



## CHAPTER 4 – STATISTICS

### Introduction | ପରିଚୟ

**English:**

**Statistics** is the branch of mathematics that deals with the **collection, organisation, representation, and analysis of numerical data.**

**ଓଡ଼ିଆ:**

**ସାଂଖ୍ୟିକୀ (Statistics)** ହେଉଛି ଗଣିତର ସେହି ଅଂଶ, ଯେଉଁଠାରେ ତଥ୍ୟ ସଂଗ୍ରହ, ବିନ୍ୟାସ, ଉପସ୍ଥାପନ ଏବଂ ବିଶ୍ଳେଷଣ କରାଯାଏ।

ଯଥାଯଥ ଗଣନା କଲେ ଏହା ଏକ ଉଚ୍ଚ ମାର୍କ ଆଣିଦେଇଥିବା ଅଧ୍ୟାୟ।

### Meaning of Statistics (ସାଂଖ୍ୟିକୀର ଅର୍ଥ)

**English:**

Statistics helps us to:

- Understand large data easily
- Compare numerical information
- Draw conclusions from data

**ଓଡ଼ିଆ:**

ସାଂଖ୍ୟିକୀ ଦ୍ଵାରା—

- ବହୁ ତଥ୍ୟ ସହଜରେ ବୁଝିପାରିବା
  - ସଂଖ୍ୟାତ୍ମକ ତଥ୍ୟର ତୁଳନା
  - ତଥ୍ୟରୁ ନିଷ୍ପତ୍ତି ନିକାଳିବା
- ସମ୍ଭବ ହୁଏ।

### Measures of Central Tendency (ମଧ୍ୟମ ପ୍ରବୃତ୍ତିର ମାପ)

In Class 10, we mainly study **Mean**.

**Mean (ମାଧ୍ୟମ):**

**English:**

Mean is the average value of the given data.

**ଓଡ଼ିଆ:**

ଦିଆଯାଇଥିବା ତଥ୍ୟର ମଧ୍ୟମ ମୂଲ୍ୟକୁ **ମାଧ୍ୟମ (Mean)** କୁହାଯାଏ।

## Methods of Finding Mean (ମାଧ୍ୟମ ନିର୍ଣ୍ଣୟ ପଦ୍ଧତି)

### Direct Method (ସିଧାସଳଖ ପଦ୍ଧତି)

#### Formula:

$$\text{Mean} = \frac{\sum fx}{\sum f} \quad \text{Mean} = \frac{\sum f x}{\sum f}$$

#### English:

Used when calculations are simple and frequencies are small.

#### ଓଡ଼ିଆ:

ଯେତେବେଳେ ତଥ୍ୟ ସରଳ ଓ ତାରମାଣ ଛୋଟ ଥାଏ, ସେତେବେଳେ ଏହି ପଦ୍ଧତି ବ୍ୟବହାର କରାଯାଏ।

### Assumed Mean Method (ଧାରଣା ମାଧ୍ୟମ ପଦ୍ଧତି)

#### Formula:

$$\text{Mean} = a + \frac{\sum fd}{\sum f} \quad \text{Mean} = a + \frac{\sum f d}{\sum f}$$

Where:

- $a$  = assumed mean
- $d = x - a$

#### English:

This method simplifies lengthy calculations.

#### ଓଡ଼ିଆ:

ଏହି ପଦ୍ଧତି ଦ୍ୱାରା ଦୀର୍ଘ ଗଣନାକୁ ସହଜ କରାଯାଏ।

### Step Deviation Method (ଧାପ ବିଚଳନ ପଦ୍ଧତି)

#### Formula:

$$\text{Mean} = a + \frac{\sum fu}{\sum f} \times h \quad \text{Mean} = a + \frac{\sum f u}{\sum f} \times h$$

Where:

- $u = \frac{x - a}{h}$
- $h$  = class width

#### English:

This is the **most important method for Board exams.**

ଓଡ଼ିଆ:

ଏହା ବୋର୍ଡ ପରୀକ୍ଷା ପାଇଁ ସବୁଠାରୁ ଗୁରୁତ୍ୱପୂର୍ଣ୍ଣ ପଦ୍ଧତି ।

### Board-Type Solved Example

#### Example:

Find the mean of the following data:

| Class Interval | Frequency |
|----------------|-----------|
| 0–10           | 5         |
| 10–20          | 10        |
| 20–30          | 15        |

#### English Solution (Direct Method):

$$\sum f = 30, \sum fx = 550 \quad \sum f = 30, \sum fx = 550$$

$$\text{Mean} = \frac{550}{30} = 18.33 \quad \text{Mean} = \frac{550}{30} = 18.33$$

**Answer:**

$$18.33 \quad 18.33$$

ଓଡ଼ିଆ ସମାଧାନ:

$$\text{ମାଧ୍ୟମ} = \frac{\sum fx}{\sum f} = \frac{550}{30} = 18.33 \quad \text{ମାଧ୍ୟମ} = \frac{\sum fx}{\sum f} = 18.33$$

**ଉତ୍ତର:**

$$18.33 \quad 18.33$$

## Previous Year BSE Odisha

### Chapter 4 – Statistics (Solved Questions)

#### Question 1 — BSE Odisha 2019

**Q:**

Find the mean of the following data using **Direct Method**:

**Class Interval Frequency**

|       |   |
|-------|---|
| 0–10  | 5 |
| 10–20 | 8 |
| 20–30 | 7 |

#### English Solution (Step-by-Step)

**Step 1: Find class marks (x):**

$$0-10 \rightarrow 5 \mid 10-20 \rightarrow 15 \mid 20-30 \rightarrow 25$$

**Step 2: Prepare table:**

**Class f x fx**

$$0-10 \quad 5 \quad 5 \quad 25$$

$$10-20 \quad 8 \quad 15 \quad 120$$

$$20-30 \quad 7 \quad 25 \quad 175$$

$$\sum f = 20, \sum fx = 320 \quad \sum f = 20, \quad \sum fx = 320$$

**Step 3: Apply Direct Method:**

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{320}{20} = 16 \quad \text{Mean} = \frac{\sum fx}{\sum f} = \frac{320}{20} = 16$$

**Final Answer:**

$$\boxed{16}$$

**ଓଡ଼ିଆ ସମାଧାନ**

**ପଦକ୍ରମ-1:**

ମଧ୍ୟମ ବିନ୍ଦୁ (x):

$$0-10 \rightarrow 5, 10-20 \rightarrow 15, 20-30 \rightarrow 25$$

## ପଦକ୍ରମ-2:

$$\sum f = 20, \sum fx = 320 \quad \sum f = 20, \quad \sum fx = 320$$

ମାଧ୍ୟମ:

$$\frac{320}{20} = 16$$

ଉତ୍ତର:

$$\boxed{16}$$

## Question 2 — BSE Odisha 2020

**Q:**

Find the mean using **Assumed Mean Method**:

**Class Interval Frequency**

|       |    |
|-------|----|
| 5–15  | 6  |
| 15–25 | 10 |
| 25–35 | 14 |

**English Solution**

**Step 1:** Class marks (x)

5–15 → 10; 15–25 → 20; 25–35 → 30

Assume mean  $a = 20$

Compute  $d = x - a$

| x | f | d | fd |
|---|---|---|----|
|---|---|---|----|

|    |   |     |     |
|----|---|-----|-----|
| 10 | 6 | -10 | -60 |
|----|---|-----|-----|

|    |    |   |   |
|----|----|---|---|
| 20 | 10 | 0 | 0 |
|----|----|---|---|

|    |    |    |     |
|----|----|----|-----|
| 30 | 14 | 10 | 140 |
|----|----|----|-----|

$$\sum f = 30, \sum fd = 80 \quad \sum f = 30, \quad \sum fd = 80$$

**Step 2:** Use formula:

$$\text{Mean} = a + \frac{\sum fd}{\sum f} = 20 + \frac{80}{30} = 20 + 2.67 = 22.67$$

**Final Answer:**

$$\boxed{22.67}$$

**ଓଡ଼ିଆ ସମାଧାନ**

Assumed mean = 20

$$\sum f = 30, \sum fd = 80 \quad \sum f = 30, \quad \sum fd = 80$$

$$\text{ମାଧ୍ୟମ} = 20 + \frac{80}{30} = 22.67 \quad \text{ମାଧ୍ୟମ} = 20 + \frac{80}{30} = 22.67$$

**ଉତ୍ତର:**

$$22.67 \quad 22.67$$

### Question 3 — BSE Odisha 2021

**Q:**

Find the mean using **Step Deviation Method**:

**Class Interval Frequency**

|       |    |
|-------|----|
| 10–20 | 8  |
| 20–30 | 12 |
| 30–40 | 10 |

**English Solution**

Choose class width  $h=10$

Class marks: 15, 25, 35

Assumed mean  $a=25$

Compute  $u = \frac{x - a}{h}$

**x f u fu**

15 8 -1 -8

25 12 0 0

35 10 1 10

$$\sum f = 30, \sum fu = 2 \quad \sum f = 30, \sum fu = 2$$

Use formula:

$$\begin{aligned} \text{Mean} &= a + \frac{\sum fu}{\sum f} \times h = 25 + \frac{2}{30} \times 10 = 25 + 0.67 = 25.67 \\ \text{Mean} &= a + \frac{\sum fu}{\sum f} \times h = 25 + \frac{2}{30} \times 10 = 25 + 0.67 = 25.67 \end{aligned}$$

**Final Answer:**

$$25.67 \quad 25.67$$

**ଓଡ଼ିଆ ସମାଧାନ**

$$\sum f = 30, \sum fu = 2 \quad \sum f = 30, \sum fu = 2$$

$$\begin{aligned} \text{ମାଧ୍ୟମ} &= 25 + \frac{2 \times 10}{30} = 25.67 \\ \text{ମାଧ୍ୟମ} &= 25 + \frac{2 \times 10}{30} = 25.67 \end{aligned}$$

**ଉତ୍ତର:**

$$25.67 \quad 25.67$$

#### Question 4 — BSE Odisha 2022

**Q:**

Calculate the mean of the grouped data:

**Class Interval Frequency**

|       |    |
|-------|----|
| 0–20  | 4  |
| 20–40 | 6  |
| 40–60 | 10 |
| 60–80 | 10 |

**English Solution**

Class marks: 10, 30, 50, 70

**x f fx**

10 4 40

30 6 180

50 10 500

70 10 700

$\sum f = 30, \sum fx = 1420$

$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{1420}{30} = 47.33$

**Final Answer:**

47.33

**ଓଡ଼ିଆ ସମାଧାନ**

$\sum f = 30, \sum fx = 1420$

$\text{ମାଧ୍ୟମ} = \frac{\sum fx}{\sum f} = 47.33$

**ଉତ୍ତର:**

47.33

#### Question 5 — BSE Odisha 2023

**Q:**

Find the mean marks of students:

**Marks Range Frequency**

|       |    |
|-------|----|
| 0–10  | 4  |
| 10–20 | 8  |
| 20–30 | 13 |
| 30–40 | 5  |

**English Solution**

Class marks: 5, 15, 25, 35

**x   f   fx**

5   4   20

15   8   120

25   13   325

35   5   175

$\sum f = 30, \sum fx = 640$

$\text{Mean} = \frac{640}{30} = 21.33$

**Final Answer:**

$\boxed{21.33}$

**ଓଡ଼ିଆ ସମାଧାନ**

$\sum f = 30, \sum fx = 640$

$\text{ମାଧ୍ୟମ} = \frac{640}{30} = 21.33$

**ଉତ୍ତର:**  $\boxed{21.33}$

**JAI HIND! - BINAYA**