Class 10-Mathematics

Instructions for students: The notes provided must be copied to the Maths copy and then do the homework in the same copy.

Chapter 21

MEASURES OF CENTRAL TENDENCY

MEAN (ARITHMETIC MEAN)

Mean of ungrouped data

The mean of 'n' variates = $\frac{\Sigma x_i}{n}$ $(\Sigma x_i = x_1 + x_2 + x_3 + \cdots + x_n)$

Mean of grouped data

- **Direct method:** Mean = $\frac{\Sigma f_i x_i}{\Sigma f_i}$
  (where x_i are the observations and f_i are the corresponding frequencies)
- **Shortcut method: Mean** = a+$\frac{\Sigma f_i d_i}{\Sigma f_i}$
  (Where a = assumed mean and $d_i = x_i - a$)

Mean of grouped data in the form of classes (continuous or discontinuous)

- **Direct method:** Mean = $\frac{\Sigma f_i x_i}{\Sigma f_i}$
  (where x_i are the class marks and f_i are the corresponding frequencies)
- **Shortcut method: Mean** = a+$\frac{\Sigma f_i d_i}{\Sigma f_i}$
  (Where a = assumed mean and $d_i = x_i - a$)
- **Step deviation Method:**
  Mean = a+ $c \times \frac{\Sigma f_i d_i}{\Sigma f_i}$
  (Where a = assumed mean, c = width of the classes and $d_i = \frac{x_i - a}{c}$)

Exercise 21.1

Q2. Solution

i) Mean of marks $= \frac{\Sigma x_i}{n}$

$$= \frac{12+14+7+9+23+11+8+13+11+19+16+24+17+3+20}{15}$$

$$= \frac{207}{15} = 13.8$$

ii) When the marks of each students are increased by 4,

Increase in sum of marks = 15×4 = 60

Σx_i = 207+60= 267

Mean = $\frac{267}{15}$ =17.8

iii) When the marks of each students are deducted by 2,

decrease in sum of marks = 15×2 = 30

Σx_i = 207-30= 187

Mean = $\frac{177}{15}$ =11.8

iv) When Marks of each student are doubled,

Σx_i = 2×207 =414

Mean = $\frac{414}{15}$ =27.6

Q24

Solution:

Assumed mean a = 50, c = 20

Class Intervals	Frequency (f_i)	Class Marks (x_i)	$d_i = \frac{x_i - a}{c}$	$f_i d_i$
0 – 20	17	10	-2	-34
20 – 40	p	30	-1	-p
40 – 60	32	50	0	0
60 – 80	q	70	1	q
80 - 100	19	90	2	38

$\Sigma f_i = 120$, $\Sigma f_i d_i = -p+q+4$

$\Rightarrow 17 + p + 32 + q + 19 = 120$

$\Rightarrow p+q = 120 - 68$

$\Rightarrow p + q = 52$ -----(1)

Mean = 50

$\Rightarrow$a+ $c \times \frac{\Sigma f_i d_i}{\Sigma f_i}$ = 50

$\Rightarrow$50 + 20 $\times \frac{-p+q+4}{120}$ = 50

$\Rightarrow$-p + q = -4 ----(2)

Adding (1) and (2) we get,

2q = 48

q = 24

p = 28 (From (2))

Home Work:

- Solve **Exercise 21.1 Questions 4, 8, 12, 16, 23 and 26** in the Maths copy.(Watch the video carefully)
- Practise **exercise 21.1 all problems.**