, 6, 5, 9, 3, 2, 7, 7, 6, 5, 4, 9, 10, 10, 3, 4, 7, 6, 9, 9 is 6.

Reason: The value which appears very frequently in a data is called median.

    a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

    b. Both Assertion and reason are correct but reason is not correct explanation for Assertion.

    c. Assertion is correct but reason is false.

    d. Both Assertions and reason are false.

Ans. :

    d. Both Assertions and reason are false.

50. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The mean of the data: 4, 10, 5, 9, 12 is 8.

Reason: Mean $= \frac{(4+10+5+9+12)}{5} = \frac{40}{5} = 8$

    a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

    b. Both Assertion and reason are correct but reason is not correct explanation for Assertion.

    c. Assertion is correct but reason is false.

    d. Both Assertions and reason are false.

Ans. :

    a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

51. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The median of the data 13, 15, 16, 17, 19, 20 is $\frac{30}{2}$

Reason: Median $= \frac{(16+17)}{2} = \frac{33}{2}$

    a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

    b. Both Assertion and reason are correct but reason is not correct explanation for Assertion.

    c. Assertion is correct but reason is false.

    d. Both Assertions and reason are false.

Ans. :

    a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

52. **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: Mode of given data 110, 120, 130, 120, 110, 140, 130, 120, 140, 120 is 120.

Reason: The observation with maximum frequency is called mode.

    a. Both Assertion and reason are correct and reason is correct explanation for Assertion.

    b.   Both Assertion and reason are correct but reason is not correct explanation for Assertion.

    c.   Assertion is correct but reason is false.

    d.   Both Assertions and reason are false.

Ans. :

    a.   Both Assertion and reason are correct and reason is correct explanation for Assertion.

53.   **Directions:** In the following questions, the Assertions (A) and Reason(s) (R) have been put forward. Read both the statements carefully and choose the correct alternative from the following:

Assertion: The median of the following observation 0, 1, 2, 3, x , x + 2, 8, 9, 11, 12 arranged in ascending order is 63, then the value of x is 62.

Reason: Median of n even observations is $\dfrac{\left(\frac{n}{2}\right)^{\text{th}}\text{term}+\left(\frac{n}{2}+1\right)^{\text{th}}\text{term}}{2}$

    a.   Both assertion and reason are true and reason is the correct enatixplaon of assertion.

    b.   Both assertion and reason are true but reason is not the correct explanation of assertion.

    c.   Assertion is true but reason is false.

    d.   Assertion is false but reason is true.

Ans. :

    a.   Both assertion and reason are true and reason is the correct enatixplaon of assertion.

    Solution:

    Number of terms = 10(even)

$$\text{median} = \dfrac{\left(\frac{n}{2}\right)^{\text{th}}\text{term}+\left(\frac{n}{2}+1\right)^{\text{th}}\text{term}}{2}$$

$$= \dfrac{5^{\text{th}}\text{term}+6^{\text{th}}\text{term}}{2}$$

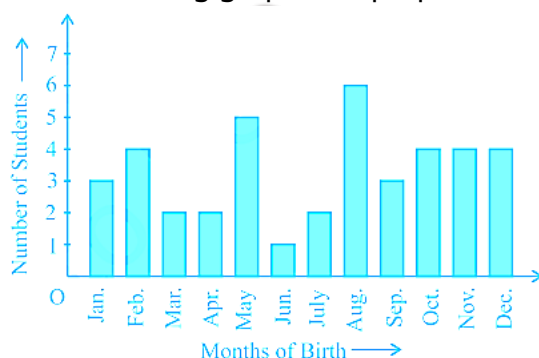$$= \dfrac{x+x+2}{2} = 63$$

$$2x + 2 = 126$$

$$x = 62$$

*   Answer the following questions. [3 Marks Each]   **[6]**

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

Observe the bar graph given above and answer the following questions:

i. How many students were born in the month of November?

ii. In which month were the maximum number of students born?

Ans. : from the graph it is clear that.

i. 4 students were born in the month of November.

ii. The Maximum number of students were born in the month of August.

55. Form the frequency distribution table and Find the mean of the marks obtained by 30 students of Class IX of a school, as given below:

10, 20, 36, 92, 95, 40, 50, 56, 60, 70, 92, 88, 80, 70, 72, 70, 36, 40, 36, 40, 92, 40, 50, 50, 56, 60, 70, 60, 60, 88

Ans. : The frequency distribution table is given below.

Marks (x_i)	Number of students (f_i)	$f_i x_i$
10	1	10
20	1	20
36	3	108
40	4	160
50	3	150
56	2	112
60	4	240
70	4	280
72	1	72
80	1	80
88	2	176
92	3	276
95	1	95
	$\sum\limits_{i=1}^{13} f_i = 30$	$\sum\limits_{i=1}^{13} f_i x_i = 1779$

So, the mean $\bar{x} = \dfrac{\text{Sum of all the observations}}{\text{Total number of observations}} = \left(\dfrac{\sum\limits_{i=1}^{13} f_i x_i}{\sum\limits_{i=1}^{13} f_i} \right)$

$= \dfrac{1779}{30} = 59.3$

*   Questions with calculation. [4 Marks Each]   **[36]**

56. The mean marks (out of 100) of boys and girls in an examination are 70 and 73, respectively. If the mean marks of all the students in that examination is 71, find the ratio of the number of boys to the number of girls.

Ans. : Let the number of boys be n_1 and number of girls be n_2

Using $\bar{x} = \dfrac{n_1 \bar{x} + n_2 \bar{x}_2}{n_1 + n_2}$

Where, $\bar{x}_1 = 70, \bar{x}_2 = 73$ and $\bar{x}_3 = 71$

$71 = \dfrac{n_1 \times 70 + n_2 \times 73}{n_1 + n_2}$

$\Rightarrow 71n_1 + 71n_2 = 70n_1 + 73n_2$

$\Rightarrow n_1 = 2n_2$

$\Rightarrow \dfrac{n_1}{n_2} = \dfrac{2}{1}$

Hence, the ratio of the number of boys to the number of girls in 2 : 1

57. Following table shows a frequency distribution for the speed of cars passing through at a particular spot on a high way:

Class interval (km/ h)	Frequency
30-40	3
40-50	6
50-60	25
60-70	65
70-80	50
80-90	28
90-100	14

Draw a histogram and frequency polygon representing the data above.

Ans. : Clearly, the given frequency distribution is in exclusive form. Along the horizontal axis, we represent the class intervals on some suitable scale. The corresponding frequencies are represented along the vertical axis on a suitable scale. We construct rectangles with class intervals as the bases and the respective frequencies as the heights.

Let us draw a histogram for this data and mark the mid-points of the top of the rectangles as B, C, D, E, F, G and H, respectively. Here, the first class is 30-40 and the last class is 90-100.

Also, consider the imagined classes 20-30 and 100-110 each with frequency O. The class marks of these classes are 25 and 105 at the points A and I, respectively.
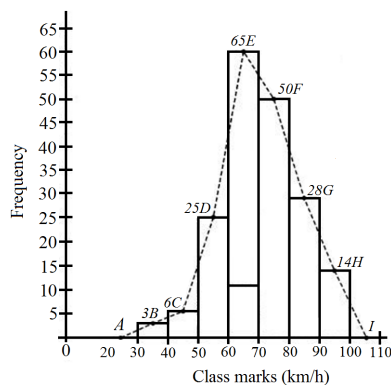
Join all these points by dotted line. Then, the curve ABCDEFGHI is the required frequency polygon.

58. The marks scored by 55 students in a test are given below:

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35
No. of students	2	6	13	17	11	4	2

Prepare a cumulative frequency table.

Marks	No. of Students	Marks	Cumulative Frequency
0-5	2	Less than 5	2
5-10	6	Less than 10	8
10-15	13	Less than 15	21
15-20	17	Less than 20	38
20-25	11	Less than 25	49
25-30	4	Less than 30	53
30-35	2	Less than 35	55
	N = 55		

59. The weights of new born babies are as follows:

2.3, 2.2, 2.1, 2.7, 2.6, 2.5, 3.0, 2.8, 2.8, 2.9, 3.1, 2.5, 2.8, 2.7, 2.9, 2.4.

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

Ans. : The weights of new born babies (in kg) are as follows:

2.3, 2.2, 2.1, 2.7, 2.6, 2.5, 3.0, 2.8, 2.8, 2.9, 3.1, 2.5, 2.8, 2.7, 2.9, 2.4.

    i.   The weights in descending order

      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.   The highest weight = 3.1Kg
    iii.   The lowest weight = 2.1Kg
    iv.   Range = 3.1 - 2.1 = 1.0Kg
    v.   15 babies were born on that particular day.
    vi.   4 babies weight below 2.5Kg.
    vii.   Weight more than 2.8Kg are 4 babies.
    viii.   Weight 2 babies.

60. 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

    i.   Arrange these marks in ascending order 30 to 39 one group 40 to 49 second group etc.

    Now answer the following:

    ii.   What is the lowest score?
    iii.   What is the highest score?
    iv.   What is the range?
    v.   If 40 is the pass mark how many failed?
    vi.   How many have scored 75 or more?
    vii.   Which observations between 50 and 60 have not actually appeared?
    viii.   How many have scored less than 50?

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

53, 61, 48, 60, 78, 68, 55, 100, 67, 0, 75, 88, 77, 37, 84, 58, 60, 48, 62, 56, 44, 58, 52, 64, 98, 59, 70, 39, 50, 60.

i.

Group	Class	Observations
I	30-39	37, 39
II	40-49	44, 48, 48
III	50-59	50, 52, 53, 55, 56, 58, 58, 59
IV	60-69	60, 60, 60, 61, 62, 64, 67, 68
V	70-79	70, 55, 77, 78
VI	80-89	84, 88
VII	90-99	90, 98
VIII	100-109	100

ii.   Highest score = 100
iii.   Lowest score = 37
iv.   Range = 100 - 37 = 63
v.   If 40 is the passing marks 2 students have failed.
vi.   8 students have scored 75 or more.
vii.   Observation 51, 54, 57 between 50 and 60 has not actually appeared.
viii.   5 students have scored less than 50

61.   Given below is a cumulative frequency distribution table showing ages of the people living in a locality:

Age in years	No. of years
Above 108	0
Above 96	1
Above 84	3
Above 72	5
Above 60	20
Above 48	158
Above 36	427
Above 24	809
Above 12	1026
Above 0	1124

Prepare a frequency distribution table.

Ans. :

Age (in years)	No. of persons	Class interval	Frequency
Above 0	1124	0-12	1124 - 1026 = 98
Above 12	1026	12-24	217
Above 24	809	24-36	382

Above 36	427	36-48	269
Above 38	158	48-60	138
Above 60	20	60-72	15
Above 72	5	72-84	5 - 3 = 2
Above 84	3	84-96	3 - 1 = 2
Above 96	3	96-108	1 - 0 = 1

62. The blood groups of 30 students of class VIII are recorded as follows:

A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O, A, AB, O, A, A, O, O, AB, B, A, O, B, A, B, O

Represent this data in the form of a frequency distribution table. Find out which is the most common and which is the most rarest blood group among these students.

Ans. : Here 9 students have blood group A, 6 as B, 3 as AB and 12 as O

So the table representing the data is as follows:

Blood Group	Number of Students
A	9
B	6
AB	3
O	12
Total	**30**

As 12 students have their blood group O and 3 students have their blood group as AB.

Therefore the most common blood group is O and the rarest blood group is AB.

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

Year	2012-13	2013-14	2014-15	2015-16	2016-17
Number of students	800	975	1100	1400	1625
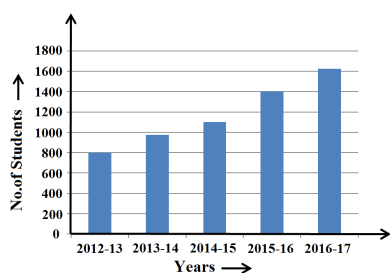
Ans. :

64. The birth rate per thousand in five countries over a pariod of time is shown below:

Country	China	India	Germany	UK	Sweden
Birth rate per thousand	42	35	14	28	21

Represent the above data by a bar graph.

Ans. : Take the countries along the x-axis and the birth rate (per thousand) along the y-axis.

Along the y-axis, take 1 big division = 5 units.

All the bars should be of same width and same space should be left between the consecutive bars.

Now we shall draw the bar chart, as shown below:

[23]
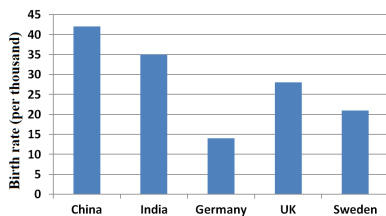
* **Answer the following questions. [5 Marks Each]** **[65]**

65. The following table gives the distribution of students of two sections according to the marks obtained by them:

Section A		Section B	
Marks	Frequency	Marks	Frequency
0-10	3	0-10	5
10-20	9	10-20	19
20-30	17	20-30	15
30-40	12	30-40	10
40-50	9	40-50	1

Represent the marks of the students of both the sections on the same graph by frequency polygons.

Ans. : For section A

Classes	Class-Marks	Frequency
0-10	5	3
10-20	15	9
20-30	25	17
30-40	35	12
40-50	45	9

For section B

Classes	Class-Marks	Frequency
0-10	5	5
10-20	15	19
20-30	25	15
30-40	35	10
40-50	45	1

Section A
Section B
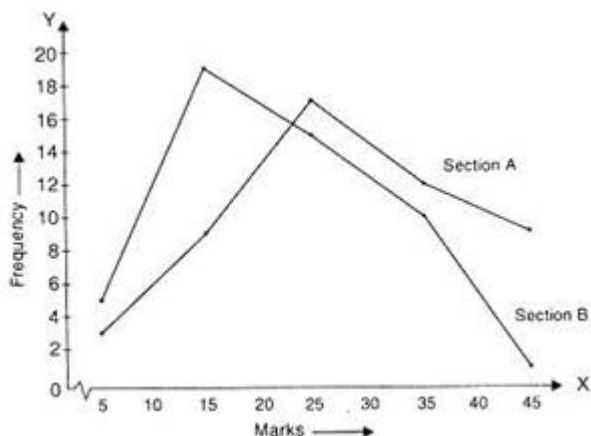
66. The runs scored by two teams A and B on the first 60 balls in a cricket match are given below :

| Number of balls	Team A	Team B
1-6	2	5
7-12	1	6
13-18	8	2
19-24	9	10
25-30	4	5
31-36	5	6
37-42	6	3
43-48	10	4
49-54	6	8
55-60	2	10

Represent the data of both the teams on the same graph by frequency polygons.

[Hint: First make the class intervals continuous.]

Ans. :

Number of balls	Class-Marks	Team A	Team B
0.5-6.5	3.5	2	5
6.5-12.5	9.5	1	6
12.5-18.5	15.5	8	2
18.5-24.5	21.5	9	10
24.5-30.5	27.5	4	5
30.5-36.5	33.5	5	6
36.5-42.5	39.5	6	3
42.5-48.5	45.5	10	4

Number of balls	Class-Marks	Team A	Team B
48.5-54.5	51.5	6	8
54.5-60.5	57.5	2	10
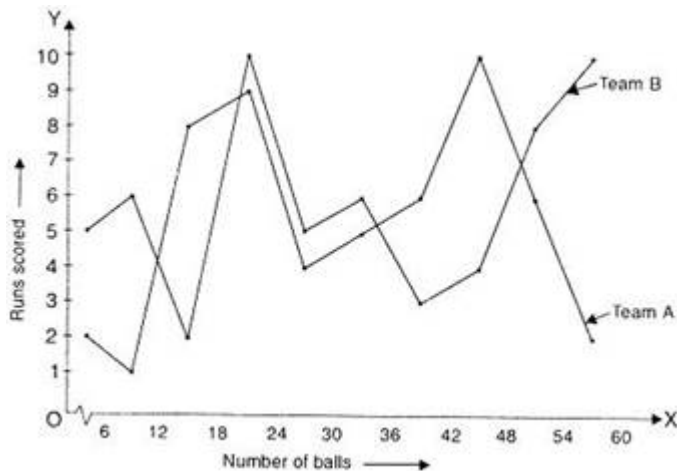
67. A random survey of the number of children of various age groups playing in a park was found as follows

Age (in years)	Number of children
1-2	5
2-3	3
3-5	6
5-7	12
7-10	9
10-15	10
15-17	4

Draw a histogram to represent the data above.

Ans. : Here, the widths of the rectangles are varying. So, we need to make certain modifications in the lengths of the rectangles, so that the areas are became proportional to the frequencies.

The minimum class size is 1.

Length of rectangle (Adjusted frequency) = $\frac{\text{Minimum class size}}{\text{Class size of this class}} \times$ Frequency

Then modified table of given data is shown below

Age (in years)	Number of children (Frequency)	Width of the class	Length of the rectangle
1-2	5	1	$\frac{1}{1} \times 5 = 5$
2-3	3	1	$\frac{1}{1} \times 3 = 3$
3-5	6	2	$\frac{1}{2} \times 6 = 3$

5-7	12	2	$\frac{1}{2} \times 12 = 6$
7-10	9	3	$\frac{1}{3} \times 9 = 3$
10-15	10	5	$\frac{1}{5} \times 10 = 2$
15-17	4	2	$\frac{1}{2} \times 4 = 2$

So, the histogram with varying width is given below
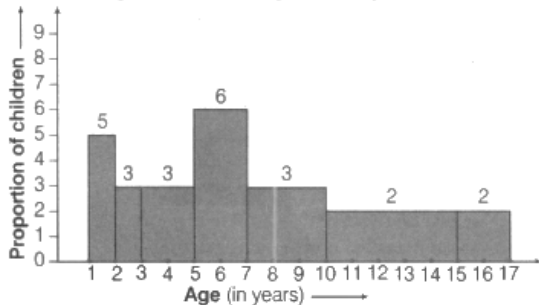
68. 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabets in the surnames was found as follows :
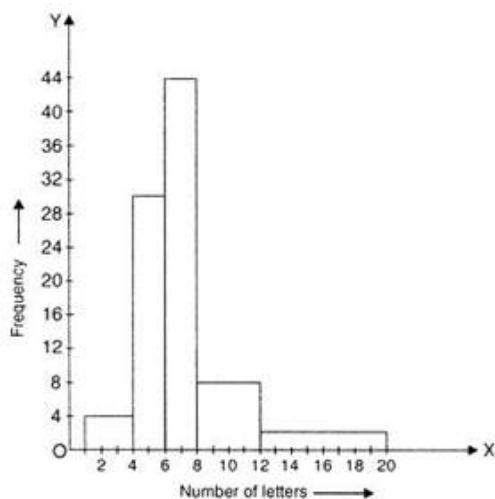
Number of letters	Number of surnames
1-4	6
4-6	30
6-8	44
8-12	16
12-20	4

    i. Draw a histogram to depict the given information.

    ii. Write the class interval in which the maximum number of surnames lie.

Ans. :

    i.

Number of letters	Number of surnames	Width of the class	Length of the rectangle
1-4	6	3	$\frac{6}{3} \times 2 = 4$
4-6	30	2	$\frac{30}{2} \times 2 = 30$
6-8	44	2	$\frac{44}{2} \times 2 = 44$
8-12	16	4	$\frac{16}{4} \times 2 = 8$
12-20	4	8	$\frac{4}{8} \times 2 = 1$

ii. The class interval in which the maximum number of surnames lie is 6-8.

69. A family with a monthly income of ₹ 20,000 had planned the following expenditures per month under various heads:

Heads	Expenditure (in thousand rupees)
Grocery	4
Rent	5
Education of children	5
Medicine	5
Fuel	2
Entertainment	1
Miscellaneous	1

Draw a bar graph for the data above.

Ans. : We draw the bar graph of this data in the following steps. Note that the unit in the second column is thousand rupees. So, '4' against 'grocery' means ₹4000.

i. We represent the Heads (variable) on the horizontal axis choosing any scale, since the width of the bar is not important. But for clarity, we take equal widths for all bars and maintain equal gaps in between. Let one Head be represented by one unit.

ii. We represent the expenditure (value) on the vertical axis. Since the maximum expenditure is ₹5000, we can choose the scale as 1 unit = ₹1000.

iii. The bar graph is drawn in Fig.
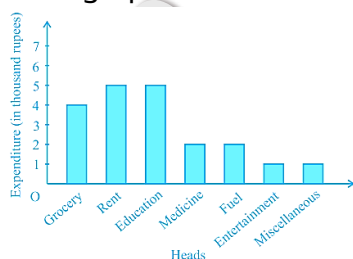
iv. Here, you can easily visualise the relative characteristics of the data at a glance, e.g., the expenditure on education is more than double that of medical expenses.

Therefore, in some ways it serves as a better representation of data than the tabular form.

70. The following table gives the quantity of goods (in crores of rupees)

Year	1950–51	1960–61	1965–66	1970–71	1980–81	1982–83
Quantity of goods (in crore tonnes)	9	16	20	20	22	26

Represent this information with the help of a bar graph.

Ans. : To represent the given data by a vertical bar graph, we first draw horizontal and vertical axes. Let us consider that the horizontal and vertical axes represent the years and the quantity of goods in Crores tonnes respectively. We have to draw 6 bars of different lengths given in the table. At first, we mark 6 points in the horizontal axis at equal distances and erect rectangles of the same width at these points. The heights of the rectangles are proportional to the quantity of goods carried by Indian railways in different years.

The vertical bar graph of the given data is following:
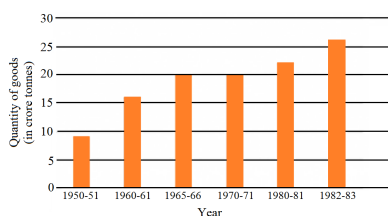
It is seen from the bar graph that the quantity of goods carried in the years 1950–51 and 1965–66 are 20 Crores tonnes and 9 Crores tonnes. Clearly 20 is more than 2 multiplied by 9. Hence, the statement is true.

71. Read the bar graph shown in the figure and answer the following questions:

    i.   What is the information given by the bar graph?
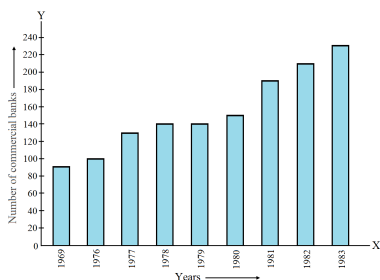
    ii.   What was the number of commercial banks in 1977?
    iii.   What is the ratio of the number of commercial banks in 1969 to that in 1980?
    iv.   State whether true or false:

    The number of commercial banks in 1983 is less than double the number of commercial banks in 1969.

Ans. :
    i.   The bar graph represents the number of commercial banks in India during some particular years.
    ii.   The number of commercial banks in 1977 was:

$$120 + \frac{(140-120)}{2}$$
$$\Rightarrow 120 + \frac{20}{2}$$
$$\Rightarrow 120 + 10$$

$\Rightarrow 130$

   iii.   The number of commercial banks in 1969 was:

$80 + \frac{(100-80)}{2}$

$\Rightarrow 80 + \frac{20}{2}$

$\Rightarrow 80 + 10$

$\Rightarrow 90$

The number of commercial banks in 1980 was:

$140 + \frac{(160-140)}{2}$

$\Rightarrow 140 + \frac{20}{2}$

$\Rightarrow 140 + 10$

$\Rightarrow 150$

Hence, the required ratio is $\frac{90}{150}$

$\Rightarrow \frac{3}{5}$

$\Rightarrow 3 : 5$

   iv.   The number of commercial banks in 1983 was:

$220 + \frac{(240-220)}{2}$

$\Rightarrow 220 + \frac{20}{2}$

$\Rightarrow 220 + 10$

$\Rightarrow 230$

The number of commercial banks in 1969 was 90.

When we multiply this number by 2, it becomes 2 × 90 = 180

Clearly, 230 is not less than 180. Hence the statement is false.

72.   The following bar graph represents the heights (in cm) of 50 students of Class XI of a particular school. Study the graph and answer the following questions:
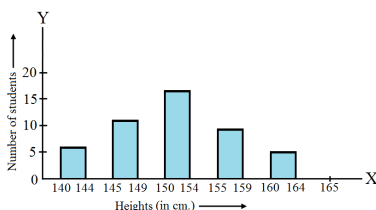
   i.   What percentage of the total number of students have their heights more than 149cm?

   ii.   How many students in the class are in the range of maximum height of the class?

   iii.   The school wants to provide a particular type of tonic to each student below the height of 150cm to improve his height. If the cost of the tonic for each student comes out to be Rs. 55, how much amount of money is required?

   iv.   How many students are in the range of shortest height of the class?

   v.   State whether true or false:

      a.   There are 9 students in the class whose heights are in the range of 155-159cm.

      b.   Maximum height (in cm) of a student in the class is 17.

    c.   There are 29 students in the class whose heights are in the range of 145-154cm.

    d.   Minimum height (in cm) of a student is the class is in the range of 140-144cms.

    e.   The number of students in the class having their heights less than 150cm is 12.

    f.   There are 14 students each of whom has height more than 154cm.

Ans. :

    i.   The total number of students is 50. The number of students having heights more than 149cm i.e desired percentage is:

$$\Rightarrow \frac{(17+9+5)}{50\times100}$$

$$\Rightarrow 62\%$$

    ii.   The maximum range of height is 164-165cm. The number of students belonging to this group is 5.

    iii.   The number of students whose heights are less than 150cm is 7 + 12 = 19. Hence, the total cost is 19 × 55 = Rs. 1045/-

    iv.   The minimum range of height is 140–144cm. The number of students belonging to this group is 7.

    v.

        a.   The number of students whose heights are in the range 155–159cm is 9. Hence, the statement is true.

        b.   The maximum possible height (in cm) of a student in the class can be 164cm. Hence the statement is false.

        c.   The number of students whose heights are in the range 145-154cm is 12 + 17 = 29. Hence, the statement is true.

        d.   The minimum range of heights of students in the class is 140-144cm. Hence, the statement is true.

        e.   The number of students having heights less than 150cm is 7 + 12 = 19. Hence, the statement is false.

        f.   The number of students having heights more than 154cm is 9 + 5 = 14. Hence, the statement is true.

73.   The population of Delhi State in different census years is as given below:

Census year	1961	1971	1981	1991	2001
Population in Lakhs	30	55	70	110	150

Represent the above information with the help of a bar graph.

Ans. : While drawing a bar graph, we keep in mind that:

The width of the bars should be uniform throughout.

The gap between any two bars should be uniform throughout.

Bars may be either horizontal or vertical.

To represent the given data by a vertical bar graph, we first draw horizontal and vertical axes.

Let us consider that the horizontal and vertical axes represent the years and the population in lakhs respectively. We have to draw 5 bars of different heights given in the table. At first, we mark 5 points in the horizontal axis at equal distances and erect rectangles of the same width at these points. The heights of the rectangles are

proportional to the population in lakhs. The vertical bar graph of the given data is following:
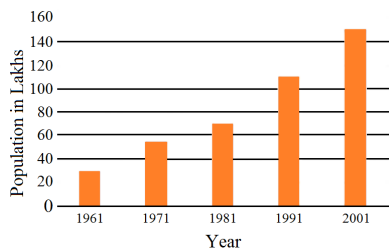
Note that each bar is of the same width and the gap between them is uniform. Make sure that the width of the bars and the gap between them should not be necessarily same.

74. Read the following bar graph and answer the following questions:
    i.   What information is given by the bar graph?
    ii.   Which state is the largest producer of rice?
    iii. Which state is the largest producer of wheat?
    iv.   Which state has total production of rice and wheat at its maximum?
    v.   Which state has total production of wheat and rice at its minimum?
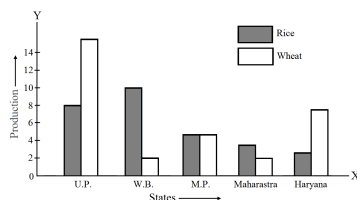

Ans. :
    i.   The bar graph represents the production of rice and wheat in different states of India.
    ii.   According to the height of the bars corresponding to rice, W.B. is the largest producer of rice.
    iii. According to the height of the bars corresponding to wheat. U.P. is the largest producer of wheat.
    iv.   U.P. has the maximum total production of rice and wheat, which is 8 + 16 = 24 units
    v.   Maharashtra has the minimum total production of rice and wheat, which are exactly 2 + 4 = 6 units.

75. The bar graph shown in figure represents the circulation of newspapers in 10 languages.
    Study the bar graph and answer the following questions:
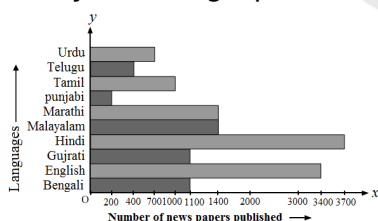
    i.   What is the total number of newspapers published in Hindi, English, Urdu, Punjabi, and Bengali?
    ii.   What percent is the number of newspapers published in Hindi of the total number of newspapers?
    iii. Find the excess of the number of newspapers published in English over those published in Urdu.
    iv.   Name two pairs of languages which publish the same number of newspapers.
    v.   State the language in which the smallest number of newspapers are published.

vi. State the language in which the largest number of newspapers are published.
vii. State the language in which the number of newspapers published is between 2500 and 3500.
viii. State whether true or false:
   a. The number of newspapers published in Malayalam and Marathi together is less than those published in English.
   b. The number of newspapers published in Telugu is more than those published in Tamil.

Ans. :

i. The total number of news papers published in Hindi, English, Urdu, Punjabi and Bengali is = 3700 + 3400 + 700 + 200 + 1100 = 9100.

ii. The total number of news papers published is = 1100 + 3400 + 1100 + 3700 + 1400 + 1400 + 200 + 1000 + 400 + 700 = 14400.

The number of news papers published in Hindi is 3700. The percentage of published Hindi news papers is $\left(\frac{3700}{14400}\right) \times 100 = \frac{3700}{144} = 25.7\%$

iii. The number of news papers published in English and Urdu are 3400 and 700 respectively. Hence, the excess of the number of news papers published in English over those published in Urdu is

= 3400 - 700 = 2700

iv. According to the length of the 5th and 6th bars from the top, the number of news papers published in Marathi and Malayalam are same. According to the length of the 1st and 3rd bars from the bottom, the number of news papers published in Bengali and Gujrati are same.

v. According to the length of the 4th bar from the top, the smallest number of news papers published in the language Punjabi.

vi. According to the length of the 4th bar from the bottom, the largest number of news papers published in the language Hindi.

vii. The languages in which the number of published news papers is greater than or equal to 2500 are English and Hindi. Among the languages Hindi and English, the language in which the number of published news papers is less than or equal to 3500 is English. Hence, the language is English.

viii.
   a. The number of news papers published in Malayalam and Marathi together is 1400 + 1400 = 2800 The number of news papers published in English is 3400. Clearly, 2800 is less than 3400. Hence, the statement is true.
   b. The number of news papers published in Telugu and Tamil are 400 and 1000 respectively. Clearly 400 is not greater than 1000. Hence, the statement is false.

76. Construct a histogram for the following frequency distribution:

Class interval	5-12	13-20	21-28	29-36	37-44	45-52
Frequency	6	15	24	18	4	9

Ans. : Histogram is the graphical representation of a frequency distrubution in the form of rectangles, such that there is no gap between any two successive rectangles.

Clearly and the lower limit of the next class.

Therefore, we need to convert the given frequency distribution into exclusive form, as shown below:

Class interval	4.5-12.5	12.5-20.5	20.5-28.5	28.5-36.5	36.5-44.5	44.5-52.5
Frequency	6	15	24	18	4	9

To draw the required histogram, take class intervals, along x-axis and frequencies along y-axis draw rectangles.

So, we required histogram.

Since the scale on X-axis starts at 4.5, a kink (break) is indicated near the origin to show that graph is drawn to scale beginning at 4.5
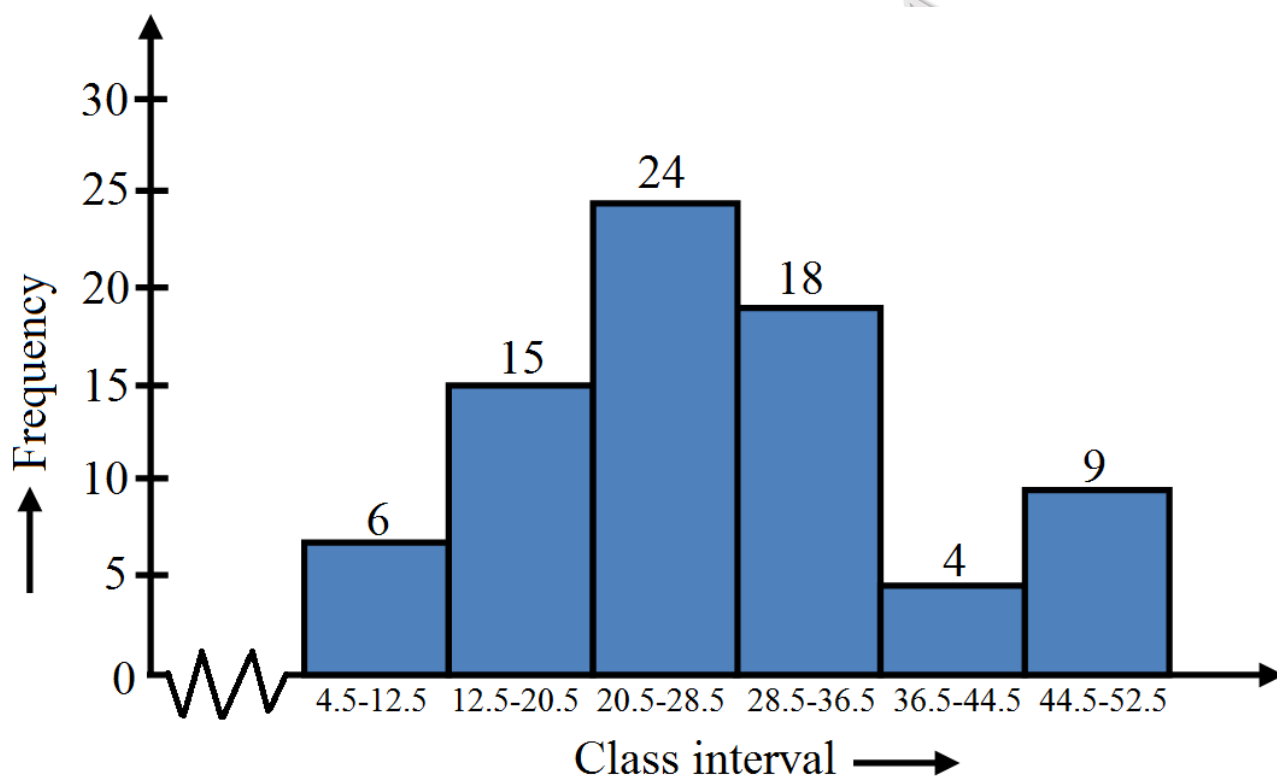
77. The heights of 75 students in a school are given below:

Height (in cm)	130-136	136-142	142-148	148-154	154-160	160-166
Number of students	9	12	18	23	10	3

Draw a histogram to represent the above data.

Ans. :

| Height (in cm)	130-136	136-142	142-148	148-154	154-160	160-166
Number of students	9	12	18	23	10	3

In the class intervals, If the upper limit of one class is the lower limit of the next class, It known as the exclusive method of classification.

Clearly, the given frequency distribution is in the exclusive form.

We take class intervals, i.e. height (in cm) along x-axis and frequencies i.e. number of stores along y-axis.

So, we get the required histogram.

Since the scale on x-axis starts at 130, a kink (break) is indicated near the origin to show that the graph is drawn to scale beginning at 130.
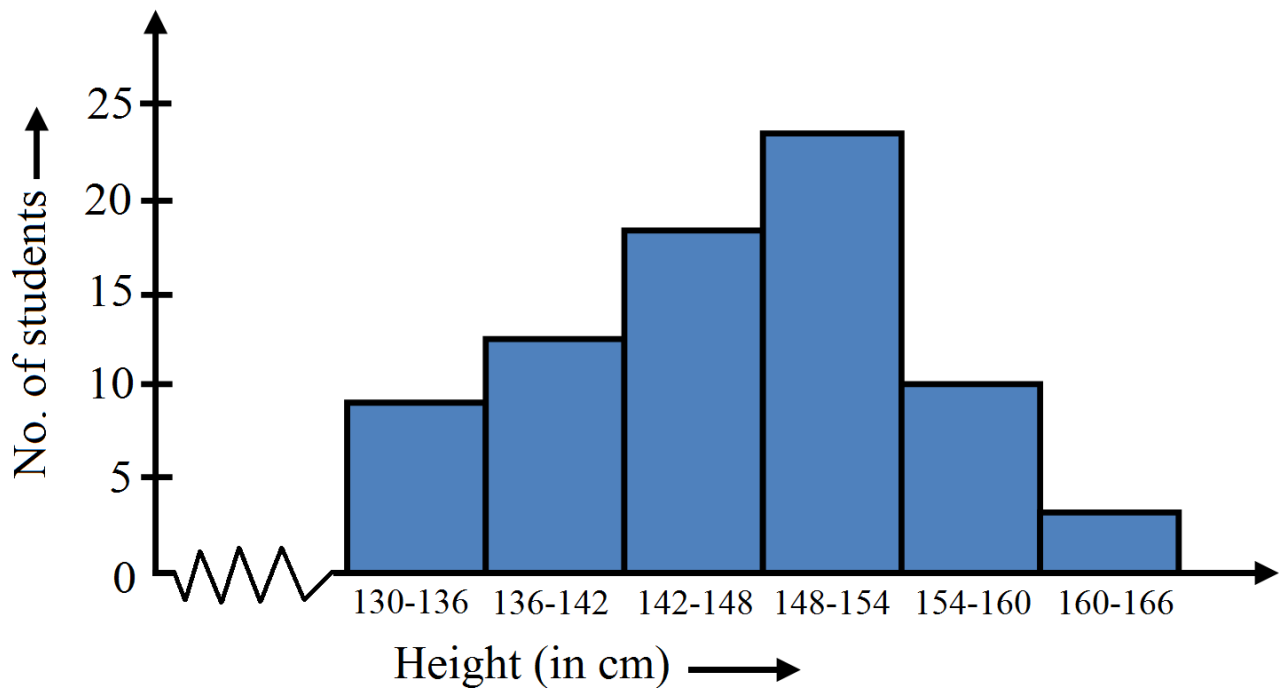
----- "Dreams are not that you see in sleep,dream are those that doesn't let you sleep'' -----