ODM EDUCATIONAL GROUP
Changing your Tomorrow

STATISTICS
PPT-2

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 14
CHAPTER NAME : STATISTICS

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PREVIOUS KNOWLEDGE TEST

1. **MEAN (AVERAGE):** Mean [Ungrouped Data] – Mean of n observations, x_1, x_2, x_3 … x_n, is

$$\overline{X} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n} = \frac{1}{n}\sum x \qquad \therefore \qquad \overline{X} = \frac{\sum x}{n}$$

- 2. Frequency of a class is centred at its mid-point called class mark.

LEARNING OUTCOMES

1 Students will be able to know mean.

2. Students will be able to apply the knowledge of mean in solving questions by assumed mean method & Step deviation method .

Assumed Mean Method: In this, an arbitrary mean ‘a’ is chosen which is called, ‘assumed mean’, somewhere in the middle of all the values of x.

$$\bar{X} = a + \frac{\sum f_i d_i}{\sum f_i}$$

[where di = (xi – a)]

Step deviation method:

$$\text{Mean } (\bar{x}) = A + \left(\frac{\sum f_i u_i}{\sum f_i}\right) h,$$

where $u_i = \frac{x_i - A}{h}$ and ‘f_i’ is the frequency corresponding to the class mark ‘x_i’.

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

Daily wages (in ₹)	No. 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.

In this case, we can use step-deviation method because the sata is large.

Here, a = 150 and h = 20

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

$$\therefore \text{Mean, } \bar{x} = a + h\left(\frac{\Sigma f_i u_i}{\Sigma f_i}\right)$$

$$= 150 + 20\left(\frac{-12}{50}\right) = 150 - \frac{240}{50}$$

$$= 150 - \frac{24}{5} = \frac{750 - 24}{5}$$

$$= \frac{726}{5} = 145.20.$$

Hence, mean daily wages of the workers are **₹ 145.20**.

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

Daily pocket allowances (in ₹)	No. of children
11 – 13	7
13 – 15	6
15 – 17	9
17 – 19	13
19 – 21	f
21 – 23	5
23 – 25	4

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

We have, $\text{Mean} = a + \dfrac{\Sigma f_i d_i}{\Sigma f_i}$

$\Rightarrow \quad 18 = 18 + \dfrac{2f - 40}{44 + f}$ [$\because$ Mean = 18 (given)]

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

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

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

Here h = 3

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

We have, $$\text{Mean} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h = 57 + \frac{25 \times 3}{400}$$

$$= 57 + 0.19 = 57.19 \text{ mangoes.}$$

Step deviation method.

HOME ASSIGNMENT Ex. 14.1 Q. No 5 to Q9

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