

CBSE Test Paper 02
Chapter 14 Statistics

1. To represent 'the less than type' graphically, we plot the _____ on the x – axis. **(1)**
- class marks
 - class size
 - lower limits
 - upper limits
2. $\frac{\text{Upperclasslimit} + \text{Lowerclasslimit}}{2} = .$ **(1)**
- frequency
 - Class mark
 - None of these
 - class size
3. The mean of the first 10 prime numbers is **(1)**
- 129
 - 1.29
 - 12.9
 - 11.9
4. The mean of the first 10 natural odd numbers is **(1)**
- 9
 - 12
 - 11
 - 10

5. For the following distribution

Class	60 – 70	70 – 80	80 – 90	90 – 100	100 – 110
Frequency	10	15	12	20	9

the sum of lower limits of the median class and modal class is **(1)**

- a. 190
- b. 20
- c. 180
- d. 170

6. If the mean and mode of a frequency distribution be 53.4 and 55.2 respectively, find the median. **(1)**

7. Find the mode of the following data: **(1)**

15, 8, 26, 25, 24, 15, 18, 20, 24, 15, 19, 15

8. In the table given below, the times taken by 120 athletes to run a 100-m hurdle race are given.

Class	13.8 - 14	14 - 14.2	14.2 - 14.4	14.4 - 14.6	14.6 - 14.8	14.8 - 15
Frequency	2	4	15	54	25	20

Find the number of athletes who completed the race in less than 14.6 seconds. **(1)**

9. What is the lower limit of the modal class of the following frequency distribution?

Age(in years)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Number of patients	16	13	6	11	27	18

10. Find the class marks of classes 10 - 25 and 35 - 55. **(1)**

11. Convert the following cumulative distribution to a frequency distribution: **(2)**

Height (in cm)	less than 140	less than 145	less than 150	less than 155	less than 160	less than 165
Number of students	4	11	29	40	46	51

12. A class teacher has the following absentee record of 40 students of a class for the

whole term. Find the mean number of days a student was absent. (2)

Number of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40
Number of students	11	10	7	4	4	3	1

13. Candidates of four schools appear in a mathematics test. The data were as follow:

Schools	No. of Candidates	Average Score
I	60	75
II	48	80
III	Not available	55
IV	40	50

If the average score of the candidates of all the four schools is 66, find the number of candidates that appeared from school III. (2)

14.

Marks	Number of students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

Write the proper data (marks) and frequency (Number of students). (3)

15. During a medical check-up, the number of heartbeats per minute of 30 patients were recorded and summarised as follows:

Number of heartbeats per minute	65 - 68	68 - 71	71 - 74	74 - 77	77 - 80	80 - 83	83 - 86
Number of patients	2	4	3	8	7	4	2

Find the mean of heartbeats per minute for these patients, choosing a suitable method. (3)

16. The following table gives the distribution of total household expenditure (in rupees) of manual workers in a city.

Expenditure	100-150	150-200	200-250	250-300	300-350	350-400	400-450	450-500
Frequency	24	40	33	28	30	22	16	7

Find the average expenditure (in Rs.) per household. (3)

17. The percentage of various categories of workers in a state is given in the following table. Present the information in the form of a pie chart (3)

Categories of workers	%
Cultivators	40.3
Agriculture labourers	25
Industrial workers	12.5
Commercial workers	9.7
Others	12.5
Total	100.00

18. Draw 'more than' ogive for the following distribution. Find the median from the

curve: (4)

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of students	10	18	40	20	12

19. Find the mode, median and mean for the following data: (4)

Marks Obtained	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85
Number of students	7	31	33	17	11	1

20. The median of the following data is 525. Find the values of x and y if the total frequency is 100. (4)

Class Interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	x	12	17	20	y	9	7	4

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Solution

1. d. upper limits

Explanation: To represent 'the less than type' graphically, we plot the upper limits on the x-axis.

e.g marks obtained by students are represented in grouped data as (0 - 10), (10 - 20), (20 - 30), (30 - 40)

only upper limits such as 10, 20, 30, 40 are taken for the x-axis

2. b. class mark

Explanation: In each class interval of grouped data, there are two limits or boundaries (upper limit and lower limit) while the mid-value is equal to

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

These mid-values are also known as Classmark.

3. c. 12.9

Explanation: The first 10 prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

$$\begin{aligned}\therefore \text{Mean} &= \frac{\text{Sum of first 10 prime numbers}}{10} \\ &= \frac{2+3+5+7+11+13+17+19+23+29}{10} \\ &= \frac{129}{10} \\ &= 12.9\end{aligned}$$

4. d. 10

Explanation: The first 10 natural odd numbers are 1, 3, 5, 7, 9, 11, 13, 15, 17, 19

$$\begin{aligned}\therefore \text{Mean} &= \frac{\text{Sum of first 10 natural odd numbers}}{10} \\ &= \frac{1+3+5+7+9+11+13+15+17+19}{10} \\ &= \frac{100}{10} \\ &= 10\end{aligned}$$

5. d. 170

Explanation:

Class	60 – 70	70 – 80	80 – 90	90 – 100	100 – 110
Frequency	10	15	12	20	9

Cumulative Frequency	10	25	37	57	66
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Here $N = 66$

$\Rightarrow \frac{N}{2} = 33 \therefore$ The median class is 80 – 90 and Modal class is 90 – 100

Sum of lower limits of Median class and Modal class = $80 + 90 = 170$

6. Mean = 53.4

Mode = 55.2

Mode = 3 Median - 2 Mean

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

$$= \frac{55.2 + 2(53.4)}{3}$$

$$= \frac{55.2 + 106.8}{3}$$

$$= \frac{162}{3}$$

$$= 54$$

7. Mode : It is the value which occurs maximum number of times.

Given data:

15, 8, 26, 25, 24, 15, 18, 20, 24, 15, 19, 15

Value (x)	8	15	18	19	20	24	25	26
Frequency (f)	1	4	1	1	1	2	1	1

\therefore From above table,

Mode = 15 because it occurs maximum number of times.

8. According to the question,

Class	13.8 - 14	14 - 14.2	14.2 - 14.4	14.4 - 14.6	14.6 - 14.8	14.8 - 15
Frequency	2	4	15	54	25	20

Number of athletes who completed the race in less than 14.6 seconds are

$$= 2 + 4 + 15 + 54 = 75$$

Therefore, 75 athletes completed the race in less than 14.6 seconds.

9. The Class having maximum frequency is called as modal class.

From observing table,

Here, maximum frequency = 27.

\therefore The modal class is 40 - 50.

The lower limit of the modal class is 40.

10. Class - mark of class 10 - 25 = $\frac{10+25}{2} = \frac{35}{2} = 17.5$
 Class - mark of class 35 - 55 = $\frac{35+55}{2} = \frac{90}{2} = 45$

11.

Class	Frequency	Cumulative Frequency
135 – 140	4	4
140 – 145	$11 - 4 = 7$	11
145 – 150	$29 - 11 = 18$	29
150 – 155	$40 - 29 = 11$	40
155 – 160	$46 - 40 = 6$	46
160 – 165	$51 - 46 = 5$	51

12.

Number of days	Number of students (f_i)	Class mark (x_i)	$f_i u_i$
0-6	11	3	33
6-10	10	8	80
10-14	7	12	84
14-20	4	17	68
20-28	4	24	96
28-38	3	33	99
38-40	1	39	39
Total	$\sum f_i = 40$		$\sum f_i x_i = 499$

Using the direct method,

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{499}{40} = 12.475$$

Hence, the mean number of days a student was absent is 12.48.

13. Let the number of candidates from school III = P

Schools	No. of candidates N_i	Average scores (x_i)
I	60	75

II	48	80
III	P	55
IV	40	50

Given

Average score for all schools = 66

$$\frac{N_1 \bar{x}_1 + N_2 \bar{x}_2 + N_3 \bar{x}_3 + N_4 \bar{x}_4}{N_1 + N_2 + N_3 + N_4} = 66$$

$$\frac{4500 + 3840 + 55p + 2000}{60 + 48 + p + 40} = 66$$

$$\Rightarrow 4500 + 3840 + 55p + 2000 = 66(60 + 48 + p + 40)$$

$$\Rightarrow 10340 + 55p = 66p + 9768$$

$$\Rightarrow 10340 - 9768 = (66 - 55)p$$

$$\Rightarrow P = \frac{572}{11}$$

$$\Rightarrow P = 52$$

14. Table:

Marks	Frequency
0 - 10	3
10 - 20	5
20 - 30	7
30 - 40	10
40 - 50	12
50 - 60	15
60 - 70	12
70 - 80	6
80 - 90	2
90 - 100	8

15. Following table shows the given data & assumed mean deviation method to calculate the mean :-

Class Interval	Frequency(f_i)	Mid value	Deviation $d_i = x_i -$	$(f_i \times d_i)$
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		x_i	75.5	
65 - 68	2	66.5	-9	-18
68 - 71	4	69.5	-6	-24
71 - 74	3	72.5	-3	-9
74 - 77	8	75.5 = A	0	0
77 - 80	7	78.5	3	21
80 - 83	4	81.5	6	24
83 - 86	2	84.5	9	18
	$\Sigma f_i = 30$			$\Sigma (f_i d_i) = 12$

Let, assumed mean (A) = 75.5.....(1)

Now, from table :-

$$\Sigma f_i = 30 \text{ and } \Sigma f_i d_i = 12 \dots\dots(2)$$

Now,

$$\begin{aligned}
 \text{mean} &= A + \frac{\Sigma f_i d_i}{\Sigma f_i} \\
 &= 75.5 + \frac{12}{30} \cdot [\text{from (1) \& (2)}] \\
 &= 75.5 + 0.4 \\
 &= 75.9
 \end{aligned}$$

Thus, the mean of heartbeats per minute for these patients is 75.9

16.

Expenditure (in Rs.) x_i	Frequency f_i	Mid- value x_i	$d_i = x_i -$ $A = x_i -$ 325	$u_i = \frac{x_i - A}{h}$ $= \frac{x_i - 325}{50}$	$f_i u_i$
100-150	24	125	-200	-4	-96
150-200	40	175	-150	-3	-120
200-250	33	225	-100	-2	-66
250-300	28	275	-50	-1	-28
300-350	30	325	0	0	0

350-400	22	375	50	1	22
400-450	16	425	100	2	32
450-500	7	475	150	3	21
	$N = \sum f_i = 200$				$\sum f_i u_i = -235$

Let the assumed mean be $A=325$.

$N = 200$, $A = 325$, $h=50$, and $\sum f_i u_i = -235$

$$\text{mean} = \bar{x} = A + h \frac{1}{N} \sum f_i u_i$$

$$\Rightarrow \bar{x} = 325 + 50 \times \left\{ \frac{-235}{200} \right\}$$

$$\Rightarrow \bar{x} = 325 - \frac{235}{4} = 325 - 58.75 = 266.25$$

17.

Categories of workers	%	Measure of central angle
Cultivators	40.3	$\frac{40.3}{100} \times 360^\circ = 145^\circ$
Agricultural labour	25	$\frac{25}{100} \times 360^\circ = 90^\circ$
Industrial workers	12.5	$\frac{12.5}{100} \times 360^\circ = 45^\circ$
Commercial workers	9.7	$\frac{9.7}{100} \times 360^\circ = 35^\circ$
Others	12.5	$\frac{12.5}{100} \times 360^\circ = 45^\circ$
Total	100	360°



18.

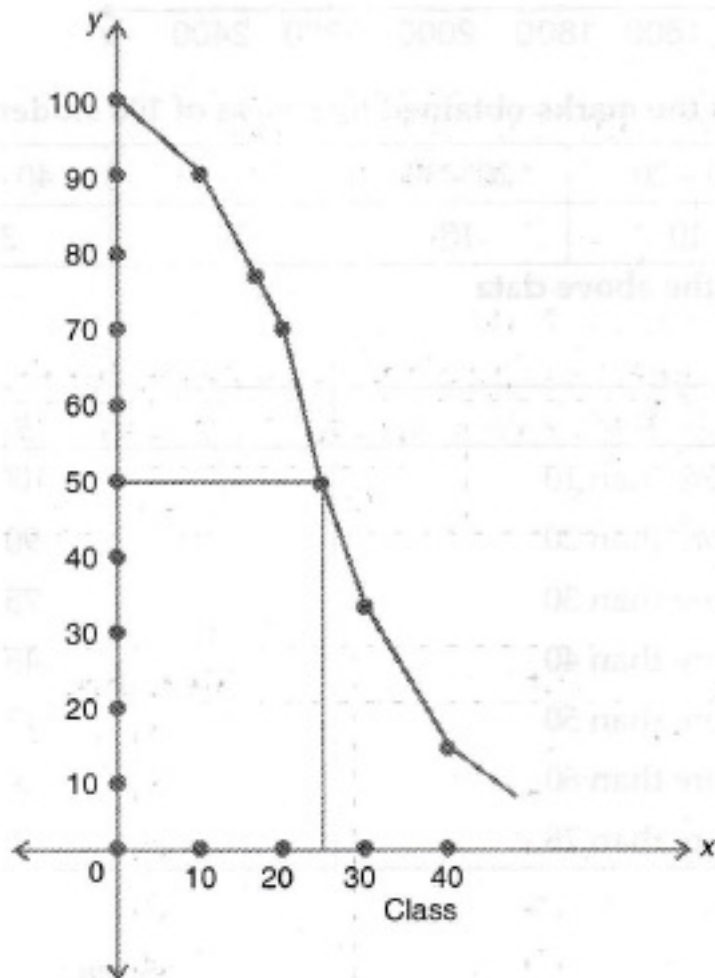
More than	C . F
0	100
10	90

20	72
30	32
40	12

Graph:

Scale: on x - axis, $1\text{cm} = 10\text{cm}$.

on y - axis, $1\text{cm} = 10\text{cm}$.



From graph,

$$\text{Median} = \frac{N}{2}$$

$$\frac{N}{2} = \frac{100}{2} = 50$$

Therefore, Median = 25

19. Table:

Class	Frequency	Mid value x_i	$f_i x_i$	Cumulative frequency
25 - 35	7	30	210	7

35 - 45	31	40	1240	38
45 - 55	33	50	1650	71
55 - 65	17	60	1020	88
65 - 75	11	70	770	99
75 - 85	1	80	80	100
	N = 100		$\sum f_i x_i = 4970$	

i. Mean

$$\frac{\sum f_i x_i}{\sum f_i} = \frac{4970}{100} = 49.70$$

ii. $N = 100$, $\frac{N}{2} = 50$

Median Class is 45 - 55

$$l = 45, h = 10, N = 100, c = 38, f = 33$$

$$\therefore \text{Median} = l + h \left(\frac{\frac{N}{2} - c}{f} \right)$$

$$= 45 + \left\{ 10 \times \frac{50 - 38}{33} \right\}$$

$$= 45 + 3.64 = 48.64$$

iii. we know that, $\text{Mode} = 3 \times \text{median} - 2 \times \text{mean}$

$$= 3 \times 48.64 - 2 \times 49.70$$

$$= 145.92 - 99.4 = 46.52$$

20.

Class Interval	Frequency	Cumulative frequency
0 -100	2	2
100-200	5	7
200-300	x	7 + x
300-400	12	19 + x
400-500	17	36 + x
500-600	20	56 + x
600 - 700	y	56 + x + y
700 - 800	9	65 + x + y

800-900	7	$72 + x + y$
900-1000	4	$76 + x + y$
	$N = 100$	

Hence, $6 + x + y = 100$

$$\Rightarrow x + y = 100 - 76 = 24$$

Given, Median = 525, which lies between class 500 - 600

\Rightarrow Median class = 500 - 600

Now, Median = $l + \frac{\frac{n}{2} - c.f}{f} \times h$

$$\Rightarrow 525 = 500 + \left[\frac{\frac{100}{2} - (36+x)}{20} \right] \times 100$$

$$\Rightarrow 25 = (50 - 36 - x)5$$

$$\Rightarrow (14 - x) = 5$$

$$\Rightarrow x = 14 - 5 = 9$$

Substituting the value of x in equation (i),

$$y = 24 - 9 = 15$$

Hence, $x = 9$ and $y = 1$