

PRESENTATION OF DATA

2.4 Presentation of the data given in the paragraph in the form of a Table.

DISTRIBUTION OF EMPLOYEES OF THE JOHN SMITH MANUFACTURING COMPANY BY SEX AND MEMBERSHIP DURING 1941-44.

Year	All			Union			Non-Union		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
1941	1650	1430	220	1250	1170	80	400	260	140
1942	1725	1500	225	1475	1300	175	250	200	50
1943	1750	1500	250	1700	1460	240	50	40	10
1944	2000	1700	300	1980	1685	295	20	15	5

Source: Census of Manufacturers Report, 1945.

2.5 (b) Determination of class-boundaries, class-limits, etc.

(i) Here the smallest weight = 98 lb, the largest weight = 226 lb.

\therefore Range = $226 - 98 = 128$ and $n = 300$.

Let us take h (class-interval) = 10 lb and the lower limit of the first class as 95 lb. The last class is to include the highest value of 226 lb. The required values are:

Classes	Class-limits	Class-boundaries	Class-mark
First	95 - 104	94.5 - 104.5	99.5
⋮	⋮	⋮	⋮
Last	225 - 234	224.5 - 234.5	229.5

(ii) The smallest observation = 0.421 and the largest observation = 0.563, so that range = $0.563 - 0.421 = 0.142$. $n = 460$. Let us decide to have about 8 classes.

Then $h = \frac{0.142}{8} = 0.020$ approximately and we may take the lower limit of the lowest class as 0.420.

The desired figures are given below:

Classes	Class-limits	Class-boundaries	Class-mark
First	0.420–0.439	0.4195–0.4395	0.4295
⋮	⋮	⋮	⋮
Last	0.560 – 0.579	0.5595–0.5795	0.5695

(c) The class-boundaries, the class-limits and class marks are given below:

Class boundaries	Class Limits	Class Marks
199.5 – 219.5	200 – 219	209.5
219.5 – 239.5	220 – 239	229.5
239.5 – 259.5	240 – 259	249.5
259.5 – 279.5	260 – 279	269.5
279.5 – 299.5	280 – 299	289.5
299.5 – 319.5	300 – 319	309.5
319.5 – 339.5	320 – 339	329.5

2.6 (b) Preparation of a Frequency Table.

Classes	Tally	Frequency
35 – 39		2
40 – 44		6
45 – 49		6
50 – 54		8
55 – 59		8
60 – 64		1
65 – 69		1
70 – 74		3
75 – 79		4
80 – 84		4
85 – 89		3
90 – 94		2
95 – 99		1
100 – 104		1
Total	--	50

Here the smallest value = 36, and the largest value = 100.

$$\therefore \text{Range} = 100 - 36 = 64.$$

The width of class-interval is given equal to 5 units. As the smallest value is 36, we may therefore take 35 (a multiple of 5) as the lower class limit of the lowest class. The frequency table is then constructed as above.

2.7 (b).

Absentees (x)	No. of days (f)	fx
0	5	0
1	7	7
2	9	18
3	6	18
4	4	16
5	2	10
6	1	6
7	1	7
Total	---	82

(i) No. of days on which fewer than 4 people were absent
 $= 5 + 7 + 9 + 6 = 27$ days

(ii) No. of days on which *at least* 4 people were absent
 $= 4 + 2 + 1 + 1 = 8$ days

(iii) Total number of absences over the whole 35 days $= \sum fx = 82$

2.8. Preparation of the Frequency Distribution.

The lowest marks = 49, highest marks = 121.

$$\therefore \text{Range} = 121 - 49 = 72.$$

Let us take 10 marks as class-interval, *i.e.*, $h = 10$, and place the lower class-limit of the lowest class or group at 40. Then the frequency distribution is constructed as follows:

Frequency Distribution of Marks of 60 Students

Marks	Tally	Frequency
40 - 49		1
50 - 59		9
60 - 69		9
70 - 79		7
80 - 89		10
90 - 99		12
100 - 109		6
110 - 119		4
120 - 129		2
Total	---	60

2.9 Construction of the frequency distribution

Here the smallest value = 61, the largest value = 153, so that the range = $153 - 61 = 92$. Class-interval (h) = 5, (given). Locating the lower class limit of the first group at 60, the frequency distribution is formed as below:

Classes	Tally	Frequency
60 - 64		2
65 - 69		1
70 - 74		2
75 - 79		7
80 - 84		2
85 - 89		7
90 - 94		4
95 - 99		9
100 - 104		11
105 - 109		10
110 - 114		10
115 - 119		9
120 - 124		5
125 - 129		7
130 - 134		2
135 - 139		3
140 - 144		4
145 - 149		3
150 - 154		2
Total	----	100

2.10 (i) Arrangement of the data in an array.

48.6, 55.9, 58.3, 59.4, 63.9, 64.2, 65.7, 67.6, 68.9, 69.1, 70.8, 71.6, 71.6, 72.1, 73.0, 73.8, 74.2, 74.2, 75.2, 77.6, 77.8, 79.4, 80.7, 81.8, 81.9, 82.7, 82.9, 83.2, 83.5, 88.1, 90.6, 95.5.

(ii) Construction of a frequency distribution using a class-interval of 5.00.

Class-limits	Class-boundaries	Tally	<i>f</i>
45.5 – 50.4	45.45 – 50.45		1
50.5 – 55.4	50.45 – 55.45	--	0
55.5 – 60.4	55.45 – 60.45		3
60.5 – 65.4	60.45 – 65.45		2
65.5 – 70.4	65.45 – 70.45		4
70.5 – 75.4	70.45 – 75.45		9
75.5 – 80.4	75.45 – 80.45		3
80.5 – 85.4	80.45 – 85.45		7
85.5 – 90.4	85.45 – 90.45		1
90.5 – 95.4	90.45 – 95.45		1
95.5 – 100.4	95.45 – 100.45		1
Total	---	--	32

2.11 As the data are discrete, therefore the ungrouped frequency distribution is prepared as below:

No. of children (<i>x</i>)	Tally	No. of women (<i>f</i>)
0		1
1		4
2		8
3		14
4		7
5		5
6		4
7		3
8		2
9		1
10		1
Total	--	50

2.12 Total number of letters in each word are counted as below: 2, 7, 2, 6, 2, 5, 10, 2, 2, 1, 4, 2, 8, 2, 2, 6, 1, 4, 2, 8, 2, 2, 4, 2, 5, 7, 2, 2, 7, 4, 2, 10, 3, 4, 4, 2, 3, 2, 9, 3, 2, 5, 1, 6, 9, 2, 8, 5, 7, 8, 3, 3, 3, 8, 2, 6, 6, 7, 2, 2, 3, 8, 2, 3, 3, 3, 7, 3, 3, 4, 3, 9, 2, 5, 11, 3, 4, 4, 1, 3, 4, 1, 6, 2, 5, 2, 3, 7, 4, 2, 7.

The desired frequency distribution of word-length is as follows:

Word-Length (x)	Tally	Frequency (f)
1		5
2		27
3		16
4		11
5		6
6		6
7		8
8		6
9		3
10		2
11		1
Total	--	91

2.13 Taking the last digit of the numbers as the *leaf* and the rest of the digits as the *stem*, we get the following stem-and-leaf display:

Stem	Leaf (ordered)
19	3
20	2 8
21	2 7 8 9
22	4 5 8
23	0 1 1 4 5 6 6 8
24	0 3 3 5 5 5 6 7 9
25	0 1 2 4 5 5 5 7 8 9 9
26	3 5 8 8 9
27	1 5 7
28	0 3 4 8

Conversion of the *stem-and-leaf* display into a frequency distribution, beginning with 190.

Weight	Frequency
190 – 199	1
200 – 209	2
210 – 219	4
220 – 229	3
230 – 239	8
240 – 249	9
250 – 259	11
260 – 269	5
270 – 279	3
280 – 289	4

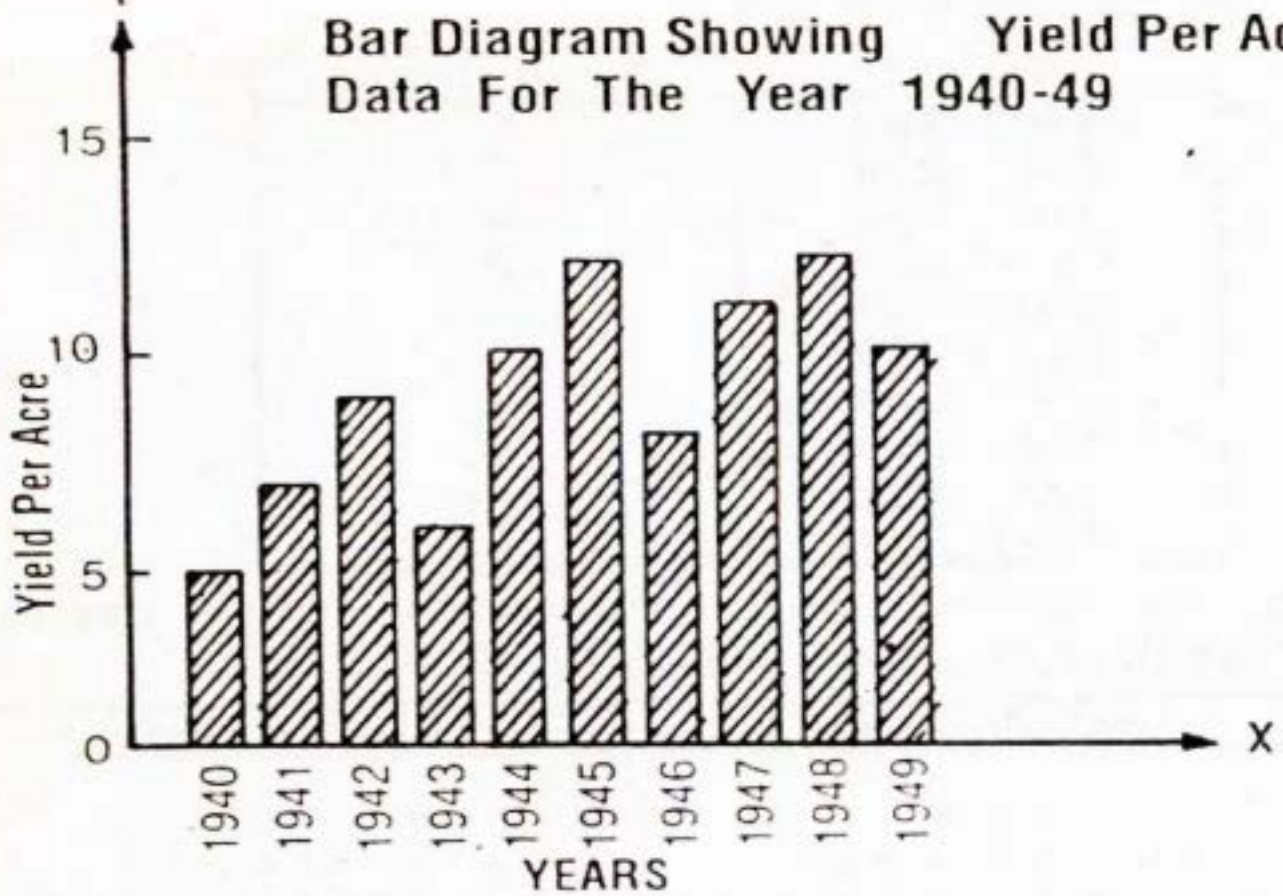
2.14 Using the whole number as the stem and the decimal as the leaf, we get the following *stem-and-leaf display*:

Stem	Leaf (decimals)	Leaf (ordered)
8	0 3 7	0 3 7
9	0 3 7 9 8 1 3 6 9	0 1 3 3 6 7 8 9 9
10	2 7 8 1 0 5 5 6 4 9 6	0 1 2 4 5 5 6 6 7 8 9
11	3 6 0 7 0 5 6 5 2 7 8 8 9 5 8	0 0 2 3 5 5 5 6 6 7 7 8 8 8 9
12	1 0 3 9 5 8 6 6	0 1 3 5 6 6 8 9
13	8 6 7 4 0 2 9 4	0 2 4 4 6 7 8 9
14	1 0 2 7 7 9	0 1 2 7 7 9
15	8 7 1 9 7	1 7 7 8 9
16	4 9 8	4 8 9
17	7 9	7 9

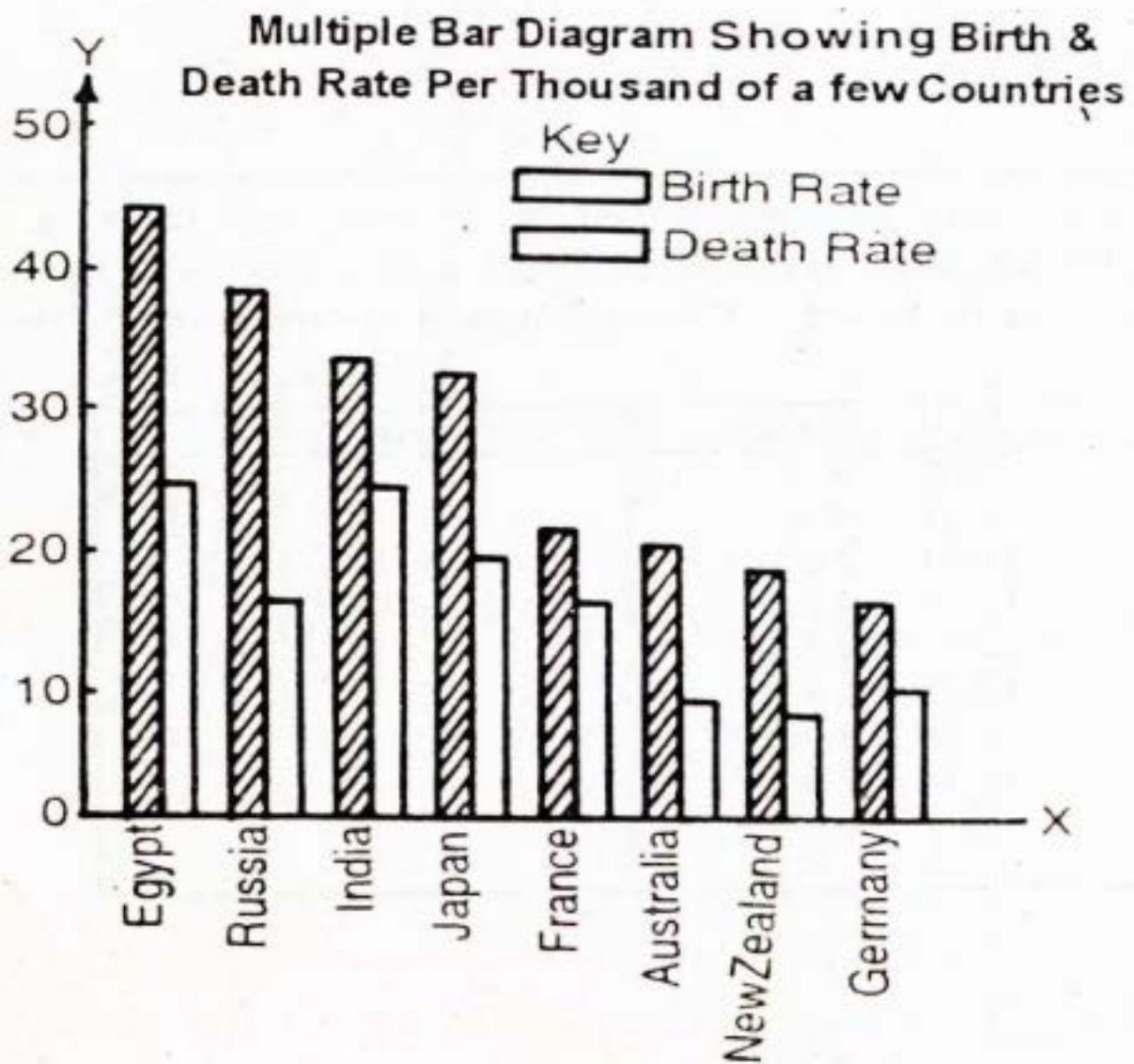
Now the data are very easily converted into a grouped frequency distribution with $h=1$ unit and using 8.0 as the lower limit of the first class. The grouped frequency distribution follows:

Class-limits	Frequency
8.0 – 8.9	3
9.0 – 9.9	9
10.0 – 10.9	11
11.0 – 11.9	15
12.0 – 12.9	8
13.0 – 13.9	8
14.0 – 14.9	6
15.0 – 15.9	5
16.0 – 16.9	3
17.0 – 17.9	2

2.19

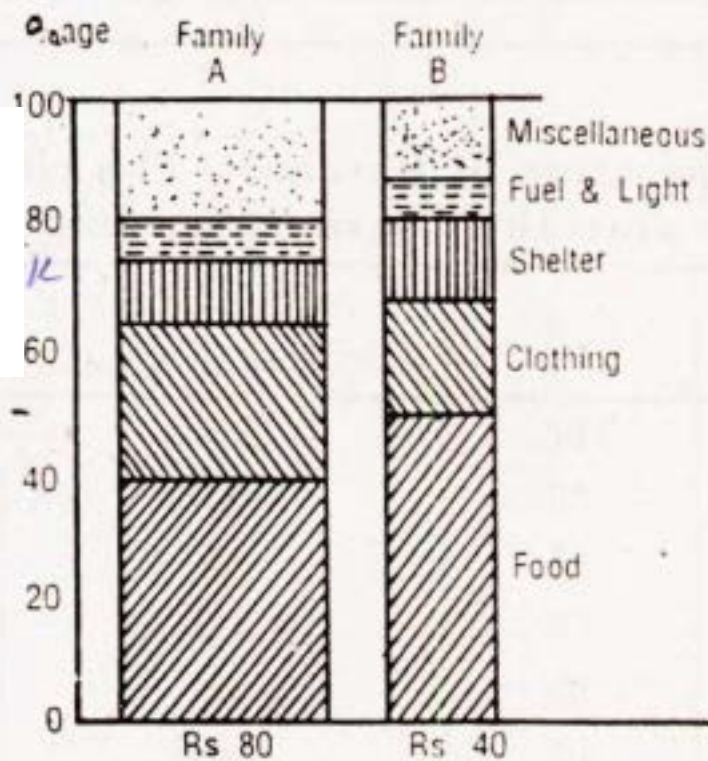


2.20

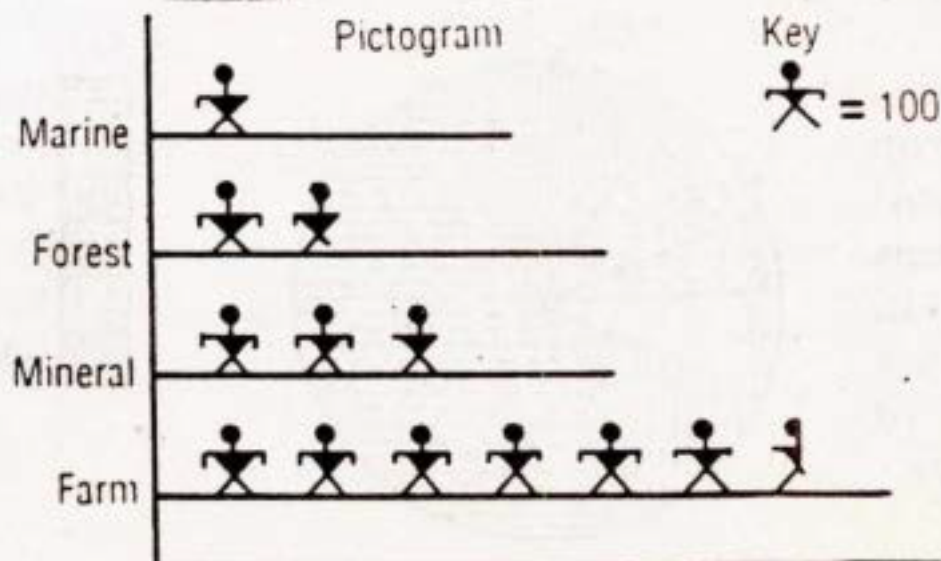


2.21 Representation of the data by rectangular diagram. Family Budgets of two Families

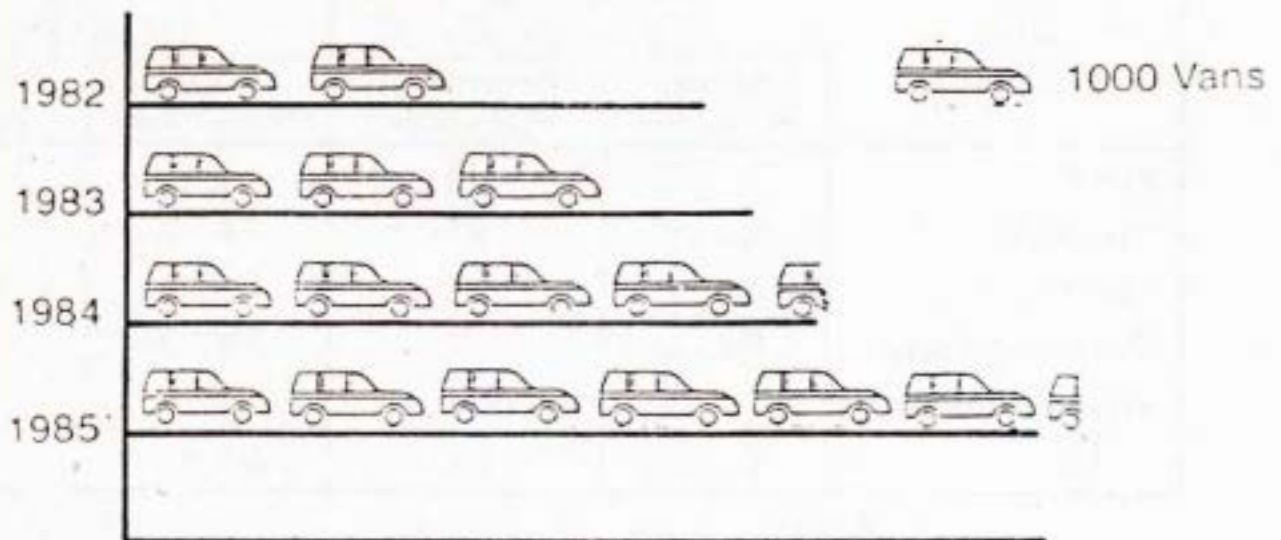
Items of Expenditure	Family A (Income Rs. 80)		Family B (Income Rs. 40)	
	Actual Expenses	Percentage Expenses	Actual Expenses	Percentage Expenses
Food	Rs. 32	40	Rs. 20	50
Clothing	Rs. 20	25	Rs. 8	20
Shelter	Rs. 8	10	Rs. 4	10
Fuel and Light	Rs. 4	5	Rs. 2	5
Miscellaneous	Rs. 16	20	Rs. 6	15
Total	Rs. 80	100	Rs. 40	100



2.23 (a) Representing 100 employees by one picture, the pictogram is drawn below:



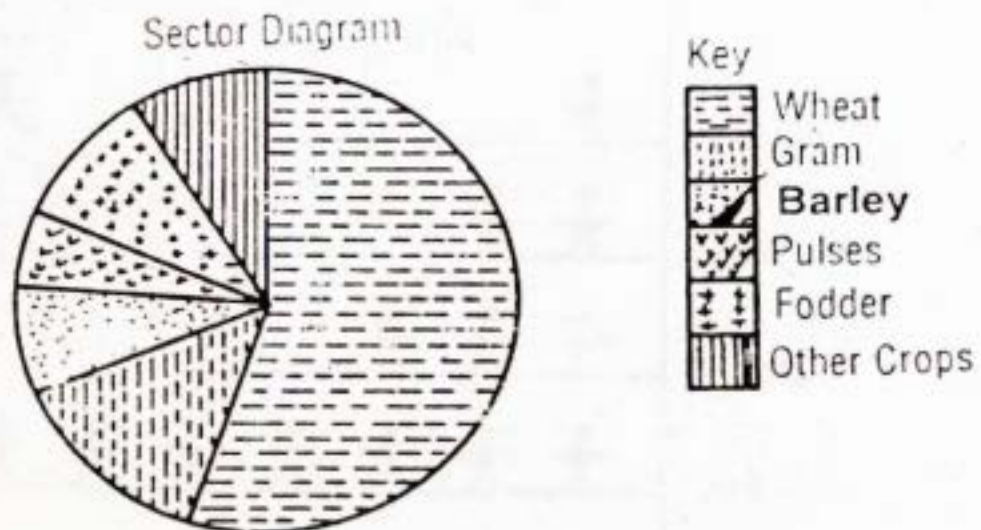
(b) Representing 1000 vans by one symbol, the pictogram is drawn below:



2.25 (a) Preparation of Pie-chart. The corresponding angles needed to draw the diagram are computed below:

Crop	Area	Angles of the Sectors (degree)	%age
Wheat	106	190.8	53
Gram	30	54	15
Barley	15	27	7.5
Pulses	10	18	5
Fodder	25	25	12.5
Other Crops	14	25.2	7
Total	200	360 °	100

(b) The per cent contribution of each crop to the total Rabi crops appears in the last column of table in (a).

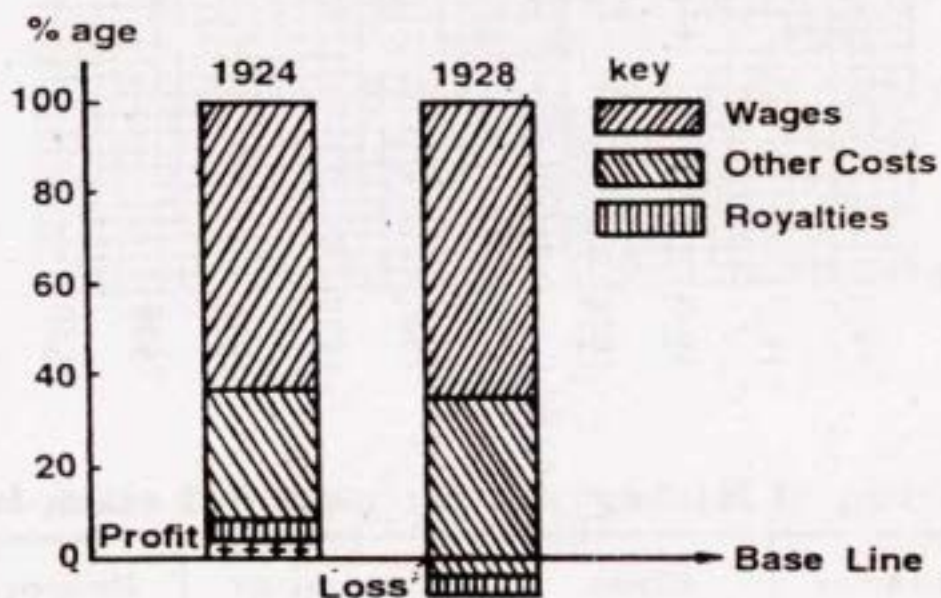


2.26 Representation of the data by (i) Percentage sub-divided Bars, (ii) a Pie-diagram.

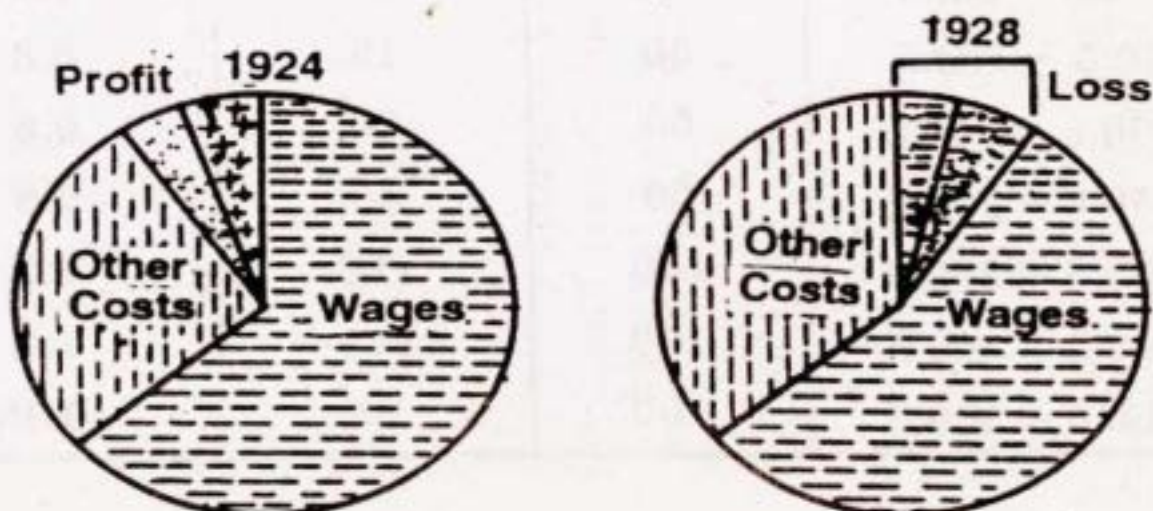
Cost per ton Disposed Commercially

Particulars	1924			1928		
	Cost	%age	Degrees	Cost	%age	Degrees
Wages	12.74	64	230	7.95	65	235
Other Costs	5.46	27	99	4.51	37	134
Royalties	0.56	3	10	0.50	4	15
Total	18.76			12.96		
Sale proceeds	19.91	100	360	12.16	100	360
Profit (+) or Loss (-)	+ 1.15	6	+ 21	-0.80	6	-24

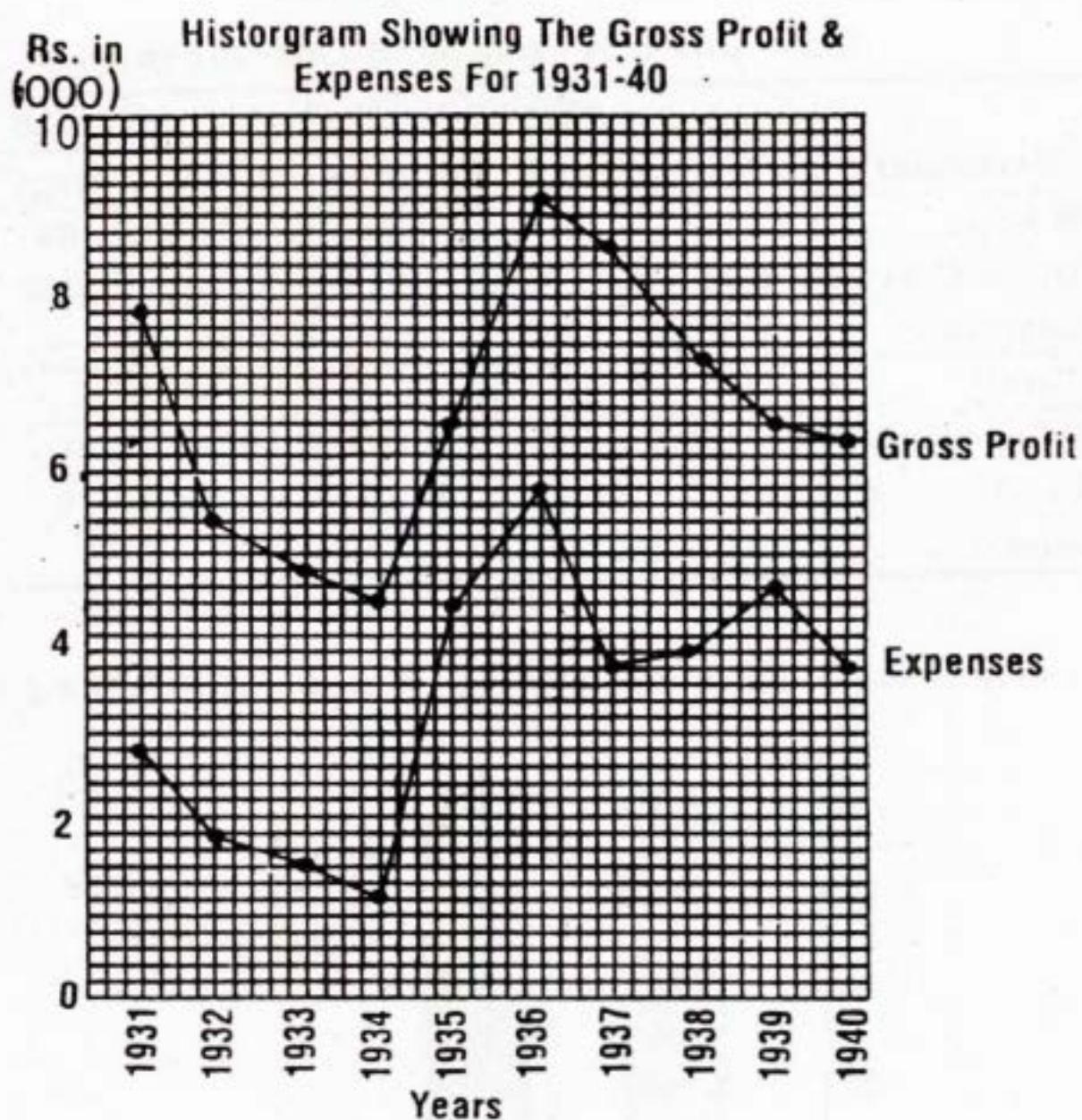
(i) Profit and Loss Chart (% age sub-divided Bars)



(ii) Profit and Loss Chart (Pie-diagram)



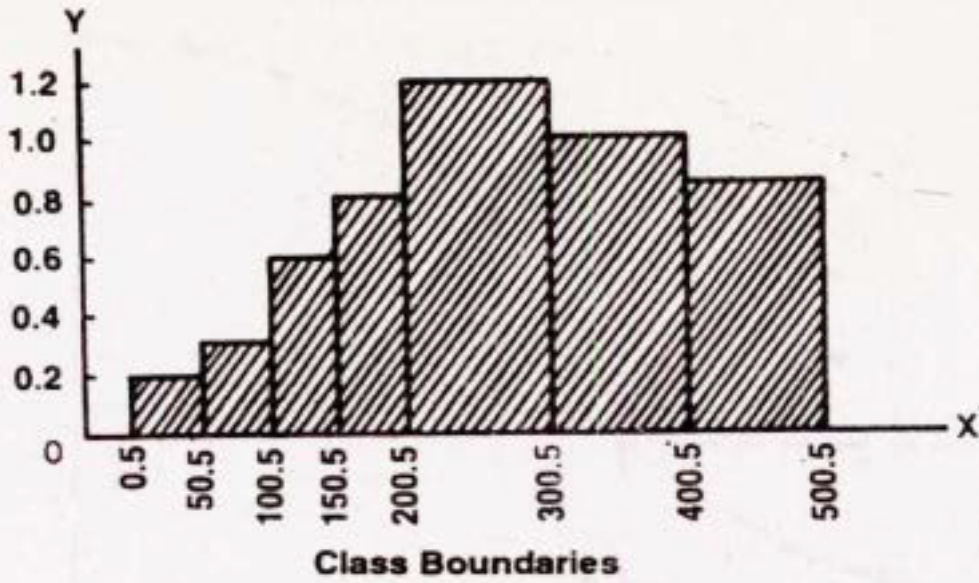
2.28.



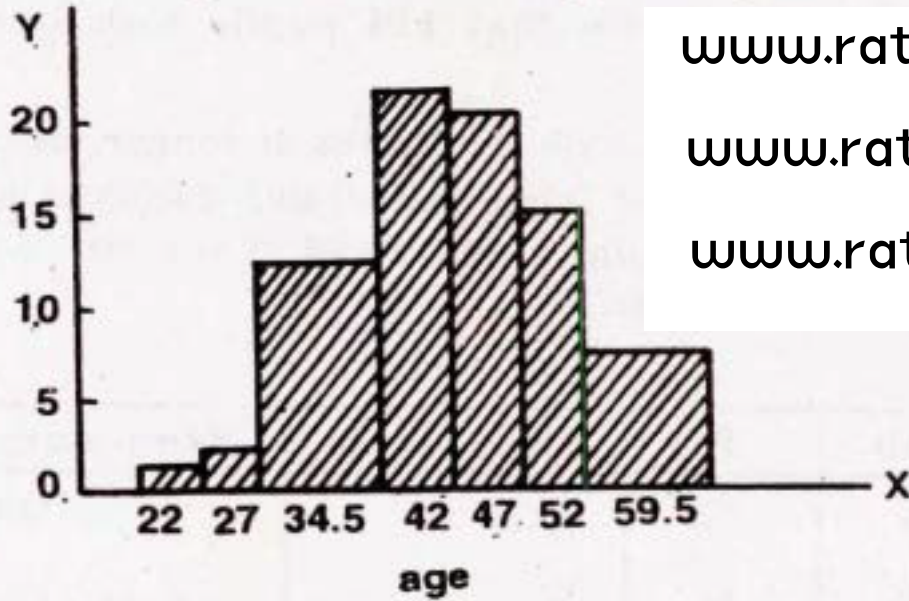
2.32 (c) Drawing of Histogram for unequal class-intervals.

Class-boundaries	Class-Interval	Frequency	Proportional heights
0.5 – 50.5	50	10	0.2
50.5 – 100.5	50	15	0.3
100.5 – 150.5	50	30	0.6
150.5 – 200.5	50	40	0.8
200.5 – 300.5	100	120	1.2
300.5 – 400.5	100	140	1.0
400.5 – 500.5	100	85	0.85

Histogram for the Distribution of Savings Certificates



2.34 (a) Histogram illustrating the Age-distribution.

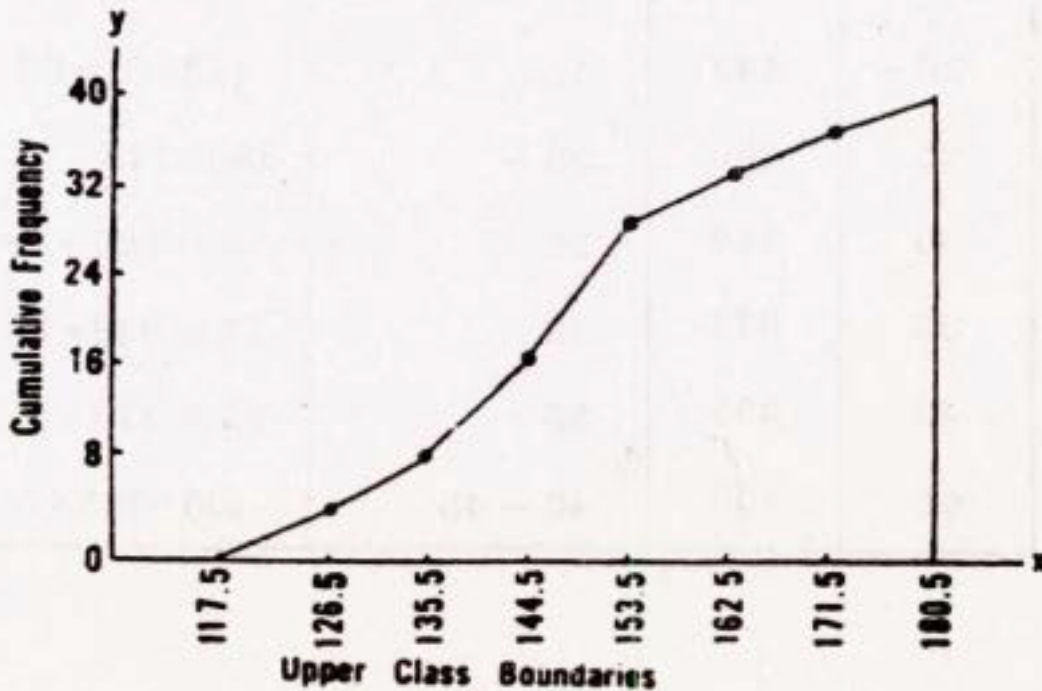


www.ratta.pk

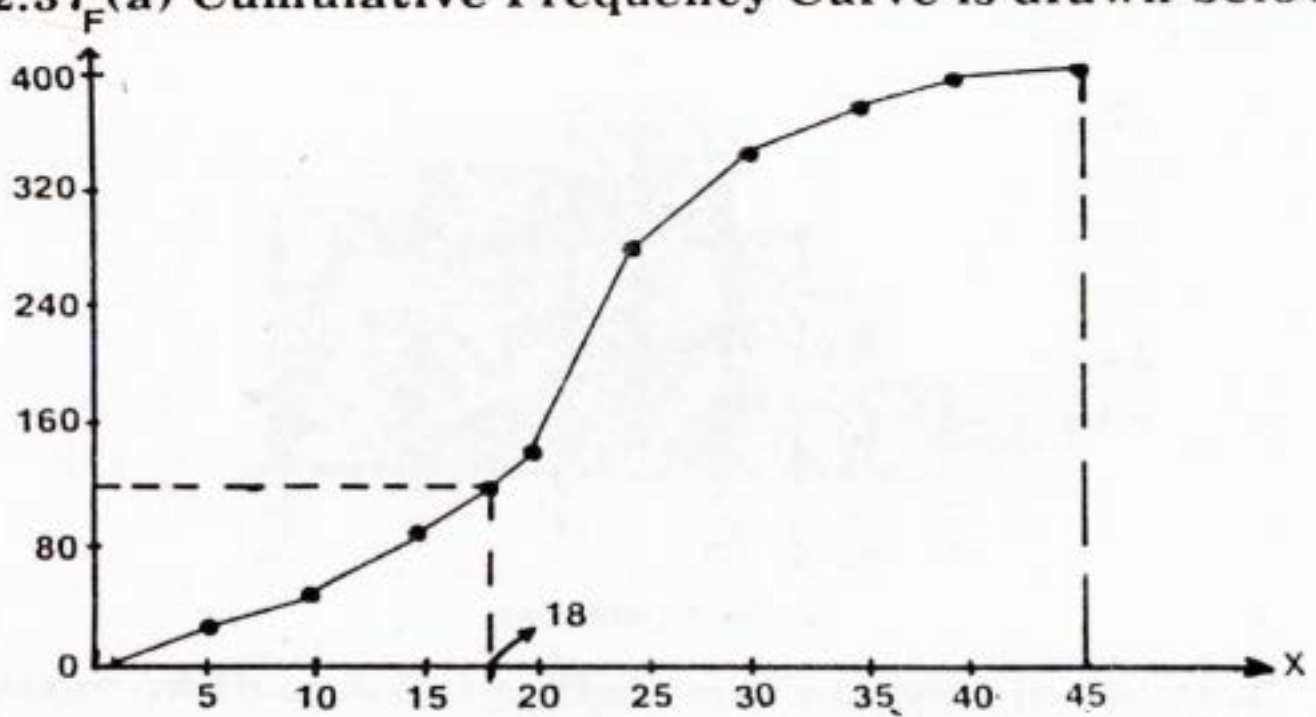
www.ratta.pk

www.ratta.pk

2.36 Ogive for the Frequency Distribution of Weights.



2.37 (a) Cumulative Frequency Curve is drawn below.



From graph, we estimate that 114 pupils took less than 18 minutes.

(b) 6% of the pupils took x minutes or longer means that 24 pupils took x minutes or longer and $(400-24)=376$ pupils took less than x minutes. From graph $x=36$. Thus 6% of the pupils took 36 minutes or longer.

(c)

ucb	F	Time (min)	Frequency
5	28	0 -	28
10	45	5 -	$45-28=17$
15	81	10 -	$81-45=36$
20	143	15 -	$143-81=62$
25	280	20 -	$280-143=137$
30	349	25 -	$349-280=69$
35	374	30 -	$374-349=25$
40	395	35 -	$395-374=21$
45	400	40 - 45	$400-395=5$

Histogram is:

www.ratta.pk

www.ratta.pk

www.ratta.pk

www.ratta.pk

