

# BSc. Vith Sem: Graphical representation of data

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# Graphical representation of data

- 1. when data is quantitatively represented through chart and diagrams.
- 2. to show the relative position of different subdivision/sub-data.

# advantages

- Easily understood, easy interpretation.
- More attractive
- Useful in comparing relationship between two or more sets of figures.
- Enable statistical problems in a visual form.

# types

- Line diagram/graph
- Bar diagram
- Pie chart
- Histogram
- Frequency polygon
- Ogive/commulative frequency polygon.

# Graphical representation of ungrouped data

can be represented by using

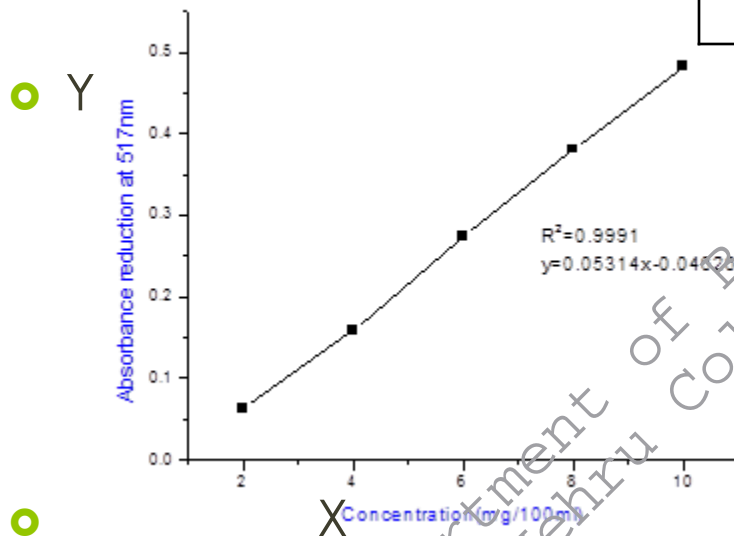
- 1. Line graph.
- 2. Bar graph/bar diagram
- 3. Circle graph/pie diagrams
- 4. pictograms

# Line graph/graph

- Most common graphical representation
- By plotting X axis on horizontally while Y axis vertically.
- Find out the intersecting point or origin and join all intersections.
- Example: cricket score in each over.

# Line graph

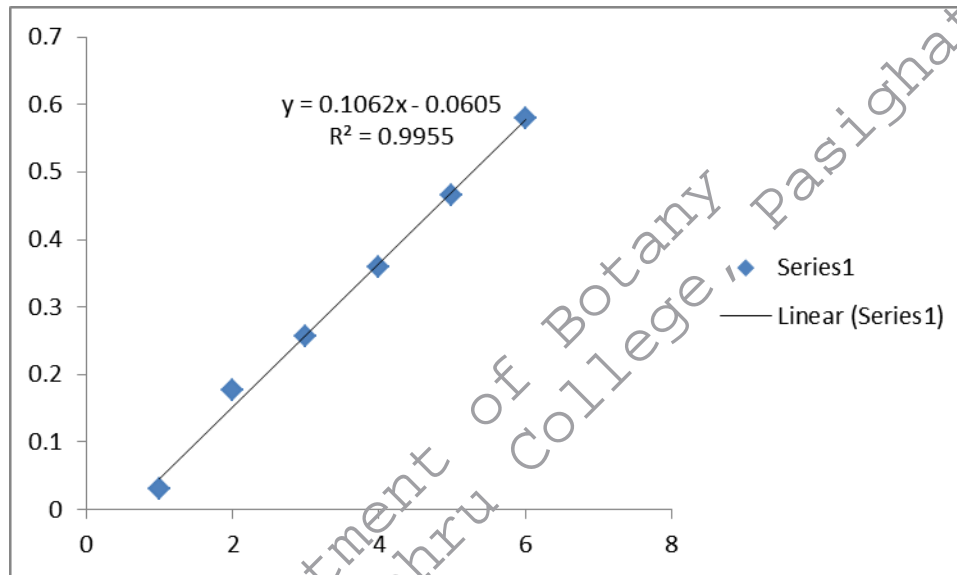
Concentration in mg/100ml	2	4	6	8	10
Absorbance at 517nm	0.0634	0.1595	0.2747	0.3815	0.4838



- Graph shows absorbance VS concentration of DPPH

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Glucose standard	
0ml	0.030192
.2ml	0.17599
.4ml	0.25736
.6ml	0.35854
.8ml	0.46592
1ml	0.5796



- Graph shows Concentration of glucose Vs absorbance

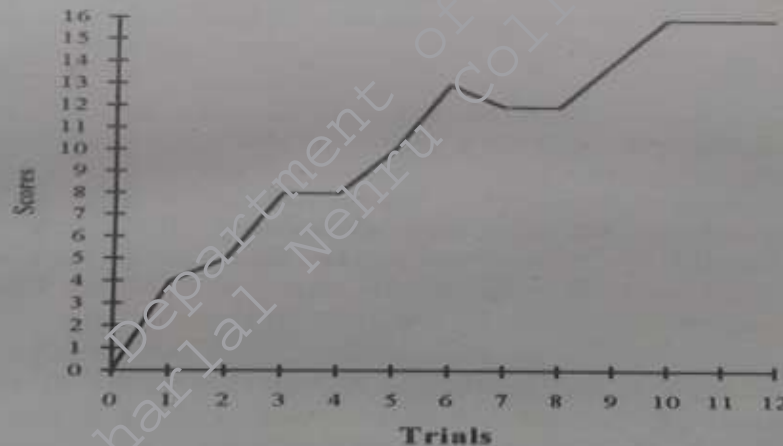


**Example 1.** A word-nonsense syllables association test was administered on a student of class X to demonstrate the effect of practice on learning. The data so obtained may be studied from the following table.

Trial No.	1	2	3	4	5	6	7	8	9	10	11	12
Score	4	5	8	8	10	13	12	12	14	16	16	16

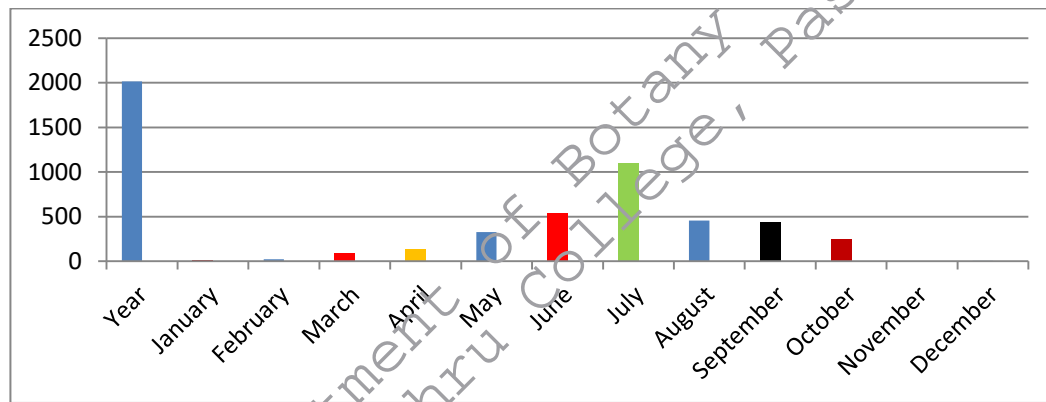
Draw a line graph for the representation and interpretation of the above data.

**Solution.** Plot the points (1, 4), (2, 5), (3, 8), (4, 8), (5, 10), (6, 13), (7, 12), (8, 12), (9, 14) and (10, 16).



**Fig. 4.1.** Line Graph — The effect of practice on learning

# Bar diagram



**Figure 2.7: Monthly rain fall (mm) in East Siang District in the year 2013.**

Source:HYDROMET DIVISION, NEW INDIA METEOROLOGICAL DEPARTMENT, Govt. of India,  
Ministry of Earth Science.

# Simple Bar diagram

only one variable can be represented

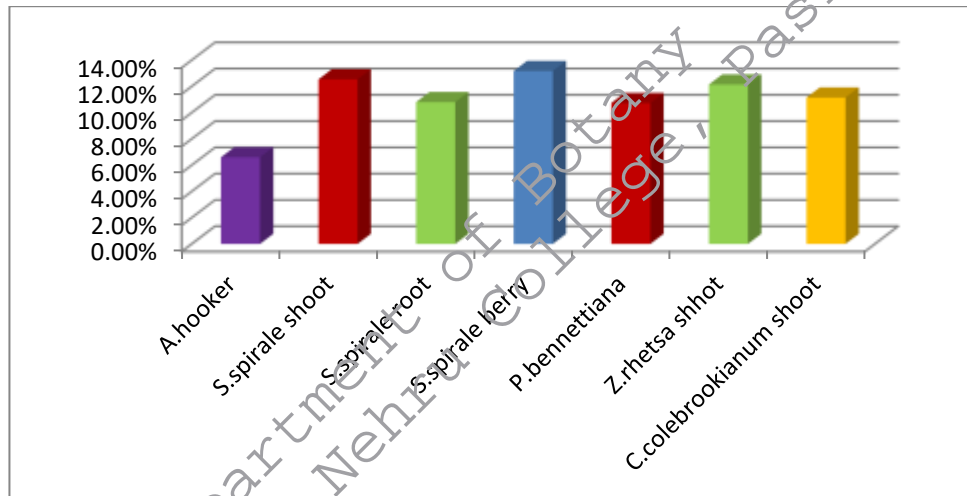
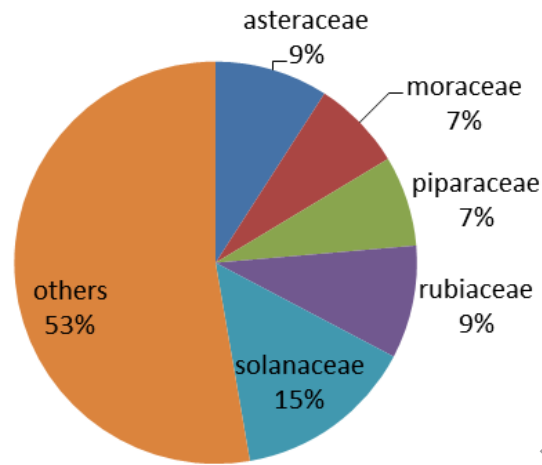


Fig: 6.22: Total ash content.



familywise medicinal plants used among tribal people of Arunachal Pradesh



Asteraceae	5
Moraceae	4
Piperaceae	4
Rubiaceae	5
Solanaceae	8
Others	29

$$\text{Angle} = \frac{\text{Value of one component}}{\text{Total of all the components}} \times 360$$

## Pie diagram for medicinal plants

out of 55 family

Eg: asteraceae:  $5/55$  then multiply by 3.6

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- Step I.** Plot a circle of appropriate size with protractor, pencil and compass. The angles of a circle total  $360^\circ$ .
- Step II.** Convert the given value of the components of an item in percentage of the total value of the item.
- Step III.** In laying out the sector for a pie chart it is logical to adopt the common procedure to arrange sectors according to size with the largest at the top and the others in sequence running clockwise.
- Step IV.** Transpose the various component values correspond to the degree on the circle. Since 100% is represented by  $360^\circ$  angle the centre of the circle, therefore, 1% value is represented by  $360^\circ / 100 = 3.6^\circ$ . If 8 be the percentage of a certain component, the angle which represent the percentage of such component is  $(3.6 \times 8)$  degrees.
- Step V.** Measure with protector the points on a circle representing the size of each sector.

# Pie chart

- Is a circular graph that represent total value in circle and components in part wise.
- Useful in comparing components and total value.
- Data is expressed in percentage of total value.
- The total value is equated as 360 degree.

Example: Marks obtained in test examination by a Bioscience students of Serampore College.

Zoology	Botany	Physiology
65	60	55

Solution: Total number of components  
 $= 65 + 60 + 55 = 180.$

Subject	Marks obtained	Angle
Zoology	65	$\frac{65}{180} \times 360 = 130^\circ$
Botany	60	$\frac{60}{180} \times 360 = 120^\circ$
Physiology	55	$\frac{55}{180} \times 360 = 110^\circ$

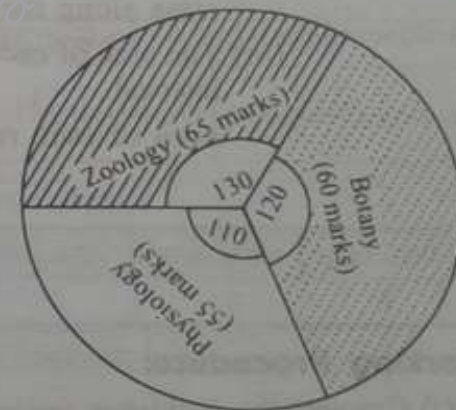


Fig. 3.6 Pie chart showing marks of three subjects





# pictogram

- Data is represented by picture

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# pictogram

**Pictogram:** It is a popular method of representing statistical data in pictures.

- (i) In pictogram a number of pictures of equal size and definite numerical value are drawn.
- (ii) Each picture represents a number of units.
- (iii) Pictures are drawn side horizontally or vertically.
- (iv) It is widely used public and private sector.

Represent the following data of the production of books (Biostatistics) from S. Chand & Company.

Year	2006	2007	2008
Production of books	1000	2000	3000

Solution: The given data is represented by pictogram as shown in Fig. 3.7.

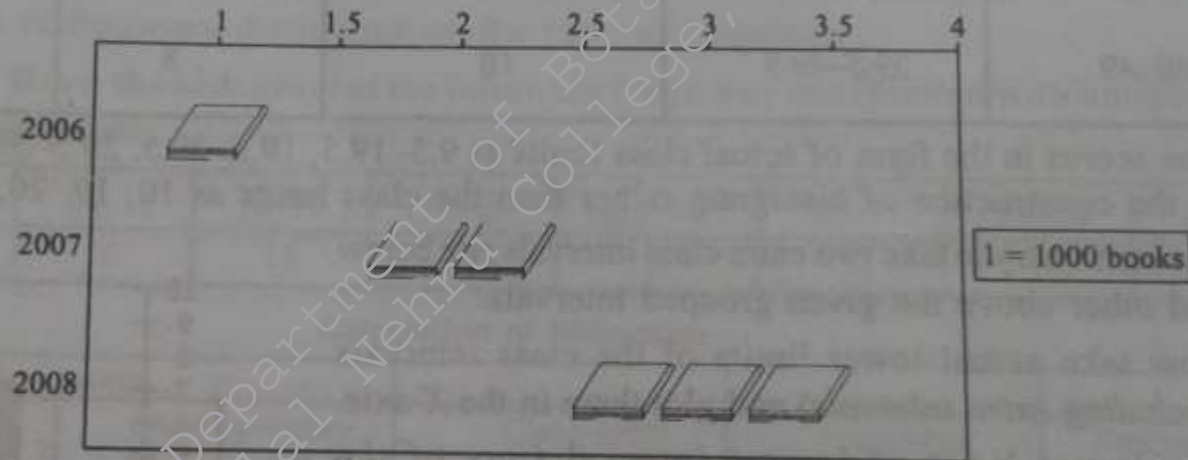
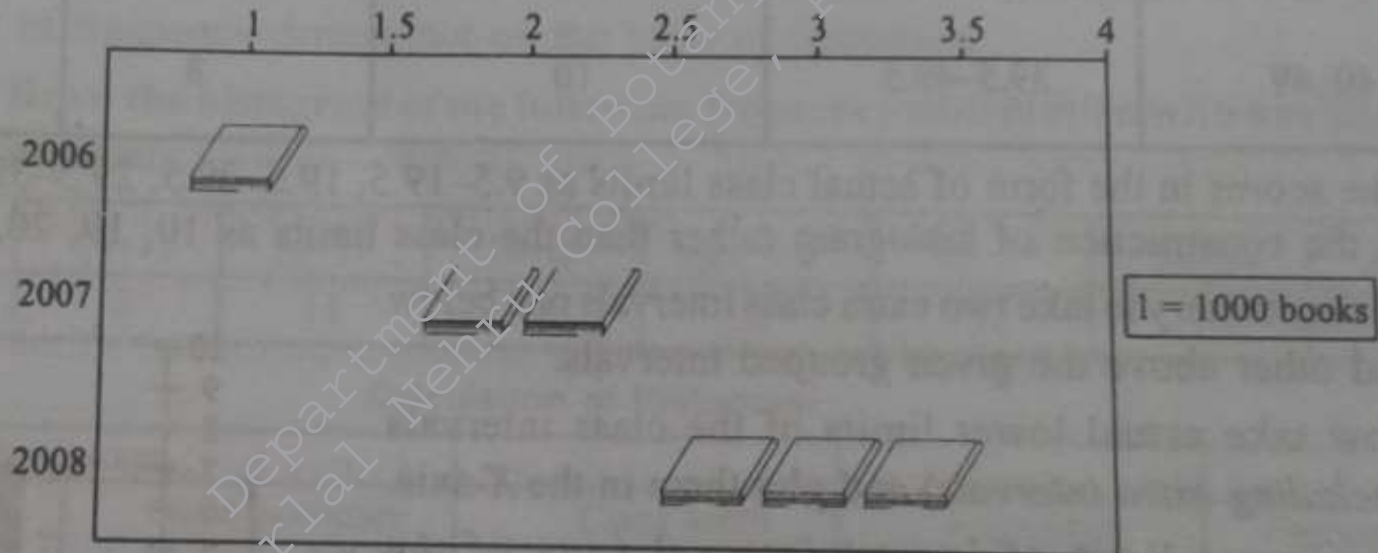


Fig. 3.7 Pictogram.

# pictogram

**Solution:** The given data is represented by pictogram as shown in Fig. 3.7.



**Fig. 3.7** Pictogram.

## Graphical representation of grouped data

Can be represented by using:

- Histogram
- Frequency polygonal
- Cumulative frequency curve or ogive
- Ratio diagram/ arithlog

### ● Graphical representation of ungrouped data

can be represented by using

- 1. Line graph.
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# histogram

- Histogram is represented by a rectangular bar to depict frequency distribution.
- Size of the class interval is represented by width
- Size of the frequency is represented by height.
- Class boundaries/intervals is important in the construction of histogram and represent in horizontal or X axis of the graph.
- Frequency is represented as height in the graph on Y axis.
- Histogram is essentially an area diagram composed of series of adjacent rectangles.

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# Steps/procedure of histogram

age	10-19	20-29	30-39	40-49
No. of class	1	0	1	10

- If data is given in inclusive series, convert data into exclusive series.
- It is customary to take two extra class intervals one below and another above the given class.

age	9.5-19.5	19.5-29.5	29.5-39.5	39.5-49.5
No. of class	1	0	1	10

- .

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- Take actual lower limit of class intervals and plot it in X axis
- Then take the corresponding frequency and construct graph by joining lower and higher limit of class interval and frequency of that class intervals.

# Example of inclusive data

Inclusive series

Age	10-19	20-29	30-39	40-49
Frequency	2	7	5	8

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# Convert inclusive data into exclusive data

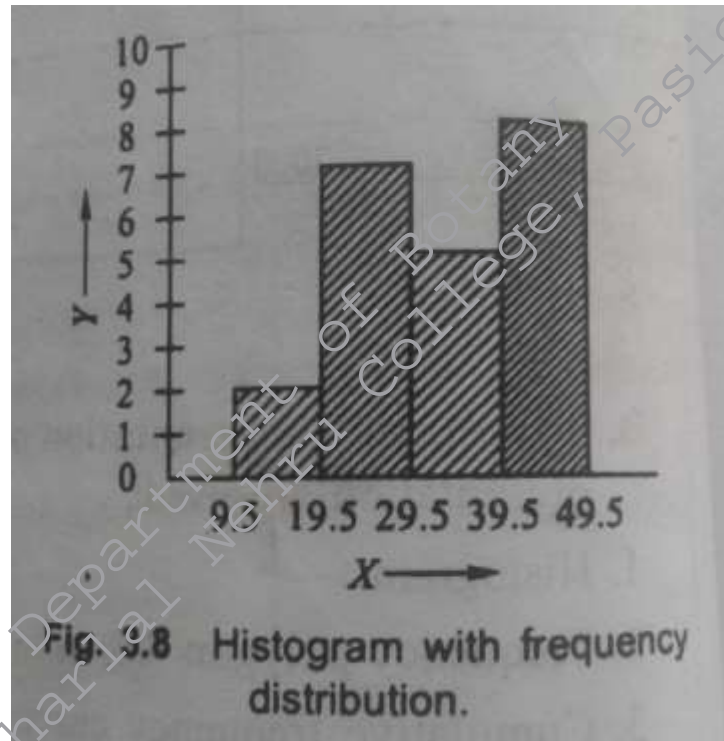
**Exclusive Series:**

Age (class interval)		Size of interval	Frequency	Frequency density
Score limit	True limit			
10-19	9.5-19.5	10	2	$\frac{2}{10} = 0.2$
20-29	19.5-29.5	10	7	$\frac{7}{10} = 0.7$
30-39	29.5-39.5	10	5	$\frac{5}{10} = 0.5$
40-49	39.5-49.5	10	8	$\frac{8}{10} = 0.8$

(ii) The scores in the form of actual class limits are 9.5-19.5, 19.5-29.5, 29.5-39.5, 39.5-49.5.

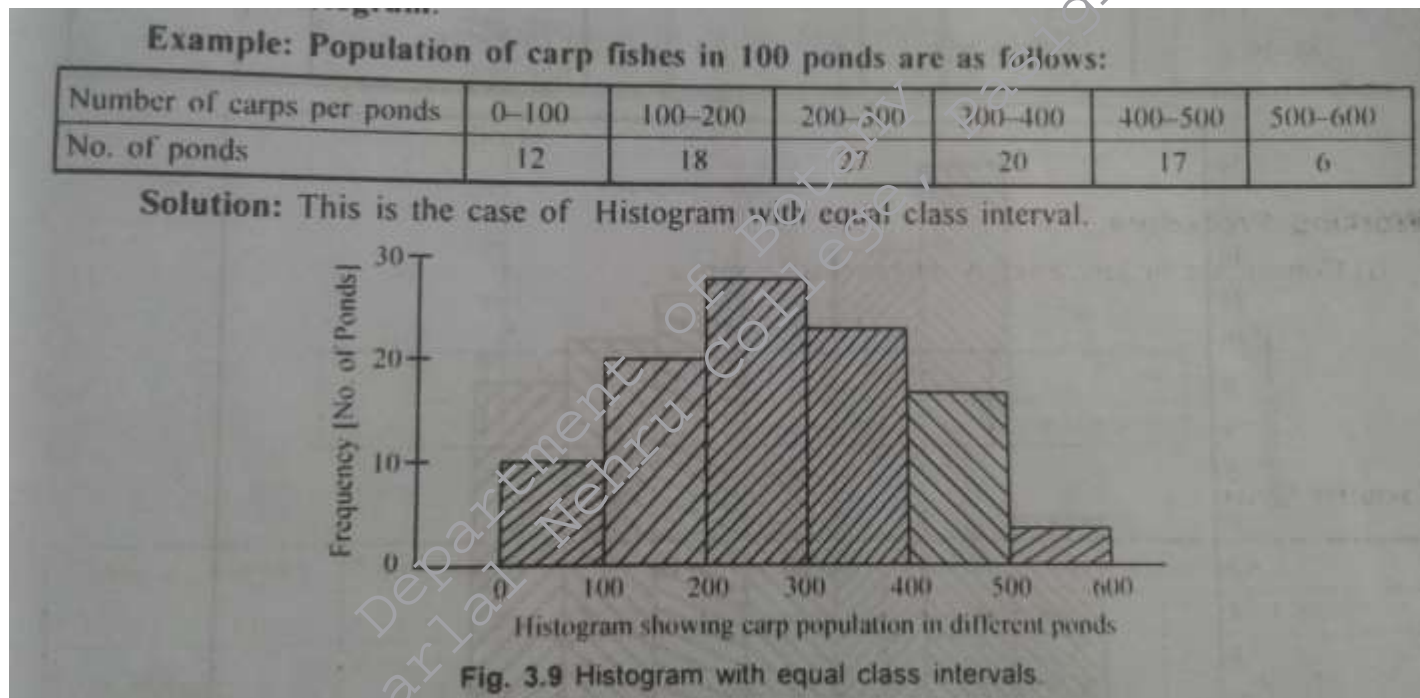
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# Draw graph



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If data is equal class intervals,  
directly construct histogram



# Frequency polygon

- A curve obtained by joining the middle of the histograms starts from (highest) histogram to immediate lower histogram successively and form into a figure with a many angles or polygon.
- It is used, where class intervals are equal with discrete (not joined) variables.
- It gives idea about the shape of the frequency distribution.

**Example:** Construct a histogram and frequency polygon for the following data:

100-150	150-200	200-250	250-300	300-350
4	6	13	5	2

**Solution:** We have the case of equal class interval.

<i>Class Interval</i>	<i>Frequency</i>	<i>C.F.</i>
100-150	4	4
150-200	6	10
200-250	13	23
250-300	5	28
300-350	2	30

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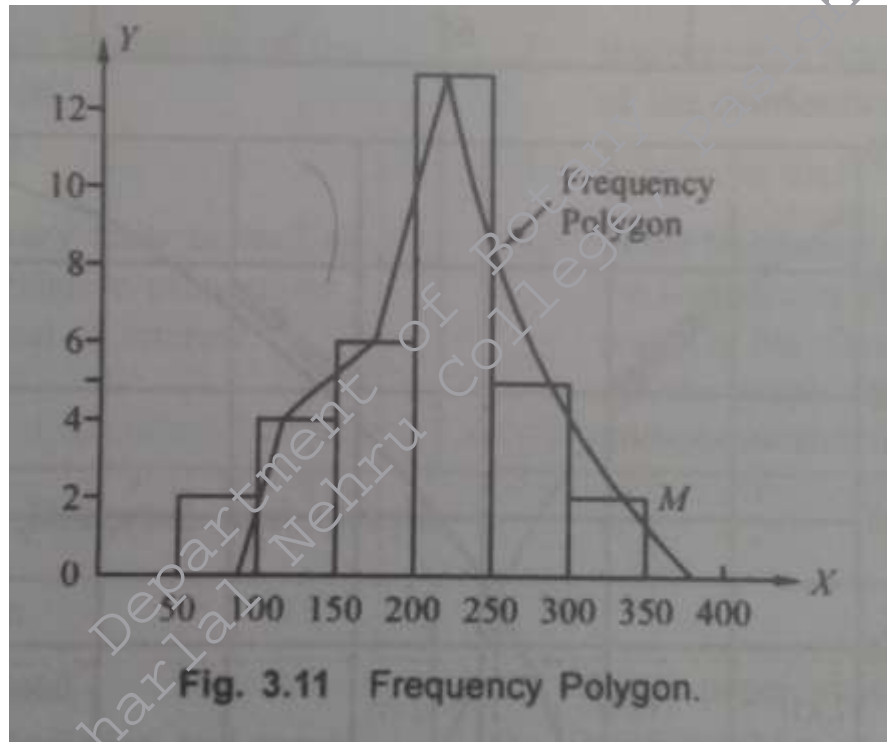


Fig. 3.11 Frequency Polygon.

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# Ogive/comulative frequency

- It is a graph to represent data of comulative frequency distribution.
- Ogive gives a curve form graph.
- When the curve is drawn from the comulated data downward, it is called less than ogive (table) while when curve is drawn from the comulated upward, it is called more than ogive.
- It is an important graph to find out median.
- Upper limits (class intervals )are presented along X axis.
- Comulative frequencies are presented along Y axi

**Example 14.** Draw a cumulative frequency graph and estimate the number of persons between the ages 32 — 42 in the following table :

Age	20 — 25	25 — 30	30 — 35	35 — 40	40 — 45	45 — 50	50 — 55	55 — 60
No. of persons	50	70	100	180	150	120	70	59

Class-interval (Age)	Class-boundary (Age)	Frequency (No. of persons)	Cumulative Frequency (Less than Ogive)
	20	0	0
20 — 25	25	50	50
25 — 30	30	70	120
30 — 35	35	100	220
35 — 40	40	180	400
40 — 45	45	150	550
45 — 50	50	120	670
50 — 55	55	70	740
55 — 60	60	59	799
		799	

**Example 15.** Plot less than Ogive and more than Ogive for the following data :

<i>Cost of production</i>	4 — 6	6 — 8	8 — 10	10 — 12	12 — 14	14 — 16
<i>No. of farms</i>	13	111	182	105	19	7

<i>Class interval (Cost of production)</i>	<i>Class boundary</i>	<i>Frequency (No. of farms)</i>	<i>Cumulative Frequency</i>	
			<i>(Less than Ogive)</i>	<i>(More than Ogive)</i>
	4	0	0	437
4 — 6	6	13	13	424
6 — 8	8	111	124	313
8 — 10	10	182	306	131
10 — 12	12	105	411	26
12 — 14	14	19	430	7
14 — 16	16	7	437	0
		437		

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Class interval (Cost of production)	Class boundary	Frequency (No. of farms)	Cumulative Frequency	
			(Less than Ogive)	(More than Ogive)
	4	0	0	437
4—6	6	13	13	424
6—8	8	111	124	313
8—10	10	182	306	131
10—12	12	105	411	26
12—14	14	19	430	7
14—16	16	7	437	0
		437		

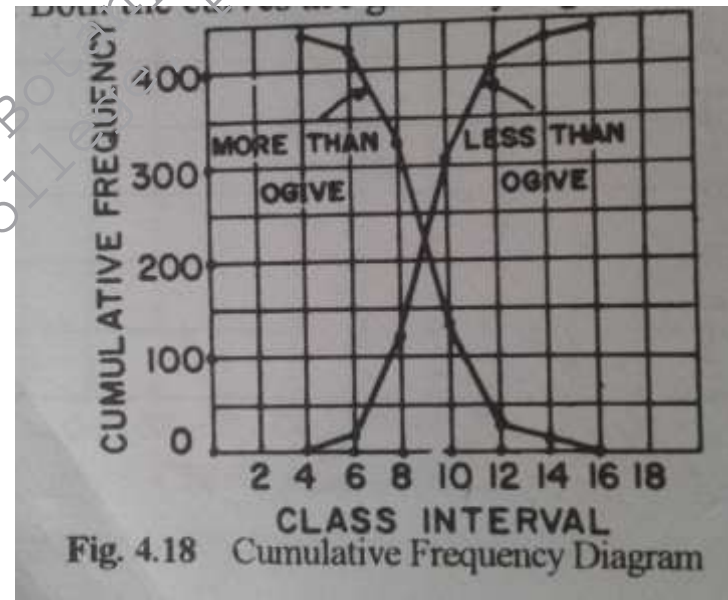


Fig. 4.18 Cumulative Frequency Diagram

Comulative frequency column is important.

Class-interval (Age)	Class-boundary (Age)	Frequency (No. of persons)	Cumulative Frequency (Less than Ogive)
	20	0	0
20—25	25	50	50
25—30	30	70	120
30—35	35	100	220
35—40	40	180	400
40—45	45	150	550
45—50	50	120	670
50—55	55	70	740
55—60	60	59	799
		799	

