

# DEBORAH SCHOOL DEPARTMENT OF MATHEMATICS GRADE 12 MATHS LECTURE NOTE AND EXERCISE FOR SOCIAL SCIENCE STUDENTS



# Frequency curves

## Definition 1.1

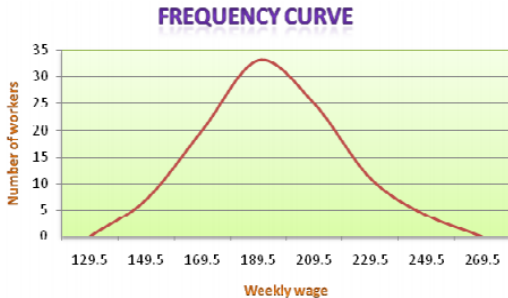
*Frequency curves are simply smoothed curves of frequency polygons.*

## Example 1.2

*Construct a frequency curve for the frequency distribution of the wages of workers given below*

| Weekly wages in<br>Birr (class limits) | Class<br>boundaries | Class mid<br>point | Number of<br>workers |
|----------------------------------------|---------------------|--------------------|----------------------|
| 140 - 159                              | 139.50 - 159.50     | 149.50             | 7                    |
| 160 - 179                              | 159.50 - 179.50     | 169.50             | 20                   |
| 180 - 199                              | 179.50 - 199.50     | 189.50             | 33                   |
| 200 - 219                              | 199.50 - 219.50     | 209.50             | 25                   |
| 220 - 239                              | 219.50 - 239.50     | 229.50             | 11                   |
| 240 - 259                              | 239.50 - 259.50     | 249.50             | 4                    |
| Total                                  |                     |                    | 100                  |

## Solution 1.1



# Representation of data using diagrams (Charts)

Bar charts are like histograms in that frequencies are represented with rectangular bars but, with a space between each bar. Bar charts are one of the most commonly used data representations found in newspapers, magazines and report papers. There are different types of bar charts

- ① simple bar charts
- ② component (subdivided) bar charts
- ③ grouped (multiple) bar charts

## Simple bar charts

### Definition 1.3

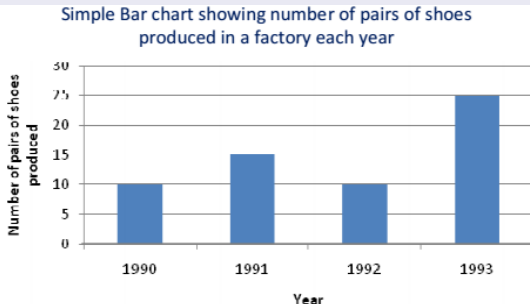
*A simple bar chart is a type of bar chart that simply represents the frequencies of single items without considering the component items.*

### Example 1.4

*The following table depicts types and amount of pairs of shoes produced by a certain factory for four consecutive years (in thousands)*

| Year | Boots | Normal | Total |
|------|-------|--------|-------|
| 1990 | 3     | 7      | 10    |
| 1991 | 5     | 10     | 15    |
| 1992 | 4     | 6      | 10    |
| 1993 | 10    | 15     | 25    |

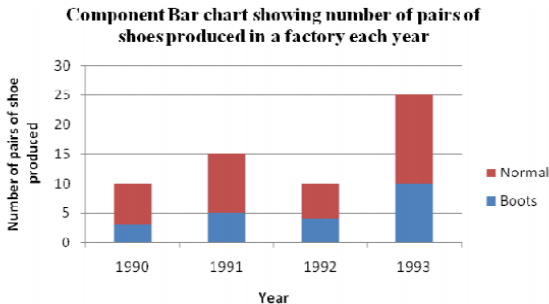
## Solution 1.2



**In order to draw a bar chart, take the following steps.**

- 1 Set horizontal and vertical axes.
- 2 Locate data values/ categories on the horizontal axis and frequency on the vertical axis.
- 3 Draw rectangular bars.
- 4 Notice that the space between each bar must be the same.

**Component bar charts** The component bar chart for the data given in the previous example is given below



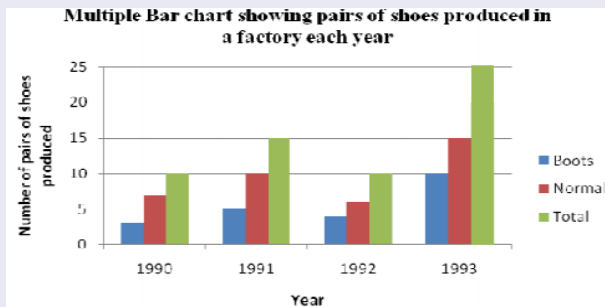
### Note 1.1

*This component bar chart describes not only the total production of pairs of shoes but also the types of shoes produced, one on top of the other so that each bar sums up the total.*

# Multiple bar charts

These are bar charts that show the various components of an item side by side. They help to facilitate comparison. The multiple bar chart for the above data is given below.

## Example 1.5



# Line graphs

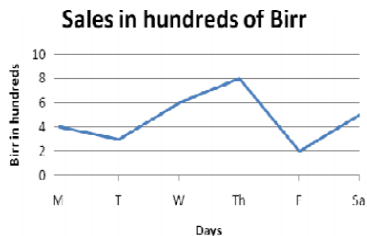
## Definition 1.6

*A line graph is another useful way to represent data, especially when the categories represent time. Such graphs portray changes in amount with respect to time by a series of line segments. These graphs are useful for comparing series of data.*

## Example 1.7

*The following data represents daily sales of a certain shop for six days.*

| Days                      | M | T | W | Th | F | Sa |
|---------------------------|---|---|---|----|---|----|
| Sales in hundreds of Birr | 4 | 3 | 6 | 8  | 2 | 5  |



In order to draw a line graph, first plot each quantity and then connect each plot with a line segment.

# Pie charts

## Definition 1.8

*A pie chart is a pictorial representation of data with several subdivisions in a circular region. The various components are converted into degrees by taking proportions of  $360^\circ$ .*

### In order to draw pie chart

- i Draw a circle with convenient radius.
- ii Find the relative frequency of each item.
- iii Convert each relative frequency into an angle.
- iv Divide the circle according to these angles.
- v Different components appear as adjacent sectors of the circle.

### Example 1.9

*The following data depicts preferred means of transport for 100 people.*

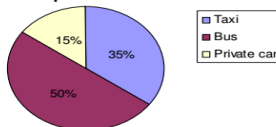
| Type of transport | Taxi | Bus | Private |
|-------------------|------|-----|---------|
| People who used   | 35   | 50  | 15      |

*To draw a pie chart that represents the given data, first you need to determine the relative frequency (from  $360^{\circ}$ ) of the users of each type of transport to calculate the angles:*

## Solution 1.3

| Type of transport | No of people | Relative frequency                  | Angle       |
|-------------------|--------------|-------------------------------------|-------------|
| Taxi              | 35           | $\frac{35}{100} \times 360^\circ =$ | $126^\circ$ |
| Bus               | 50           | $\frac{50}{100} \times 360^\circ =$ | $180^\circ$ |
| Private car       | 15           | $\frac{15}{100} \times 360^\circ =$ | $54^\circ$  |

Transport Preference



## Note 1.2

- 1 *In the Pie chart, notice that the area of the sector is proportional to the relative frequency.*
- 2 *Components representing equal percentages will have equal areas in the circle.*
- 3 *Pie charts may not be effective if there are too many categories.*

## Exercise 1.1

- ① *The following table represents the costs in thousands of Birr of building a house in three months.*

| Month    | Items  |       |        | Total |
|----------|--------|-------|--------|-------|
|          | Cement | Steel | Labour |       |
| Meskerem | 70     | 90    | 50     | 210   |
| Tikimt   | 80     | 100   | 70     | 250   |
| Hidar    | 50     | 45    | 45     | 155   |

*Represent the above data using the three types of bar charts.*

## Exercise 1.2

- 1
- 2 Represent the following using any of the three types of bar charts.

| Year | Production in tonnes |       |       | Total |
|------|----------------------|-------|-------|-------|
|      | Teff                 | Wheat | Maize |       |
| 1996 | 80                   | 60    | 70    | 210   |
| 1997 | 100                  | 150   | 180   | 430   |
| 1998 | 150                  | 200   | 250   | 600   |

### Exercise 1.3

- ① The age distribution of people in a village is given as follows. Fill in the Degree column and construct a pie chart.

| Age      | Number of people | Degree |
|----------|------------------|--------|
| Under 20 | 15               |        |
| 20 – 40  | 60               |        |
| 40 – 60  | 20               |        |
| Over 60  | 5                |        |

## Exercise 1.4

- ① Draw a pie chart for the data give below

| Crop   | Production in tonnes |
|--------|----------------------|
| Teff   | 500                  |
| Wheat  | 700                  |
| Maize  | 800                  |
| Barley | 500                  |

Thank You !!!