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(Affiliated to CBSE up to +2 Level)

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Statistics

1. A survey 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.

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

Sol. We can calculate the mean as:

Number of plants	Number of houses (f_i)	Mid-point (x_i)	($f_i x_i$)
0-2	1	1	1 × 1 = 1
2-4	2	3	2 × 3 = 6
4-6	1	5	1 × 5 = 5
6-8	5	7	5 × 7 = 35
8-10	6	9	6 × 9 = 54
10-12	2	11	2 × 11 = 22
12-14	3	13	3 × 13 = 39
Total	$\Sigma f_i = 20$		$\Sigma f_i x_i = 162$

$$\therefore \text{Mean } \bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$\Rightarrow \text{Mean } \bar{x} = \frac{162}{20} = 8.1$$

Thus, mean number of plants per house is 8.1.

Since, values of x_i and f_i are small

∴We have used the direct method.

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

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

Sol. Let the assumed mean, a = 150

∵ Class interval h = 20

$\therefore u_i = \frac{x_i - a}{h} = \frac{x_i - 150}{20}$

∴We have the following table:

Class interval	Class mark (x_i)	Frequency (f_i)	$u_i = \frac{x_i - 150}{20}$	$f_i u_i$
100–120	110	12	$\frac{110 - 150}{20} = -2$	$12 \times (-2) = -24$
120–140	130	14	$\frac{130 - 150}{20} = -1$	$14 \times (-1) = -14$
140–160	150	8	$\frac{150 - 150}{20} = 0$	$8 \times 0 = 0$
160–180	170	6	$\frac{170 - 150}{2} = 1$	$6 \times 1 = 6$
180–200	190	10	$\frac{190 - 150}{2} = 2$	$10 \times 2 = 20$
Total		50		-12

Now $\bar{x} = a + h \times \frac{\Sigma f_i u_i}{\Sigma f_i}$

$= 150 + 20\left(\frac{-12}{50}\right)$

$= 150 - \frac{24}{5}$

$= \frac{750 - 24}{5} = \frac{750 - 24}{5} = \frac{726}{5}$

= 145.2

3. 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.

Sol. Let the assumed mean, a = 16

∵ Class interval h = 2

$\therefore u_i = \frac{x_i - a}{h} = \frac{x_i - 16}{2}$

Now, we have the following table:

Class interval	Mid value (x_i)	Frequency (f_i)	$u_i = \frac{x_i - 16}{2}$	$f_i u_i$
11–13	12	7	$\frac{12 - 16}{2} = -2$	$7 \times (-2) = -14$
13–15	14	6	$\frac{14 - 16}{2} = -1$	$6 \times (-1) = -6$
15–17	16	9	$\frac{16 - 16}{2} = 0$	$9 \times (0) = 0$
17–19	18	13	$\frac{18 - 16}{2} = 1$	$13 \times 1 = 13$
19–21	20	f	$\frac{20 - 16}{2} = 2$	$f \times 2 = 2f$
21–23	22	5	$\frac{22 - 16}{2} = 3$	$5 \times 3 = 15$
23–25	24	4	$\frac{24 - 16}{2} = 4$	$4 \times 4 = 16$
		$\Sigma f_i = (f + 44)$		$\Sigma f_i u_i = (2f + 24)$

Since $\bar{x} = 18$, a = 16 and h = 2

$$\therefore \bar{x} = a + h\left[\frac{\Sigma f_i u_i}{\Sigma f_i}\right]$$

$$\Rightarrow 18 = 16 + 2\left[\frac{2f + 24}{f + 44}\right]$$

$$\Rightarrow 18 - 16 = 2\left[\frac{2(f+12)}{f+44}\right] \Rightarrow 2 = 2\left[\frac{2(f+12)}{f+44}\right]$$

$$\Rightarrow f + 44 = 2(f + 12) = 2f + 24$$

$$\Rightarrow -f = -44 + 24 = -20 \Rightarrow f = 20$$

Thus, the missing frequency is 20.

4. 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.

Sol. Let the assumed mean a = 75.5

$\therefore$ Class interval h = 3

$$\therefore u_i = \frac{x_i - a}{h} = \frac{x_i - 75.5}{3}$$

Now, we have the following table:

Class interval	Class mark (x_i)	Frequency (f_i)	$u_i = \frac{x_i - 75.5}{3}$	$f_i u_i$
65–68	66.5	2	(66.5 – 75.5) ÷ 3 = –3	2 × (–3) = –6
68–71	69.5	4	(69.5 – 75.5) ÷ 3 = –2	4 × (–2) = –8
71–74	72.5	3	(72.5 – 75.5) ÷ 3 = –1	3 × (–1) = –3
74–77	75.5	8	(75.5 – 75.5) ÷ 3 = 0	8 × 0 = 0
77–80	78.5	7	(78.5 – 75.5) ÷ 3 = 1	7 × 1 = 7
80–83	81.5	4	(81.5 – 75.5) ÷ 3 = 2	4 × 2 = 8
83–86	84.5	2	(84.5 – 75.5) ÷ 3 = 3	2 × 3 = 6
Total		$\Sigma f_i = 30$		$\Sigma f_i u_i = 4$

$$\therefore \bar{x} = a + h\left[\frac{\Sigma f_i u_i}{\Sigma f_i}\right]$$

$$= 75.5 + 3 \times \frac{4}{30}$$

$$= 75.5 + \frac{4}{10} = \frac{755}{10} + \frac{4}{10}$$

$$= \frac{759}{10} = 75.9$$

Thus, the mean heart beat per minute is 75.9.