WEEK 2

BASIC TOOLS OF ECONOMIC ANALYSIS

A. MATHEMATICAL TOOLS

Tools used in economic analysis include tables charts, graphs, algebraic expressions and equations. They assist the economist in making predictions by discovering the implications of economic theories.

B. MEANING AND USES OF STATISTICS

In simple terms, statistics means the science of data compilation, analysis and interpretation.

Uses of Statistics

a. Statistics is used for the purpose of describing an event or an outcome in order to economize time, money, efforts, etc.
b. For inferential purposes, policy or decision makers are called upon from time to time to use statistics to discover the secret behind a given data.

C. MEANING OF CENTRAL TENDENCY

Meaning: By a measure of central tendency, we mean an average figure or value, or typically placed in a set of values or figures. The measures of central tendency are:

i. Arithmetic Mean [or mean] (X)
ii. Median (md)
iii. Mode (mo)
iv. Geometric Mean (Gm)
v. Harmonic Mean (Hm)

The more important measures of central tendency are the mean, the median and the mode

D. TABLE

A table is an orderly arranged list of information or data, which is set out in rows and columns, and which attempts to condense or summarise the information or data in order to make it more easily comprehensible.

Characteristics of a Good Table

1. A table must be very simple
2. It must be easy to understand
3. It must have a title or heading

4. The units of measurement used in the table must be stated
5. The purpose of constructing the table must be stated
6. A table must be numbered if they are many; and
7. A table source of information should be properly stated if it is known.

Importance of Tables

1. A table helps to summarise the data presented
2. It assists in an orderly arrangement of data
3. A table eases comparison between different classes of data
4. A table helps to bring out the important features in the data
5. A table helps to understand data; and
6. It makes it easier and faster to move decision through the use of table.

Example of a Table

Revenue for Nigeria (1974 – 1977)

Sources of Revenue	YEARS			
	1974 (₦)	1975 (₦)	1976 (₦)	1977 (₦)
Direct Taxes	66.8	54.2	58.9	62.5
Indirect Taxes	11.0	13.8	15.1	18.5
Interest Repayments	2.8	3.0	2.9	6.5
Royalties and Rent	18.8	28.5	28.5	25.1
Miscellaneous	0.6	5.8	7.85	10.5
	100	**105.3**	**113.2**	**122.8**

E. CHARTS AND GRAPHS

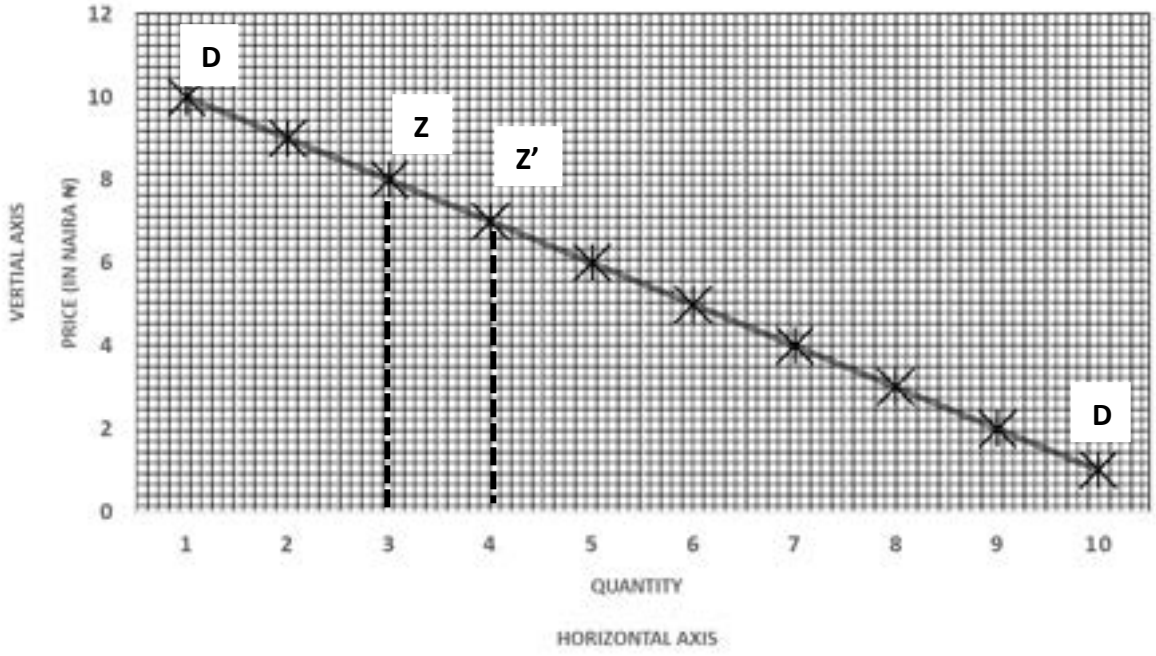
A graph is a pictorial presentation of the relationship between two variables. Many types of graphs are employed in economics, depending on the nature of the data involved and the purposes for which the graphs are intended. Among these are bar graphs, pie graphs, pictographs, and so on.

For example, you can draw a graph from demand schedule:

QTY (Tins demanded)	Price (Naira per Unit)
10	1
9	2
8	3
7	4
6	5
5	6
4	7

3	8
2	9
1	10

Along the horizontal axis, we measure the quantity of the commodity sold, and long, the vertical axis we measure the price.



A graph showing the relationship between price and the quantity (tins) of milk demanded

To obtain the curve marked **DD**, we have to mark out the points where a straight line from the various quantities sold meets with the lines drawn from the corresponding prices measured along the vertical axis. For instance, the line from quantity 4 meets the line from price 7 at the point **Z**, while that from quantity 3 meets the one from the price 8 naira at the point **Z**.

In a similar manner, all the other corresponding points are joined to get a curve which we have labelled **DD**. This is a demand curve. It shows the functional relationship between price and quantity.

F. PIE CHART

A pie chart is a circle divided into segments by radial lines. The circle represents the total mass of data while the various sectors indicate the relative sizes of the different values or variables which form components of the data.

Example:

Using the data in the table below, information is converted into degrees to be depicted in the pie chart.

TOWN	POPULATION (IN THOUSANDS)
A	70
B	100
C	30

Solution:

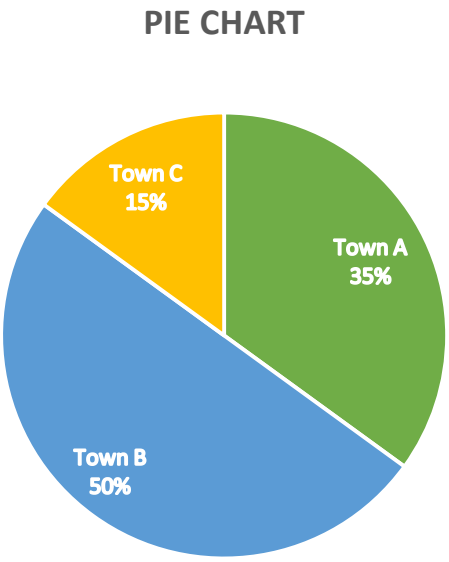
To obtain the analysis this formula is used:

$$\frac{\text{Population of X}}{\text{Total Population Size}} \times \frac{360}{1}$$

$$\text{Therefore, for town A} = \frac{70}{200} \times \frac{360}{1} = 126°$$

$$\text{town B} = \frac{100}{200} \times \frac{360}{1} = 180°$$

$$\text{town C} = \frac{30}{200} \times \frac{360}{1} = 54°$$



Also, in Percentages

$$\text{town A} = \frac{70}{200} \times \frac{100}{1} = 35\%$$

$$\text{town B} = \frac{100}{200} \times \frac{100}{1} = 50\%$$

$$\text{town C} = \frac{30}{200} \times \frac{100}{1} = 15\%$$

Towns	Population (in thousands)	Degree
A	70	$126°$
B	100	$180°$
C	30	$54°$

G. BAR CHART

A bar chart is a type of chart that shows the changes in the figures or size of variables. They are easy to understand and shows data more accurately than pictograms. There are types of bar charts namely:

1. Simple Bar Chart

   This is used when the data to be represented involves a single category. The bars representing the different values may be drawn vertically or horizontally.

   Example:

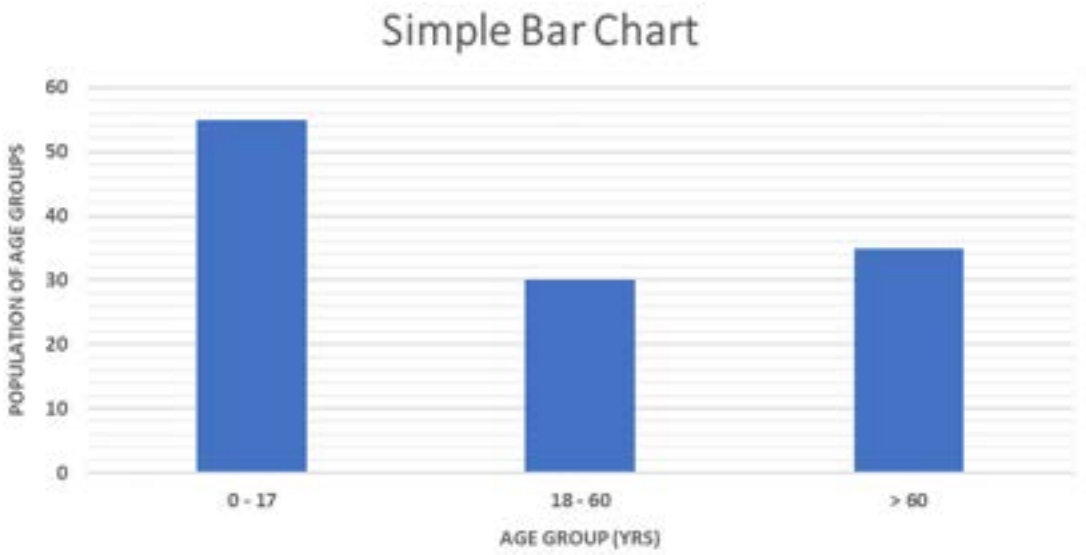
   The table below shows the population of the three broad age groups in KOTA in 2009. Present the information in a simple bar chart.

   Solution:

   Choose an appropriate scale for the population:

SCALE:

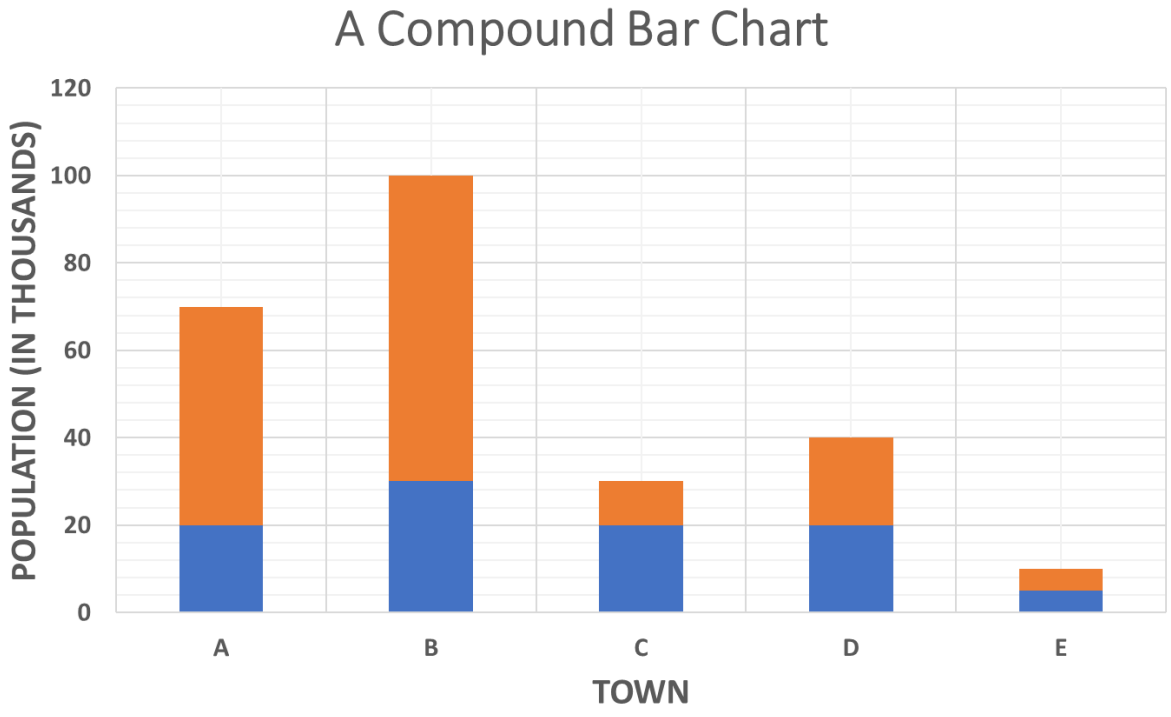
Y-axis – 1cm: 10,000,000 people
X-axis – 1cm to represent each age group



TAKE NOTE: The width of the bars must be equal and must be spaced out evenly.

H. COMPONENT BAR CHART

This is used when the data to be represented involves more than one category. Simple bars are divided into sections or components which corresponds in size to the magnitude of the item it represents.

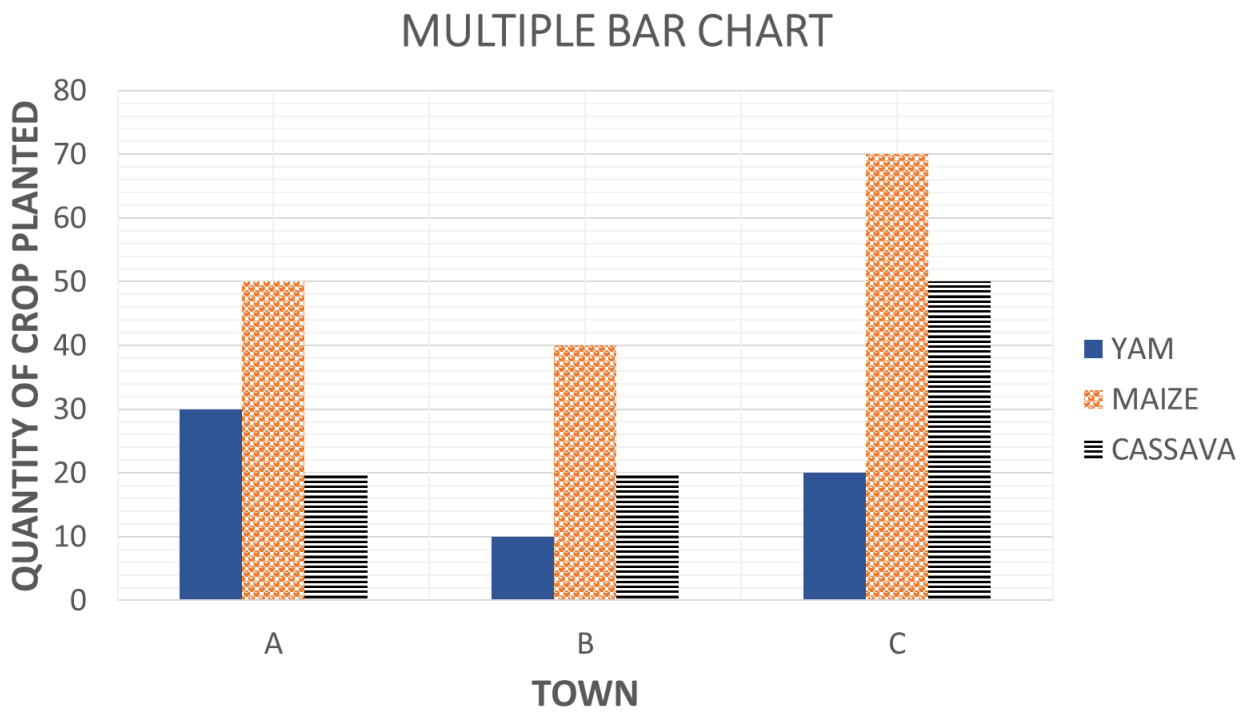


TOWN	POPULATION		
	MALE	FEMALE	TOTAL
A	50	20	70
B	70	30	100
C	10	20	30
D	20	20	40
E	5	5	10

I. MULTIPLE BAR CHART

This is a variation of the component bar chart also used to represent data comprising more than one category or component values. The component values are drawn as separate bars and placed next to each other.

TOWN	QUANTITY OF CROP PLANTED		
	YAM	MAIZE	CASSAVA
A	30	50	20
B	10	40	20
C	20	70	50



J. PICTOGRAMS

Pictograms or pictographs are charts in which pictures or drawings of objects used to represent items in a given data. The pictures so use is meant to represent the magnitude of the variables or to convey other information. In this case, pictures or diagrams are appreciated rather than tables or other charts.

Example:

With the aid of the table below. Draw a pictogram to show the total number of chickens consumed in Ghana between 1998 and 2003.

Chicken Consumed in Ghana Between 1998 and 2003	
Year	**Chicken Consumed (1,000s)**
1998	30
1999	60
2000	20
2001	50
2002	40
2003	10

Solution:

i. The picture or diagram must look like a chicken or birds.
ii. One picture to represent 10,000 chickens.
iii. The pictogram is them drawn as shown.

1998	
1999	
2000	
2001	

2002	
2003	

K. HISTOGRAM

Histogram is a graph of a frequency distribution in which rectangular bars are used with the width of the bars as the intervals between the class, boundaries and their areas proportional to the frequencies of the classes.

Histogram of Ungrouped Data

Example:

Let us assume that the ages of 30 students in the press club in a school are as follows:

10, 12, 18, 20, 11, 18, 19, 11, 12, 13, 14, 16, 13

14, 10, 12, 11, 11, 18, 12, 13, 14, 15, 18, 20, 21, 11

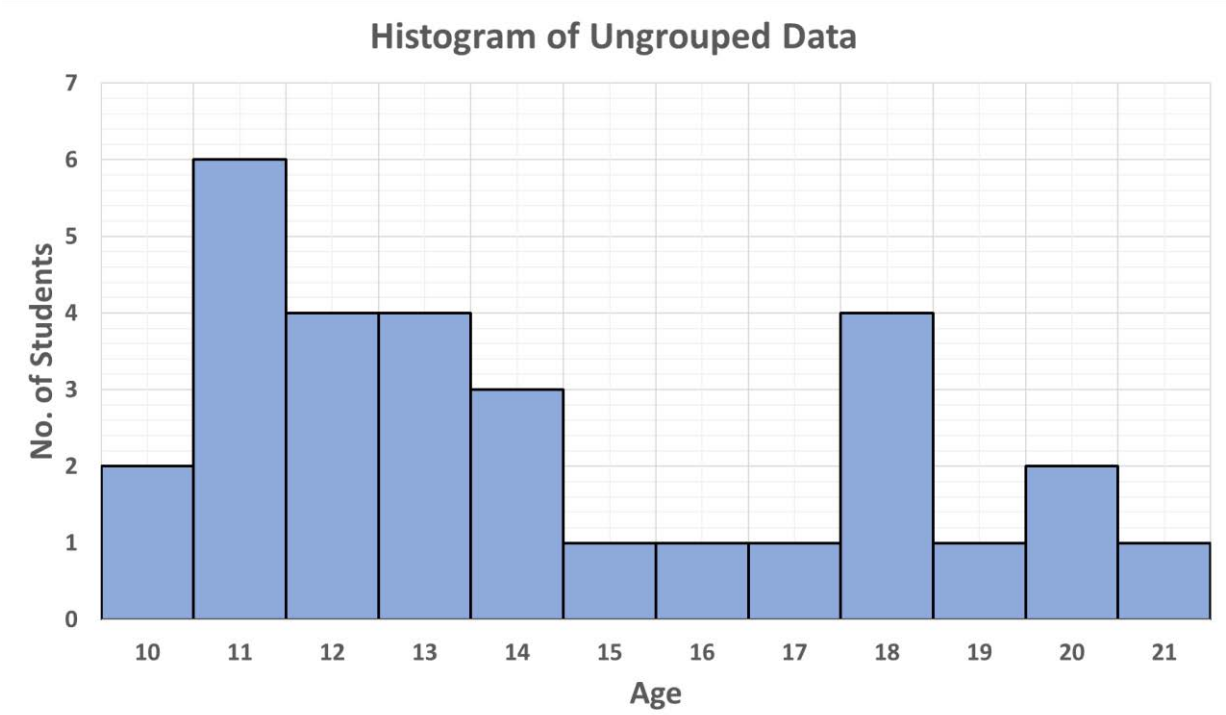
17, 11, 13

A frequency table could be prepared as:

Age (X)	No. of Students (frequency or f)
10	2
11	6
12	4
13	4
14	3
15	1
16	1
17	1
18	4
19	1
20	2
21	1

$\sum f = 30$

Draw a histogram showing the ages of the 30 students in the press club in a school.



Histogram of Grouped Data

Example: By using appropriate intervals, draw a histogram showing the ages of 30 students in the club in a school.

Solution:

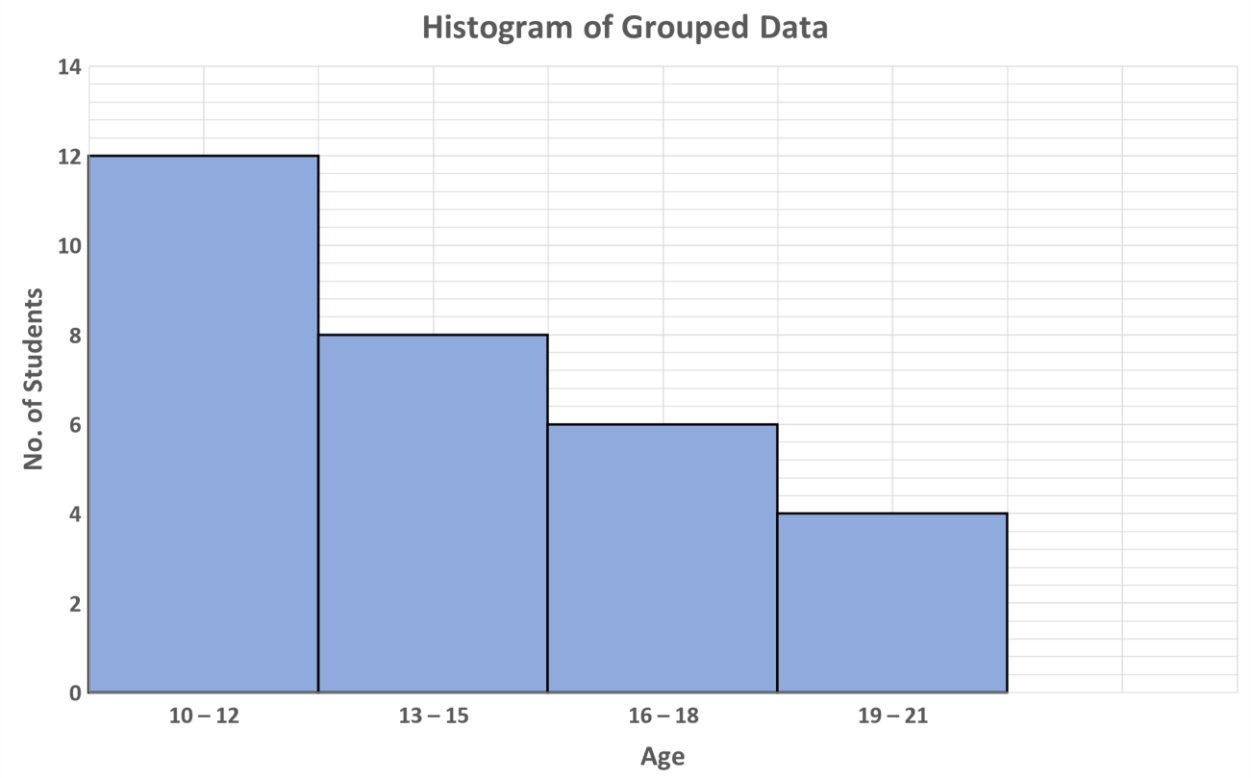
Let is group the ages of the students at intervals of 3. The frequency table now becomes:

Cass Intervals (Age or X)	No. of Students (frequency or f)
10 – 12	12
13 – 15	8
16 – 18	6
19 – 21	4

The next step is to determine the class boundaries.

Class Interval	Class Boundaries	Frequency (f)
10 – 12	$9^1/_2 - 12^1/_2$	12
13 – 15	$12^1/_2 - 15^1/_2$	8
16 – 18	$15^1/_2 - 18^1/_2$	6
19 – 21	$18^1/_2 - 21^1/_2$	4

The class boundaries are obtained by reducing by half the upper-class interval and increasing by half the lower-class intervals. E.g., Class interval 10 – 12 becomes class boundary $9^1/_2$ – $12^1/_2$. This ensures that there is no gap between class intervals and enable the histogram to be drawn easily. The class midpoint is the middle value of class boundary.



L. Importance of Charts

1. Charts are easier to understand regardless of the level of education of layman could identify which sector of the economy is more developed by selecting a larger section of a pie chart depicting output of different sectors of the economy.
2. The use of pictures and colours for different sections readily conveys the message with regards to size and improvements of certain sections represented in the charts. Also colour coding it easy remember the data show.
3. Two or more factors can be represented in a single component or multiple bar chart making it easier for a group analysis.
4. Charts are easy to construct and different charts can be used for different purposes as suitable to the user.

M. Frequency Distribution

The frequency of an observation refers to the number of times a particular value occurs. A frequency table (or distribution) shows the values of a set of observations and the number of times each value occurs. It could be for a group or an ungrouped data.

Example: Represent the marks scored by 30 biology students in SS1 by frequency distribution using the following data.

20	8	12	4	18	18	18
20	12	6	18	20	4	12
8	18	12	8	8	18	20
2	20	18	18	20	8	2
4	18					

Solution:

Arrange the data in the following manner

Score (X)	Tally or Counts	Frequency (f)
2	II	2
4	III	3
6	I	1
8	~~IIII~~	5
12	IIII	4
18	~~IIII~~ IIII	9
20	~~IIII~~ I	6

$\sum f = 30$

N. Frequency Polygon

It is a graph which results when the successive midpoints of the tops of the rectangular bars in the histogram are joined together with a line.