

$$\bar{x} = \frac{20+26+28+30+32}{5} = \frac{136}{5} = 27.2$$

$$\bar{x}_w = \frac{1 \cdot 1 + 2 \cdot 2 + 3 \cdot 3 + 4 \cdot 4 + \dots + n \cdot n}{1+2+3+4+5+\dots+n}$$

$$= \frac{1^2 + 2^2 + 3^2 + \dots + n^2}{1+2+3+\dots+n}$$

$$= \frac{n(n+1)(2n+1)}{6}$$

$$\frac{n(n+1)}{2}$$

$$= \frac{n(n+1)(2n+1)}{6} \times \frac{2}{n(n+1)}$$

$$= \frac{2n+1}{3}$$

<u>x</u>	<u>f</u>	<u>Cumulative frequency</u>
1	8	8
2	10	18
3	11	29
4	16	45
5	20	65
6	25	90
7	15	105
8	9	114
9	6	120
	<u>120</u>	

$$\underline{\underline{x=5}}$$

Median

$$\text{Median} = \text{Size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item} = \frac{121}{2}^{\text{th}} \text{ item} = 60.5 \text{ item}$$

4

Wages in (Rs) x	No. of workers f	c. f.	Mid-Value
2000-3000	3	3	2500
3000-4000	5	8	3500
4000-5000	20	28	4500 → Median class
5000-6000	10	38	5500
6000-7000	5	43	6500

A: antiklog

$$\text{Size of } \left[\frac{43}{2} \right]^{\text{th}} \text{ item} = 22.5^{\text{th}} \text{ item}$$

$$\text{Median} = 4000 + \left(\frac{22.5 - 8}{20} \right) 1000$$

$$= 4000 + \left(\frac{14.5}{20} \right) 1000$$

$$= 4000 + 725$$

$$= \underline{\underline{4725}}$$

5

$$\text{Mode} = 2$$

6

$$\text{Mode} = 4$$

7Class Interval f

0-10 5

10-20 8

20-30 7

30-40 12

~~30-40~~ 40-50 ← 28

50-60 20

60-70 10

70-80 10

$$\text{Mode} = 40 + \left(\frac{28 - 12}{2(28) - 12 - 20} \right) 10$$

$$= 40 + \frac{16}{24} \times 10$$

$$= 40 + 6.667$$

$$= 46.667$$

$$M = \text{antilog} \left(\frac{\log 85 + \log 70 + \log 15 + \log 75 + \log 500 + \log 8 + \log 45 + \log 250 + \log 40 + \log 36}{10} \right)$$

$$= \text{antilog} \left(\frac{\log (85 \times 70 \times 15 \times 75 \times 500 \times 8 \times 45 \times 250 \times 40 \times 36)}{10} \right)$$

$$= \text{antilog} \left(\frac{17.6372}{10} \right)$$

$$= \text{antilog} (1.76372)$$

$$= \underline{58.04}$$

<u>q</u>	Marks(x)	f	m m	log f log m	f log m
	4-8	6	6	0.7782	4.6692
	8-12	10	10	1	10
	12-16	18	14	1.1461	20.6298
	16-20	30	18	1.2553	37.6590
	20-24	15	22	1.3424	20.1360
	24-28	12	26	1.4150	16.9800
	28-32	10	30	1.4771	14.7710
	32-36	6	34	1.5315	9.1890
	36-40	2	38	1.5798	3.1596
		<u>109</u>			<u>137.1936</u>

$$G_m = \text{antilog} \frac{137.1936}{109}$$

$$= \underline{\underline{18.1408}}$$

10

Day _____
Page _____

$$H.m = \frac{8}{\frac{1}{2574} + \frac{1}{475} + \frac{1}{75} + \frac{1}{5} + \frac{1}{0.8} + \frac{1}{0.08} + \frac{1}{0.001}}$$

$$= \frac{8}{\left[(3.885 \times 10^{-4}) + (2.1053 \times 10^{-3}) + (0.01333) + 0.2 + 1.25 + 12.5 + 200 + 1111.11 \right]}$$

$$= \frac{8}{1325.075824}$$

$$= 6.037 \times 10^{-3}$$

11

Mark(x)	No. of students (f)	$\frac{1}{x}$	f. $\frac{1}{x}$
10	20	0.1	2
20	30	0.05	1.5
25	50	0.04	2
40	15	0.025	0.375
50	5	0.02	0.1
	<u>120</u>		<u>5.975</u>

$$H.m = \frac{120}{5.975} = 20.0837$$

12

Class Interval	f	m	$\frac{1}{m}$	f. $\frac{1}{m}$
10 - 20	4	15	0.0667	0.2668
20 - 30	6	25	0.0400	0.2400
30 - 40	10	35	0.02857	0.2857
40 - 50	7	45	0.02222	0.155554
50 - 60	3	55	0.01818	0.054545
	<u>30</u>			<u>1.00258</u>

$$H.m = \frac{30}{1.00258} = 29.9228$$

Day	Mon	Tues	wed	Thur	Fri	Sat
Price	200	210	208	160	220	250

$$\text{Range} = 250 - 160 = 90$$

$$\text{Co. eff} = \frac{250 - 160}{250 + 160} = \frac{90}{410} = 0.2195$$

14

Marks	No. of students	c.f
10-20	8	8
20-30	4 10	18 $\rightarrow Q_1$
30-40	12	30
40-50	8	38 $\rightarrow Q_3$
50-60	4	42
	<u>42</u>	

$$Q_1 = \text{size of } \left[\frac{42}{4} \right]^{\text{th}} \text{ item} = \text{size of } 10.5^{\text{th}} \text{ item}$$

$$= 20 + \left(\frac{10.5 - 8}{10} \right) 10$$

$$= 20 + 2.5$$

$$= 22.5$$

$$Q_3 = \text{size of } \left[\frac{42}{4} \right]^{\text{th}} \text{ item} = \text{size of } 31.5^{\text{th}} \text{ item}$$

$$= 40 + \left(\frac{31.5 - 30}{8} \right) 10$$

$$= 40 + 1.875 = 41.875$$

$$QD = \frac{41.875 - 22.5}{2} = \frac{19.375}{2} = 9.6875$$

$$\text{Co. eff} = \frac{Q_3 - Q_1}{Q_3 + Q_1} = \frac{41.875 - 22.5}{41.875 + 22.5} = \frac{19.375}{64.375} = 0.3009 \approx 0.301$$

15

Roll no. Marks

1	20
2	28
3	40
4	12
5	30
6	15
7	50

12, 15, 20, 28, 30, 40, 50

~~$Q_1 = \text{size of } \left[\frac{7+1}{4} \right]^{\text{th}} \text{ item} = 2^{\text{nd}} \text{ item} = 28$~~

~~$Q_3 = \text{size of } 3 \left[\frac{7+1}{4} \right]^{\text{th}} \text{ item} = 6^{\text{th}} \text{ item} = 15$~~

$Q_1 = \text{size of } \left[\frac{7+1}{4} \right]^{\text{th}} \text{ item} = 2^{\text{nd}} \text{ item} = 15$

$Q_3 = \text{size of } 3 \left[\frac{7+1}{4} \right]^{\text{th}} \text{ item} = 6^{\text{th}} \text{ item} = 40$

$Q.D = \frac{40 - 15}{2} = \frac{25}{2} = 12.5$

$\text{Range} = \frac{40 - 15}{40 + 15} = \frac{25}{55} = 0.4545$

discrete :-

Roll no.	Marks	c.f
1	20	20
2	28	48
3	40	88
4	12	100
5	30	130
6	15	145
7	50	195
	<u>195</u>	

~~$Q_1 = \frac{196}{4} \text{ item} = 49^{\text{th}} \text{ item} = 40$~~

~~$Q_3 = 3 \times 49^{\text{th}} \text{ item} = 147^{\text{th}} \text{ item} = 50$~~

~~$Q.D =$~~

Marks (x)	No. of Students (f)	c.f
10	4	4
20	7	11
30	15	26
40	8	34
50	7	41
60	2	43
	<u>43</u>	

$$Q_1 = \text{size of } \left[\frac{44}{4} \right]^{\text{th}} \text{ item} = 11^{\text{th}} \text{ item} = 20$$

$$Q_3 = \text{size of } 3 \left[\frac{44}{4} \right]^{\text{th}} \text{ item} = 33^{\text{rd}} \text{ item} = 40$$

$$\text{Co-efficient} = \frac{40 - 20}{40 + 20} = \frac{20}{60} = \frac{1}{3} = \underline{\underline{0.33}}$$

17

Wages	No. of wage earners	c.f.
Less than 35 \rightarrow 31.5 - 33.5	14	14
35 - 37 \rightarrow 34.5 - 36.5	62	76 $\rightarrow Q_1$
38 - 40 \rightarrow 37.5 - 39.5	99	175 $\rightarrow Q_3$
41 - 43 \rightarrow 40.5 - 42.5	18	193
Over 43 \rightarrow 43.5 - 45.5	7	200

$$Q_1 = \text{size of } \frac{200}{4}^{\text{th}} \text{ item} = 50^{\text{th}} \text{ item} = 34.5 + \left(\frac{50 - 14}{62} \right) 2$$

$$= 35.61$$

$$Q_3 = \text{size of } 3 \left(\frac{200}{4} \right)^{\text{th}} \text{ item} = 150^{\text{th}} \text{ item} = 37.5 + \left(\frac{150 - 76}{99} \right) 2$$

$$= 38.99$$

$$Q.D. = \frac{38.99 - 35.61}{2} = 1.665$$

$$\text{Co-eff} = \frac{38.99 - 35.61}{38.99 + 35.61} = \frac{3.38}{74.65} = \underline{\underline{0.0446}}$$

18

$$\frac{4000 + 4200 + 4400 + 4600 + 4800}{5}$$

5

$$= 4400$$

$$\hookrightarrow \bar{X} = \text{Median} = \text{Mean}$$

x	mean	D
4000	4400	$\rightarrow -400$
4200	4400	$\rightarrow -200$
4400	4400	$\rightarrow 0$
4600	4400	$\rightarrow +200$
4800	4400	$\rightarrow +400$

$$\Sigma |D| \quad \text{Mean deviation} = 400 + 200 + 200 + 400 + 0 = 1200$$

$$\text{mean deviation} = \frac{1200}{5} = \underline{\underline{240}}$$

19

x	f	f.x	c.f.
10	3	30	3
11	12	132	15
12	18	216	33
13	12	156	45
14	3	42	48
	<u>48</u>	<u>576</u>	

$$\text{Mean} = \frac{576}{48} = 12$$

$$\text{Median} = \frac{48}{2} = 24.5^{\text{th}} \text{ item} = 12$$

$$M.D = \frac{36}{48} = \underline{\underline{0.75}}$$

x	mean	f	x - mean	f x - mean
10	12	3	-2 = 2	6
11	12	12	-1 = 1	12
12	12	18	0 = 0	0
13	12	12	1 = 1	12
14	12	3	2 = 2	6
				<u>36</u>

Size of item (x)	f	$f \cdot x$	$A = 6.5$ $d = x - A$	$f \cdot d$	$f d^2$
3.5 → 3-4	3	10.5	-3	-9	27
4.5 → 4-5	7	31.5	-2	-14	28
5.5 → 5-6	22	121	-1	-22	22
6.5 → 6-7	60	390	0	0	0
7.5 → 7-8	85	637.5	1	85	85
8.5 → 8-9	32	272	2	64	128
9.5 → 9-10	8	76	3	24	192
	<u>217</u>	<u>1538.5</u>		<u>128</u>	<u>482</u>

$$\text{Mean} = \frac{1538.5}{217} = 7.08986 \approx 7.09$$

$$\sigma = \sqrt{\frac{482}{217} - \left(\frac{128}{217}\right)^2}$$

$$= \sqrt{1.874}$$

$$= 1.3689 \approx 1.37$$

$$\text{C.V.} = \frac{1.37}{7.09} \times 100 = 19.32$$

$$\bar{X} = 35 + \frac{118 \times 10}{200}$$

$$= 35 + 5.9$$

$$= 40.9$$

$$\sigma = \sqrt{\frac{510}{200} - \left(\frac{118}{200}\right)^2} \times 10$$

Marks (x)	No. of students (f)	m	$A = 35$ $d = \frac{x - A}{i}$	$f \cdot d$	$f \cdot d^2$
0-10	5	5	-3	-15	45
10-20	12	15	-2	-24	48
20-30	30	25	-1	-30	30
30-40	45	35	0	0	0
40-50	50	45	1	50	50
50-60	37	55	2	74	148
60-70	21	65	3	63	189
	<u>200</u>			<u>118</u>	<u>510</u>

$$\sigma = \sqrt{2.55 - (0.59)^2} \times 10$$

$$= (\sqrt{2.55 - 0.3481}) \times 10 = \sqrt{2.2019} \times 10 = 14.8388$$

22

SD of boys is 3

SD of girls is 2

$$C.V = \frac{s}{\bar{x}} \times 100$$

$$CV(\text{boys}) = \frac{3}{60} \times 100 = 5$$

$$CV(\text{girls}) = \frac{2}{45} \times 100 = 4.44$$

Since CV for boys is greater than that of girls, distribution of the weights of boys is more variable than that of girls.

23

Expenditure (in Rs.)
(x)

No. of
Students
(f)

m

A = 60

L = 4

$d = \frac{x-A}{L}$ f.d fd^2

Expenditure (in Rs.) (x)	No. of Students (f)	m	$d = \frac{x-A}{L}$	f.d	fd^2
33-37	2	35	-6.25	-12.5	78.125
38-42	4	40	-5	-20	100
43-47	7	45	-3.75	-26.25	98.4375
48-52	9	50	-2.5	-22.5	56.25
53-57	13	55	-1.25	-16.25	20.3125
58-62	18	60	0	0	0
63-67	12	65	1.25	15	18.75
68-72	7	70	2.5	17.5	43.75
73-77	6	75	3.75	22.5	84.375
78-82	2	80	5	10	50
	<u>80</u>		<u>-32.5</u>		<u>550</u>

$$\begin{aligned} \bar{x} &= 60 + \left(\frac{-32.5}{80} \right) 4 \\ &= 60 - 1.625 \\ &= \underline{58.375} \end{aligned}$$

$$s = \sqrt{\frac{550}{80} - \left(\frac{-32.5}{80}\right)^2} \times 4$$

$$= \sqrt{6.875 - (0.165)} \times 4$$

$$= \sqrt{6.71} \times 4$$

$$= 2.591 \times 4$$

$$= \underline{\underline{10.364}}$$

$$C.V = \frac{10.364}{58.375} \times 100$$

$$= 17.754$$