APS

"Descriptive Statistics"

Data → unordered / unarranged

Arrange raw data

- Sorting
- Tables
- Telly markes, frequencies
- Graphs / chats

Unordered data

24	21	19	25	23	12
19	17	23	18	12	24
22	16	16	12	19	28
15	20	17	25	15	13
20	25	22	23	33	15
12	14	21	21	15	24
17	15	22	22	24	17
12	28	24	19	22	15
20	12	21	17	16	20
25	14	19	23	16	17
22	21	25	18	12	25
28	26	28	17	24	20
28	20	17	29	33	18
20	29	22	20		

Arrang data

12-20	21-30	31-33
12 +++++	21 ++++	
13	22 ++++++	33
14 +	23 ++++	
15 +++++	24 +++++	
16 ++ +	25 +++++	
17 ++++++	26	

17 +++++++   28 ++++
18 ++   29 +
19 +++++
20 +++++++

Telly Marks

12	⊔⊓ ‖	21	⊔⊓
13	‖	22	⊔⊓ ‖
14	‖	23	⊔⊓
15	⊔⊓‖	24	⊔⊓ ‖
16	‖‖‖	25	⊔⊓‖
17	⊔⊓ ‖‖	26	‖
18	‖‖	28	⊔⊓
19	⊔⊓	29	‖
20	⊔⊓ ‖‖	33	‖

Raw Data (weight of apples)

106	107	76	82	109	107
115	93	187	95	123	125
111	92	86	70	126	68
130	129	139	119	115	128
100	186	84	99	113	204
111	141	136	123	90	115
98	110	78	185	162	178
140	152	173	146	153	19
148	90	107	181	131	75
184	104	110	80	118	82

Lowest value = 68

Highest = 204

niceday

106, 107, 76, 82, 109, 107, 115, 93, 187

95, 123, 125, 111, 92, 86, 70, 126, [68]

130, 129, 139, 119, 115, 128, 100, 186, 84

99, 113, [204], 111, 141, 136, 123, 90, 115,

98, 110, 78, 185, 162, 178, 140, 152, 173,

146, 158, 194, 148, 90, 107, 181, 131, 75

184, 104, 110, 80, 118, 82

204 - 68 = 136

No. of class : $K = 1 + 3.3 \log N$

N = no. of observations

$= 1 + 3.3 \log(60)$

$= 6.87$

≈ 7
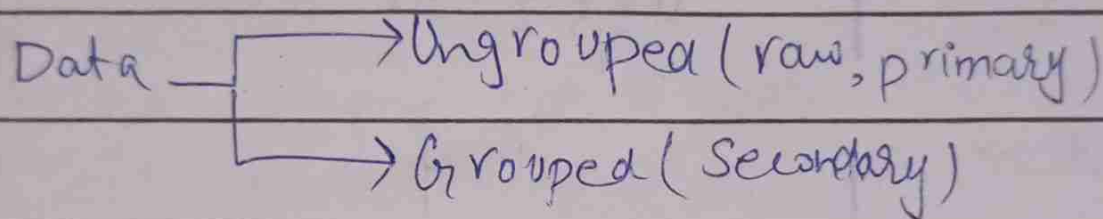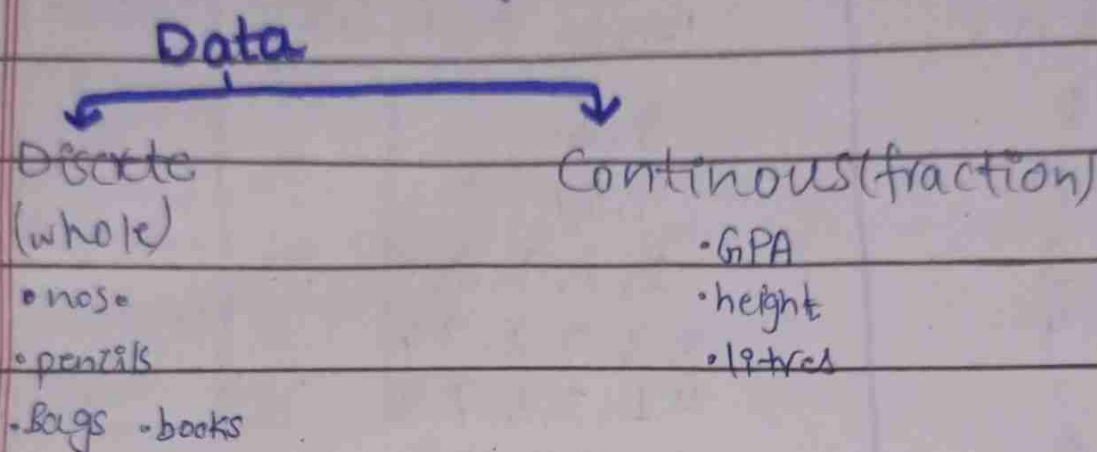
For classes ranges $= \frac{136}{7} = 19.47 \approx 20$ (interval / width)

So classes are:

Weights	Tally	f	Class Boundaries	cummulative frequency	X Class marks
68 - 87	ⅢⅢ	10	67.5 - 87.5	10	77.5
88 - 107	ⅢⅢⅢ	13	87.5 - 107.5	10+13 = 23	97.5
108 - 127	ⅢⅢⅢ	15	107.5 - 127.5	23+15 = 38	117.5
128 - 147	ⅢⅢⅢ	9	127.5 - 147.5	38+9 = 47	137.5
148 - 167	ⅢⅢ	4	147.5 - 167.5	47+4 = 51	157.5
168 - 187	ⅢⅢ	7	167.5 - 187.5	51+7 = 58	177.5
188 - 207	Ⅱ	2	187.5 - 207.5	58+2 = 60	197.5
Total		$\Sigma f = 60$			

→ When upper class of one class and
lower class of next class is different,
it is called "class limits."

Mon Tue Wed Thu Fri Sat

✿ **Primary** = raw data, initial

❀ **Secondary** = After applying tools, data

become secondary.

Data

Discrete
(whole)

• nose

• penzils

• Bags • books

Continous(fraction)

• GPA

• height

• litres

Data — { → Ungrouped (raw, primary)

→ Grouped (Secondary)

○ **Class Boundries** = upper class   or lower class

ke difference nikalo and then divide it

to 2. and — it to lower class and add it

upper class . To identify the class boundries

upper class of previous class and lower class

of next class   is   same

→ Example   2·3, 2·4, 2·5, 2·7, 2·8

Stem-leaf display :-

Stem (leading digit) | leaf (Trailing digit

Homework

2·7 48, 31, 54, 37, 18, 64, 61, 43, 40, 71

51, 12, 52, 65, 53, 42, 39, 42, 39, 62,

74, 48, 29, 67, 30, 49, 68, 35, 57, 26, 27, 8

Stem	leaf
1	8, 2
2	9, 6, 7
3	1, 7, 9, 0, 5
4	8, 3, 0, 2, 8, 9
5	4, 1, 2, 3, 7, 8
6	4, 1, 5, 2, 7, 8
7	1, 4

2·8

Stem	leaf
3	9
4	6, 6
5	4, 0, 5
6	2, 5, 5, 2, 6, 6, 8, 6, 0, 0, 9
7	5, 8, 4, 3, 3, 8, 4, 7, 7, 8, 6, 19, 3
8	2, 9, 4, 7, 6, 7, 6, 1, 1, 8, 8, 9, 8
9	4, 9, 7, 7, 9, 3, 1, 7, 3, 6, 3, 3, 0, 4, ^
10	9, 8, 2, 3, 1, 0, 4, 3, 4, 6, 4, 7, 8, 1, 9
11	6, 1, 9, 4, 6, 4
12	6, 0, 5, 4, 8, 18
14	0

PIE Diagram

① Represent total expenditure & expenditures on various times of a family by pie diagram.

Items	Expenditure (Rs.)	Angles
Foods	50	120
Clothing	30	72
RentHous	20	48
Fuel&light	15	36
Mis	35%	84
	150	360

$$\boxed{\text{Angle} = \frac{\text{Component Part}}{\text{whole Quantity}} \times 360°}$$

• Angles of all column is must be **360** ←sum

key
- Food
- Clothing
- mischaenous
- Fuel&light
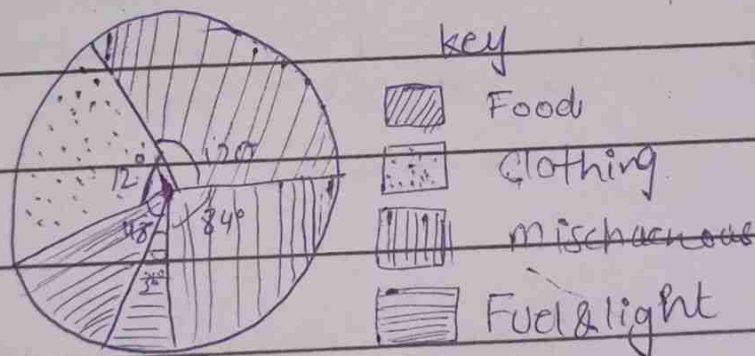
Histogram

② Construct a histrogram for following frequency dist relating to ages of telephones operators.

○ Quantity and over year

No. of something = frequency
- Histrogram me class Boundries must hota.

Date: __/__/20

Ages	No. of	Class Boundries	Class interval	Proportional Heights
18-19	9	17.5-19.5	2	9/2 = 4.5
20-24	188	19.5-24.5	5	188/5 = 37.6
25-29	160	24.5-29.5	5	160/5 = 32
30-34	123	29.5-34.5	5	123/5 = 24.6
35-44	84	34.5-44.5	10	84/10 = 8.4
45-49	15	44.5-49.5	15	15/15 = 1

For uniform

It is When class-limit is same for all class, it is called uniform.
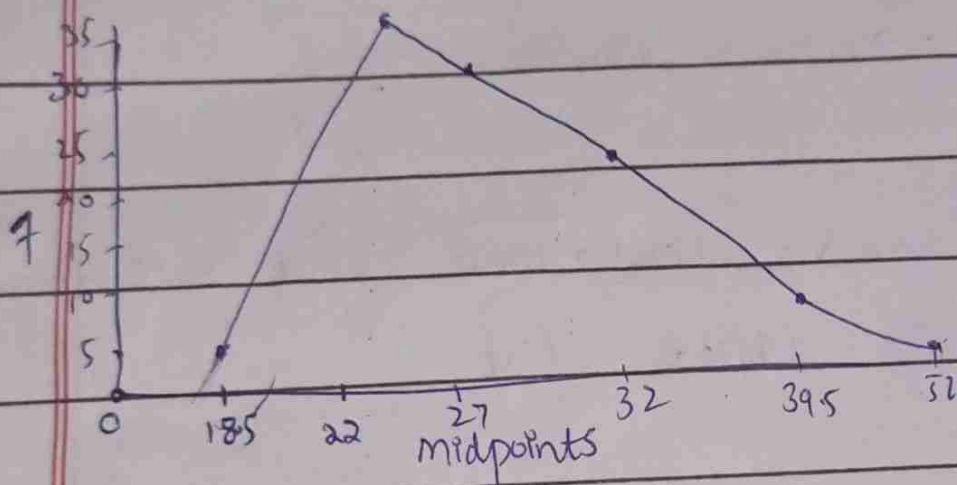

class boundries
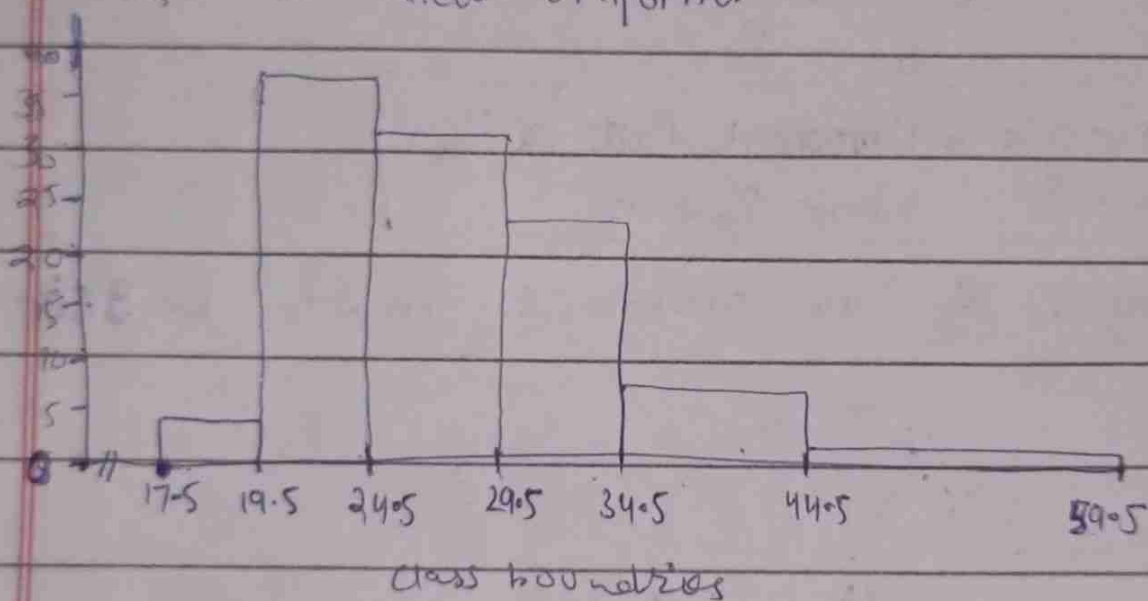
- in un-uniform data, frequency are proportional weight on y-axis.

Frequency Polygon

- In this graph, midpoints or class marks(X) are compulsory.

Ages	(X)	Freq
18 – 19	18·5	4·5
20 – 24	22	37·6
25 – 29	27	32
30 – 34	32	24·6
35 – 34	39·5	8·4
45 – 59	52	1

- It is related to time.

Measure of Central Tendency

- **Arithmetic Means :-**

$$\bar{x} = \frac{\sum x}{n} \quad \text{Ungrouped} \qquad n = \text{no. of observation in data}$$

$$\bar{x} = \frac{\sum (f \cdot x)}{\sum f} \quad \text{grouped!} \qquad n = \sum f \; ; \; \bar{x} = \frac{\sum (f \cdot x)}{n}$$

- **Change of origin & scale method; Coding/method**

$$\bar{x} = a + \frac{\sum f \cdot u}{\sum f} \times h \qquad \text{where}$$

$$u = \frac{x - a}{h} \qquad a = \text{any random value from } x$$

$$h = \text{class interval}$$

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

- **Geometric mean :-**

$$G = \text{antilog}\left[\frac{1}{\sum f} \sum f \log x\right] \rightarrow \text{grouped}$$

$$G = \text{antilog}\left[\frac{1}{n} \sum \log x\right] \rightarrow \text{ungrouped data}$$

- **Harmonic mean :-**

$$H = \frac{\sum f}{\sum f(1/x)} \rightarrow \text{grouped}$$

$$H = \frac{n}{\sum (1/x)} \rightarrow \text{ungrouped data}$$

Class Limits	f	C.B	x	fx	$u = \frac{x-a}{h}$	fu	log x	flog x
68 – 87	10	67.5 – 87.5	77.5	775	$\frac{77.5-137.5}{20} = -3$			
88 – 107	13	87.5 – 107.5	97.5	1267.5	-2			
108 – 127	15	107.5 – 127.5	117.5	1762.5	-1			
128 – 147	9	127.5 – 147.5	137.5	1237.5	0			
148 – 167	4	147.5 – 167.5	157.5	630	1			
168 – 187	7	167.5 – 187.5	177.5	1242.5	2			
188 – 207	2	187.5 – 207.5	197.5	395	3			
	$\Sigma f = 60$			$\Sigma fx = 7310$		$\Sigma fu = 47$		$\Sigma f \log x = 124.1695$

$$\bar{x} = \frac{7310}{60} = 121.8$$

$$h = 20 \qquad a = 137.5$$

$$\bar{x} = 137.5 + \frac{-47}{60} \times 20 = 121.8$$

Friday

① Graph following data showing areas in millions of squares miles of the ocean? of the world using pie chart.

Ocean	Area	Angles
Pacific	70·8	167
Atlantic	41·2	97
Indians	28·5	67
Antartic	7·6	18
Artic	4·8	11
	153	360°

$$\text{Angles} = \frac{\text{Component Part}}{\text{Whole quantity}} \times 360°$$

key

Pacific

Atlantic

Antartic

Indians

Artic
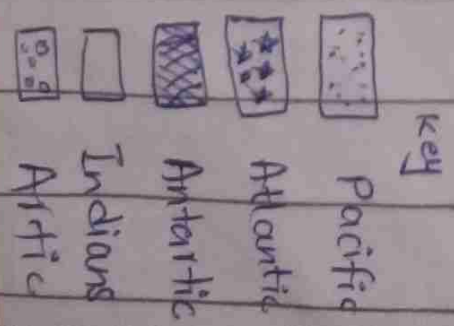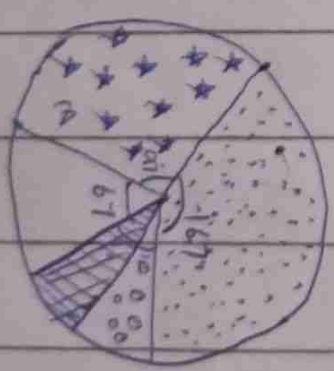
Weekly Income	f No. of lab	Classmarks x	$u=\frac{x-a}{h}$	fu
35 — 39	15	37	-3	-45
40 — 44	13	43	-2	-26
45 — 49	17	47	-1	-17
50 — 54	29	52	0	0
55 — 59	11	57	1	11
60 — 64	10	62	2	20
65 — 69	5	67	3	15
	$\Sigma f = 100$			-42

Let $a = 52$

$\longrightarrow h = 5$

For Grouped Data:-

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

$$= 52 + \left(\frac{-42}{100} \right) \times 5$$

$$= 50$$

so data is
uniform

②

Median: is a value which divide ur data in 2 equal parts. median is not necessary in ur given data. It may be in ur range.

2 9 3 7 5
5 is median!

$$median = l + \dfrac{h}{f_m}\left(\dfrac{n}{2} - c\right)$$

$h \to$ class interval

$f_m \to$ freqv of median class

$l \to$ lower class boundary of median class

$\dfrac{\sum f}{n} \to$

$c \to$ commulative frequency above median class

Median class = $n/2 \to$ answer check into cf columns.

Mode: most frequent data.

~~Ungropd data~~ = Konsi value sb se zyaada he.

Unimodel distribution = have only one mode

bimodel distribution = have two mode.

Grouped:-

$$mode = l + \dfrac{fm - f_1}{(fm - f_1) + (fm - f_2)} \times h$$

$= 59.5 + \dfrac{(304 - 190)}{(304 - 190) + (3\cancel{40}\,211)} \times 10$

$+ \dfrac{114}{}$ $= \boxed{65}$

$fm =$ freqv of model class

$f_1 =$ freqv associated with class preceding with model class

$f_2 = $ " " " " following " "

$h =$ class width