

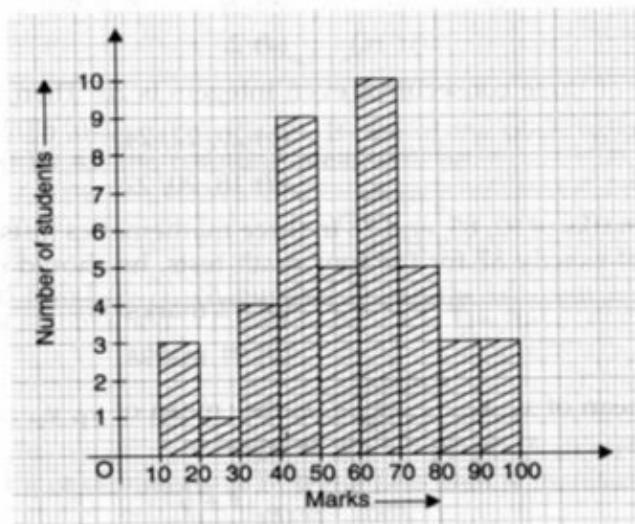
CBSE Test Paper 01

CH-14 Statistics

1. Which of the following variables are discrete ? 1. Size of shoes, 2. Number of pages in a book, 3. Distance travelled by a train, 4. Time
- a. 2 and 4
 - b. 1 and 3
 - c. 1 and 4
 - d. 1 and 2
2. 'Less than' cumulative frequency table for a given data is as follows. Then, the frequency of class interval 20-30 is

Marks	Less than 10	Less than 20	Less than 30	Less than 40
Cumulative frequency	3	17	37	92

- a. 34
 - b. 55
 - c. 14
 - d. 20
3. Find out the mode of the following: 5, 4, 3, 5, 6, 6, 6, 5, 4, 5, 5, 3, 2, 1
- a. 4
 - b. 5
 - c. 6
 - d. 3
4. In the given graph, the number of students who scored 60 or more marks is



- 22
 - 20
 - 21
 - 19
- In a bar graph if 1 cm represents 30 km, then the length of bar needed to represent 75 km is
 - 3.5 cm
 - 2.5 cm
 - 2 cm
 - 3 cm
 - Fill in the blanks: The difference between the upper-class limit and lower class limit is called _____ .
 - Fill in the blanks: The percentage of marks obtained by students of a class in mathematics are 65, 35, 37, 23, 0, 18, 82, 92, 72, 32, 10, 5. Then median is _____.
 - Write the class mark of 90-110 group.
 - Find the arithmetic mean of first 6 natural numbers.
 - Find the median of the following observation : 72, 68, 42, 33, 35, 39, 40, 41, 65, 69
 - The mean of 40 observations was 160. It was detected on rechecking that the value of 165 was wrongly copied as 125 for computation of mean. Find the correct mean.
 - Draw a histogram and frequency polygon to represent the following data on the same scale) which shows the monthly cost of living index of a city in a period of 2 years :

Cost of living index	Number of months

440-460	2
460-480	4
480-500	3
500-520	5
520-540	3
540-560	2
560-580	1
580-600	4
Total	24

13. Find the missing value of p of the following distribution whose mean is 12.58.

x	5	8	10	12	p	20	25
f	2	5	8	22	7	4	2

14. The water bills (in Rs.) of 32 houses in a certain street for the period 1.1.98 to 31.3.98 are given below:

56, 43, 32, 38, 56, 24, 68, 85, 52, 47, 35, 58, 63, 74, 27, 84, 69, 35, 44, 75, 55, 30, 54, 65, 45, 67, 95, 72, 43, 65, 35, 59.

Tabulate the data and present the data as a cumulative frequency table using 70-79 as one of the class intervals.

15. Find the missing frequencies in the following frequency distribution if it knows that the mean of the distribution is 50. The total frequency is 120.

x	10	30	50	70	90
f	17	f_1	32	f_2	19

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Solution

1. (d) 1 and 2

Explanation: Discrete variables are variables that can only take finite values.

Size of shoes & pages in the book have finite number.

2. (d) 20

Explanation: A cumulative frequency distribution is the sum of the class and all classes below it in a frequency distribution.

Less than 30 has the class interval 20-30. Frequency of this class interval will be corresponding to

Marks	Cumulative frequency	Class	Frequency
Less than 10	3	1-10	3
Less than 20	17	10-20	14
Less than 30	37	20-30	20
Less than 40	92	30-40	55

$$37 - 17 = 20$$

3. (b) 5

Explanation: The observation which occurs maximum number of times is called as mode of the given data.

Above given data has maximum number of 5, so mode is 5

4. (c) 21

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

$$10 + 5 + 3 + 3 = 21$$

5. (b) 2.5 cm

Explanation: 1 cm - 30 km

so for 75 km

$$\frac{75}{30} = 2.5 \text{ cm}$$

6. class width/ class size

7. 33.5

$$8. \text{ Class Mark} = \frac{\text{Upper class Limit} + \text{Lower Class Limit}}{2}$$

$$\text{Class Mark} = \frac{110+90}{2}$$

$$\text{Class Mark} = \frac{200}{2}$$

$$\text{Class Mark} = 100$$

9. First six natural numbers are 1, 2, 3, 4, 5, 6. Let $\bar{X}$ be their arithmetic mean. Then,
$$\bar{X} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = \frac{7}{2} = 3.5$$

10. Arranging the data in ascending order, we have

33, 35, 39, 40, 41, 42, 65, 68, 69, 72

Number of items (N) = 10 which is even.

$$\begin{aligned} \therefore \text{Median} &= \frac{\text{Size of } \left(\frac{N}{2}\right)^{\text{th}} \text{ item} + \text{Size of } \left(\frac{N}{2} + 1\right)^{\text{th}} \text{ item}}{2} \\ &= \frac{\text{Size of } 5^{\text{th}} \text{ item} + \text{Size of } 6^{\text{th}} \text{ item}}{2} \\ &= \frac{41+42}{2} = 41.5. \end{aligned}$$

11. Here, $n = 40$, $\bar{X} = 160$

$$\text{So, } \bar{X} = \frac{1}{n} (\sum x_i) \Rightarrow 160 = \frac{1}{40} (\sum x_i) \Rightarrow \sum x_i = 160 \times 40 = 6400$$

$$\therefore \text{Incorrect value of } \sum x_i = 6400$$

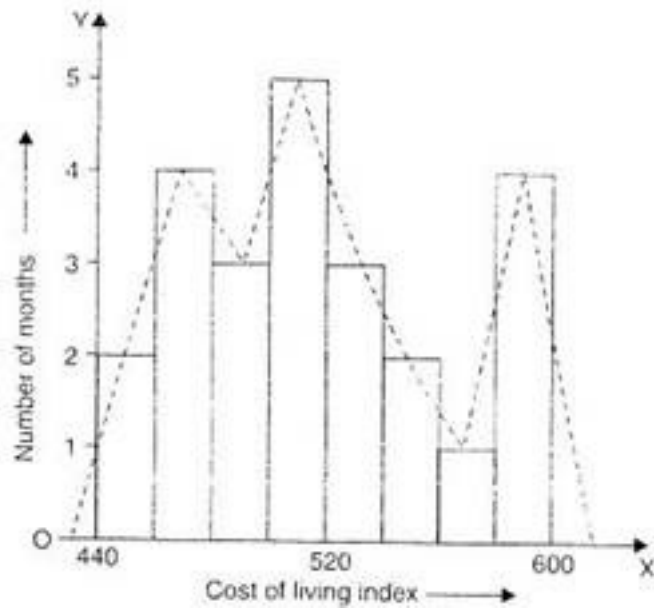
Now,

$$\text{Correct value of } \sum x_i = \text{Incorrect value of } \sum x_i - \text{Incorrect item} + \text{Correct item}$$

$$\Rightarrow \text{Correct value of } \sum x_i = 6400 - 125 + 165 = 6440$$

$$\therefore \text{Correct mean} = \frac{\text{Correct value of } \sum x_i}{n} = \frac{6440}{40} = 161$$

12. Histogram and Frequency polygon representing the cost of living index of a city in a period of 2 years.



13.

x_i	f_i	$f_i x_i$
5	2	10
8	5	40
10	8	80
12	22	264
p	7	7p
20	4	80
25	2	50
	N = 50	$\sum f_i x_i = 7p + 524$

Given Mean = 12.58

$$\Rightarrow \frac{\sum f_i x_i}{N} = 12.58$$

$$\Rightarrow \frac{7p+524}{50} = 12.58$$

$$\Rightarrow 7p + 524 = 629$$

$$\Rightarrow 7p = 629 - 524$$

$$\Rightarrow 7p = 105$$

$$\Rightarrow p = \frac{105}{7} = 15$$

14. The minimum and maximum bills are Rs.24 and Rs.95.

The range is $95 - 24 = 71$

Given class interval is 70 - 79. So, class size is $79 - 70 = 9$

$$\therefore \text{Number of classes} = \frac{\text{Range}}{\text{Class-size}} = \frac{71}{9} = 7.80$$

$\Rightarrow$ Number of classes = 8

The cumulative frequency distribution is as:

Bills (Rs.)	No. of house (Frequency)	Cumulative frequency
16-25	1	1
25-34	3	4
34-43	5	9
43-52	4	13
52-61	7	20
61-70	6	26
70-79	3	29
79-88	2	31
88-97	1	32

15.

x_i	f_i	$f_i x_i$
10	17	170
30	f_1	$30f_1$
50	32	1600
70	f_2	$70f_2$
90	19	1710
	N = 120	$\sum f_i x_i = 3480 + 30f_1 + 70f_2$

Given, Mean = 50

$$\Rightarrow \frac{\sum f_i x_i}{N} = 50$$

$$\Rightarrow \frac{30f_1 + 70f_2 + 3480}{120} = 50$$

$$\Rightarrow 30f_1 + 70f_2 + 3480 = 6000$$

$$\Rightarrow 30f_1 + 70f_2 = 6000 - 3480$$

$$\Rightarrow 30f_1 + 70f_2 = 2520$$

$$\Rightarrow 3f_1 + 7f_2 = 252 \text{(i) [Divide by 10]}$$

And N = 120

$$\Rightarrow 17 + f_1 + 32 + f_2 + 19 = 120$$

$$\Rightarrow 68 + f_1 + f_2 = 120$$

$$\Rightarrow f_1 + f_2 = 120 - 68 = 52$$

$$\Rightarrow 3f_1 + 3f_2 = 156 \text{ ...(ii) [Multiply by 3]}$$

Subtract equation (ii) from equation (i),

$$3f_1 + 7f_2 - 3f_1 - 3f_2 = 252 - 156$$

$$\Rightarrow 4f_2 = 96$$

$$\Rightarrow f_2 = \frac{96}{4} = 24$$

Put value of f_2 in equation (i),

$$3f_1 + 7 \times 24 = 252$$

$$\Rightarrow 3f_1 + 168 = 252$$

$$\Rightarrow 3f_1 = 252 - 168 = 84$$

$$\Rightarrow f_1 = \frac{84}{3} = 28$$