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SECTION: BS - DSC(N)

SUBJECT: PROBABILITY & STATISTICS

DU^E DATE: 24th MARCH, 2021

ASSIGNMENT 1

Q1:

Highest Number = 325

Lowest Number = 165

$$\text{Range} = \text{Highest Number} - \text{Lowest Number} = 325 - 165 = 160$$

$$\text{Width} = \frac{\text{Range}}{\text{Number of the Class}} = \frac{160}{8} = 20$$

CLASS LIMITS	CLASS BOUNDARIES	FREQUENCY
165 - 185	164.5 - 185.5	4
186 - 206	185.5 - 206.5	6
207 - 227	206.5 - 227.5	15
228 - 248	227.5 - 248.5	13
249 - 269	248.5 - 269.5	9
270 - 290	269.5 - 290.5	1
291 - 311	290.5 - 311.5	1
312 - 332	311.5 - 332.5	1

TOTAL FREQUENCY = 50

A Peak occurs in class 207 - 227. There are no empty classes. Each of the three highest classes has one data value.

	CUMULATIVE FREQUENCY
Less than 164.5	0
Less than 185.5	4
Less than 206.5	10
Less than 227.5	25
Less than 248.5	38
Less than 269.5	47
Less than 290.5	48
Less than 311.5	49
Less than 332.5	50

Q2:

$$\text{HIGHEST NUMBER} = 70$$

$$\text{LOWEST NUMBER} = 27$$

$$\text{RANGE} = \text{HIGHEST NUMBER} - \text{LOWEST NUMBER} = 70 - 27 = 43$$

$$\text{WIDTH} = \frac{\text{RANGE}}{\text{NUMBER OF THE CLASSES}} = \frac{43}{7} = 6.1 \text{ or } 7$$

CASS LIMIT	CASS BOUNDARIES	FREQUENCY
27 - 33	26.5 - 33.5	7
34 - 40	33.5 - 40.5	14
41 - 47	40.5 - 47.5	15
48 - 54	47.5 - 54.5	11
55 - 61	54.5 - 61.5	3
62 - 68	61.5 - 68.5	3
69 - 75	68.5 - 75.5	2

TOTAL FREQUENCY = 55

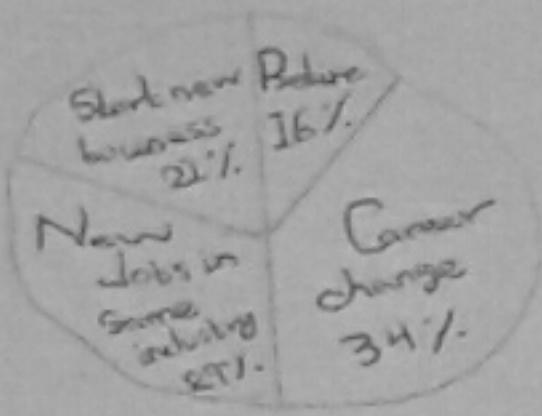
	CUMMULATIVE FREQUENCY
Less than 26.5	0
Less than 33.5	7
Less than 40.5	21
Less than 47.5	36
Less than 54.5	47
Less than 61.5	50
Less than 68.5	53
Less than 75.5	55

Q3.

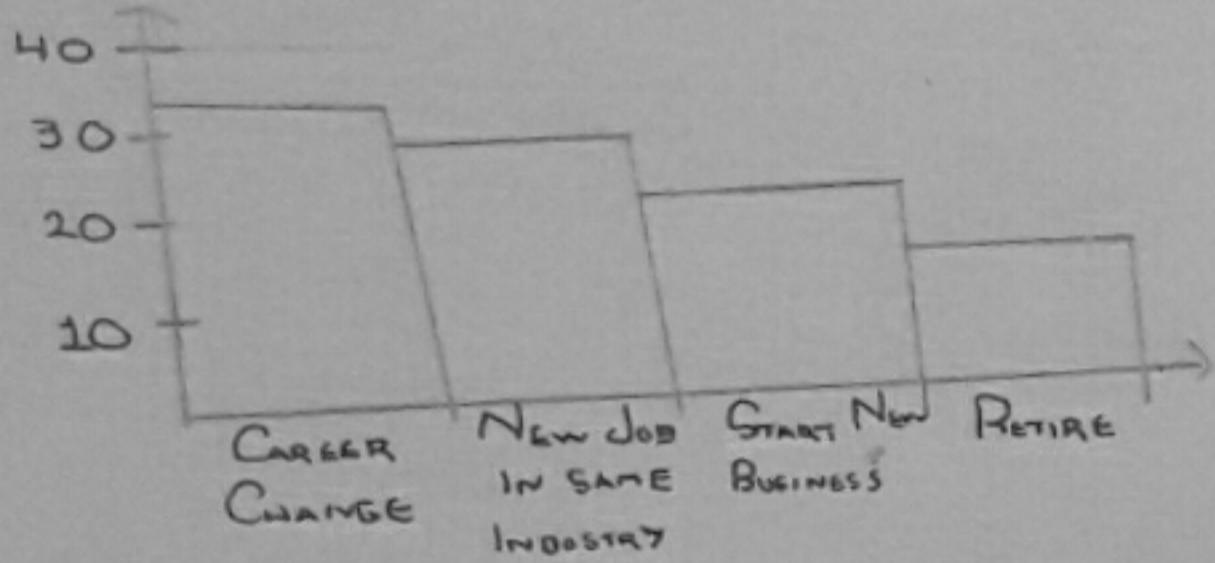
The given information is:

Retire	16%
Career change	34%
New job in same industry	29%
Start new business	21%

PIE GRAPH:



PARETO CHART:



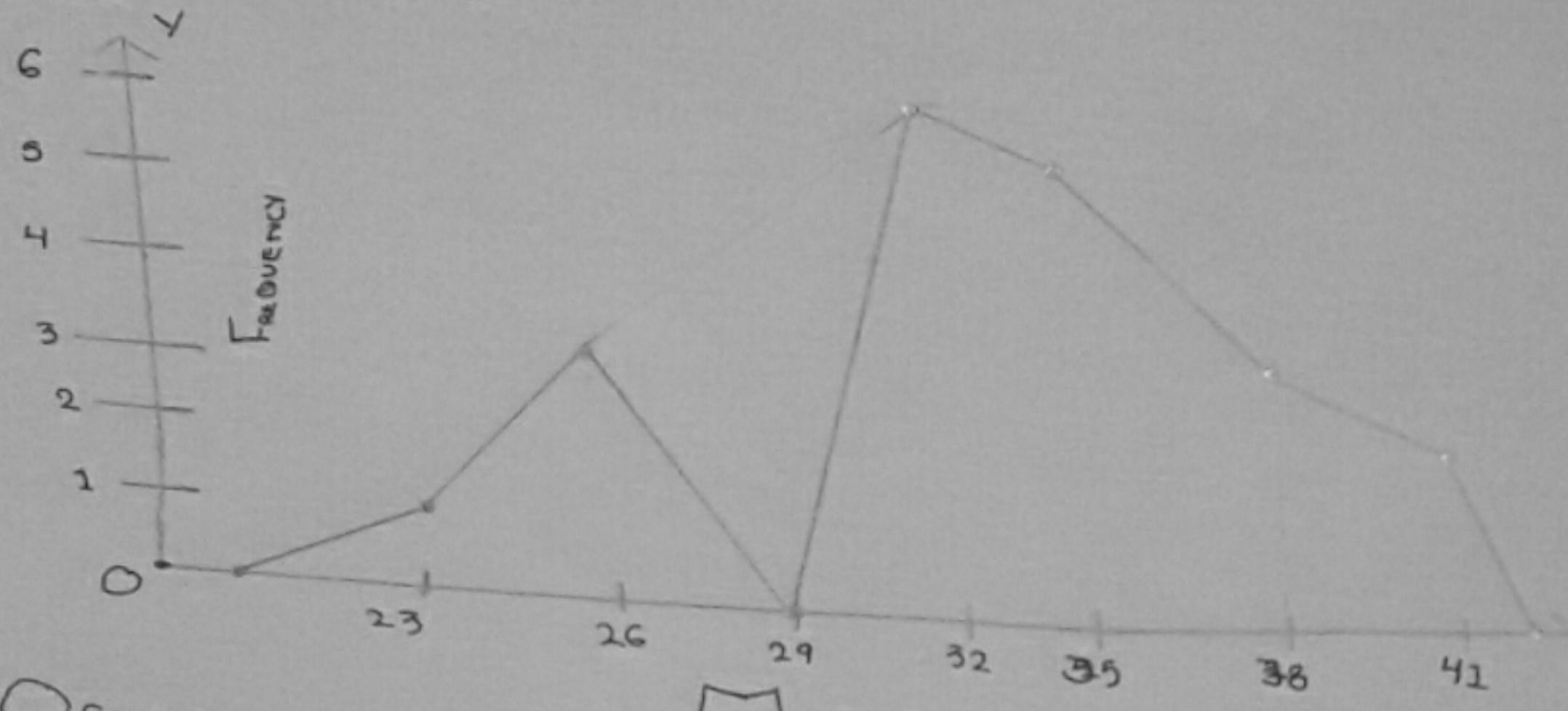
PIE CHART is better represents the data, since we are looking at part of a whole

Q4: From the given Histograms

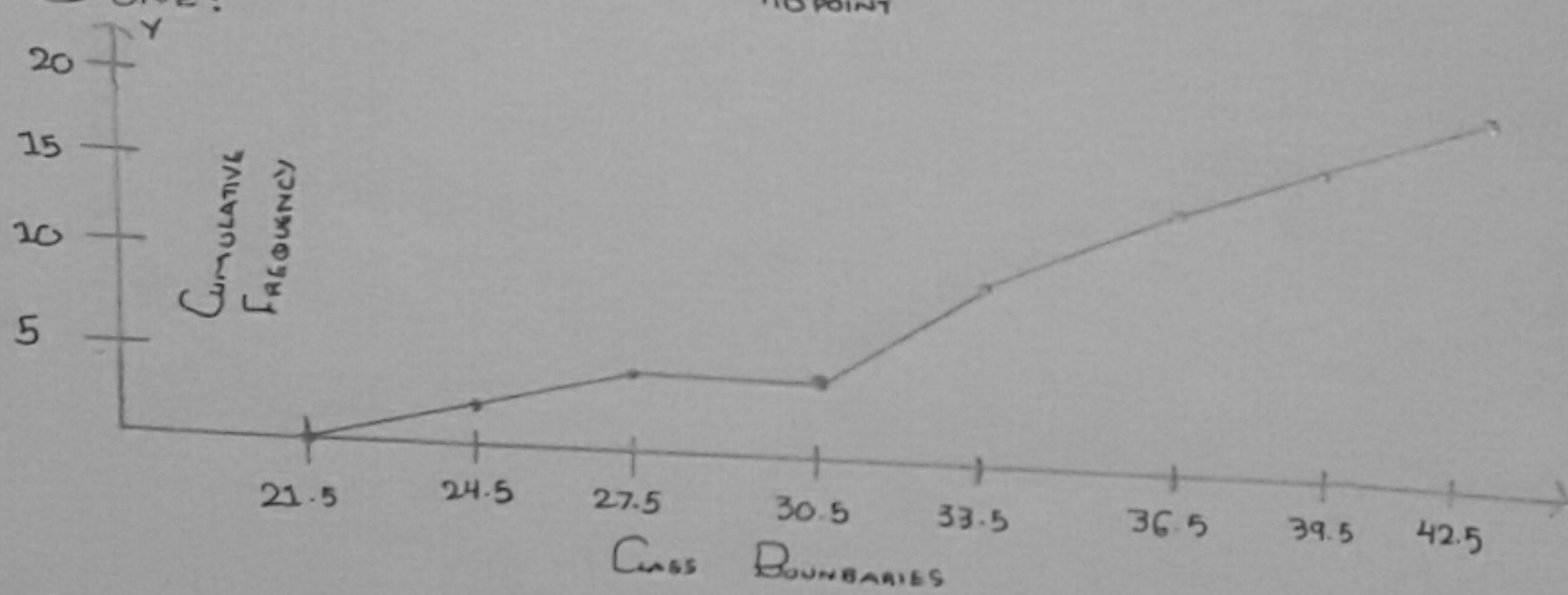
CLASS LIMITS	CLASS BOUNDARIES	MID POINTS	FREQUENCY
22-24	21.5-24.5	23	1
25-27	24.5-27.5	26	3
28-30	27.5-30.5	29	0
31-33	30.5-33.5	32	6
34-36	33.5-36.5	35	5
37-39	36.5-39.5	38	3
40-42	39.5-42.5	41	2

CUMULATIVE FREQUENCY
Less than 21.5
Less than 24.5
Less than 27.5
Less than 30.5
Less than 33.5
Less than 36.5
Less than 39.5
Less than 42.5

FREQUENCY POLYGON:



GIVE:



Q5:

$$H_{\text{GEST}} \text{ VALUE} = H = 57$$

$$\text{LOWEST VALUE} = L = 12$$

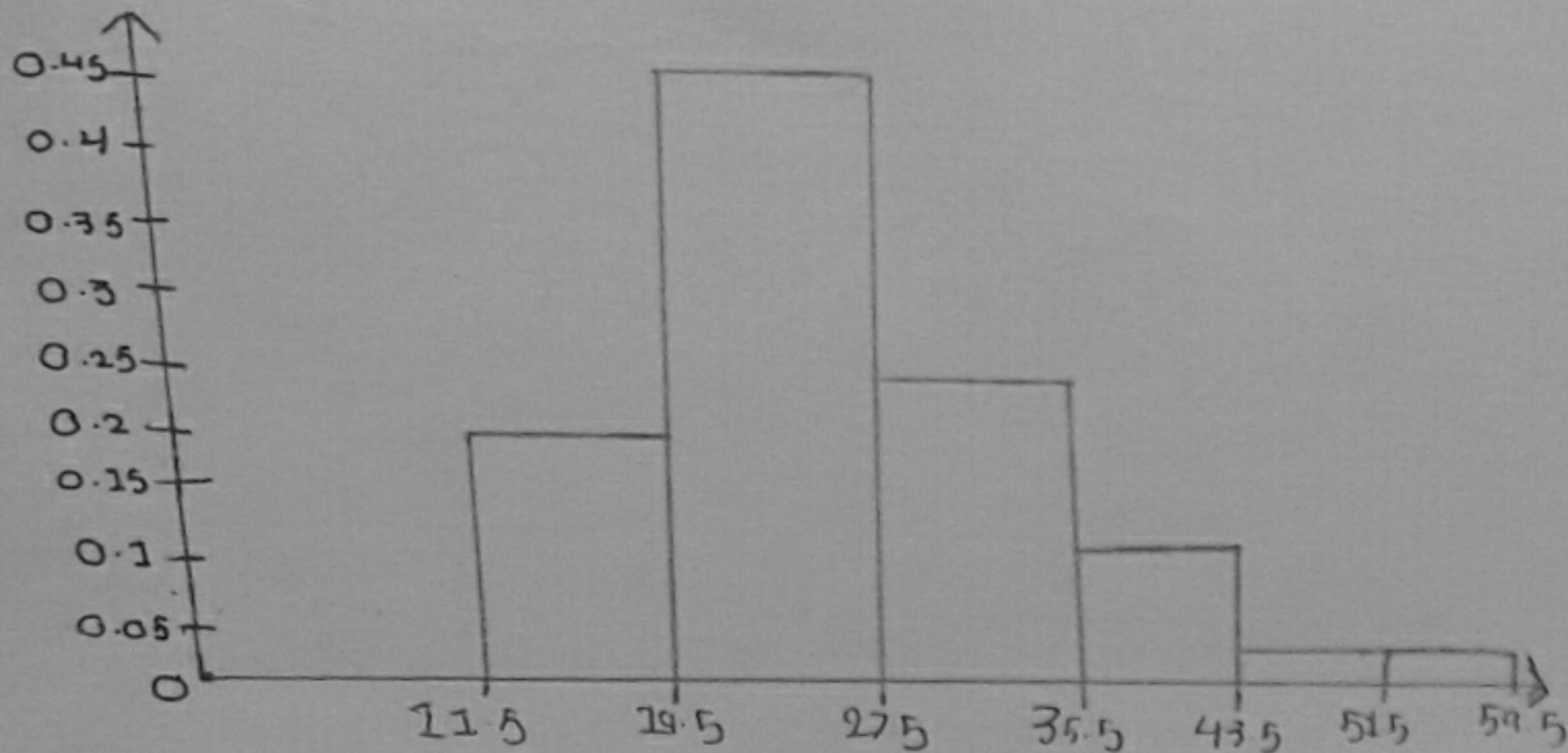
$$R_{\text{ANGE}} = H - L = 57 - 12 = 45$$

$$W_{\text{IDTH}} = \frac{R_{\text{ANGE}}}{\text{NUMBER OF THE CLASS}} = \frac{45}{6} = 7.5 \approx 8$$

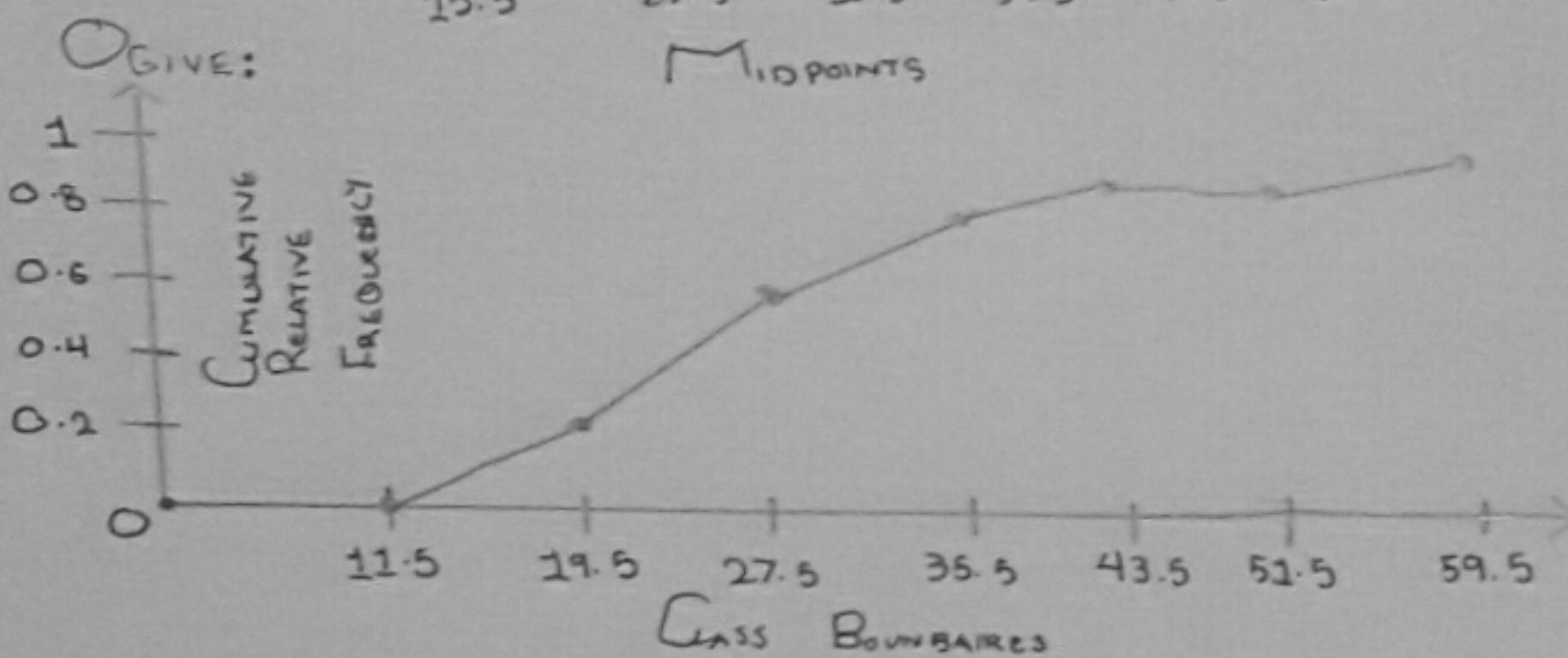
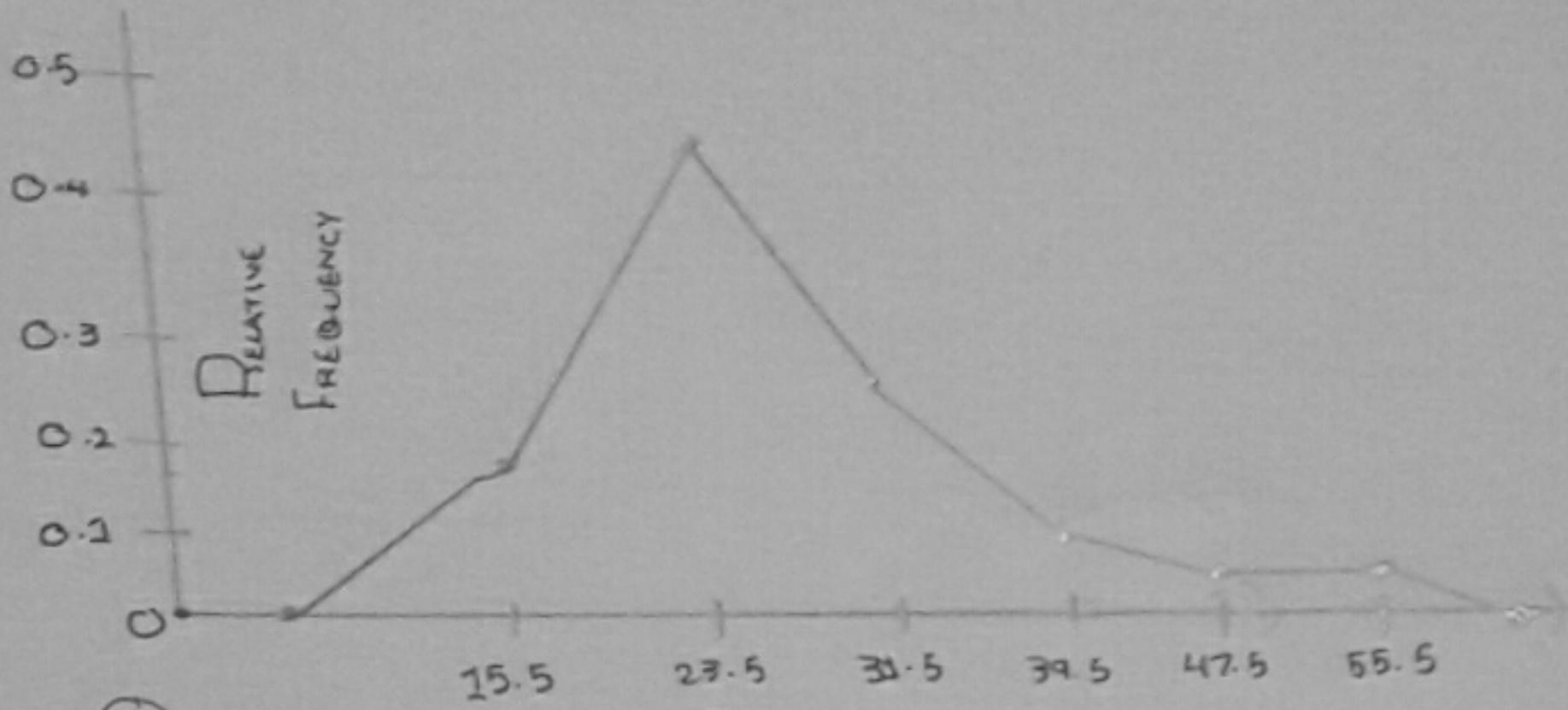
CLASS LIMITS	CLASS BOUNDARIES	RELATIVE FREQUENCY	MID POINTS
12-19	11.5-19.5	0.175	15.5
20-27	19.5-27.5	0.425	23.5
28-35	27.5-35.5	0.250	31.5
36-43	35.5-43.5	0.1000 0.025	39.5 47.5
44-51	43.5-51.5	0.025	55.5
52-59	51.5-59.5	0.025	

	CUMULATIVE RELATIVE FREQUENCY
Less than 11.5	0
Less than 19.5	0.175
Less than 27.5	0.600
Less than 35.5	0.850
Less than 43.5	0.950
Less than 51.5	0.975
Less than 59.5	1.000

HISTOGRAM:



FREQUENCY POLYGON:



$$\text{Q6. } M_{\text{mean}} = \frac{\sum x_i f_i}{f_i}$$

$$\text{GIVEN } M_{\text{mean}} = 5 \text{ and } \sum f_i = 20$$

$$M_{\text{mean}} = \frac{1 \times 2 + 2 \times 5 + 4 \times 7 + x \times 6}{20}$$

$$5 = \frac{2 + 10 + 28 + 6x}{20}$$

$$100 = 40 + 6x \Rightarrow 6x = 100 - 40 \Rightarrow 6x = 60 \Rightarrow x = \frac{60}{6}$$

$x = 10$

$$\textcircled{O}7: \bar{x} = \frac{\sum w X}{\sum w}$$

$$\bar{x} = \frac{40(1000) + 30(3000) + 50(800)}{1000 + 3000 + 800}$$

$$\bar{x} = \frac{170000}{4800}$$

$$\bar{x} = 35.41\%$$

\textcircled{O}8:

CLASS BOUNDARY	(F)	(x)	
	FREQUENCY	MIDPOINT	XF
1.45 - 1.95	2	1.7	3.4
1.95 - 2.45	1	2.2	2.2
2.45 - 2.95	4	2.7	10.8
2.95 - 3.45	15	3.2	48
3.45 - 3.95	10	3.7	37
3.95 - 4.45	5	4.2	21
4.45 - 4.95	3	4.7	14.1
TOTAL	40		136.5

$$M_{EAN} = \frac{\sum x F}{F} = \frac{136.5}{40} = 3.413$$

\textcircled{O}9: We arrange data in Ascending Order

$X = 16.5, 16.8, 16.9, 16.9, 17, 17.2, 17.2, 17.3, 17.4, 17.5$
 18, 18, 19.1, 19.1, 19.3, 19.7, 19.8, 20, 20.1, 20.4, 20.4, 21.6, 22.9
 23.2, 23.7, 24, 24, 24.1, 24.3, 25, 25.1, 25.2, 25.2, 25.4, 25.5,
 25.9, 26.8, 28.6, 29.1, 31.4, 31.7, 31.7, 35.2, 35.4, 36.8,
 37.6, 38.5, 41.7, 47.7

$$\text{Median} = \frac{\text{Middle Most Value}}{2} = \frac{23.2 + 23.7}{2} = 23.45$$

Q10.

CLASS BOUNDARIES	FREQUENCY	CUMULATIVE FREQUENCY
7.5 - 12.5	3	3
12.5 - 17.5	5	8
17.5 - 22.5	15	23
22.5 - 27.5	5	28
27.5 - 32.5	2	30

$$\text{Median} = \left[\frac{n}{2} \right]^{\text{th}} \text{ term}$$

We have $n = 30$

$$\text{Median term} = \left[\frac{30}{2} \right] = 15^{\text{th}} \text{ term}$$

From cumulative frequency, we can see that 15th term lies in the class 17.5 - 22.5

Lower bound of the class = $L = 17.5$

Cumulative frequency of Preceding class = $c = 8$

Frequency of the median class = $f = 15$

Class length of the median class = $h = 5$

$$\text{Median} = L + \frac{h}{f} \left[\frac{n}{2} - c \right] = 17.5 + \frac{5}{15} \left[\frac{30}{2} - 8 \right] = 19.33$$

Q11:

MEDIAN:

We are arranging in ascending order:

7 7 7 8 8 10 10 19 20 24 35 42 50
Middle Value

So, the median of the given data is 10

MODE:

\$ 7 [Most REPEATED VALUE] million

Q12:

$$\text{Mode} = L + \frac{f_m - f_{m-1}}{[f_m - f_{m-1}] + [f_m - f_{m+1}]} \times h$$

CLASS BOUNDARY	FREQUENCY
6.5 - 18.5	6
18.5 - 30.5	10
30.5 - 42.5	13
42.5 - 54.5	8
54.5 - 66.5	5
66.5 - 78.5	6
78.5 - 90.5	2

$$L = 30.5$$

$$f_m = 13$$

$$f_{m-1} = 10$$

$$f_{m+1} = 8$$

$$\text{Width} = h = 42.5 - 30.5 = 12$$

$$\text{Mode} = 30.5 + \frac{13 - 10}{(13 - 10) + (13 - 8)} \times 12$$

$$= 30.5 + \frac{3}{3+5} \times 12 = 30.5 + \frac{36}{8} = 30.5 + 4.5$$

$$= 35$$