In last class, we describe about data presentation by a table. More specifically "Frequency distribution table". Here we have learnt how to construct a frequency distribution, how to calculate relative frequency, cumulative frequency, percentage frequency and so on.

Now, we need to convert this table into graphical form, which is actually called "Graphical Presentation of Data" or "Visual Representation of Data".

Firstly, we need to know about the importance of graph. So, why do we need graph? We need graphs because,

- They are more attractive than table. [Obviously, tables represent the summary of any types of data set. But, in graphical form, we will get some colorful vision, and it must be more attract you than a simple row-column]
- It makes a clear impression in mind.
- Most importantly, a graph gives us a bird's eye view of the entire data set.
- Easy to compare among two or more data sets.
- Easy to interpret.

Though it has a lot of importance, there are some limitations in graphical presentation. For example,

- Amount of details is reduced
- We cannot always compute precise estimates of the data sets. [NEED GRAPHICAL EXAMPLE]

As we know, there are two types of data and two types of frequency distribution table. What are they? “Frequency Distribution of Quantitative” and “Frequency Distribution of Qualitative”. Since, graphs are made by using frequency distribution table, so how many types of graphical presentation can be done?

Yes!!! There are two types of graphical presentation.

1. Graphs for Quantitative data
2. Graphs for Qualitative data

Now, for first one, that is, graphs for quantitative data. When someone create a graph by using quantitative data/quantitative frequency distribution table, those graphs are actually called graphs for quantitative data. Five common graphical methods for displaying quantitative data.

- Histogram
- Frequency Polygon
- Frequency curve
- Ogive curve
- Stem and Leaf plot

Histogram:

- Firstly, we need to create a frame work (that is, X axis and Y axis)
- Mark the distinct class boundary value in X-axis
- Mark the frequencies in the Y-axis
- Draw a rectangle above each class whose height equals to the frequency of that class.
- Label the axis.

For example: Hypothetical data set: 17, 8, 12, 19, 14, 6, 10, 15, 7, 18, 11, 16, 8

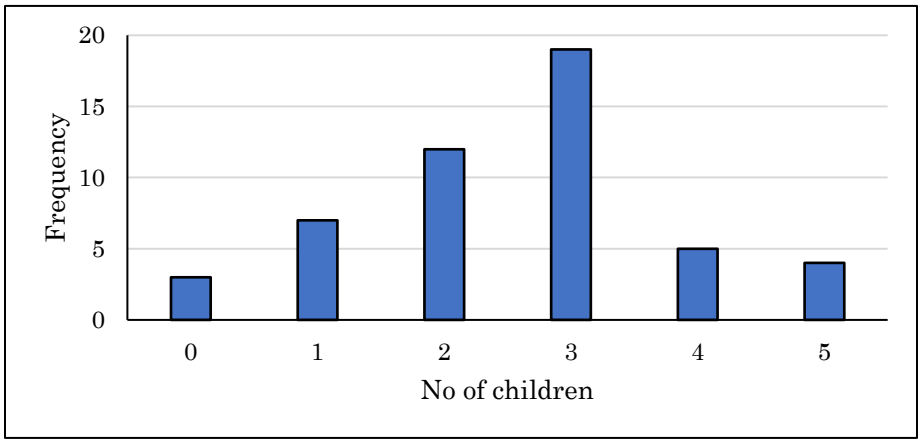
a) Construct the frequency distribution table.

b) Construct the histogram for the data.

Class	Tally	Frequency
5-9	| | | |	4
9-13	| | |	3
13-17	| | |	3
17-21	| | |	3

Additional examples:

No of children	f_i
0	3
1	7
2	12
3	19
4	5
5	4



Computer sold	**Class Boundary**	f_i
20-29	19.5-29.5	4
30-39	29.5-39.5	11
40-49	39.5-49.5	9
50-59	49.5-59.5	7
60-69	59.5-69.5	5
70-79	69.5-79.5	4

Expenditure	f_i	**Class width**	**Height of rectangles**
48-58	4	10	$\frac{4}{10} = 0.4$
58-68	8	10	0.8
68-73	5	5	1
73-78	5	5	1
78-98	28	20	1.4

Frequency Polygon:

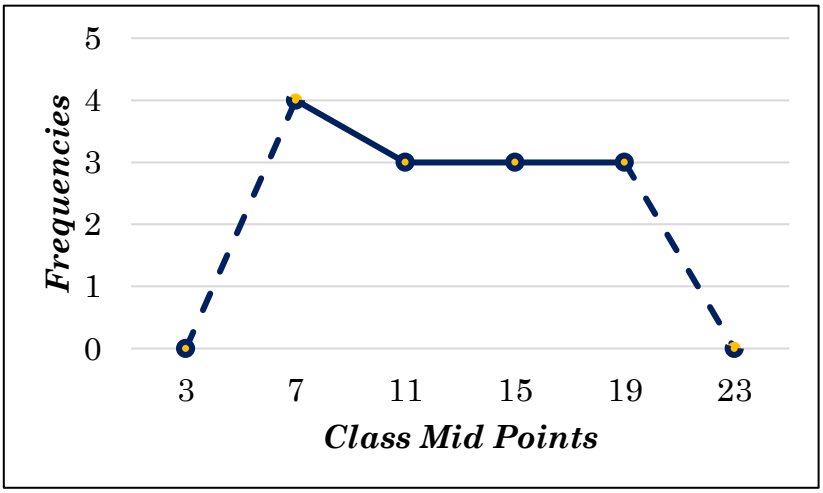
- Firstly, we need to create a frame work (that is, X axis and Y axis)
- Mark the distinct class mid value in X-axis
- Mark the frequencies in the Y-axis
- Plot a point above each mid value at the height equal to the frequency of that class
- Label the axis.

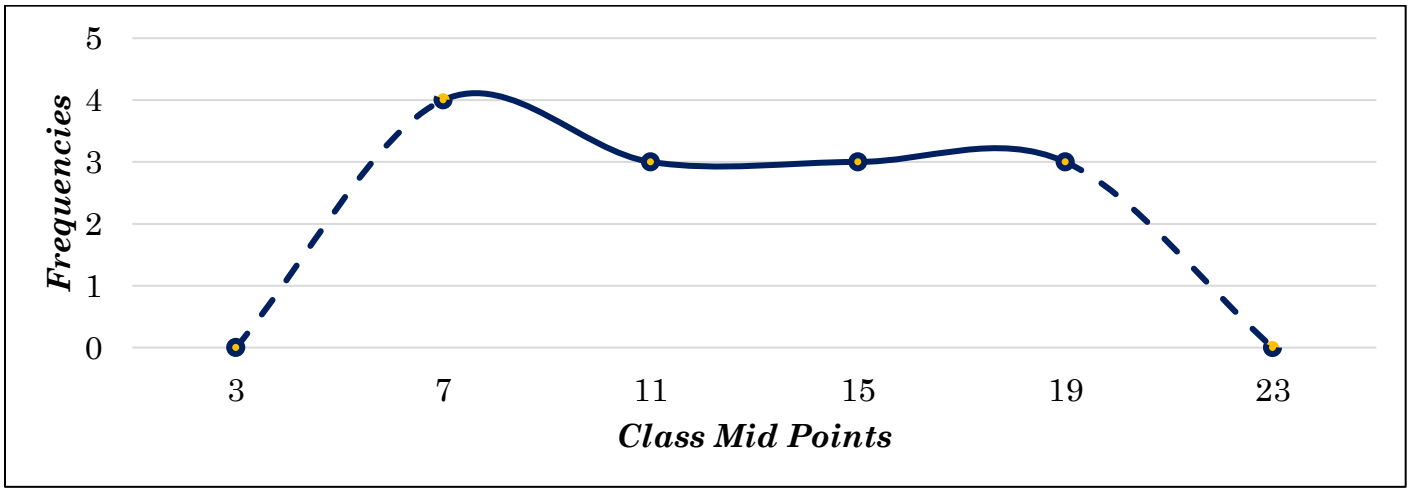
For example: Hypothetical data set: 17, 8, 12, 19, 14, 6, 10, 15, 7, 18, 11, 16, 8

a) Construct the frequency distribution table.

b) Construct the frequency polygon for the data.

Class	Mid value	Frequency
5-9	7	4
9-13	11	3
13-17	13	3
17-21	19	3





Histogram vs Frequency polygon:

- The histogram is more often used when single distributions are presented.
- The frequency polygon is largely used for comparison of two or more distribution.

Class Work:

Given below the frequency distributions of heights (in cm) of male and female students of CSE department of BRAC University.

Height	**105-115**	**115-125**	**125-135**	**135-145**	**145-155**	**155-165**	**165-175**	**Total**
Male	5	6	8	19	10	7	5	60
Female	7	10	18	8	6	2	*	**
*** Last digit of your ID; ** Sum of all female students**								

a) Calculate relative frequency, cumulative frequency.
b) Draw comparative frequency polygon using frequency.
c) Draw comparative frequency polygon using Relative frequency

Ogive curve:

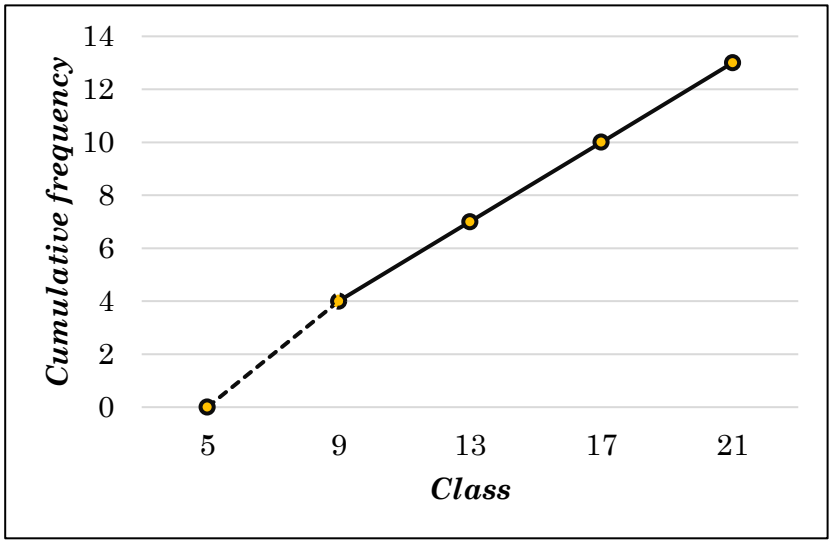
- Firstly, we need to create a frame work (that is, X axis and Y axis)
- Mark the distinct class boundary in X-axis
- Mark the cumulative frequency in the Y-axis
- Plot a point above each upper boundary at a height equal to the cumulative frequency of that class.
- Label the axis.

For example: Hypothetical data set: 17, 8, 12, 19, 14, 6, 10, 15, 7, 18, 11, 16, 8

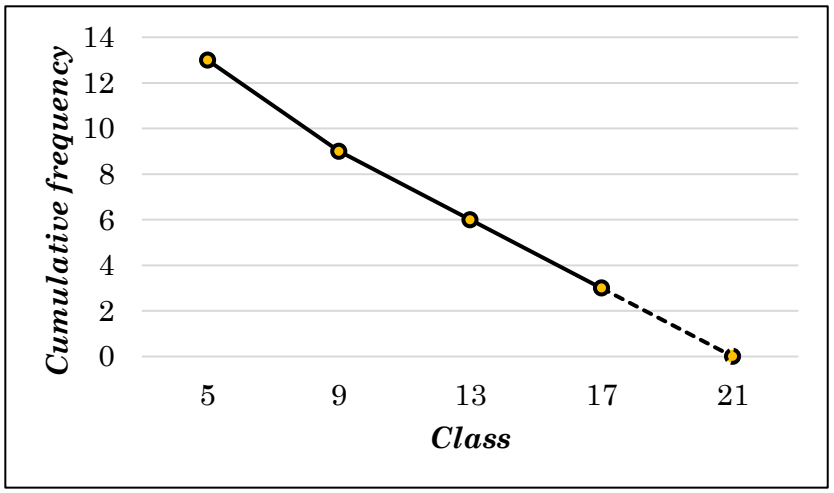
a) Construct the frequency distribution table.

b) Construct the frequency polygon for the data.

Class	Frequency	CF_i
5-9	4	4
9-13	3	7
13-17	3	10
17-21	3	13



Class	Frequency	CF_i
5-9	4	13
9-13	3	9
13-17	3	6
17-21	3	3



Stem and Leaf plot: The stem and leaf plot are a simple device to construct a histogram-like picture of a frequency distribution.

For value 84, 8=Stem and 4=Leaf
For value 184, sometimes 18=Stem and 4=Leaf; sometimes 1=Stem and 84=Leaf

Hypothetical data set: 12, 23, 19, 6, 10, 7, 15, 25, 21, 12

Example:
Data set A: 53, 78, 66, 77, 62, 68, 65, 59, 73, 60, 90, 76
Data set B: 98, 79, 83, 96, 82, 78, 79, 87, 98, 70, 87, 68

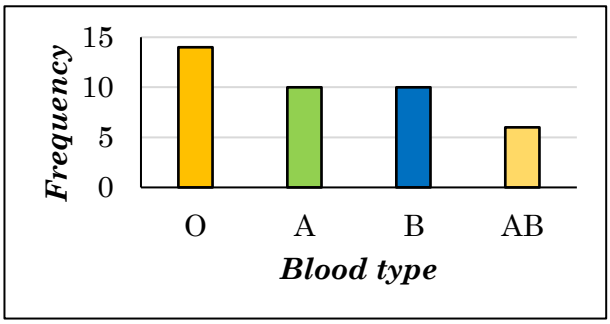
Graphs for Qualitative data: When someone create a graph by using qualitative data/ qualitative frequency distribution table, those graphs are actually called graphs for qualitative data. two common graphical methods for displaying qualitative data.

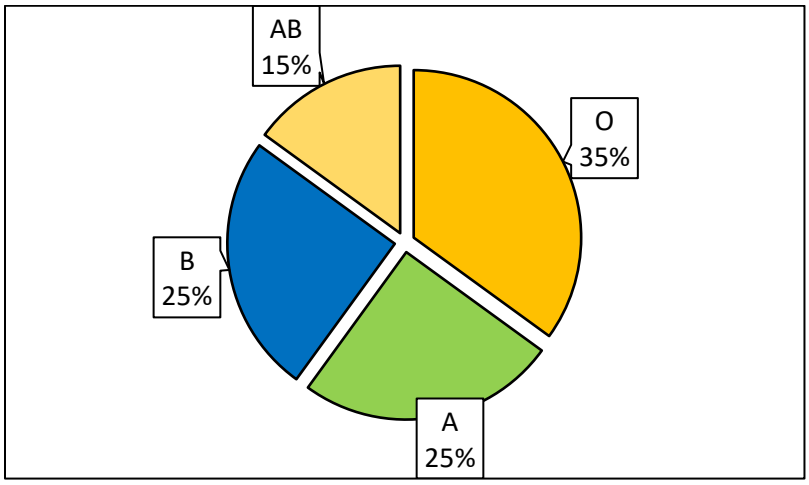
a) Bar chart
b) Pie chart

Bar chart:

- Firstly, we need to create a frame work (that is, X axis and Y axis)
- Mark the distinct classes/categories in X-axis
- Mark the frequencies in the Y-axis
- Plot a point above each category at the height equal to the frequency of that class
- Label the axis.

Blood type	Frequency	Relative frequency
O	14	14/40=0.35
A	10	10/40=0.25
B	10	0.25
AB	6	0.15
Total	40	1.00





Bar chart vs Pie chart:

Pie charts are useful for showing the division of all possible categories of a qualitative variable into its parts. They are not as useful in comparing two specific categories of the qualitative variable. Bar graphs are useful when we want to compare the different parts, not necessarily the parts to the whole.

Class Work:

	Eye Condition		
Gender	Near Sighted	Far Sighted	Need Bifocals
Male	12	40	12
Female	12	48	36

a) Bar chart of gender by eye condition
b) Bar chart of eye condition by gender

Bar chart vs Histogram:

- Histogram refers to a graphical representation; that displays data by way of bars to show the frequency of numerical data.
- A bar graph is a pictorial representation of data that uses bars to compare different categories of data.