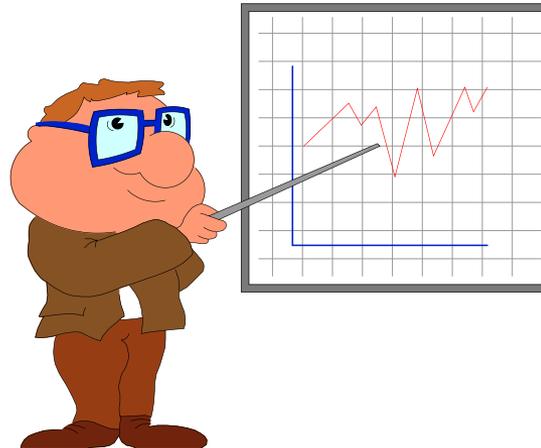TAIBAH UNIVERSITY

Faculty of Science

Department of Math.

جامعة طيبة
كلية العلوم
قسم الرياضيات

Probability and Statistics for Engineers

STAT 301

Teacher :

Lesson 4

Graphical Presentation

Presenting categorical data

Bar Chart

- **A chart containing rectangles in which the length of each bar represents the count, amount, or percentage of responses of one category.**
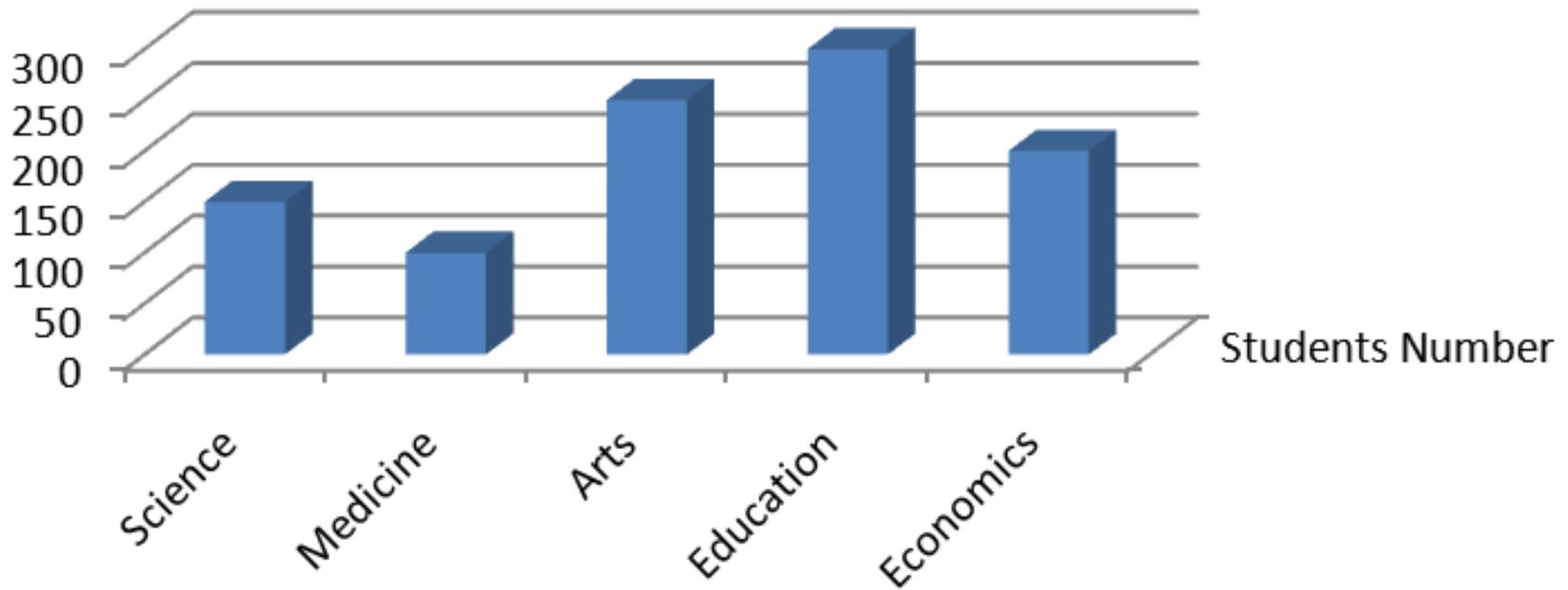
- **There are gabs between bars**

Example

The following table represents distribution of students according to their faculties in one of universities:

Faculty	Students
Science	150
Medicine	100
Arts	250
Education	300
Economics	200
Total	1000

Example

Pie Chart

- **A pie chart is a circle that is divided into sections according to the percentage of frequencies in each category of the distribution.**

Pie Chart

Steps :

1. Calculate the percentage contribution for each category by divide the value of each category by the total, and multiply the product by 100.

2. Calculating the number of degrees by multiplying the percent by 3.6 (a circle has 360 degrees)

Example

The following table represents the exports of one of countries from petroleum and the categories of the imported countries:

category	Quantity	percentage	Angle degree
Arabic	2803	1.27%	5
Australia	42886	19.37%	70
America	11552	5.22%	19
Asia	158764	71.71%	258
Africa	5383	2.43%	9
Total	221388	100%	360

Example

Petroleum Exports

- Arabic
- Australia
- America
- Asia
- Africa

2.43%   1.27%
19.37%
5.22%
71.71%
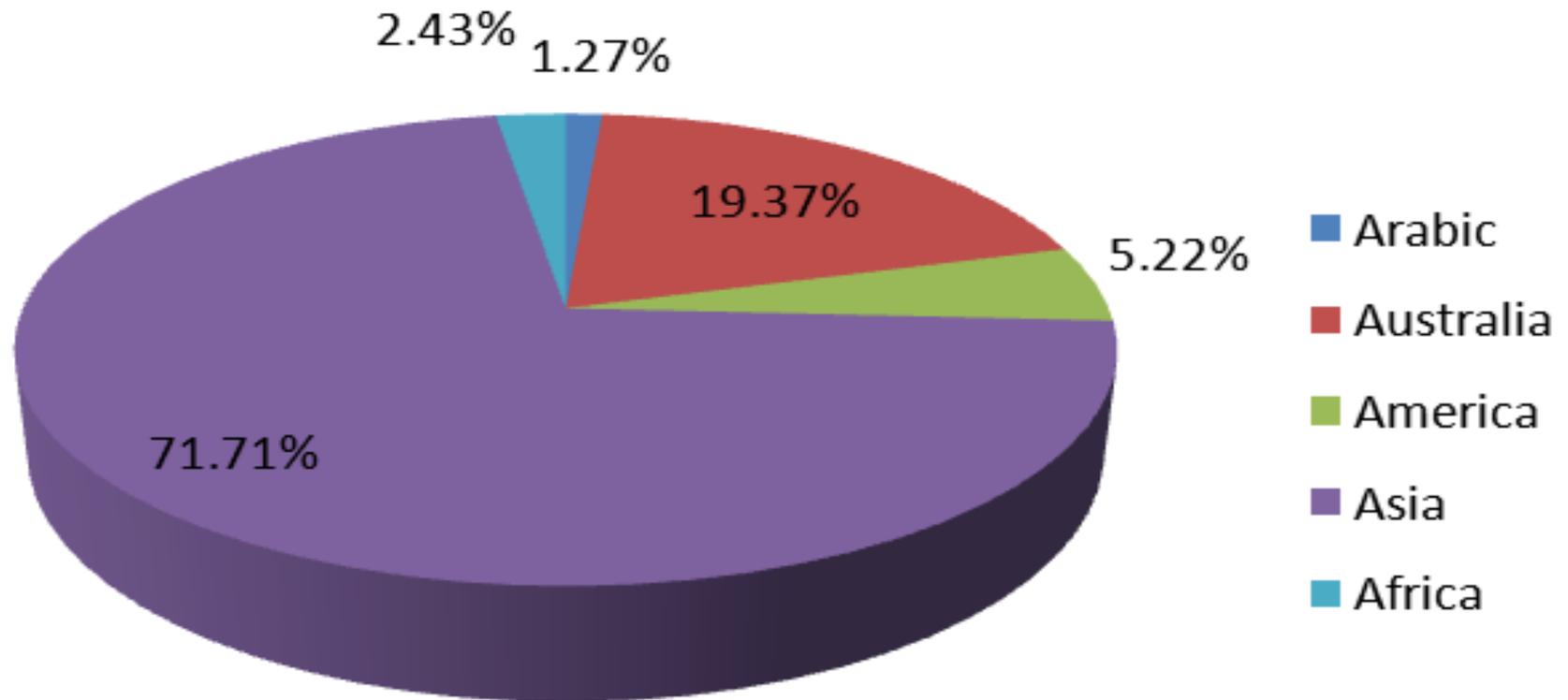
Example

For example:

For Arabic category :

percentage (1.27%) = (28203/221388)×100%

Angle degree (5) = (1.27× 3.6) = 4.56 ~ 5

Presenting quantitative data

Stem-and-Leaf Plots

The stem and leaf plot represents an effective way to summarize data.

A stem-and-leaf plot can help you compare data.

Stem-and-Leaf Plots (Example 1)

The heights of 11 fourth-grade badminton players are (in inches):

- **56**
- **61**
- **61**
- **60**
- **59**
- **57**

- **58**
- **58**
- **63**
- **61**
- **59**

Stem-and-Leaf Plots (Example 1)

The ordered numbers are: 56, 57, 58, 58, 59, 59, 60, 61, 61, 61, 63

- **Each STEM stands for the first digit of each number.**

- **Record the tens digits in order from least to greatest.**

HEIGHT IN INCHES	
Stem	**Leaf**
5	6, 7, 8, 8, 9, 9
6	0, 1, 1, 1, 3

Stem-and-Leaf Plots (Example 2)

Table			Car Battery Life				
2.2	4.1	3.5	4.5	3.2	3.7	3.0	2.6
3.4	1.6	3.1	3.3	3.8	3.1	4.7	3.7
2.5	4.3	3.4	3.6	2.9	3.3	3.9	3.1
3.3	3.1	3.7	4.4	3.2	4.1	1.9	3.4
4.7	3.8	3.2	2.6	3.9	3.0	4.2	3.5

Stem-and-Leaf Plots (Example 2)

Stem-and-Leaf Plot of Battery Life

Stem	Leaf	Frequency
1	69	2
2	25669	5
3	0011112223334445567778899	25
4	11234577	8

- **The stem represents the digit preceding the decimal and the leaf corresponds to the decimal part of the number.**

DOT PLOT

➢ **This type of chart uses for numerical raw data, each response is represented as a dot above a horizontal line that extends through the range of all values.**

➢ **Should two or more response values be identical, the dots for these responses are stacked (placed vertically) above each**

DOT PLOT (Steps)

➤ **Step 1**: Label your axis and title your graph. Draw a horizontal line and label it with the variable. Title your graph

➤ **Step 2**: Scale the axis based on the values of the variable

➤ **Step 3**:Mark a **dot** above the number on the horizontal axis corresponding to each data value.

DOT PLOT (Example)

The number of goals scored by each team in the first round of the California Southern Section Division V high school soccer playoffs is shown in the following table.

5	0	1	0	7	2	1	0	4
0	3	0	2	0	3	1	5	0
3	0	1	0	1	0	2	0	3

DOT PLOT (Example)

Goals Scored in California Division 5 Soccer Playoffs

Number of Goals

Histogram

Is a bar graph in which the horizontal scale represents classes of data values and the vertical scale represents frequencies.

Histogram

A special bar chart for grouped numerical data in which the frequencies or percentages of each group of numerical data are represented as individual bars on the vertical Y-axis and the variable is plotted on the horizontal X-axis. In a histogram, there are no gaps between adjacent bars as there would be in a bar chart of categorical data.

Example

The following distribution represents marks of 54 students. Draw a histogram to this data

Mark	students
0-4	8
4 – 8	12
8 – 12	20
12 – 16	6
16 – 20	8
Total	54

Example
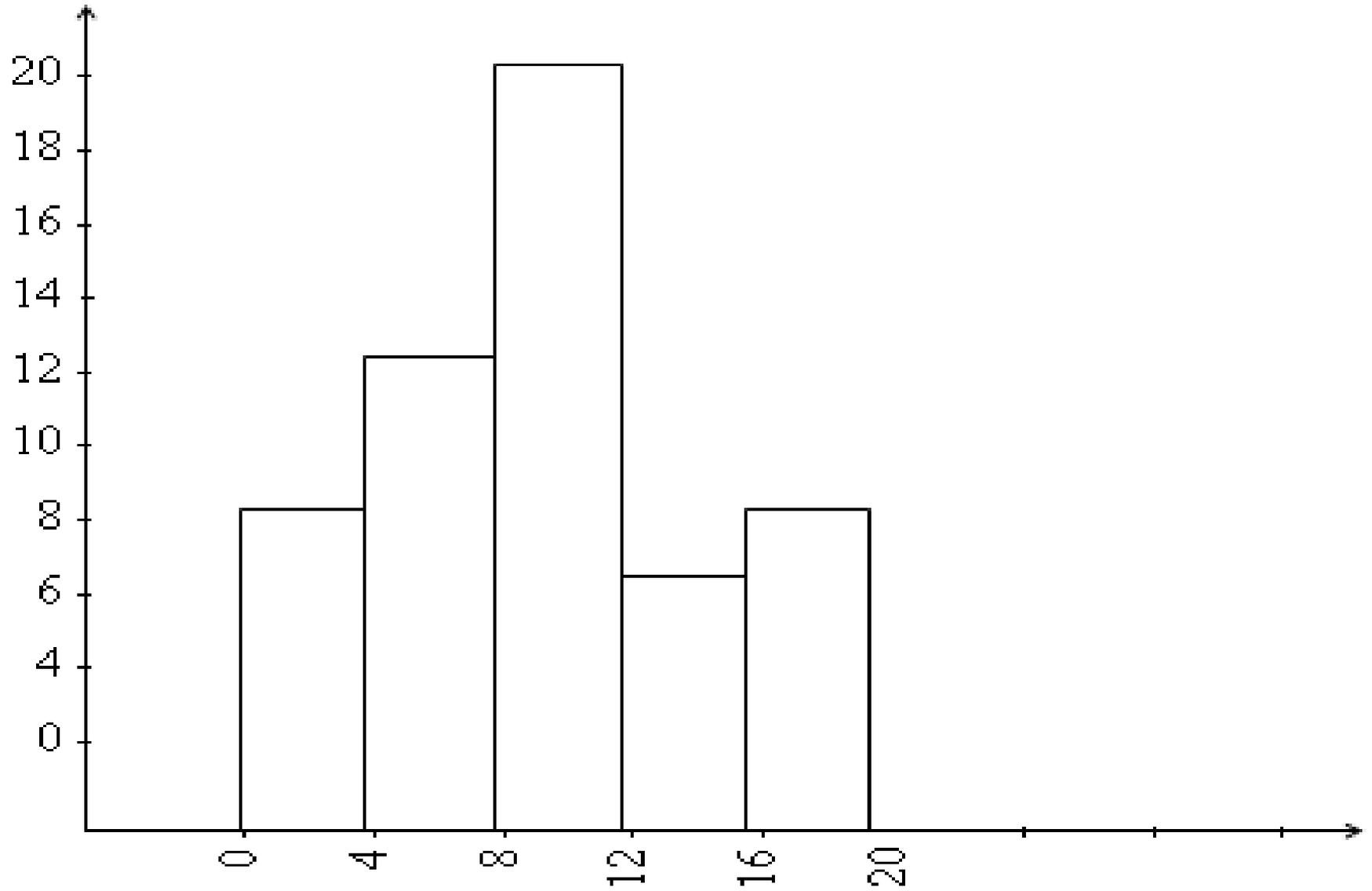
Example

If the previous table converted to

Mark	students
1 - 4	8
5 – 9	12
10 – 12	20
13 – 16	6
17 – 20	8
Total	54

Example

Solution: First we must compute <u>classes boundaries.</u>

Class Limit	Class boundaries	students
1 – 4	0.5 – 4.5	8
5 – 8	4.5 – 8.5	12
9 –12	8.5 – 12.5	20
13 –16	12.5 – 16.5	6
17 –20	16.5 – 20.5	8
Total		**54**
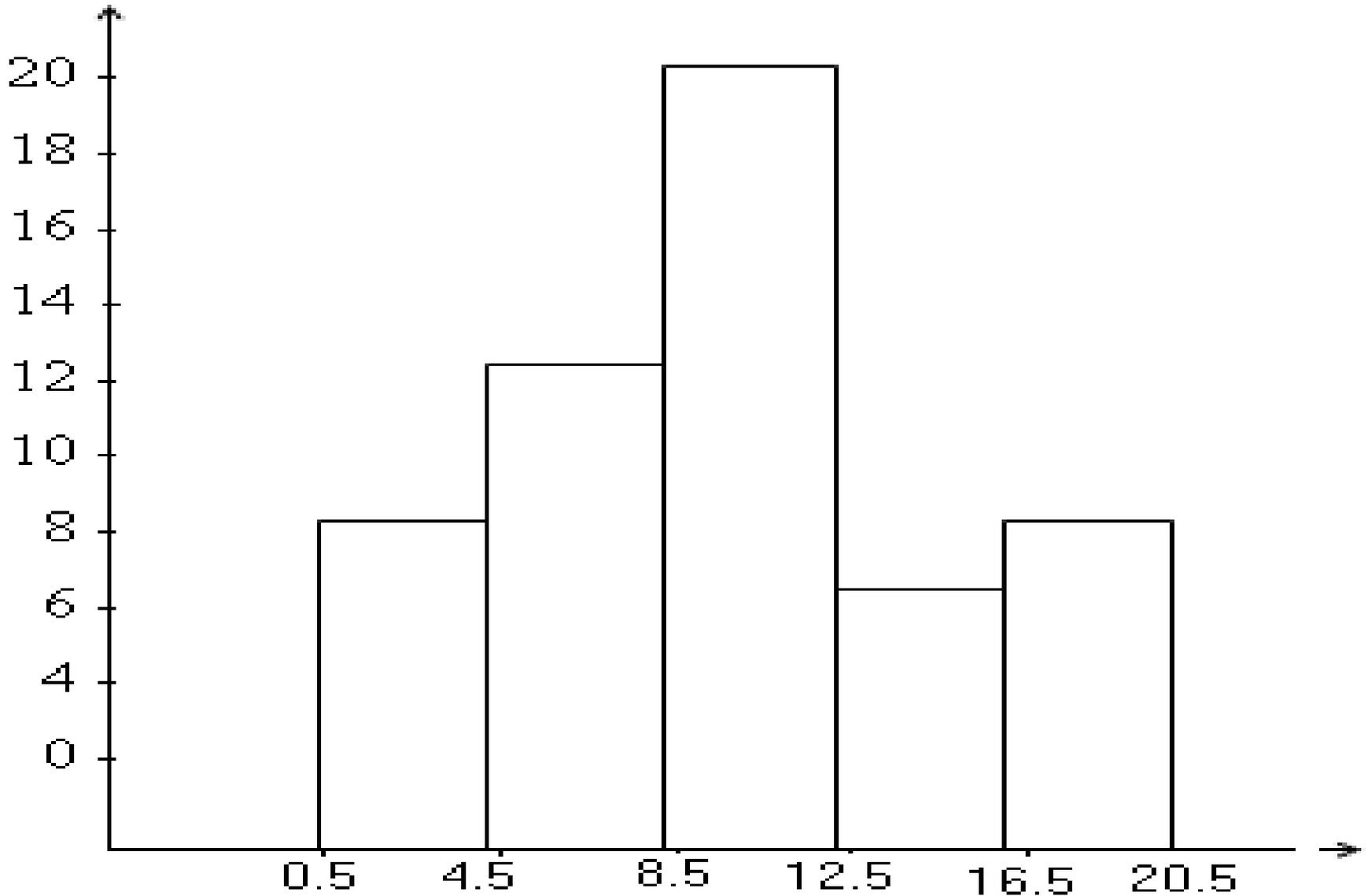
Polygon

A frequency polygon uses line segments connected to points located directly above class midpoint values.

Polygon

The heights of the points correspond to the class frequencies, and the line segments are extended to the right and left so that the graph begins and ends on the horizontal axis.

Example

Draw a polygon for the following data

Class	Frequency	midpoints
2 – 4	4	3
4 – 6	8	5
6 – 8	16	7
8 – 10	12	9
10 – 12	6	11
12 – 14	2	13
Sum	48	

To draw polygon we need to compute classes midpoints

Example