

6

T
8
8

0, 870

175

$$\begin{array}{r}
 0.0 \\
 197.5 \\
 197.5 \\
 \hline
 395
 \end{array}$$

Graph:-

Represent the total expenditure of Expenditure on various items of a family by a pie diagram:-

Items	Expenditure(Rs)	Angles
Food	50	120
Clothing	30	72
House Rent	20	48
Fuel & light	15	36
Miscellaneous	35	84
Total	150	360

Angle = Component part \times 360°
Whole Quantity



To find angle:-
 Food
 Clothing
 House Rent
 Fuel & light
 Miscellaneous

Frequency

Histo Graph Histogram: / Class boundaries

Construct a histo - gram for the following frequency distribution relating to the ages of telephone operators.

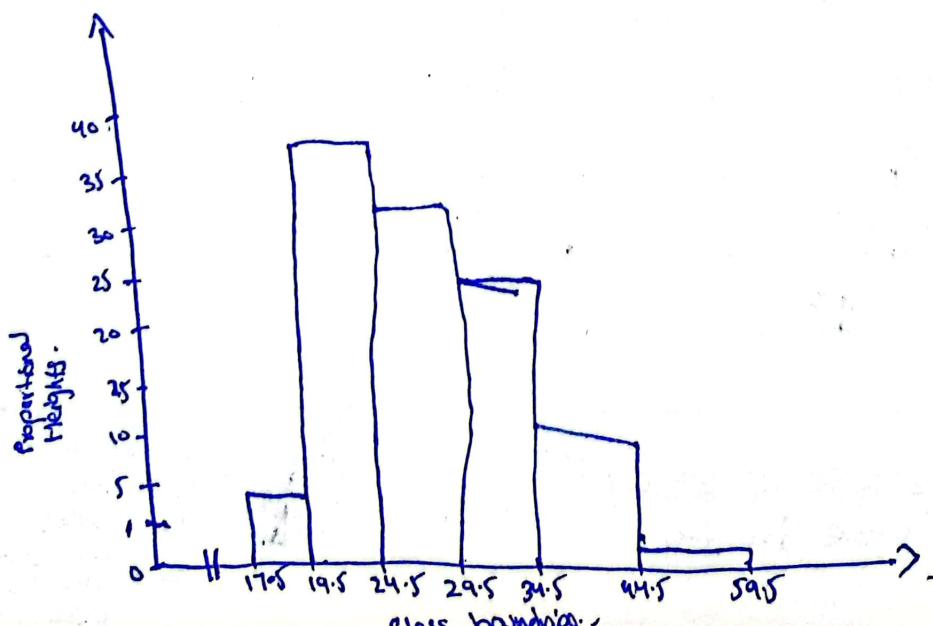
Ages:-	No. of operators	class boundaries	class Intervals (h)	Proportional Heights.	freq	Mid Points
18-19	9	17.5-19.5	2	4.5	9/2	18.5
20-24	188	19.5-24.5	5	37.6	188/5	22
25-29	160	24.5-29.5	5	32	160/5	27
30-34	123	29.5-34.5	5	24.6	123/5	32
35-44	84	34.5-44.5	10	8.4	84/10	39.5
45-59	15	44.5-59.5	15	1	15/15	52.
	579					

Same class Interval = uniform Data.

Diff. " " = Ununiform Data:-

When uniform Data is present then we will only make A 4 lines

But for ununiform " " " " " " make Proportional Heights || Data in blw them exist but not use " "

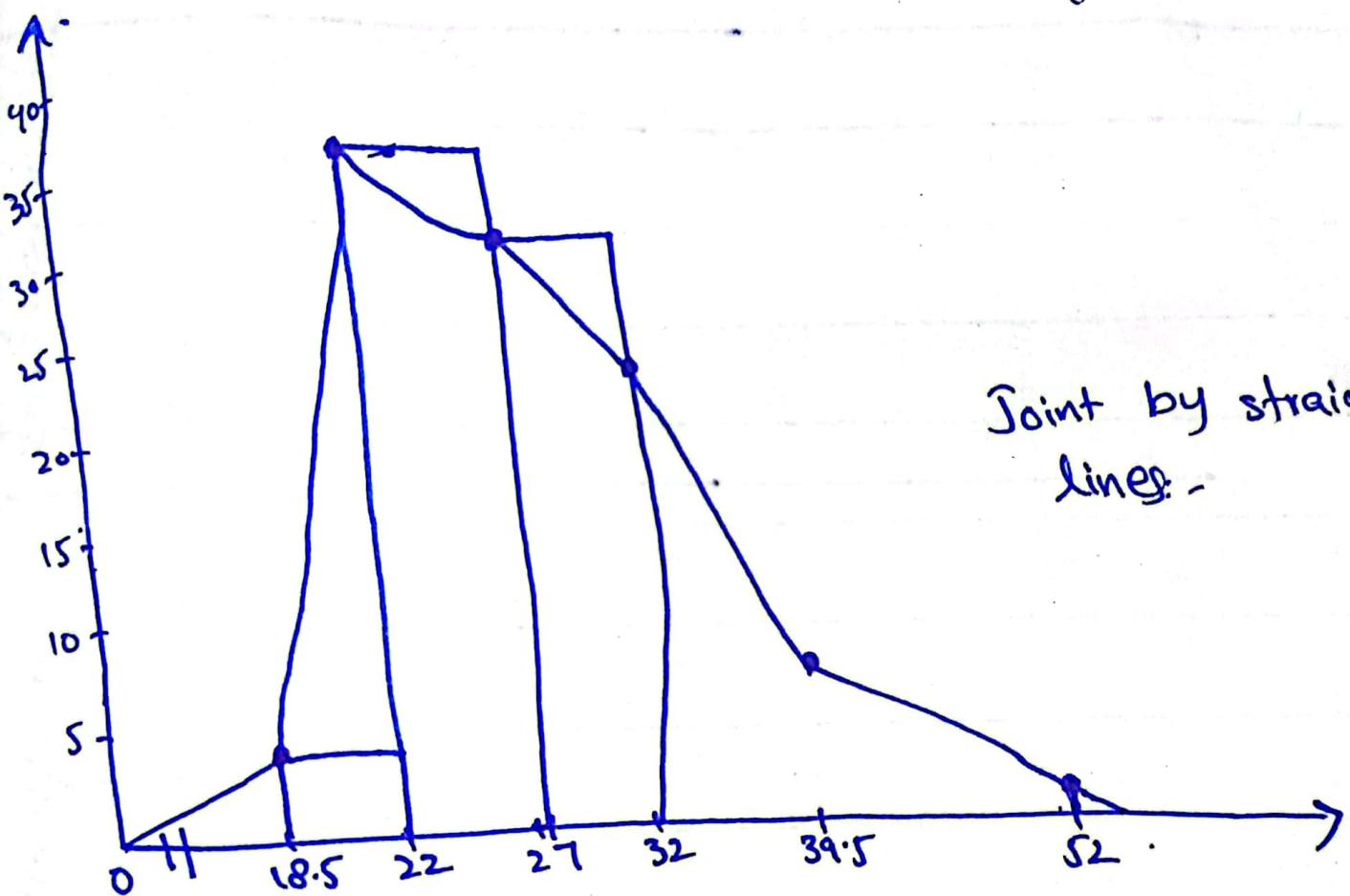


Frequency Polygon (mid points)

In it class interval or $\frac{\text{No. of operators}}{\text{No. of operators}}$ are not useful. Eg also class boundaries.

Ages -

J



Joint by straight
lines:-

Chp 2 Exercise (Practice Qs)

Date: _____

APS:-

M T W T F S S

Measure of Central Tendency:-

* Arithmetic Mean:-

formula

$$\bar{x} = \frac{\sum x}{n} \text{ for ungrouped data. } \bar{u} = \frac{\sum fu}{\sum f} \text{ for grouped data.}$$

no. of observations:-
in Data

$$\bar{u} = \frac{\sum fu}{n} \rightarrow \begin{matrix} \text{Sum of frequency in grouped} \\ \text{data.} \end{matrix}$$

$f_n i:$

$$\bar{x} = 16.04 \text{ Arithmetic Mean for ungrouped data.}$$

$$\bar{u} = 121.83 \text{ Arithmetic Mean for grouped data.}$$

Change of origin & Scale Method - (Coding Method)

$$\bar{x} = a + \frac{\sum fu}{\sum f} \times h$$

class interval or class width: - for ungrouped data

where u equals to

$$a + \frac{\sum u}{n} \times h$$

any given value from
 $n:$

$$u = \frac{x - a}{h}$$

$$137.5$$

$$137.5 + \frac{(-47)}{60} \times 28 \text{ Geometric Mean.}$$

$$G_1 = \text{antilog} \left[\frac{1}{n} \sum f \log u \right] \text{ for grouped data.}$$

$$137.5 - 15.6$$

$$\bar{u} = 121.9$$

for ungrouped data.

$$G_1 = 2.0687 \text{ antilog } 117.1274$$

$$G_1 = \text{antilog} \left[\frac{1}{n} \sum f \log u \right]$$

$$G_1 = 117.3546$$

$$G_1 = 0.2471 \text{ antilog.}$$

$$G_1 = 1.7666$$



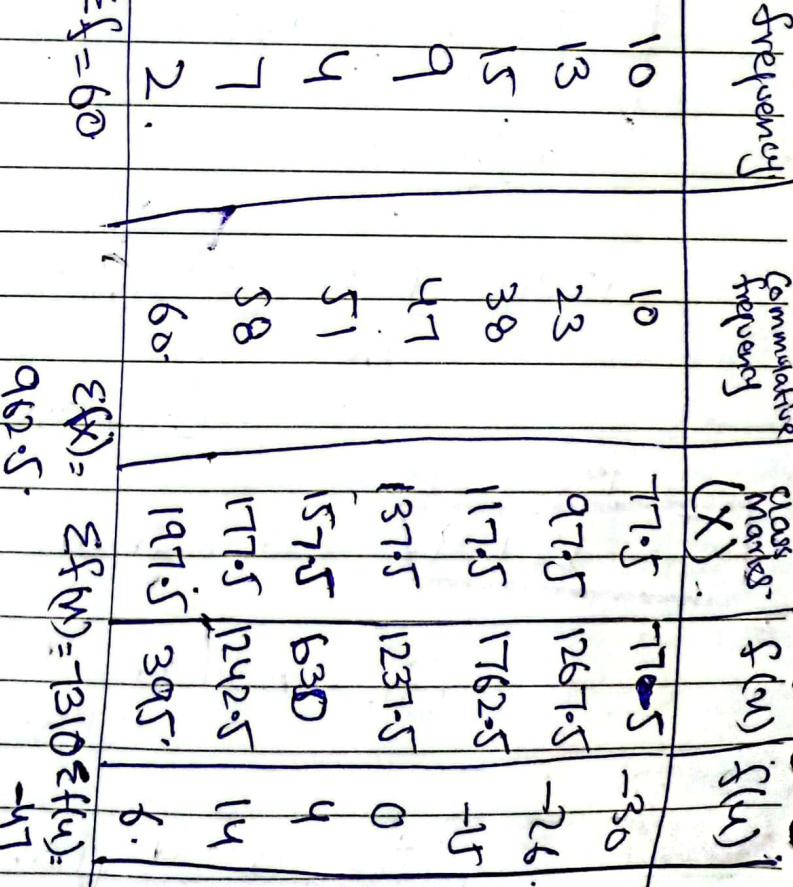
Class boundaries	Frequency	Commulative frequency	Class Marks (X)	$f(x)$	$f(x) \cdot f(x)$
67.5 - 87.5	0	0	77.5	77.5	77.5
87.5 - 107.5	10	10	97.5	97.5	97.5
107.5 - 127.5	23	33	117.5	117.5	117.5
127.5 - 147.5	38	71	137.5	137.5	137.5
147.5 - 167.5	20	91	157.5	157.5	157.5
167.5 - 187.5	15	106	177.5	177.5	177.5
187.5 - 207.5	15	121	197.5	197.5	197.5
207.5 - 227.5	10	131	217.5	217.5	217.5
227.5 - 247.5	26	157	237.5	237.5	237.5
247.5 - 267.5	30	187	257.5	257.5	257.5
267.5 - 287.5	15	202	277.5	277.5	277.5
287.5 - 307.5	10	212	297.5	297.5	297.5
307.5 - 327.5	5	217	317.5	317.5	317.5
327.5 - 347.5	0	217	337.5	337.5	337.5

Date:	U ₁ = 13.75	U ₂ = 13.75	U ₃ = 13.75
	class limits	tally marks	class boundaries
1	87.5 - 107.5		87.5 - 107.5
2	107.5 - 127.5		107.5 - 127.5
3	127.5 - 147.5		127.5 - 147.5
4	147.5 - 167.5		147.5 - 167.5
5	167.5 - 187.5		167.5 - 187.5
6	187.5 - 207.5		187.5 - 207.5
7	207.5 - 227.5		207.5 - 227.5
8	227.5 - 247.5		227.5 - 247.5
9	247.5 - 267.5		247.5 - 267.5
10	267.5 - 287.5		267.5 - 287.5
11	287.5 - 307.5		287.5 - 307.5
12	307.5 - 327.5		307.5 - 327.5

$$140.828 \times \log(n) + \log(m) = 124.1695 \approx 0.5307$$

$$\log(n) + \log(m) = \frac{1}{n} \cdot f(\bar{x}) + \sum \left(\frac{1}{m} \right) \cdot 0.0560$$

$$1.00093 \quad 18.0930 \quad 0.0129 \quad 0.1290 \\ 1.0000 \quad 25.0570 \quad 0.0103 \quad 0.1330 \\ 2.00700 \quad 31.0500 \quad 0.0085 \quad 0.1275 \\ 2.1383 \quad 19.2447 \quad 0.0073 \quad 0.0651 \\ 2.1973 \quad 0.7092 \quad 0.0063 \quad 0.0252 \\ 2.2492 \quad 15.7444 \quad 0.0056 \quad 0.0392 \\ 2.2956 \quad 4.05912 \quad 0.0051 \quad 0.0102$$



Date: _____

M T W T F S S
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Harmonic Mean.

for grouped data:

$$H = \frac{\sum f}{\sum f \left(\frac{1}{m} \right)}$$

$$H = 113.0582$$

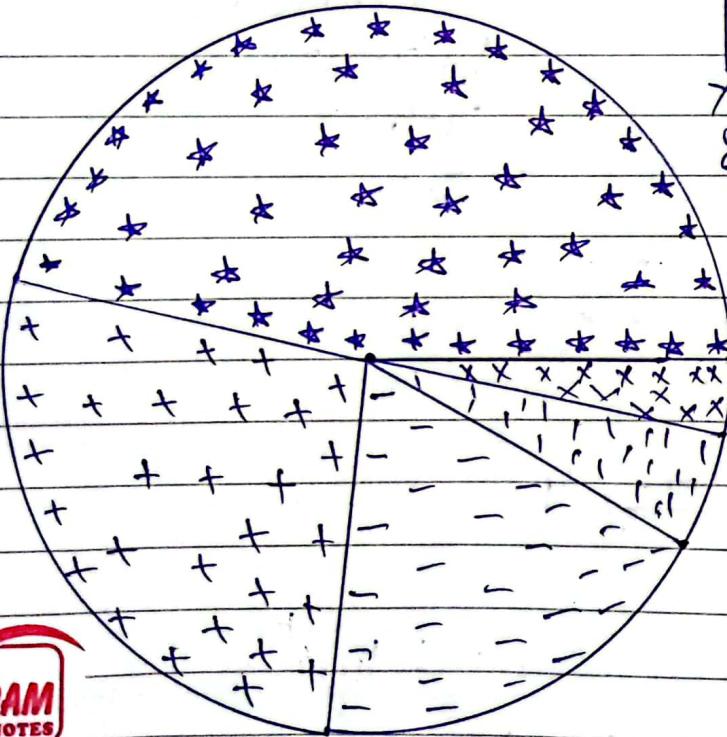
for ungrouped data:

$$H = \frac{n}{\sum \left(\frac{1}{x_i} \right)} = \frac{60}{0.0560}$$

$$\approx 1071.4286$$

Graph the following data showing the areas in Millions of square miles in of the ocean of the world using pie chart.

Oceans Area



Ocean	Area.	Angle.
Pacific	70.8	161°
Atlantic	41.2	97°
Arctic	16.7	41°
Antarctic	11.1	11°
Whole	152.9	360°

- [Star pattern] 161°
- [Cross pattern] 97°
- [Dash pattern] 41°
- [Plus pattern] 11°
- [X pattern] 11°

Arithmetic Mean by Coding Method.

Date:

8. Weekly Income	class Marks (X')	No. of workers (f)	$U = \frac{u-g}{h}$	f_u
35 - 39	37	15	2.0000	30.0000
40 - 44	42	13	3.2500	42.2500
45 - 49	47	17	4.5000	76.5000
50 - 54	52	29	5.7500	166.7500
55 - 59	57	11	7.0000	77.0000
60 - 64	62	10	8.2500	82.5000
65 - 69	67	5	9.5000	47.5000
		$\sum f = 100$ (Total)		$\sum f_u = 522.5000$

$$\bar{x} = a + \frac{\sum f_u}{\sum f} \times h$$

$$\therefore a = 29$$

Class Marks $\frac{\text{upper-lower}}{2}$

$$u = \frac{u-g}{h}$$

$$\frac{2}{2}$$

$$h = \text{highest} - \text{lowest} \\ = 69 - 35$$

$$= \frac{40 - 35}{2} = 0.5$$

$$\begin{aligned} \text{Range} &= 34 \quad \therefore \text{no. of class} = 1 + 3.3 \log N \\ &= 1 + 3.3 \log(100) \\ &= 1 + 3.3(2) \\ &= 7.6 \\ &= 8. \end{aligned}$$

$$= \frac{34}{8}$$

$$= 4.25$$

$$h = 5. \text{ it is } 8.$$

$$\bar{x} = 29 + \frac{522.5000}{100} \times 4$$

$$\bar{x} = 21.19$$

Date: _____

M T W T F S S
□ □ □ □ □ □ □

Find Arithmetic Mean by coding Method:-

Weekly Income	Class Marks (X)	No. of workers (f)	$U = \frac{X - a}{h}$	f_U	
35 - 39	37	15	1.6000	24.0000	$\therefore a = 29$
40 - 44	42	13	2.6000	33.8000	$h = \text{range of data}$
45 - 49	47	17	3.6000	61.2000	$n = \text{no. of class}$
50 - 54	52	29	4.6000	133.4000	$\text{Range} = \frac{\text{highest} - \text{lowest}}{2}$
55 - 59	57	11	5.6000	61.6000	= 34
60-65 - 64	62	10	6.6000	66.0000	$\text{no. of class} = 1 + 3 \cdot 3 \log N$
65 - 69	67	5	7.6000	38.0000	= 1 + 3 \cdot 3 \log 10
		$\sum f = 100$	$\sum U = 32.2000$	418.0000	= 7.6 ≈ 8

$$\text{Formula} = \bar{x} = a + \frac{\sum f_U}{\sum f} \times h \quad \text{for grouped data} \quad \therefore h = \frac{34}{8} = 5$$

$$29 + \frac{418.0000}{100} \times 5$$

$$49.9 \approx 50.0 = \bar{x}$$

$$\bar{x} = a + \frac{\sum u}{n} \times h \quad \text{for ungrouped data.}$$

$$29 + \frac{32.2000}{100} \times 5$$

$$30.6000 \approx 31 = \bar{x}$$

Exercise Chp 2:- Q \Rightarrow 2.6

100 96 92 88 86 84 82 80 78 91

81 83 79 77 75 73 71 69 58 56

73 50 57 55 53 51 48 46 63 59

55 51 49 47 45 43 41 58 54 50

44 42 40 38 36 46 53 50 43

Date: _____

M T W T F S

lowest 36 highest 100

	40	50	60	70	80	90	100
30	42	58, 57	69	78	88	96	
38	48	53, 50	63	77	86	92	
36	46	56, 56		79	89	98	
	42	58, 58		73	82		
	44	57		75	80		
	43	58		71	86		
	45	59		73	83		
	47	58					
	49	59					
	48	51					
	46	53					
	45	55					

Class Interval Tally Marks frequency.

36 — 40		3
41 — 45		6
46 — 50		6
51 — 55		9
56 — 60		6
61 — 65		1
66 — 70	1	1
71 — 75		4
76 — 80		4
81 — 85		3
86 — 90		3
91 — 95		2
96 — 100		2

Date: _____

Su
Mo Tu We Th Fr Sa
④ ⑥

2.7.

Absentees(n)
No. of Days(f)
 $f(n)$

0	1	2	3	4	5	6	7
5	7	9	6	4	2	1	1
0	7	18	18	16	10	6	7

$$\sum f(n) = 82$$

i) Days on which fewer 4 people absent?

$$5 + 7 + 9 + 6 = 27 \text{ days.}$$

ii) " " " at least " " " ?

$$4 + 2 + 11 = 8.$$

iii) Total No. of absentees over 35 days:-

$$\sum f(n) = 82.$$

2.8.-

74 49 103 95 90 118 52 88 101 96 72 56 64 116 97
 59 62 96 82 65 85 105 116 91 83 99 52 76 84 89
 77 104 96 84 62 58 66 100 80 54 15 55 99 104 78
 66 96 83 57 60 51 114 120 121 92 88 64 63 95 78

lowest = 49. highest = 121

40 50 60 70 80 90 100 110 120

49 52 64 74 83 96 103 114 121

56 62 77 84 96 108 116 126

52 62 72 82 96 101. 110

59 66 75 85 95 108 118

58 63 76 88 90 108 11

54 64 78 80 91 105

55 66 78 83 96 104

51 57 65 88 92 100

84 99 104

89 99 108

97 99 108

95 97 99



M T W T F S S

Date: _____

class intervals

Tally Marks

Frequency:

40 - 49

|

1

50 - 59

|||| ||||

9

60 - 69

|||| |||

6

70 - 79

|||| ||

7

80 - 89

|||| ||||

10

90 - 99

|||| |||| ||

12

100 - 109

|||| |

6

110 - 119

||||

4

120 - 129

||

2

$$\sum f = 60$$

2.10

79.4	71.6	95.5	73.0	74.2	81.8	90.6	55.9
75.2	81.9	68.9	74.2	80.7	65.7	67.6	82.9
88.1	77.8	69.4	83.2	82.7	73.8	64.2	63.9
68.3	48.6	83.5	70.8	72.1	71.6	59.4	77.6

lowest = 48.6

highest = 95.5

class intervals	Tally Marks:-	frequency	class boundaries:-
45.5 - 50.4		1	45.4500 - 50.3500
50.5 - 55.4	0	0	50.4500 - 55.3500
55.5 - 60.4		2	55.4500 - 60.3500
60.5 - 65.4		2	60.4500 - 65.3500
65.5 - 70.4		5	65.4500 - 70.3500
70.5 - 75.4		9	70.4500 - 75.3500
75.5 - 80.4		3	75.4500 - 80.3500
80.5 - 85.4		7	80.4500 - 85.3500
85.5 - 90.4		1	85.4500 - 90.3500
90.5 - 95.4	0	1	90.4500 - 95.3500
95.5 - 100.4	1	1	95.4500 - 100.3500

ARMS
NOTES

105.

$$\sum f = 32$$

Date: _____

M	T	W	T	F	S	S
◇	◇	◇	◇	◇	◇	◇

40.0	50.0	60.0	70.0	80.0	90.0	
48.6	59.4	63.9	79.4	82.9	95.5	
	55.9	67.6	75.2	81.8	90.6	
		64.2	71.6	80.7		
		65.7	77.8	82.7		
		69.4	73.0	83.2		
		68.9	74.2	83.5		
	2	68.3	70.8	81.9		
	$\frac{0.1}{2} = 0.05$		74.2	88.1		
			72.1			
			71.6			
			73.8			
			77.6			

Class boundaries:
upper limit - lower limit

R.

$50.5 - 50.4$

2

$\frac{0.1}{2} = 0.05$

2.90

frequency distribution:

lowest = 61
 highest = 177

91	124	109	129	141	107	86	76	118	111
99	99	114	100	88	108	87	101	101	71
63	121	122	111	119	77	127	61	133	68
77	177	110	95	96	96	86	106	119	79
81	127	86	153	79	129	151	89	143	147
90	142	105	94	125	96	99	138	145	113
129	87	113	110	144	91	106	104	97	115
100	117	73	134	108	102	123	106	119	104
101	120	112	138	140	103	96	136	78	83
75	100	113	114	109	116	109	116	104	128
60	70	80	90	100	110	120	130	140	150
63, 61	76, 71, 77	88, 87, 91, 99, 99	109, 101, 101, 100	116, 116	124, 129	133, 136, 138	147		177
68	79, 77, 73	86, 98, 96, 96, 95	101, 108, 107, 109	114, 113	127, 122	134, 136,	143, 145		
75	89, 88, 99, 96, 94	100, 106, 104	112, 117	121, 129	127, 125	138, 136	141, 144	153	
		83, 90, 91, 97, 96	105, 104	119, 113	129, 123	140	140, 142	151	
				115, 113					
				120					



M T W T F S S

Date:

class Interval	Tally Mark	frequency.
60 — 64		2
65 — 69		1
70 — 74		2
75 — 79		5
80 — 84		2
85 — 89		6
90 — 94		4
95 — 99		9
100 — 104		12
105 — 109		7
110 — 114		10
105 — 109		
110 — 114		
115 — 119		8
120 — 124		5
125 — 129		6
130 — 134		2
135 — 139		3
140 — 144		5
145 — 149		2
150 — 154		3
155 — 159	XXXX	8



Date:

M T W T F S S

2.11

lowest = 0

highest = 10

2	6	1	5	4	3	3	8	3	1
4	3	3	0	5	2	1	4	3	3
5	3	3	6	3	3	3	2	7	3
1	4	2	4	4	4	6	8	10	7
7	5	6	5	3	2	3	9	2	2

Class Intervals Tally Marks frequency

0	1	1
1		4.
2		8.
3		14
4		7.
5		5
6		4.
7		3.
8		2
9		1
10		1
		50

2.12

2 7 2 6 2 5 10 2 2 1 4 2 8 2 2 6 14 2 8 3 3 3
 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 1 1 3 4 4 1 3
 4 1 6 2 5 2 3 7 4 2 7.

Class Interval	Marks	(f)	Class Intervals	Marks	frequency
-1		9.	0-7		8.
2		29.	8		5
3		16.	9		3
4		11	10		2
5		6.	11		1

