Measures of Central Tendency

- *Topics covered:*

✓ **Frequency distribution**
✓ **Visual representation of the data**
✓ **Mean**
✓ **Median**
✓ **Mode**

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Frequency distribution

Sl. No.	Name	MCQ (out of 12)	2 Marks each (out of 16)	3 Marks each (out of 9)	Total (Out of 37)
1	KAZI	11	15.5	9	**35.5**
2	ARPIT	12	15	6	**33**
3	PRATHAMESH	12	14	7	**33**
4	SAAKETH	11	16	7	**34**
5	SUJITHA	12	14.5	6	**32.5**
6	JAYSHREE	12	11.5	6	**29.5**
7	DEVIKA	12	10.5	7.5	**30**
8	SRIVASTAV	8	13	6.5	**27.5**
9	REET	8	8.5	5	**21.5**
10	RUDRANI	12	13.5	7	**32.5**
11	PRASHANTH	12	12	9	**33**
12	SHAGUN	11	14	7.5	**32.5**
13	SOHAM	11	9.5	5	**25.5**
14	HARISH	9	5.5	8.5	**23**
15	TEJASWINI	12	15	7	**34**
16	MADHU	9	15.5	6	**30.5**
17	VINOD	12	13	4	**29**
18	SUHAS	10	13.5	9	**32.5**
19	YASH	12	15	6	**33**
20	JOHN	12	13.5	6	**31.5**

Class Interval	Tally Mark	Frequency f
19.5 – 22.5	I	1
22.5 – 25.5	I	1
25.5 – 28.5	II	2
28.5 – 31.5	IIII	4
31.5 – 34.5	~~IIII~~ ~~IIII~~ I	11
34.5 – 37.5	I	1
		20

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'x' Marks	(Tally Marks) No. of students	'f' frequency
21.5	I	1
22	0	0
22.5	0	0
23	I	1
23.5	⋮	⋮
32.5	IIII	4
33	IIII	4
35	0	0
35.5	I	1
		20

$35.5 - 21.5 = 14$

$\frac{14}{5} = 2.8 \simeq 3$

Struges formula

no. of classes

$$k = 1 + 3.322 \log_{10} N$$

N = total frequency

$N = 20$

$k = 1 + 3.322 \log_{10} 20$

$= 5.3220$

$\simeq 5$

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25 6 '3' , 21.5 , 35.5

21 – 23	20 – 22
23 – 25	23 – 25
25 – 27	26 – 28
27 – 29	29 – 31
29 – 31	32 – 34
31 – 33	35 – 37
33 – 35	
35 – 37	

$d = 1$

Inclusive type classification

19.5 – 22.5
22.5 – 25.5
25.5 – 28.5
28.5 – 31.5
31.5 – 34.5
34.5 – 37.5

exclusive type of classification

$19.5 \leq ( ) < 22.5$

lower boundary $20 - \frac{d}{2}$, upper boundary $= 22 + \frac{d}{2}$

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Class Interval	No. of students frequency f
19.5 – 22.5	1
22.5 – 25.5	1
25.5 – 28.5	2
28.5 – 31.5	4
31.5 – 34.5	11
34.5 – 37.5	1
	N = 20

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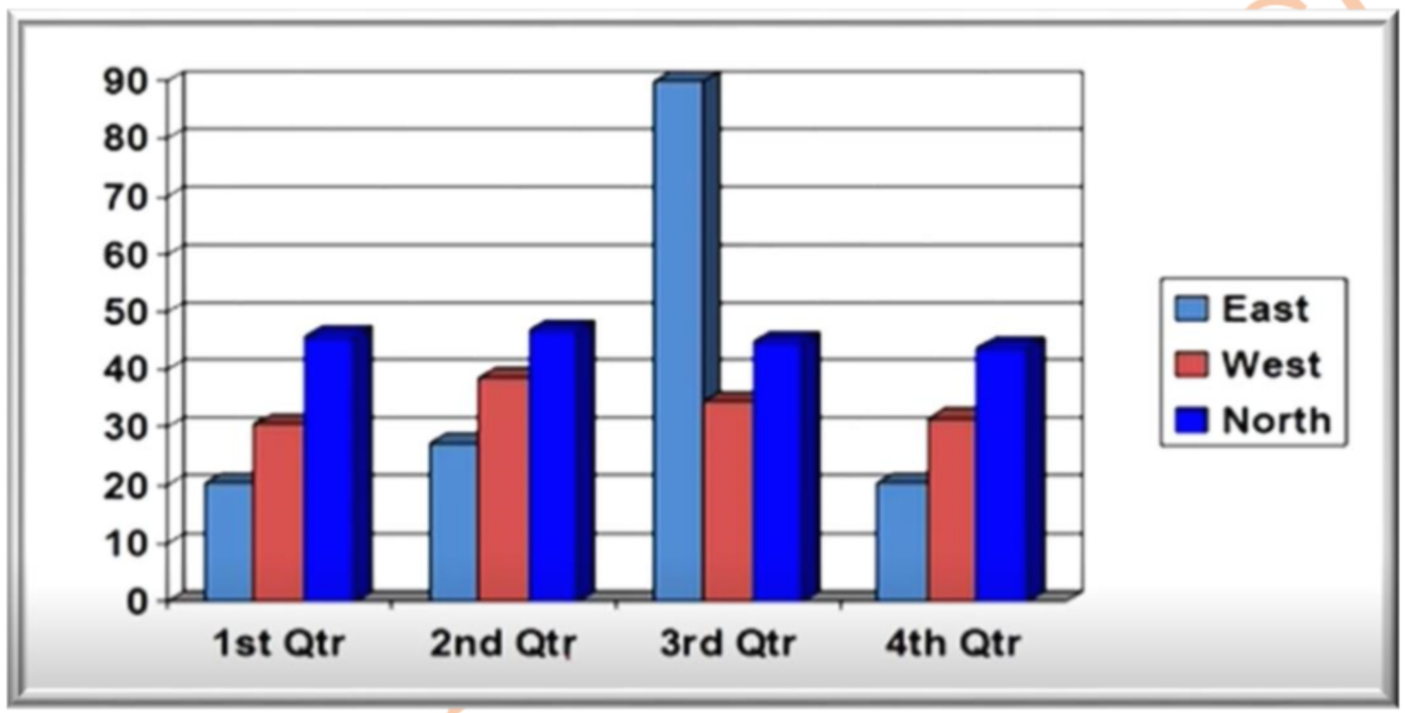
Graphical representation

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
East	20.4	27.4	90	20.4
West	30.6	38.6	34.6	31.6
North	45.9	46.9	45	43.9



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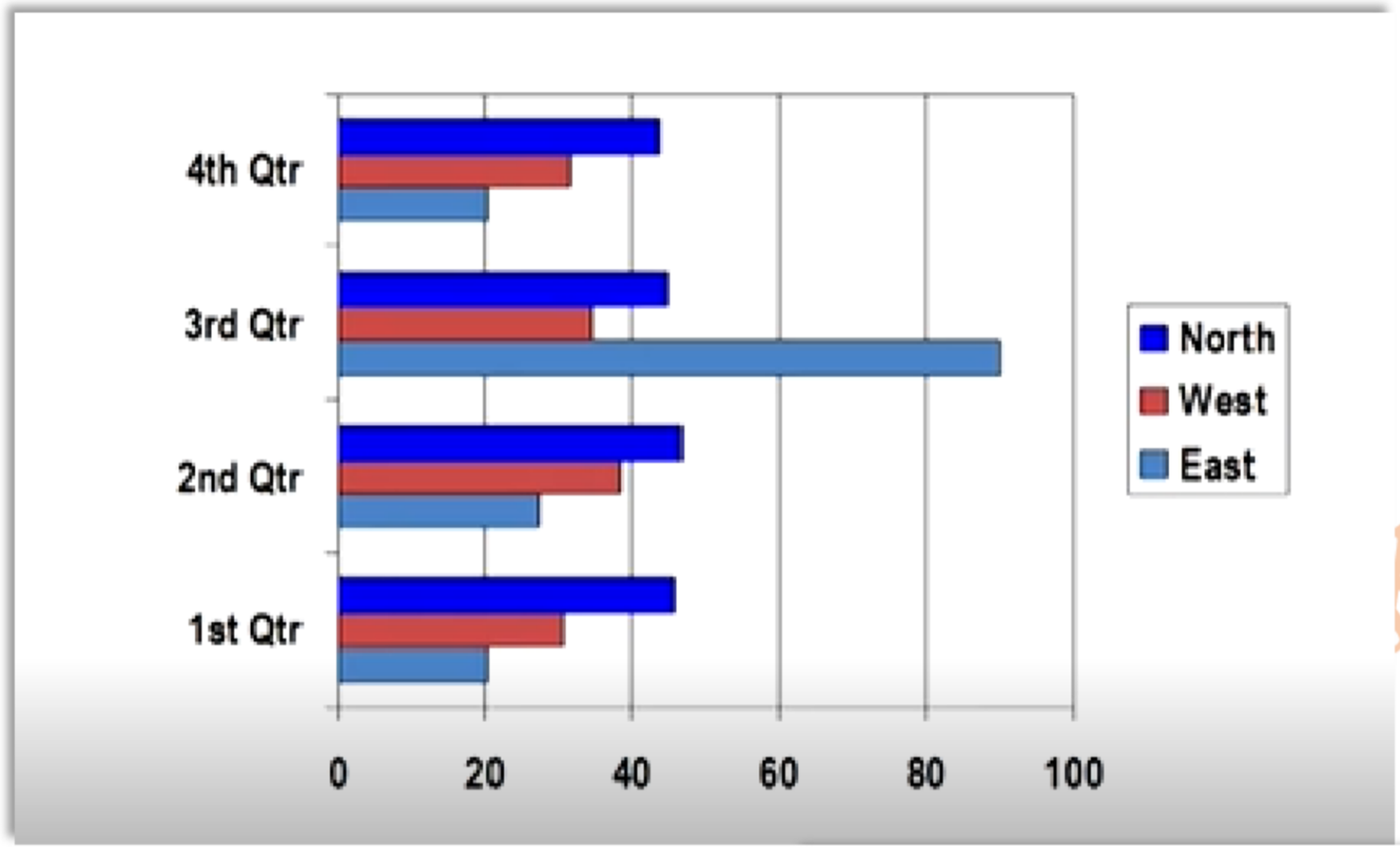

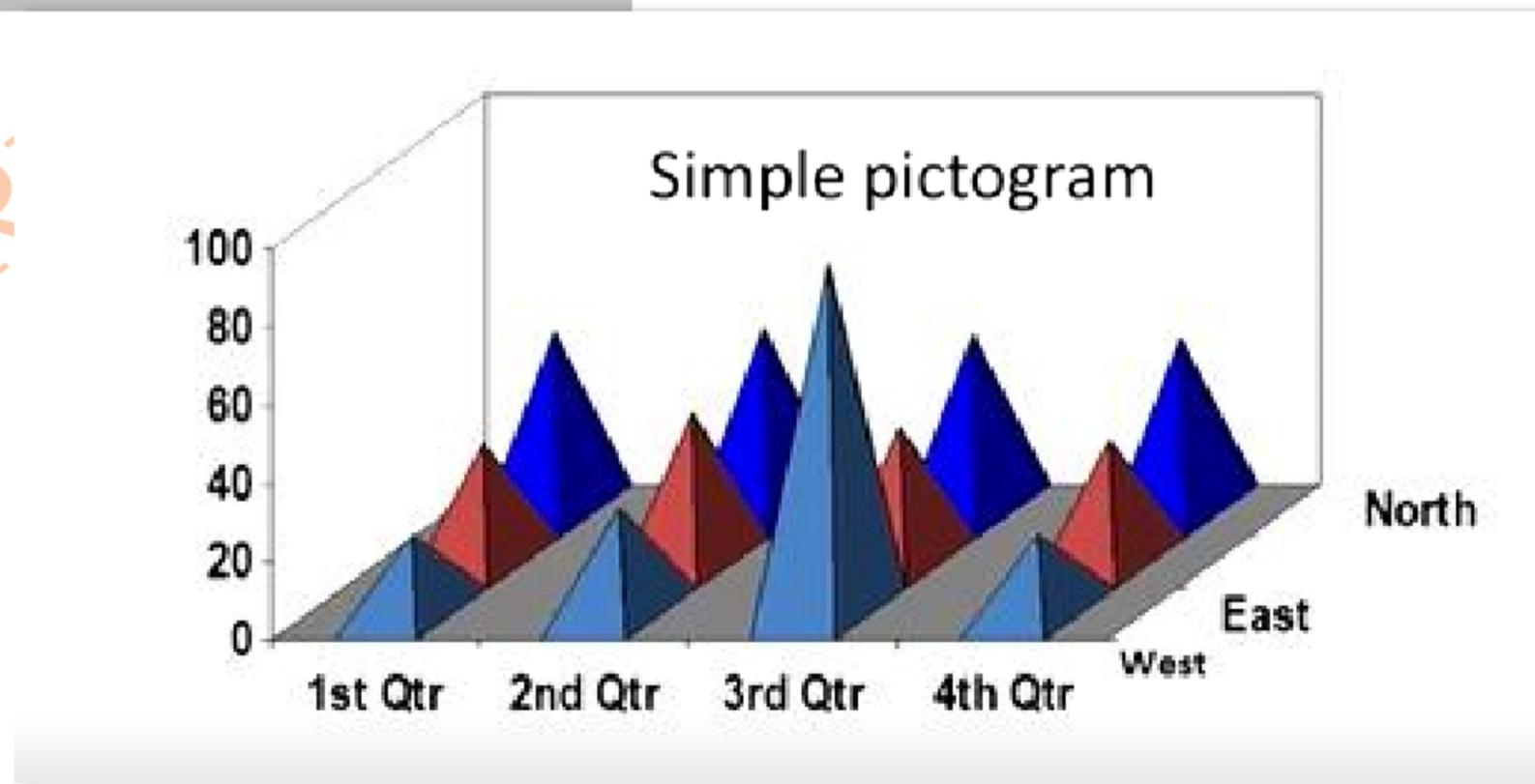

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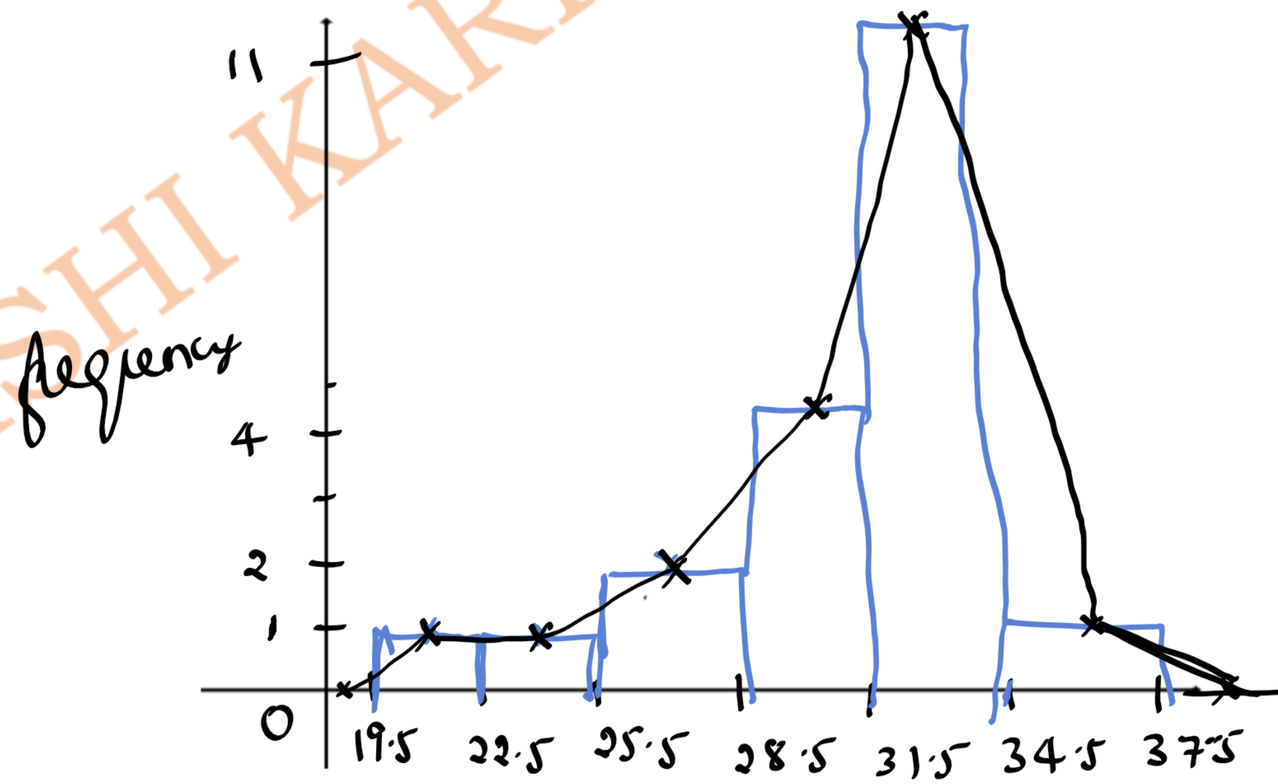
Graphical representation of a frequency distribution

Histogram

Marks of 20 students

class interval	No. of students frequency f
19.5 – 22.5	1
22.5 – 25.5	1
25.5 – 28.5	2
28.5 – 31.5	4
31.5 – 34.5	11
34.5 – 37.5	1
	20



Frequency polygon:

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Relative frequency

cumulative frequency

class interval	frequency (students) f	cumulative frequency
19.5 – 22.5	1	1
22.5 – 25.5	1	2
5.5 – 28.5	2	4
8.5 – 31.5	4	8
31.5 – 34.5	11	19
34.5 – 37.5	1	20

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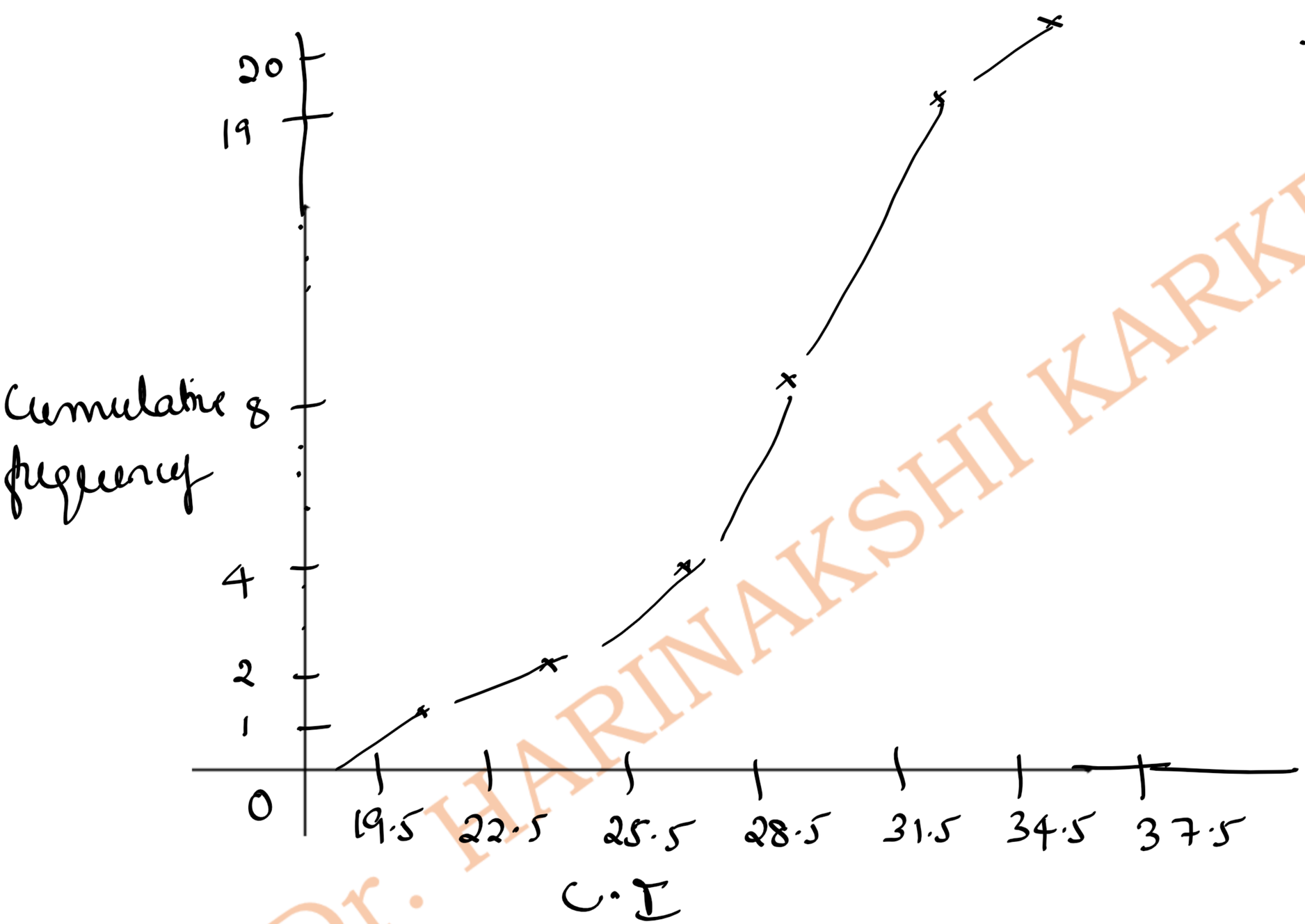
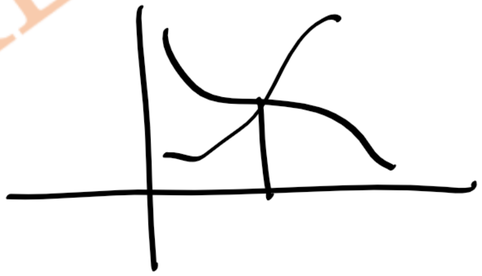


less than ogive
More than ogive



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Frequency polygon

Relative frequency ogive

Relative frequency

class interval	frequency (students) f	Relative frequency f/n	Cumulative	relative cumulative freq
19.5 – 22.5	1	1/20 =		
22.5 – 25.5	1	1/20 =		
5.5 – 28.5	2	2/20		
8.5 – 31.5	4	4/20		
31.5 – 34.5	11	11/20		
34.5 – 37.5	1	1/20		
	N = 20			

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21.5 — 35.5

Stem and leaf plot

G
Total (Out of 37)
35.5
33
33
34
32.5
29.5
30
27.5
21.5
32.5
33
32.5
25.5
23
34
30.5
29
32.5
33
31.5

Stem	leaf
2	1.5, 3, 5.5, 7.5, 9, 9.5
3	0, 0.5, 1.5, 2.5, 3, 4, 5.5

20, 22, 50, 75, 100, 150, 200, 250

Stem	leaf
2	0, 2
5	0
7	5
10	0
15	0
20	0
25	0

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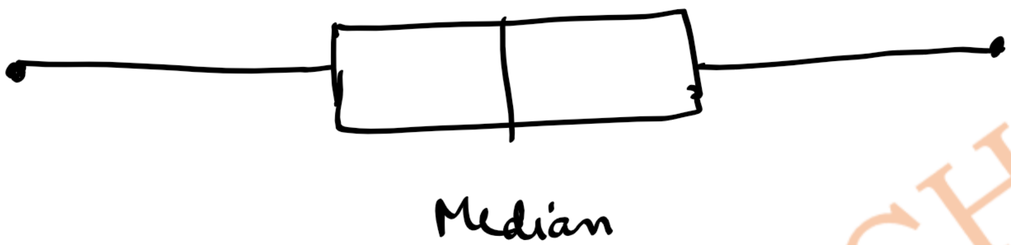
Box plot



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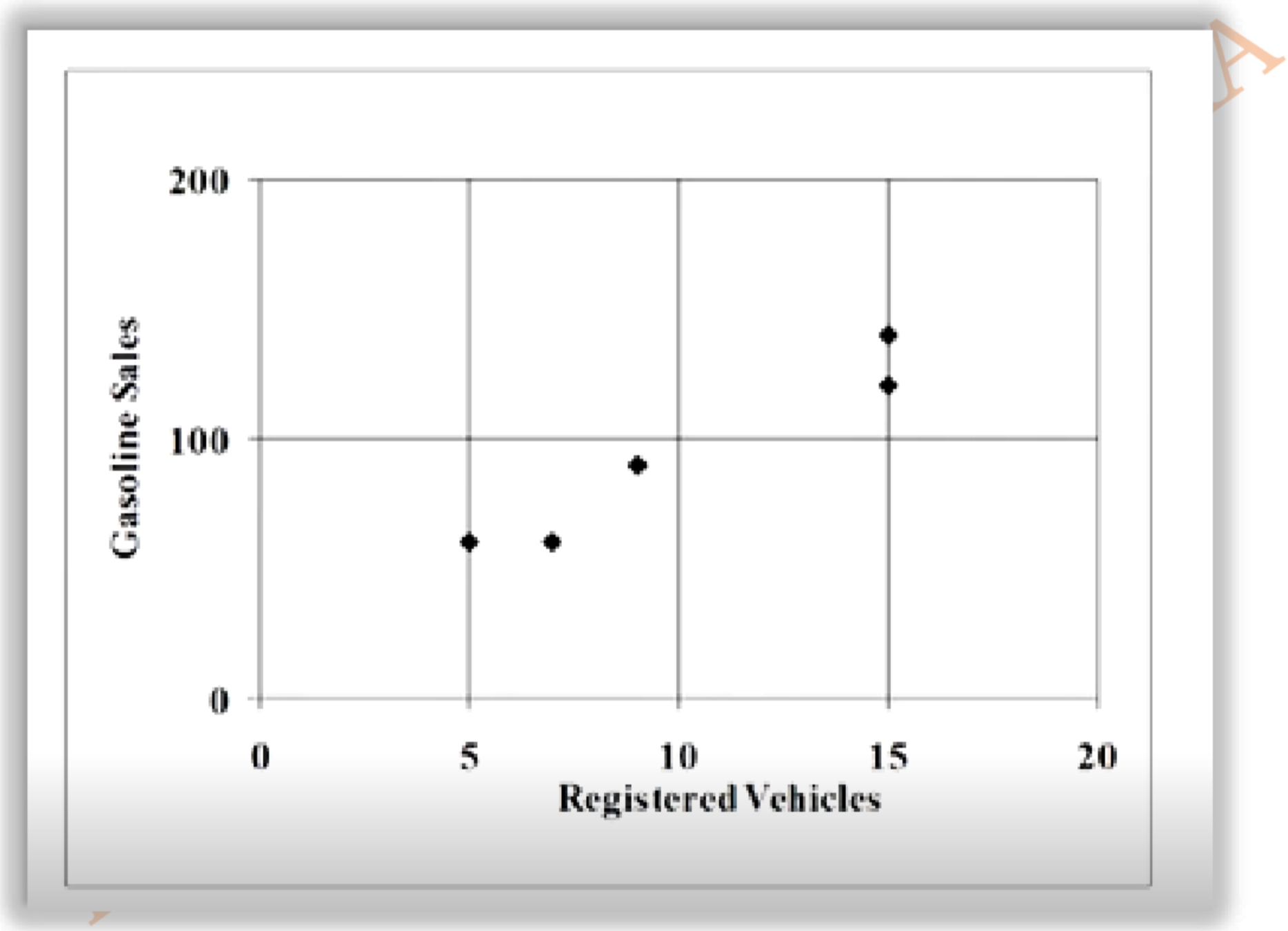
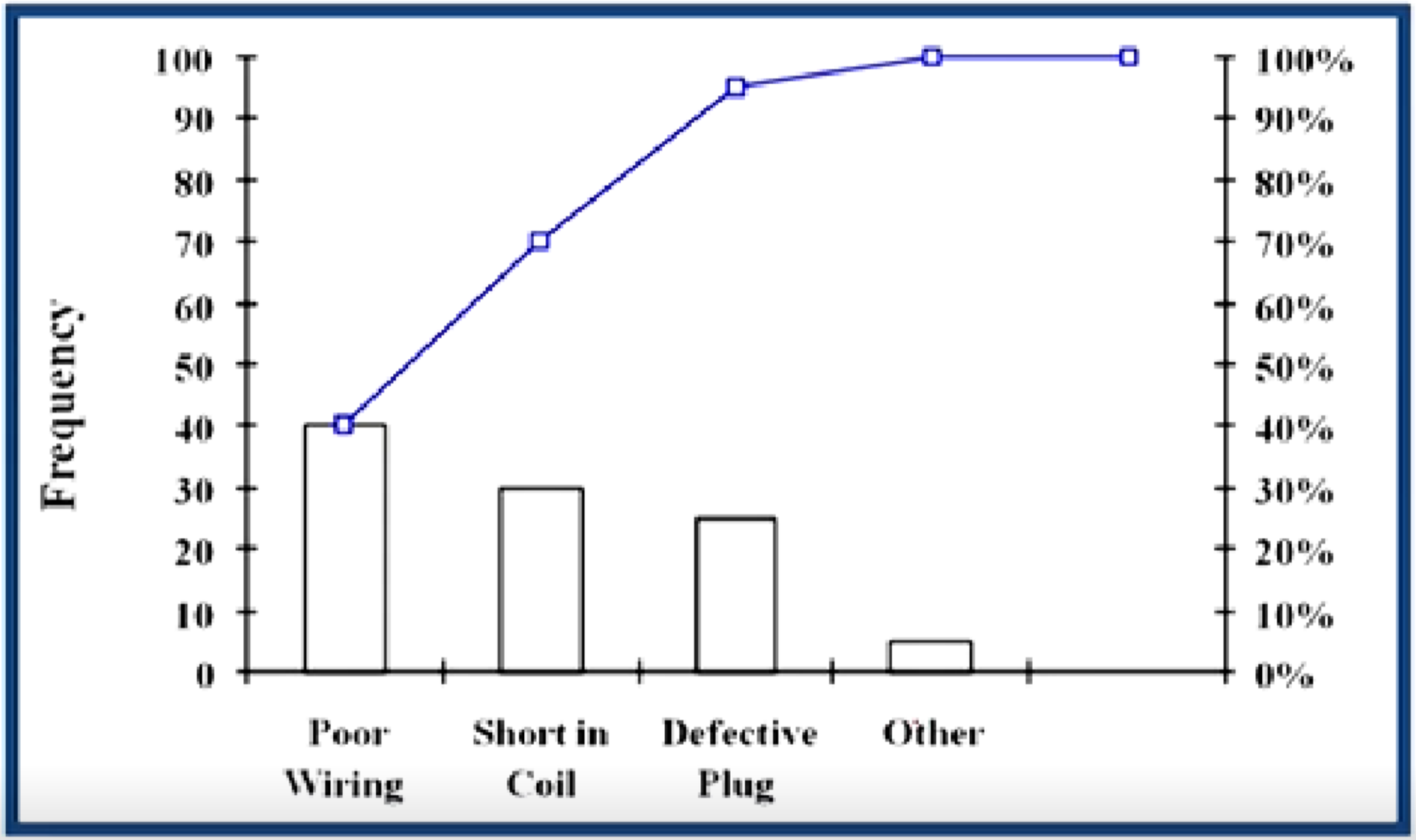
Scatter diagram



Pareto chart



Measures of central tendency

Mean
Median
Mode

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Mean (average)

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Mean of grouped data

$$\bar{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}$$

Ex:

C.I	frequency f_i	x_i	$f_i x_i$
20 - 30	6	25	
30 - 40	18	35	
⋮	11	⋮	⋮
70 - 80	1	75	
	50		

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Weighted average

Weighted average

$$= \frac{\sum_i w_i x_i}{\sum_i w_i}$$

x_i — data value

w_i — the weight assigned to that data value

'A' Internal Exam 83

Final Exam 95

Weights 40% / 60%

'A' 90 — A

$$W.A = \frac{(83 \times 0.4) + (95) \times (0.6)}{0.4 + 0.6}$$

$$= \underline{\underline{90.2}}$$

'A' I.M — 82

F.M — 94.5

$$W.A = \frac{82 \times (0.4) + (94.5) \times 0.6}{1}$$

$$= \underline{\underline{89.5}}$$

'A' 82 –

94

$$WA = 82 \times (0.4) + (94) \times (0.6)$$

$$= \underline{\underline{89.2}}$$

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	f	Relative frequency
20 – 23	1	$f/50 =$
23 – 26	2	
⋮		
	50	

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