There are two types of data

* Grouped Data

Representation for the grouped data by

- Frequency distribution: It is simple table consist of two columns, the first column represent the group data, column two represent an no. of element belong to that interval

Class width	frequency (f_i)
160 – 162	6
163 – 165	19
166 – 168	44
169 – 171	25
172 – 174	6

* midpoint class = $\frac{\text{upper class limit} + \text{lower class limit}}{2}$

* The class limits, for each class interval there is a class limits which are called Lower class limit and upper class limits.

* The range for the data, Is the difference between the largest and the smallest value for the data.

* class interval, It is sub divisions of the total range values which a variable can take

* class frequency, Is the number of observations (data) in each Falling class interval, represent no. of element belong to that interval.

General Rules for constracting freq. table.

1. find the range
2. Determenit the number of classinterval which is preferable to be between 5-15 in the number of data less than 100, and between 15-20 if the number of data great than 100.
3. Finel the class lenght
4. write the class limit.
5. Evaluate the number of the class freq.

Example: ① we have some of the value, find the freq. table.

80	79	48	74	81	98	87	80
84	80	90	70	91	93	82	79
71	70	92	65	56	81	74	73
72	69	85	51	45	93	83	86
(35)	90	83	73	74	43	86	68
93	92	76	71	90	72	67	75
91	80	61	72	97	91	88	81
74	70	(99)	95	80	59	71	77
60	63	83	82	60	67	89	63
63	76	88	70	66	88	79	75

① find the Range

upper value − lower value = 99 − 35 = 64

② number of class 5-15 we are chose 7

③ find the class lenght, there are many ways to find the class lenght

a- class lenght = $\frac{\text{Range}}{\text{no. of classes}}$

b- class lenght = upper class − lower class +1

3- = upper boundaries − lower boundaries +1

upper boundaries = $M + \frac{1}{2}w$ where M = midpoint class, w = interval lenght

lower bounderies = $M - \frac{1}{2}w$

④ write the class limit take

lower class 35 − 31

upper class 99 − 100

we apply these points for the example ①

Interval class	freq. (fi)	class boundaries	Relative freq. fi/Σfi	Percentage Freq. %/ (fi/Σfi)×100
31 − 40	1	30.5 − 40.5	1/80	(1/80)×100
41 − 50	2	40.5 − 50.5	2/80	(2/80)×100
51 − 60	5	50.5 − 60.5	5/80	(5/80)×100
61 − 70	15	60.5 − 70.5	15/80	(15/80)×100
71 − 80	25	70.5 − 80.5	25/80	(25/80)×100
81 − 90	20	80.5 − 90.5	20/80	(20/80)×100
91 − 100	12	90.5 − 100.5	12/80	(12/80)×100
	80			

** ungrouped data

Def:- ungrouped data is the initial data which are collected by the researcher (without doing any chanee of the data which be collected).

Graphical Representation of frequency distribution table

The are different graphics representation for the data

① Histogram freq. It is graphical representation of freq-dist. and it is consist of a set of rectangle where,

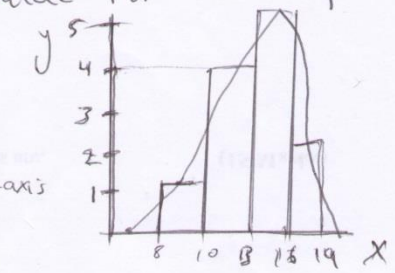
i- The bases on the x-axis with lenght of the classes and the lenght equales class interval size

ii- high for the rectangle is the value for the freq. and is on the y-axis.

For example

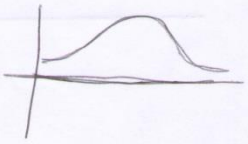
classes	f_i
8 - 10	1
10 - 13	4
13 - 16	5

x-axis: classes; y-axis: f_i



② frequency polygon:- polygon is a line graph of class freq. against the class mark which can be obtain by connecting the mid point of the top of rectangles in the histogram.

③ frequency Curve:- The smooth curve between the plotted point is called curve.



Measures of Centeral Tendency (Ungrouped data)

① Arithematic Mean ($\bar{x}$) :- The mean $\bar{x}$ of aset of value $x_1, x_2, \dots, x_n$ is the sum value divided by the number of items that is $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$

Ex :- find the Arithematic Mean of the numbers 8, 3, 5, 12, 10 then $\bar{x} = \frac{8+3+5+12+10}{5} = \frac{38}{5} = ?$

② Geometric Mean $\bar{G}$

$\bar{G} = \sqrt[n]{x_1 \cdot x_2 \cdot x_3 \cdots x_n} = \sqrt[5]{(8)(3)(5)(12)(10)} = ?$

③ Harmonic Mean $\bar{H}$

$\bar{H} = \frac{n}{\sum \frac{1}{x_i}} = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \cdots + \frac{1}{x_n}} = \frac{5}{\frac{1}{8} + \frac{1}{3} + \frac{1}{5} + \frac{1}{12} + \frac{1}{10}} = ?$

④ The Median ($\bar{M}_e$) :- is a set of n observation which have been ranked in order of size is equal to the value taken by the middle $\left[\frac{1}{2}(n+1)\right]$ observation when n is odd, and is half the sum of value of the two middle observation $\left[x_{\frac{n}{2}}, x_{\frac{n}{2}+1}\right]$, when n is even and $\frac{(x_{\frac{n}{2}} + x_{\frac{n}{2}+1})}{2}$

Ex :- find the Median for the values.

① 80, 82, 76, 87, 84

x_1 x_2 x_3 x_4 x_5

ordered the value

76, 80, (82), 84, 87

x_1 x_2 x_3 x_4 x_5

no. of observation is 5 odd

$$X\left(\frac{n+1}{2}\right) = X\left(\frac{5+1}{2}\right) = X\left(\frac{6}{2}\right) = X_3 = 82$$

(4) 5, 4, 8, 7, 3, 12, 9, 2 $n=8$ even

ordered the values 2, 3, 4, 5, 7, 8, 9, 12
x_1 x_2 x_3 x_4 x_5 x_6 x_7 x_8

$$\left[x_{\frac{n}{2}}, x_{\frac{n}{2}+1}\right] = \left[x_{\frac{8}{2}}, x_{\frac{8}{2}+1}\right] = \left[\frac{x_4, x_5}{2}\right] = \frac{5+7}{2} = 6$$

(5) The mode (Mo)

The mode is the value with the greatest Freq.

EX:-1 5, 7, 5, 2, 4 The mode is 5

EX:-2 2, 3, 4, 5, 6 No mode