

### Grouped Data

If the variable being analysed takes on more than 10 values, the data should be presented and analysed using grouped class intervals with each class interval having the same width. The data can be grouped in between 5 and 10 groups

**Example:** The following table contains the results of 30 students in an exam.

35	64	71	81	54	48
41	38	29	86	56	57
59	40	49	51	63	72
18	55	49	70	81	93
63	42	61	46	69	73

Construct a grouped frequency distribution table showing these results.

#### **Measures of Averages:**

- Mean

Formula: 
$$\bar{x} = \frac{\sum fx}{\sum f} \quad \text{[Given in exams]}$$

where X = Mid Interval Value

- Median

Formula: 
$$\text{Quartile} = L + \frac{r}{f}(U - L) \quad \text{[Given in exams]}$$

Where

L = The lower limit of the Median class

U = The upper limit of the Median class

r = The difference between the required frequency value and the cumulative frequency associated with L.

f = The frequency of the Median class.

## 3. Mode

Formula: 
$$\mathbf{Mode} = L + \frac{d_1}{d_1 + d_2}(U - L) \quad [\mathbf{Given\ in\ exams}]$$

Where

- L = The lower limit of the Modal class
- U = The upper limit of the Modal class
- $d_1$  = The difference in frequencies between the Modal class and the previous class
- $d_2$  = The difference in frequencies between the Modal class and the next class.

**Measures of Dispersion (Spread):**

1. **Range:** is the difference between the largest and the smallest X values.

2. **Inter – Quartile Range:**  $Q_3 - Q_1$

Quartiles divide up the distribution (the total of the frequencies). When calculating any quartile divide up the distribution into quarters.  $Q_1$  is one quarter of the distribution and  $Q_3$  is three quarters of the distribution.

**Quartile Formula:** 
$$Q = L + \frac{r}{f}(U - L) \quad [\mathbf{Given\ in\ exams}]$$

Where

- Q = The required quartile
- L = The lower limit of the quartile class
- U = The upper limit of the quartile class.
- r = The difference between the required frequency value and the cumulative frequency associated with L.
- f = The frequency of the quartile class.

3. **Standard Deviation:** 
$$\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} \quad [\mathbf{Given\ in\ exams}]$$

Where X = Mid Interval Value

**Continuous Variables:** can take on an unlimited number of different values e.g. time, temperature, heights and weights.

**Example: Frequency Distribution:**

The following table lists the heights in cm of 25 people chosen at random:

165.4	174.3	182.4	173.4	177.1
169.9	168.5	165.3	185.2	171.3
166.5	173.2	172.5	176.4	180.4
167.5	166.8	178.9	179.2	176.3
160.5	167.4	177.5	172.4	169.4

**Frequency distribution Table:**

<i>Heights</i>	<i>Frequency</i>
160 – 165	
165 – 170	
170 – 175	
175 – 180	
180 – 185	
185 - 190	

**Note:** (160 – 165) interval ranges from 160.0 to 164.9 because we have decimal data (continuous data).

**Cumulative Frequency Distribution Table:**

< Height	Cumulative Frequency
165	
170	
175	
180	
185	
190	

**Formulae for Continuous Data:****Measures of Average:**

## 1. Mean

Formula:  $\bar{x} = \frac{\sum fx}{\sum f}$  *[Given in exams]*

where X = Mid Interval Value

## 2. Median

Formula: **Quartile** =  $L + \frac{r}{f}(U - L)$  *[Given in exams]*

Where

L = The lower limit of the Median class

U = The upper limit of the Median class

r = The difference between the required frequency value and the cumulative frequency associated with L.

f = The frequency of the Median class.

## 1. Mode

Formula: **Mode** =  $L + \frac{d_1}{d_1 + d_2}(U - L)$  *[Given in exams]*

Where

L = The lower limit of the Modal class

U = The upper limit of the Modal class

d<sub>1</sub> = The difference in frequencies between the Modal class and the previous class

d<sub>2</sub> = The difference in frequencies between the Modal class and the next class.

**Measures of Dispersion (Spread):**

1. **Range:** is the difference between the largest and the smallest X values.

2. **Inter – Quartile Range:**  $Q3 - Q1$

Quartiles divide up the distribution (the total of the frequencies). When calculating any quartile divide up the distribution into quarters. Q1 is one quarter of the distribution and Q3 is three quarters of the distribution.

$$\text{Quartile Formula: } Q = L + \frac{r}{f}(U - L) \text{ [Given in exams]}$$

Where Q = The required quartile

L = The lower limit of the quartile class

U = The upper limit of the quartile class.

r = The difference between the required frequency value and the cumulative frequency associated with L.

f = The frequency of the quartile class.

3. **Standard Deviation:**  $\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$  **[Given in exams]**

Where X = Mid Interval Value

**Summer Exam 2005****Question 7**

Give a brief description of each of the following:

Ordinal Data

Cluster Sampling.

**(4 marks)**

(b) The following table gives the weekly wages earned by all employees in a factory.

Weekly Wage €	No. of Employees
150 – 169	16
170 – 189	31
190 – 209	22
210 – 229	14
230 – 249	10
250 – 269	7

Using the above data:

(i) Present the data in a cumulative frequency distribution table.

**(2 marks)**

(ii) Draw a Histogram and Ogive to represent the above data.

**(4 marks)**

(iii) Calculate the mean and the median.

**(6 marks)**

(iv) Calculate the inter-quartile range.

**(4 marks)**