Presentation and Description of Statistical Data

Statistic: in the last time the definition of statistic is means the collecting of data and arrange it by a tables or presented it by graphs

Statistic: in the present date is mean the scientific tools can be used in the several kinds of science such as engineering, management, agriculture, …… etc for collecting data and analysis these data by many several mathematical forms to make decision.

Method of presentation data

There are several method to present data there are as follows

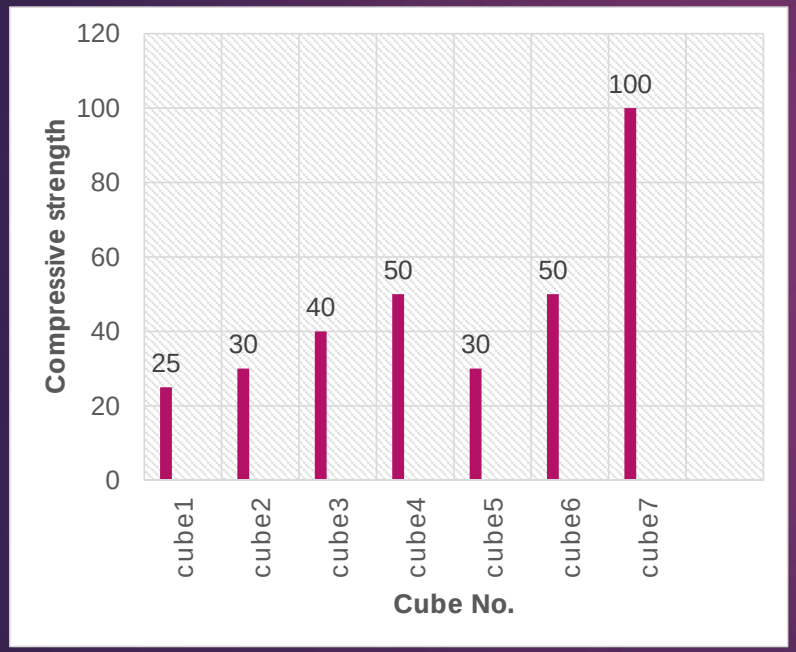
1. Table method

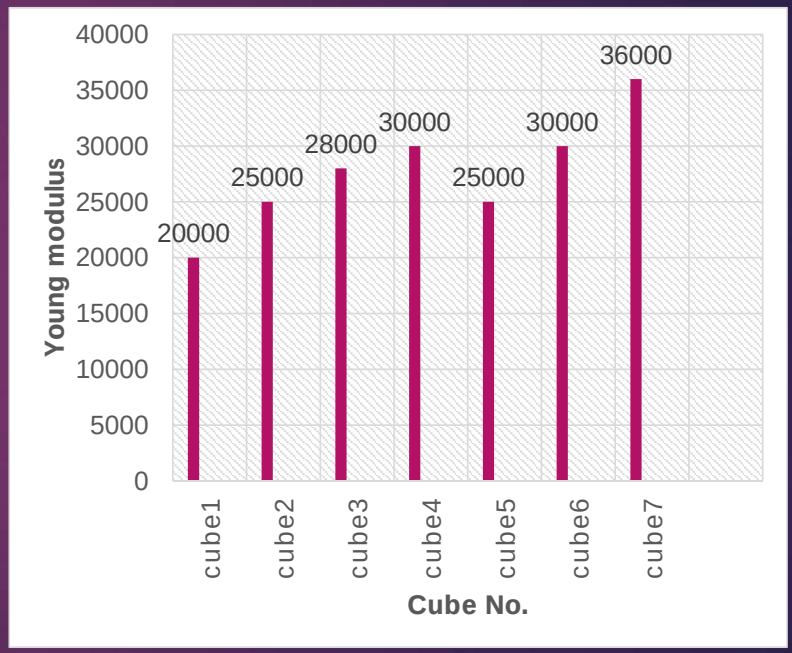
   It is concluded by putting the data in table form contain the information about data in each column.

Concrete cube (No.)	Compressive strength (kPa.)	Young modulus (kPa.)
1	25	20000
2	30	25000
3	40	28000
4	50	30000
5	30	25000
6	50	30000
7	100	36000

2. Bar chart

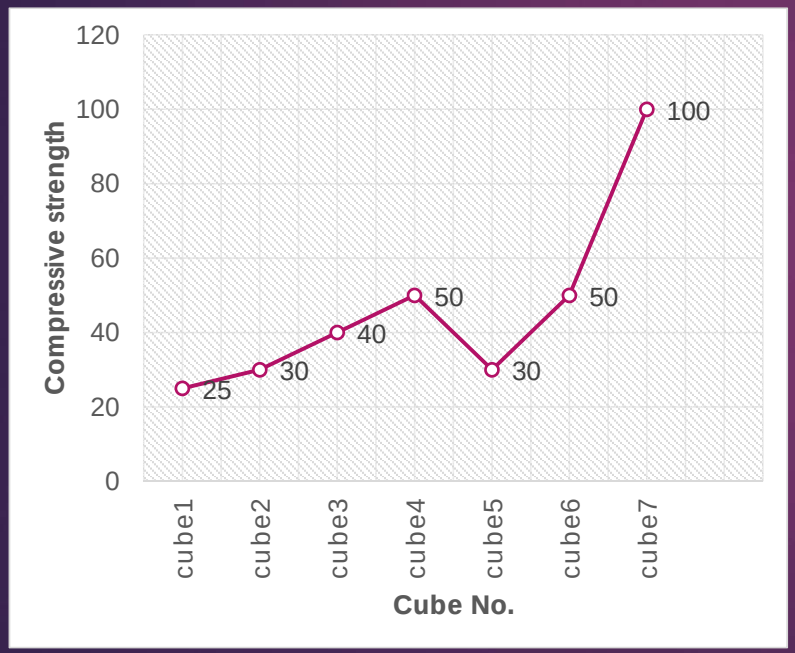
It is concluded by graph the data in a rectangular form.

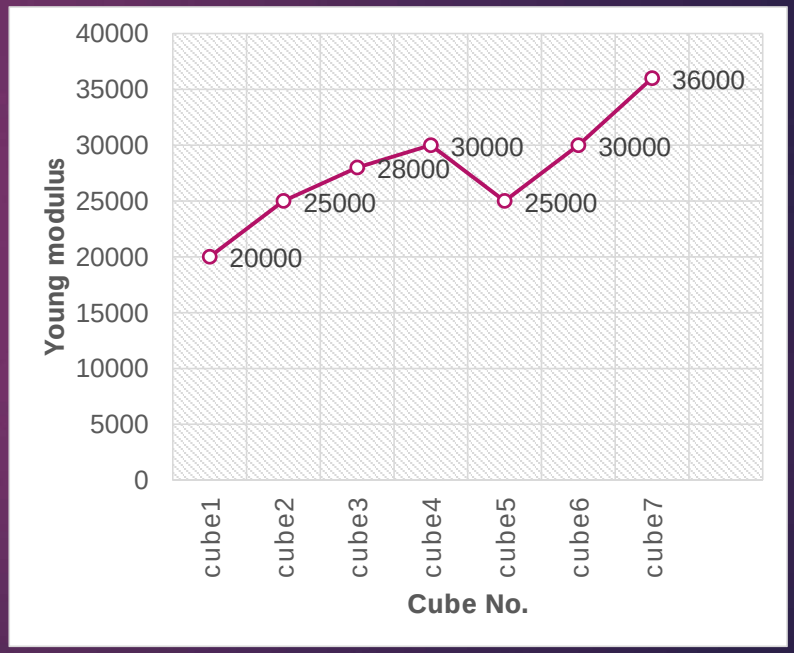




3. Broken line chart

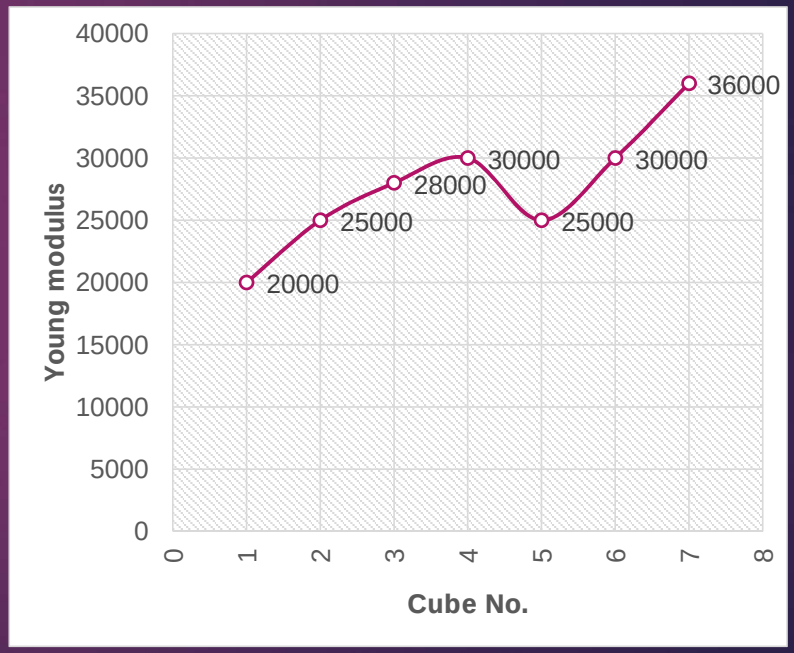
It is concluded by graph the data in a broken line by connect each point to another point by straight line form.





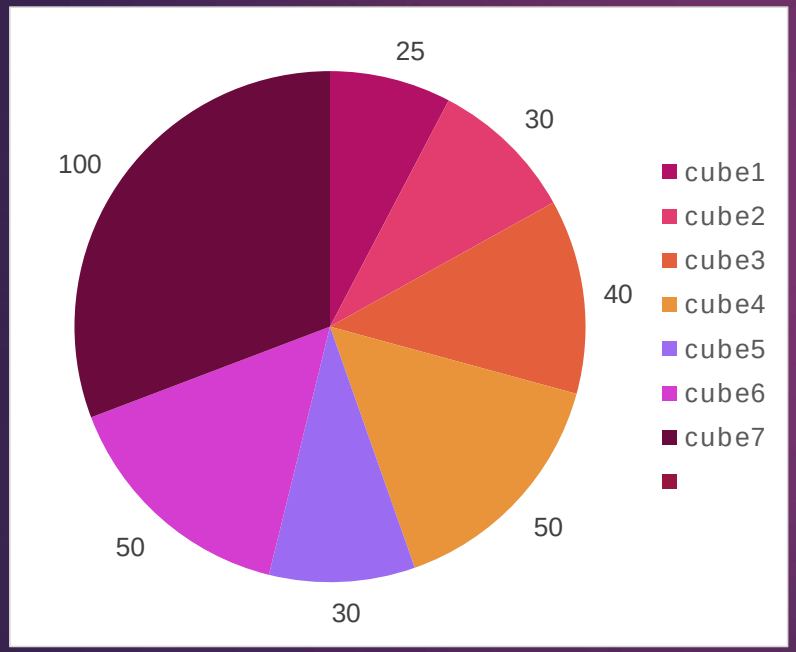
4. Curved line chart

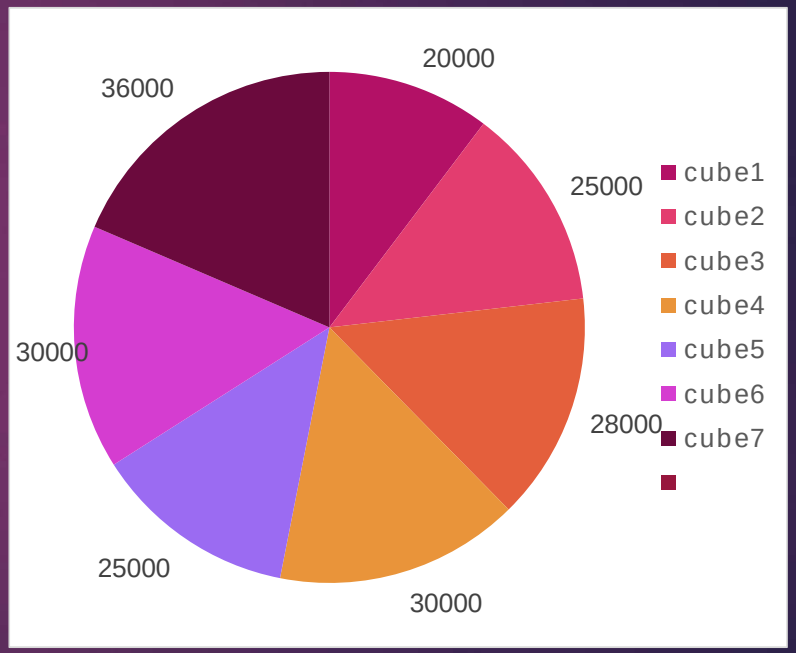
It is concluded by graph the data in a broken line by connect each point to another point by straight line form.



5. Pie chart

It is concluded by graph the data in a circular form.





Frequency distribution:
When found a large number of data of an problem for such field the frequency distribution is the one of important form to contribution these data.

Example:
The following data are considered the values of columns load when tested several samples in structural laboratory construct a frequency table for these data.

100kN, 90kN, 120kN, 60kN, 140kN, 110kN, 80kN, 70kN, 110kN, 130kN, 140kN, 90kN, 70kN, 80kN, 140kN, 50kN, 148kN, 120kN, 130kN, 140kN, 80kN, 70kN, 130kN, 140kN, 60kN, 90kN, 70kN.

Solution:

There are several forms of frequency tables as follows.

1. Simple frequency table

(Column Load (kN), (x	(Frequency (f
50	1
60	2
70	4
80	3
90	3
100	1
110	2
120	2
130	3
140	5
148	1

2. Interval frequency table

in this stage we are must limiting the length of interval, assume interval length a= 10,

Columns Load (X1 – X2) Interval limit	Frequency (fi)	Real interval limit
50 - 59	1	49.5 – 59.5
60 - 69	2	59.5 – 69.5
70 - 79	4	69.5 – 79.5
80 – 89	3	79.5 – 89.5
90 – 99	3	89.5 – 99.5
100 – 109	1	99.5 – 109.5
110 – 119	2	109.5 – 119.5
120 – 129	2	119.5 – 129.5
130 – 139	3	129.5 – 139.5
140 – 149	6	139.5 – 149.5

b=20

Columns Load (X1 – X2) Interval limit	Frequency (fi)	Real interval limit (X1 – X2)
50 - 69	3	49.5 – 69.5
70 - 89	7	69.5 – 89.5
90 - 109	4	89.5 – 109.5
110 – 129	4	109.5 – 129.5
130 – 149	9	129.5 – 149.5

2. Interval frequency table continue

in this stage we are must limiting the length of interval, assume interval length a= 10,

Columns Load (X1 – X2)	Frequency (fi)	Interval center (Xi)
50 - 59	1	54.5
60 - 69	2	64.5
70 - 79	4	74.5
80 – 89	3	84.5
90 – 99	3	94.5
100 – 109	1	104.5
110 – 119	2	114.5
120 – 129	2	124.5
130 – 139	3	134.5
140 – 149	6	144.5

b=20

Columns Load (X1 – X2)	Frequency (fi)	Interval center (Xi)
50 - 69	3	59.5
70 - 89	7	79.5
90 - 109	4	99.5
110 – 129	4	119.5
130 – 149	9	139.5

$$Xi = \frac{X1 + X2}{2}$$

3. Relative frequency distribution

Is the same of frequency distribution but we are fixed the frequency as a rate of total frequency. In the last example, were interval length 20 the relative frequency table becomes, as follows.

Columns Load (X1 – X2)	Interval center (Xi)	Frequency (fi)	Relative frequency (fr)	Percentage frequency (fp)
50 - 69	59.5	3	0.11111	11.111
70 - 89	79.5	7	0.25926	25.926
90 - 109	99.5	4	0.14815	14.815
110 – 129	119.5	4	0.14815	14.815
130 – 149	139.5	9	0.33333	33.333
		ft = 27		

$$ft = \sum_{1}^{n} fi$$

$$fr = \frac{fi}{ft}$$

$$fp = \frac{fi}{ft}\%$$

4. Cumulative frequency distribution

Is the same of frequency distribution but we are fixed the frequency as a cumulative arrangement. In the last example, were interval length 20 the cumulative frequency table becomes, as follows.

Columns Load (X1 – X2)	Real interval limit (X1 – X2)	Interval center (Xi)	Frequency (fi)	Cumulative frequency
50 - 69	49.5 – 69.5	59.5	3	3
70 - 89	69.5 – 89.5	79.5	7	10
90 - 109	89.5 – 109.5	99.5	4	14
110 – 129	109.5 – 129.5	119.5	4	18
130 – 149	129.5 – 149.5	139.5	9	27

$$f_{ic} = fi + fic\_1$$

5. Frequency graphs

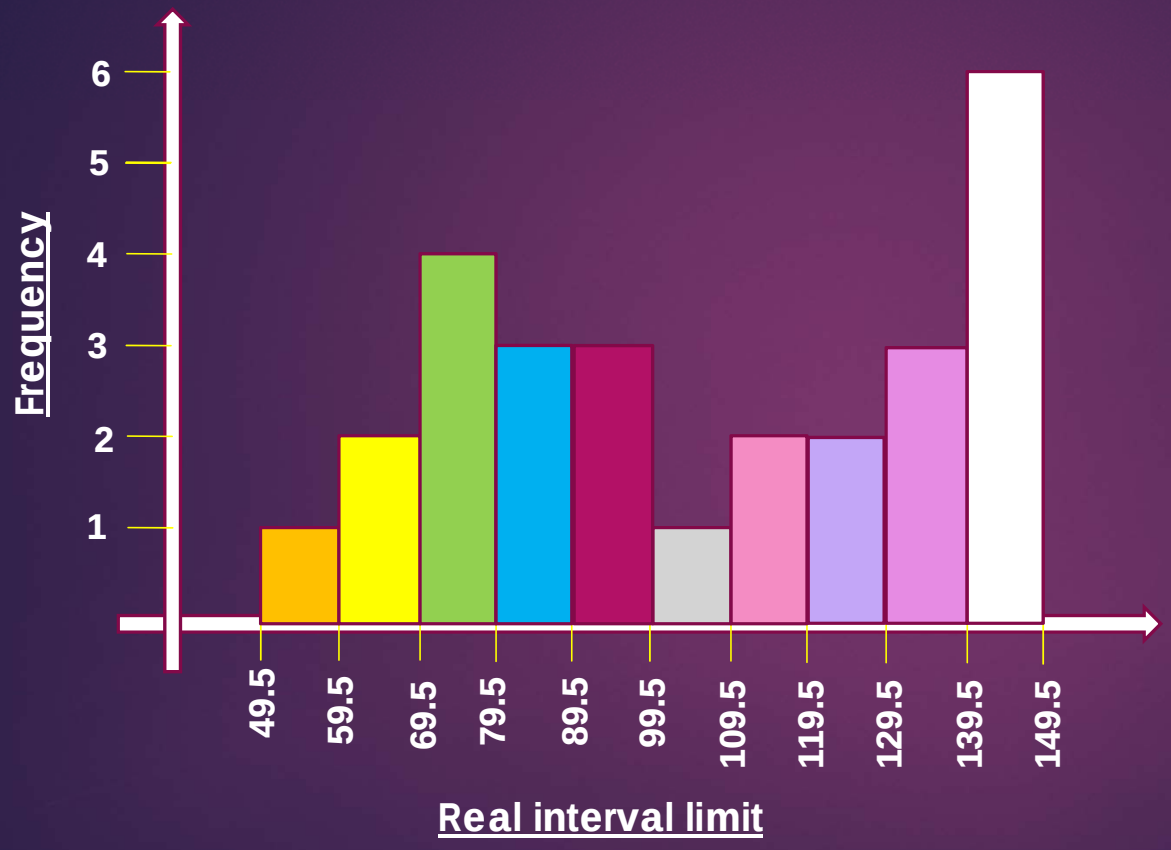
It is a new form to display the frequency distribution by graphs method, and divided to the following:

a) Frequency histogram.
b) Frequency polygon.
c) Frequency curve.
d) Cumulative frequency polygon.

Example:

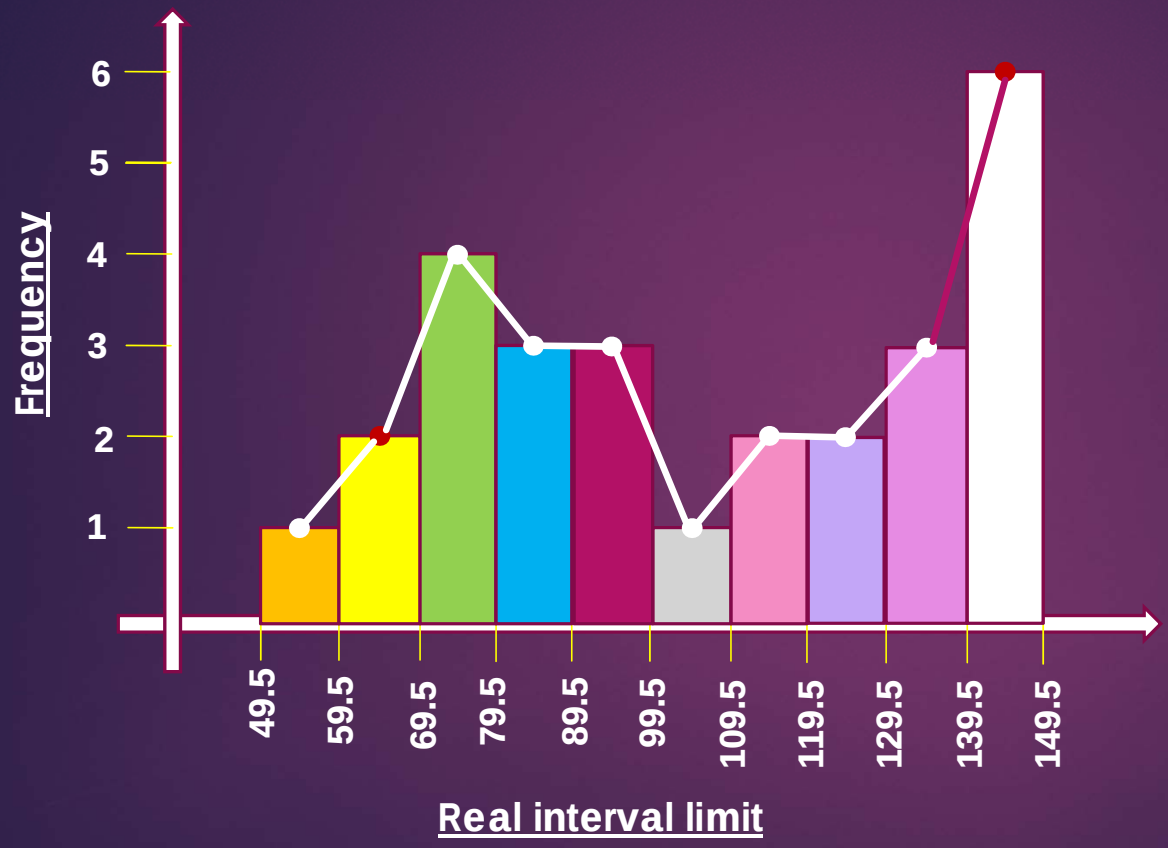
For the following date in the beside table draw the frequency histogram, frequency polygon, frequency curve, and cumulative frequency polygon.

Columns Load (X1 – X2)	Real interval limit	Frequency (fi)
50 - 59	49.5 – 59.5	1
60 - 69	59.5 – 69.5	2
70 - 79	69.5 – 79.5	4
80 – 89	79.5 – 89.5	3
90 – 99	89.5 – 99.5	3
100 – 109	99.5 – 109.5	1
110 – 119	109.5 – 119.5	2
120 – 129	119.5 – 129.5	2
130 – 139	129.5 – 139.5	3
140 – 149	139.5 – 149.5	6



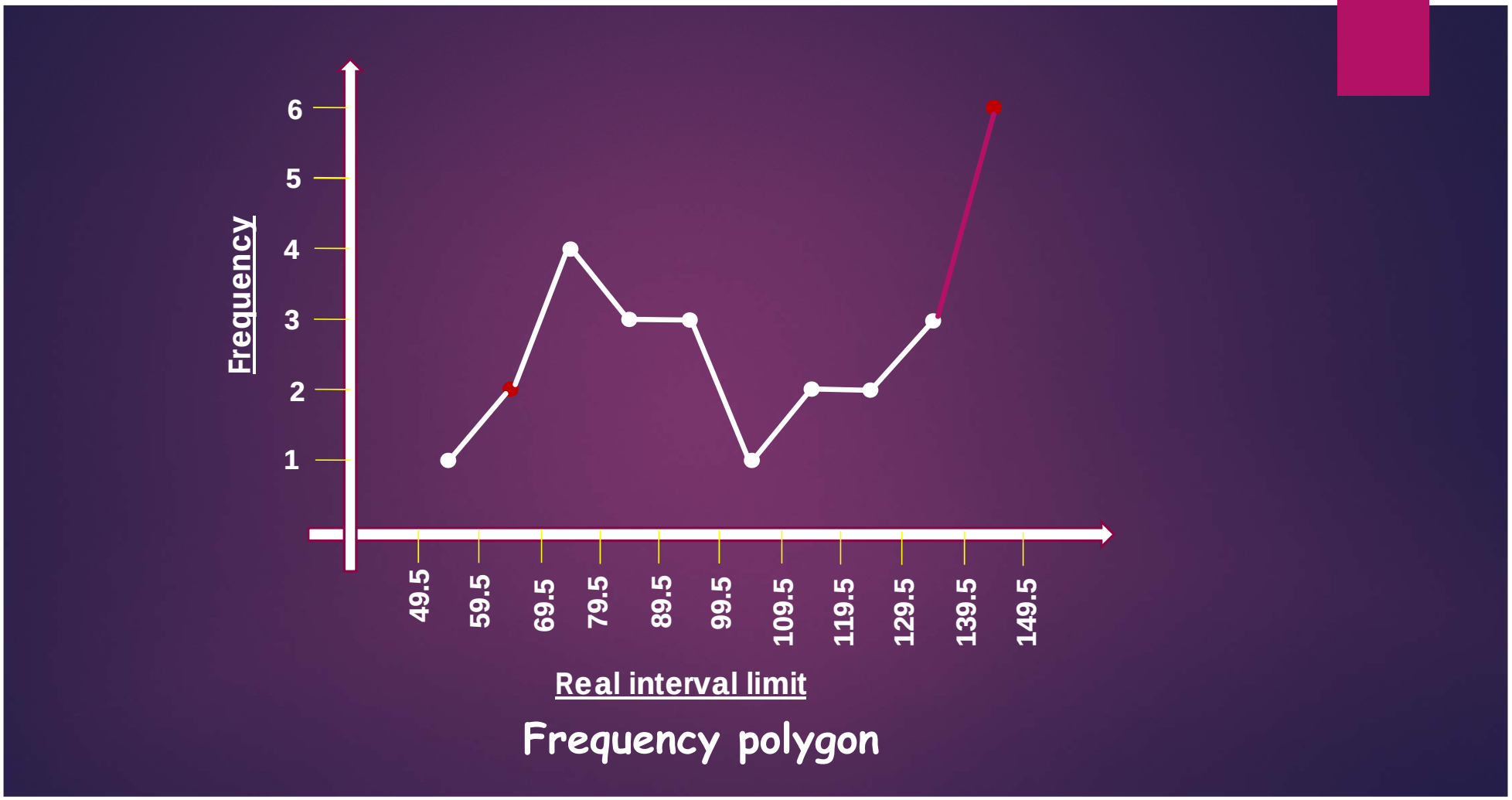
Real interval limit	Frequency (fi)
49.5 – 59.5	1
59.5 – 69.5	2
69.5 – 79.5	4
79.5 – 89.5	3
89.5 – 99.5	3
99.5 – 109.5	1
109.5 – 119.5	2
119.5 – 129.5	2
129.5 – 139.5	3
139.5 – 149.5	6

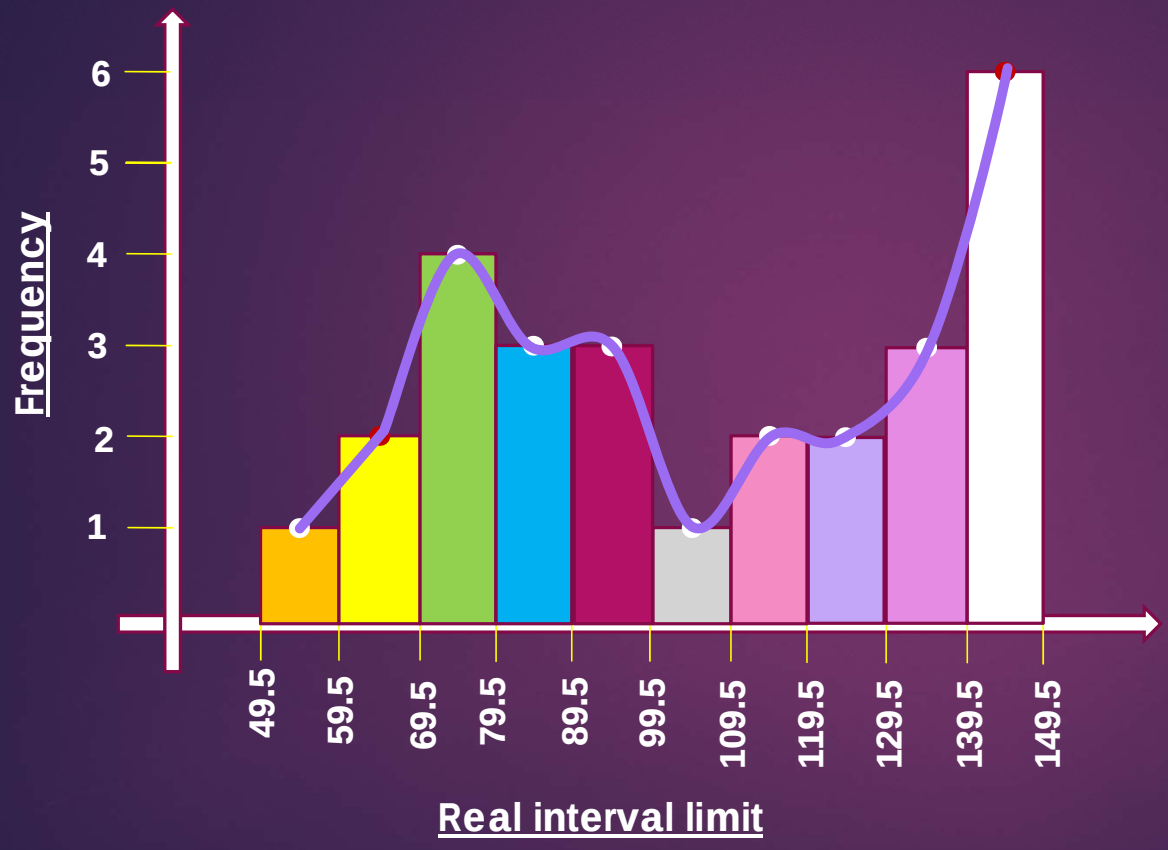
Frequency histogram



Real interval limit	Frequency (fi)	Interval center (Xi)
49.5 – 59.5	1	54.5
59.5 – 69.5	2	64.5
69.5 – 79.5	4	74.5
79.5 – 89.5	3	84.5
89.5 – 99.5	3	94.5
99.5 – 109.5	1	104.5
109.5 – 119.5	2	114.5
119.5 – 129.5	2	124.5
129.5 – 139.5	3	134.5
139.5 – 149.5	6	144.5

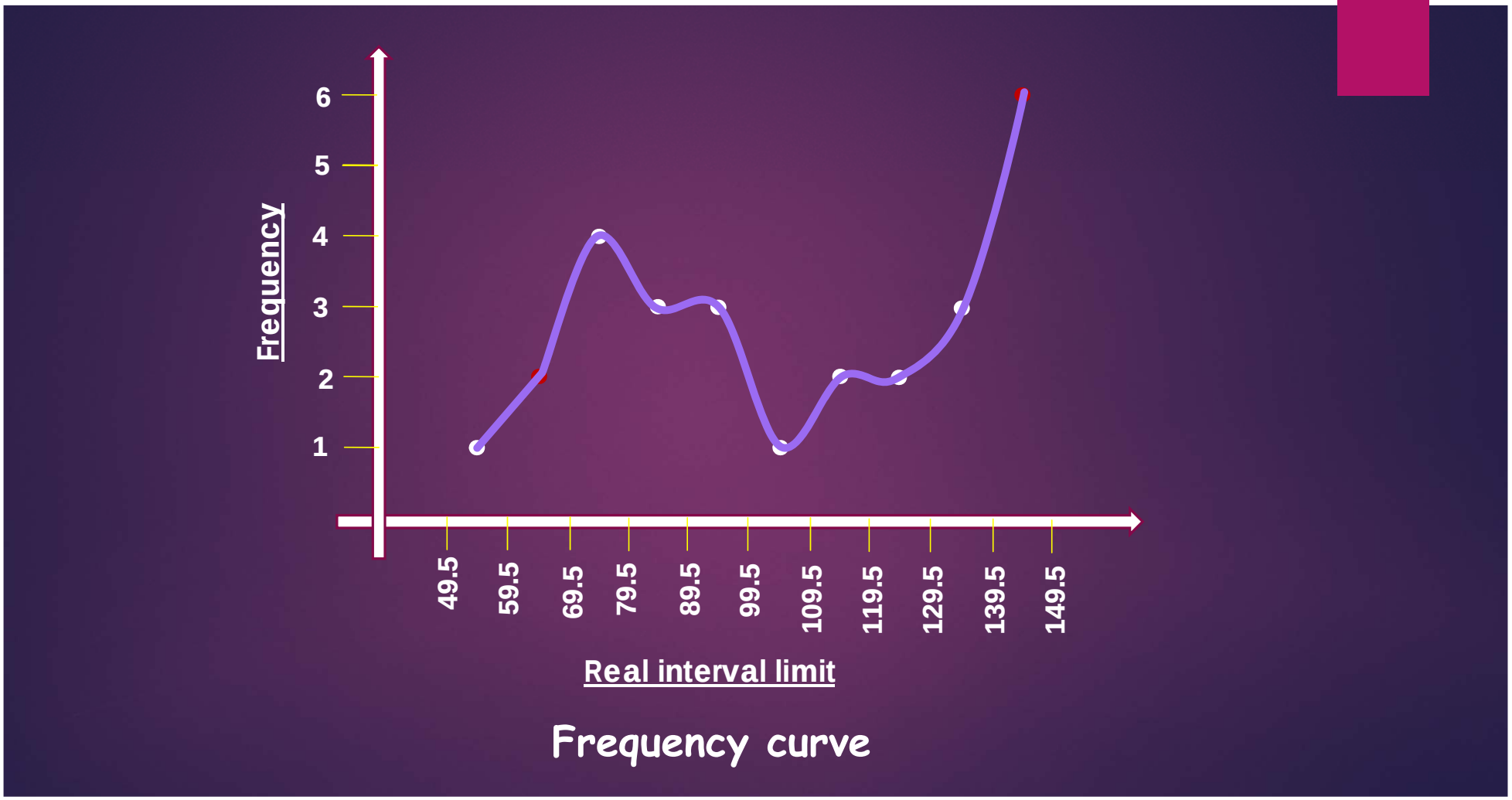
Frequency polygon


Frequency
6
5
4
3
2
1
49.5
59.5
69.5
79.5
89.5
99.5
109.5
119.5
129.5
139.5
149.5
Real interval limit
Frequency polygon



Real interval limit	Frequency (fi)	Interval center (Xi)
49.5 – 59.5	1	54.5
59.5 – 69.5	2	64.5
69.5 – 79.5	4	74.5
79.5 – 89.5	3	84.5
89.5 – 99.5	3	94.5
99.5 – 109.5	1	104.5
109.5 – 119.5	2	114.5
119.5 – 129.5	2	124.5
129.5 – 139.5	3	134.5
139.5 – 149.5	6	144.5

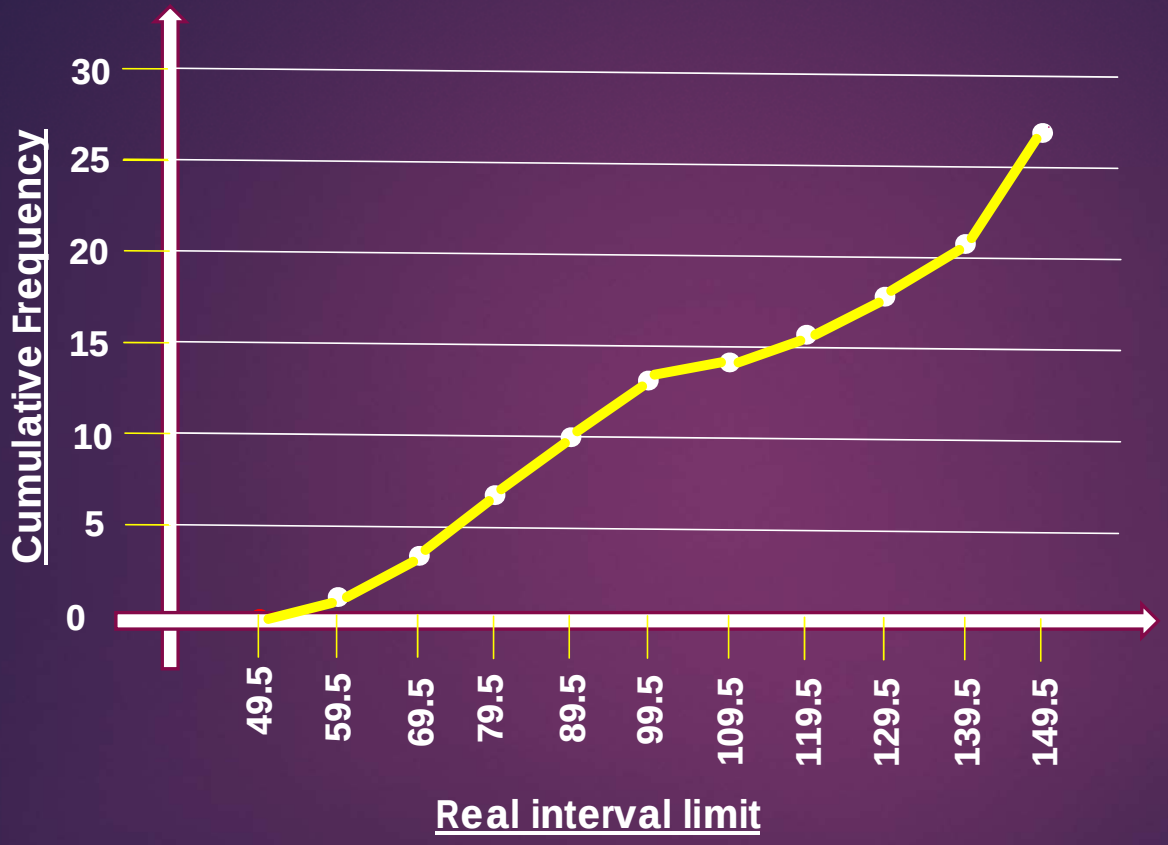
Frequency curve



Frequency curve

Cumulative frequency polygon

Columns Load (X1 – X2) Interval limit	Real interval limit	Frequency (fi)	Interval center (Xi)	Cumulative frequency (fi)
50 - 59	49.5 – 59.5	1	54.5	1
60 - 69	59.5 – 69.5	2	64.5	3
70 - 79	69.5 – 79.5	4	74.5	7
80 – 89	79.5 – 89.5	3	84.5	10
90 – 99	89.5 – 99.5	3	94.5	13
100 – 109	99.5 – 109.5	1	104.5	14
110 – 119	109.5 – 119.5	2	114.5	16
120 – 129	119.5 – 129.5	2	124.5	18
130 – 139	129.5 – 139.5	3	134.5	21
140 – 149	139.5 – 149.5	6	144.5	27



Cumulative frequency polygon

This graph is concluded by plotting the points, between cumulative frequency and the upper limit of each interval, but the first point only is located between the lower limit of interval and zero frequency.