**Central Tendencies**

1. **Arithmetic Mean with Frequencies**
2. **Median of grouped data with frequencies**
3. **Median of grouped data with class intervals**

**Arithmetic mean in case of data with frequencies**

Example: Scores of students

10 20 36 92 95 40 50 56 60 70

92 88 80 70 72 70 36 40 36 40

92 40 50 50 56 60 70 60 60 88

**Calculate Mean**

Add all numbers and divide by 30

**Calculate Mean**

**Construct a frequency table**

|  |  |
| --- | --- |
| **Marks** | **Number of Students** |
| 10 | 1 |
| 20 | 1 |
| 36 | 3 |
| 40 | 4 |
| 50 | 3 |
| 56 | 2 |
| 60 | 4 |
| 70 | 4 |
| 72 | 1 |
| 80 | 1 |
| 88 | 2 |
| 92 | 3 |
| 95 | 1 |

Shorter Method: Use Frequencies multiplication

∑fx / ∑f

1779/30 = 59.3

**Calculating Median in case of Frequency Distribution**

The **median** is that value of the given number of observations, which divides it into exactly two parts. So, when the data is arranged in ascending (or descending) order the median of ungrouped data is calculated as follows:

Two Possibilities: Odd and Even Number of Observations

**Odd Observations**

(N+1)/2

**Even Observations**

Mean value of [N/2, N/2 + 1]

**Exercises**

**Calculating Median**

**Example:** The heights (in cm) of 9 students of a class are as follows:

155 160 145 149 150 147 152 144 148

Firstly, order the data in ascending order

**Example**: The points scored by a Kabaddi team in a series of matches are as follows:

17, 2, 7, 27, 15, 5, 14, 8, 10, 24, 48, 10, 8, 7, 18, 28

Find the Median:

Hint: 8th and 9th terms

**Median of Grouped Data**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks obtained | 20 | 29 | 28 | 33 | 42 | 38 | 43 | 25 |
| Number of Students | 6 | 28 | 24 | 15 | 2 | 4 | 1 | 20 |

*How do you find Median here?*

|  |  |  |
| --- | --- | --- |
| Marks Obtained | Frequency | Cum Freq |
| 20 | 6 | 6 |
| 25 | 20 | 26 |
| 28 | 24 | 50 |
| 29 | 28 | 78 |
| 33 | 15 | 93 |
| 38 | 4 | 97 |
| 42 | 2 | 99 |
| 43 | 1 | 100 |

Median

100/2, 100/2 + 1

[28 + 29]/2 = 28.5

**Example:**

A survey regarding heights in cms of 51 girls of Class X of a school was conducted and the following data was obtained

|  |  |
| --- | --- |
| **Height** | **Number of girls** |
| Less than 140 | 4 |
| Less than 145 | 11 |
| Less than 150 | 29 |
| Less than 155 | 40 |
| Less than 160 | 46 |
| Less than 165 | 51 |

|  |  |  |
| --- | --- | --- |
| Height | Frequency | Cum. Frequency |
| 0-140 | 4 | 4 |
| 140-145 | 7 | 11 |
| 145-150 | 18 | 29 |
| 150-155 | 11 | 40 |
| 155-160 | 6 | 46 |
| 160-165 | 5 | 51 |

**Median = N/2 = 25.5**

L + (N/2 – cf)/f x h

145 + (25.5 – 11)/18 x 5

149.03

**Exercises**

**Example - 1**

Consider a small unit of a factory where there are 5 employees : a

supervisor and four labourers. The labourers draw a salary of Rs. 5,000 per month each

while the supervisor gets Rs. 15,000 per month. Calculate the mean, median and mode

of the salaries of this unit of the factory.

**Example - 2**

The following observations have been arranged in ascending order. If the median of the data is 63, find the value of *x*.

29, 32, 48, 50, *x*, *x* + 2, 72, 78, 84, 95

Ans: 63

**Example - 3**

Which of the following two lists has a bigger average? Or are they the same? Try to answer without doing any arithmetic

1. 10, 7, 8, 3, 5, 9
2. 10, 7, 8, 3, 5, 9, 11

**Example – 4**

Average hourly earnings are computed each month by the Bureau of Labor Statistics using payroll data from commercial establishments. The Bureau figures the total wages paid out and divides by the total hours worked. During recessions, average hourly earnings typically go up. When the recession ends, average hourly earnings often start going down. How can this be?

**Example - 5**

The distribution below gives the weights of 30 students of a class. Find the Median weight of the student

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Weight | 40-45 | 45-50 | 50-55 | 55-60 | 60-65 | 65-70 | 70-75 |
| No.of students | 2 | 3 | 8 | 6 | 6 | 3 | 2 |