Class X : MATH
Chapter 13 : Statistics
Questions & Answers - Exercise : 13.1 - NCERT Book

Q1. A survery was conducted by a group of students as a part of their environment awareness programme, in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per house.

Number of Plants	0-2	2-4	4-6	6-8	8-10	10-12	12-14
Number of houses	1	2	1	5	6	2	3

Which method did you use for finding the mean, and why?

Sol. Let us find mean of the data by direct method because the figures are small.

(Number of plants) Class	(Number of houses) Frequency (f_i)	Class marks (x_i)	$f_i \times x_i$
0-2	1	1	1
2-4	2	3	6
4-6	1	5	5
6-8	5	7	35
8-10	6	9	54
10-12	2	11	22
12-14	3	13	39
Total	n = 20		162

We have, $n = \Sigma f_i = 20$ and $\Sigma f_i x_i = 162$.

Then mean of the data is

$\bar{x} = \frac{1}{n} \times \Sigma f_i x_i = \frac{1}{20} \times 162 = 8.1$

Hence, the required mean of the data is 8.1 plants.

Q2. Consider the following distribution of daily wages of 50 workers of a factory.

Daily wages (in Rs.)	Number of workers
100-120	12
120-140	14
140-160	8
160-180	6
180-200	10

Find the mean daily wages of the workers of the factory by using an appropriate method.

Sol.

Daily wages (In Rs.)	**No. of workers (f_i)**	**Class marks (x_i)**	**$f_i x_i$**
100–120	12	110	1320
120–140	14	130	1820
140–160	8	150	1200
160–180	6	170	1020
180–200	10	190	1900
Total	**n = 50**		**7260**

We have $\Sigma f_i = 50$ and $\Sigma f_i x_i = 7260$

Mean $= \frac{\sum f_i x_i}{\sum f_i} = \frac{7260}{50} = 145.2$

Q3. The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs. 18. Find the missing frequency f.

Daily pocket Allowance (in Rs.)	Number of children
11-13	7
13-15	6
15-17	9
17-19	13
19-21	f
21-23	5
23-25	4

Sol. We may prepare the table as given below :

Daily pocket allowance (in Rs.)	Number of children (f_i)	Class mark (x_i)	$d_i = x_i - 18$	$f_i \times d_i$
11-13	7	12	-6	-42
13-15	6	14	-4	-24
15-17	9	16	-2	-18
17-19	13	18 = a	0	0
19-21	f	20	2	2f
21-23	5	22	4	20
23-25	4	24	6	24
	$\Sigma f_i = 44 + f$			$2f - 40$

It is given that mean = 18.

From the table, we have

$$a = 18,\ n = 44 + f \text{ and } \Sigma f_i d_i = 2f - 40$$

Now, $$\text{mean} = a + \frac{1}{n} \times \Sigma f_i d_i$$

Then substituting the values as given above, we have

$$18 = 18 + \frac{1}{(44 + f)} \times (2f - 40)$$

$$\Rightarrow \quad 0 = \frac{2f - 40}{44 + f} \Rightarrow f = 20.$$

Q4. Thirty women were examined in a hospital by a doctor and the number of heart beats per minute were recorded and summarised as follows. Find the mean heart beats per minute for

these women, choosing a suitable method.

Number of heart beats per minute	Number of women
65-68	2
68-71	4
71-74	3
74-77	8
77-80	7
80-83	4
83-86	2

Sol.

No. of heart beats per min	**No. of women (f_i)**	**Class marks (x_i)**	**$f_i x_i$**
65–68	2	66.5	133
68–71	4	69.5	278
71–74	3	72.5	217.5
74–77	8	75.5	604
77–80	7	78.5	549.5
80–83	4	81.5	326
83–86	2	84.5	169
Total	**n = 30**		**2277**

Mean $= \frac{\sum f_i x_i}{\sum f_i} = \frac{2277}{30} = 75.9.$

Q5. In a retail market, fruit vendors were selling mangoes kept in packing boxes. These boxes contained varying number of mangoes. The following was the distribution of mangoes according to the number of boxes.

No. of mangoes	50-52	53-55	56-58	59-61	62-64
No. of boxes	15	110	135	115	25

Find the mean number of mangoes kept in a packing box. Which method of finding the mean did you choose?

Sol.

Number of mangoes	Number of boxes f_i	Class mark x_i	$u_i = \frac{x_i - 57}{3}$	$f_i \times u_i$
50-52	15	51	-2	-30
53-55	110	54	-1	-110
56-58	135	57	0	0
59-61	115	60	1	115
62-64	25	63	2	50
Total	$n = 400$			25

$a = 57$, $h = 2$, $n = 400$ and $\Sigma f_i u_i = 25$.

By step deviation method,

$$\text{Mean} = a + h \times \frac{1}{n} \times \Sigma f_i u_i = 57 + 2 \times \frac{1}{400} \times 25 = 57.19$$

Q6. The table below shows the daily expenditure on food of 25 households in a locality.

Daily expenditure (in Rs.)	No. of households
100-150	4
150-200	5
200-250	12
250-300	2
300-350	2

Find the mean daily expenditure on food by a suitable method.

Sol.

Daily Exp. (in Rs.)	No. of house holds (f_i)	Class marks (x_i)	f_ix_i
100–150	4	125	500
150–200	5	175	875
200–250	12	225	2700
250–300	2	275	550
300–350	2	325	650
Total	**25**		**5275**

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{5275}{25} = 211$$

Q7. To find out the concentration of SO_2 in the air (in parts per million, i.e., ppm), the data was collected for 30 localities in a certain city and is presented below :

Concentration of SO_2 (in ppm)	Frequency
0.00-0.04	4
0.04-0.08	9
0.08-0.12	9
0.12-0.16	2
0.16-0.20	4
0.20-0.24	2

Find the mean concentration of SO_2 in the air.

Sol.

Concentration of SO_2 (in ppm)	Frequency (f_i)	Class marks (x_i)	f_ix_i
0-0.04	4	0.02	0.08
0.04–0.08	9	0.06	0.54
0.08–0.12	9	0.10	0.90
0.12–0.16	2	0.14	0.28
0.16–0.20	4	0.18	0.72
0.20–0.24	2	0.22	0.44
Total	**30**		**2.96**

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{2.96}{30} = 0.098.$$

Q8. 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.

No. of days	0-6	6-10	10-14	14-20	20-28	28-38	38-40
No. of students	11	10	7	4	4	3	1

Sol.

No. of days	No. of students (f_i)	Class marks (x_i)	f_ix_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	**40**		**499**

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{499}{40} = 12.475$$

Q9. The following table gives the literacy rate (in percentage) of 35 cities. Find the mean literacy rate.

Literacy rate (in %)	45-55	55-65	65-75	75-85	85-95
No. of cities	3	10	11	8	3

Sol.

Literacy rate (in %)	**No. of cities (f_i)**	**Class marks (x_i)**	**$f_i x_i$**
45–55	3	50	150
55–65	10	60	600
65–75	11	70	770
75–85	8	80	640
85–95	3	90	270
Total	**35**		**2430**

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{2430}{35} = 69.43$$