CBSE Test Paper 02 Chapter 14 Statistics

- **1.** To represent 'the less than type' graphically, we plot the _____ on the x axis. **(1)**
 - a. class marks
 - b. class size
 - c. lower limits
 - d. upper limits
- 2. $\frac{Upperclasslimit+Lowerclasslimit}{2}$ =. (1)
 - a. frequency
 - b. Class mark
 - c. None of these
 - d. class size
- **3.** The mean of the first **10** prime numbers is **(1)**
 - a. 129
 - b. 1.29
 - c. 12.9
 - d. 11.9
- 4. The mean of the first 10 natural odd numbers is (1)
 - a. 9
 - b. 12
 - **c.** 11
 - d. 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 lim<mark>it of t</mark>he 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	less than					
cm)	140	145	150	155	160	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

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

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

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

Schools	No. of Candidates	Average Score
Ι	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 abo	ove		80			
10 and ab	ove		77			
20 and ab	ove		72			
30 and ab	ove		65			
40 and ab	ove		55			
50 and ab	ove		43			
60 and ab	ove		28			
70 and ab	ove		16			
80 and ab	ove	10				
90 and ab	ove	8				
100 and ab	ove	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	65 -	68 -	71 -	74 -	77 -	80 -	83 -
minute	68	71	74	77	80	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-	200-	250-	300-	350-	400-	450-
	150	200	250	300	350	400	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 laboure	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	0-	100-	200-	300-	400-	500-	600-	700-	800-	900-
Interval	100	200	300	400	500	600	700	800	900	1000
Frequency	2	5	х	12	17	20	у	9	7	4

CBSE Test Paper 02 Chapter 14 Statistics

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
Upper class limit+Lower class limit
2

These mid-valu<mark>es are</mark> also k<mark>nown</mark> as Classmark.

3. c. 12.9

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

$$= \frac{2+3+5+7+11+13+17+19+23+29}{10}$$
$$= \frac{129}{10}$$
$$= 12.9$$

4. d. 10

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

$$= \frac{1+3+5+7+9+11+13+15+17+19}{10}$$
$$= \frac{100}{10}$$
$$= 10$$

5. d. 170

Explanation:

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

	00
Here N = 66	

 $\Rightarrow rac{N}{2} = 33$ \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

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Mode = 3 Median - 2 Mean

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

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

= \frac{55.2 + 106.8}{3}

= \frac{162}{3}

= 54
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7. Mode : It is the value which occurs maximum number of times.

Given data:

15, 8, 26, 25, 24, 15, 18<mark>, 20, 24, 15, 19, 1</mark>5

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

. 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.

. 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 = $\frac{35+55}{2} = \frac{90}{2} = 45$

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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 student	s (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,

$$\overline{x} = rac{\sum f_i x_i}{\sum f_i} = rac{499}{40} = 12.475$$

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	Р	55
IV	40	50

Given

Average score for all schools = 66

$$\frac{N_1\overline{x_1} + N_2\overline{x_2} + N_3\overline{x_3} + N_4\overline{x_4}}{N_1 + N_2 + N_3 + N_4} = 66$$

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

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

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

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

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

$$\Rightarrow P = 52$$

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		Mid value	Deviation d _i = x _i -	a -
Interval	Frequency(f _i)			($f_i imes d_i$)

		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 :- $\sum f_i = 30$ and $\sum f_i d_i = 12$(2) Now, mean = $A + \frac{\sum f_i d_i}{\sum f_i}$ = 75.5 + $\frac{12}{30}$. [from (1) & (2)] = 75.5 + 0.4 = 75.9

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

Expenditure (in Rs.) x _i	Frequency f _i	Mid- value x _i	$d_i = x_i - A = x_i - 325$	$u_i = rac{x-A}{h} \ = rac{x_i-325}{50}$	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.

$$\begin{array}{l} \mathsf{N} = 200, \mathsf{A} = 325, \mathsf{h} = 50, \text{ and } \Sigma f_i u_i = -235 \\ mean = \overline{x} = A + h \frac{1}{N} \Sigma f_i u_i \\ \Rightarrow \quad \overline{x} = 325 + 50 \times \left\{ \frac{-235}{200} \right\} \\ \Rightarrow \quad \overline{x} = 325 - \frac{235}{4} = 325 - 58.75 = 266.25 \end{array}$$

17.

Categories of workers	%	Measure of central angle
Cultivators	40.3	$-\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!360^\circ=145^\circ$
Agricultural <mark>labou</mark> r	25	$rac{25}{100} imes 360^\circ = 90^\circ$
Industrial workers	12.5	$-\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!360^\circ =$
Commercial workers	9.7	$rac{9.7}{100} imes 360^\circ = 35^\circ$
Others	12.5	$-\!\!\!-\!\!\!-\!\!\!-\!\!\!-\!\!\!360^\circ =$
Total	100	360°



18.

More than	C . F
0	100
10	90

20	72
30	32
40	12

Graph:



From graph,

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

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

Therefore, $\operatorname{Median}=25$

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

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

∴Median =
$$l + h\left(\frac{2}{f}\right)$$

= $45 + \left\{10 \times \frac{50-38}{33}\right\}$
= $45 + 3.64 = 48.64$

iii. we know that, Mode = $3 imes ext{median} - 2 imes ext{mean}$

= 3 imes 48.64 - 2 imes 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	у	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 = 15Hence, x = 9 and y = 1