

ICSE Class 10 Maths Selina Solutions Chapter 24: ICSE Class 10 Maths Selina Solutions for Chapter 24, Measures of Central Tendency, cover essential topics such as Mean, Median, Quartiles, and Mode. This chapter provides a comprehensive guide to understanding and calculating these statistical measures. The solutions offer step-by-step explanations for each concept, making it easier for students to grasp how to find the mean, median, and mode of a data set, as well as how to determine quartiles. With detailed examples and clear instructions, these solutions help students master the techniques for analyzing data and interpreting statistical information effectively.

ICSE Class 10 Maths Selina Solutions Chapter 24 Measures of Central Tendency (Mean, Median, Quartiles and Mode) Overview

These notes are prepared by the subject experts of Physics Wallah to provide detailed ICSE Class 10 Maths Selina Solutions for Chapter 24, Measures of Central Tendency (Mean, Median, Quartiles, and Mode).

The chapter covers important concepts like mean, median, quartiles, and mode, which are fundamental in understanding data analysis. These solutions are designed to simplify complex topics and enhance students problem-solving skills, aiding in their exam preparation.

ICSE Class 10 Maths Selina Solutions Chapter 24 PDF

The PDF link is available below for ICSE Class 10 Maths Selina Solutions Chapter 24.

These solutions are designed to help students grasp the concepts clearly and perform well in their exams. Access the PDF to enhance your understanding and improve your performance in your studies.

ICSE Class 10 Maths Selina Solutions Chapter 24 PDF

ICSE Class 10 Maths Selina Solutions Chapter 24 Measures of Central Tendency (Mean, Median, Quartiles and Mode)

Below we have provided the ICSE Class 10 Maths Selina Solutions for Chapter 24 Measures of Central Tendency (Mean, Median, Quartiles, and Mode) to assist students. These solutions are designed to help students grasp the concepts more effectively and prepare better for their exams.

ICSE Class 10 Maths Selina Solutions Chapter 24 Exercise 24(A) Page No: 356

1. Find the mean of the following set of numbers:

(i) 6, 9, 11, 12 and 7

(ii) 11, 14, 23, 26, 10, 12, 18 and 6

Solution:

(i) By definition, we know

$$\text{Mean} = \frac{\sum x}{n}$$

Here, $n = 5$

Thus,

$$\text{Mean} = \frac{6 + 9 + 11 + 12 + 7}{5} = \frac{45}{5} = 9$$

(ii) By definition, we know

$$\text{Mean} = \frac{\sum x}{n}$$

Here, $n = 8$

Thus,

$$\text{Mean} = \frac{11 + 14 + 23 + 26 + 10 + 12 + 18 + 6}{8} = \frac{120}{8} = 15$$

2. Marks obtained (in mathematics) by 9 student are given below:

60, 67, 52, 76, 50, 51, 74, 45 and 56

(a) find the arithmetic mean

(b) if marks of each student be increased by 4; what will be the new value of arithmetic mean.

Solution:

$$(a) \text{ Mean} = \frac{\sum x}{n}$$

Here, $n = 9$

Thus,

$$\text{Mean} = (60 + 67 + 52 + 76 + 50 + 51 + 74 + 45 + 56) / 9 = 531 / 9 = 59$$

(b) If the marks of each student be increased by 4 then new arithmetic mean will be $= 59 + 4 = 63$

3. Find the mean of the natural numbers from 3 to 12.

Solution:

The numbers between 3 to 12 are 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

Here $n = 10$

$$\text{Mean} = \sum x / n$$

$$= (3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12) / 10 = 75 / 10 = 7.5$$

4. (a) Find the mean of 7, 11, 6, 5, and 6

(b) If each number given in (a) is diminished by 2, find the new value of mean.

Solution:

$$(a) \text{ Mean} = \sum x / n, \text{ here } n = 5$$

$$= (7 + 11 + 6 + 5 + 6) / 5 = 35 / 5 = 7$$

(b) If 2 is subtracted from each number, then the mean will be changed as $7 - 2 = 5$

5. If the mean of 6, 4, 7, 'a' and 10 is 8. Find the value of 'a'

Solution:

Given,

$$\text{No. of terms } (n) = 5$$

$$\text{Mean} = 8$$

$$\text{Sum of all terms} = 8 \times 5 = 40 \dots\dots (i)$$

$$\text{But, sum of numbers} = 6 + 4 + 7 + a + 10 = 27 + a \dots\dots (ii)$$

On equating (i) and (ii), we get

$$27 + a = 40$$

$$\text{Thus, } a = 13$$

6. The mean of the number 6, 'y', 7, 'x' and 14 is 8. Express 'y' in terms of 'x'.

Solution:

Given,

No. of terms (n) = 5 and mean = 8

So, the sum of all terms = $5 \times 8 = 40$ (i)

but sum of numbers = $6 + y + 7 + x + 14 = 27 + y + x$ (ii)

On equating (i) and (ii), we get

$$27 + y + x = 40$$

$$x + y = 13$$

$$\text{Hence, } y = 13 - x$$

7. The ages of 40 students are given in the following table:

Age(in yrs)	12	13	14	15	16	17	18
Frequency	2	4	6	9	8	7	4

Find the arithmetic mean.

Solution:

Age in yrs	Frequency	$f_i x_i$
x_i	(f_i)	
12	2	24
13	4	52
14	6	84
15	9	135
16	8	128
17	7	119

18	4	72
Total	40	614

$$\text{Mean} = \sum f_i x_i / \sum f_i = 614/40 = 15.35$$

Exercise 24(B) Page No: 361

1. The following table gives the ages of 50 students of a class. Find the arithmetic mean of their ages.

Age – Years	16 – 18	18 – 20	20 – 22	22- 24	24-26
No. of Students	2	7	21	17	3

Solution:

Age in years	x_i	Number of students (f_i)	$x_i f_i$
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C.I.

16 – 18	17	2	34
18 – 20	19	7	133
20 – 22	21	21	441
22 – 24	23	17	391
24 – 26	25	3	75
Total		50	1074

$$\text{Mean} = \sum f_i x_i / \sum f_i = 1074/50 = 21.48$$

2. The following table gives the weekly wages of workers in a factory.

Weekly Wages (Rs)	No. of Workers
50-55	5

55-60	20
60-65	10
65-70	10
70-75	9
75-80	6
80-85	12
85-90	8

Calculate the mean by using:

(i) Direct Method

(ii) Short – Cut Method

Solution:

(i) Direct Method

Weekly Wages	Mid-Value	No. of Workers (f_i)	$f_i x_i$
(Rs)	x_i		
50-55	52.5	5	262.5
55-60	57.5	20	1150.0
60-65	62.5	10	625.0
65-70	67.5	10	675.0
70-75	72.5	9	652.5
75-80	77.5	6	465.0
80-85	82.5	12	990.0
85-90	87.5	8	700.0
Total		80	5520.00

$$\text{Mean} = \sum f_i x_i / \sum f_i = 5520/80 = 69$$

(ii) Short – cut method

Weekly wages (Rs)	No. of workers (f_i)	Mid-value x_i	$A = 72.5$ $d_i = x - A$	$f_i d_i$
50-55	5	52.5	-20	-100
55-60	20	57.5	-15	-300
60-65	10	62.5	-10	-100
65-70	10	67.5	-5	-50
70-75	9	$A = 72.5$	0	0
75-80	6	77.5	5	30
80-85	12	82.5	10	120
85-90	8	87.5	15	120
Total	80			-280

Here, $A = 72.5$

$$\bar{x} = A + \frac{\sum f_i d_i}{\sum f_i} = 72.5 + \left(\frac{-280}{80} \right) = 72.5 - 3.5 = 69$$

3. The following are the marks obtained by 70 boys in a class test:

Marks	No. of boys
30 – 40	10
40 – 50	12
50 – 60	14
60 – 70	12
70 – 80	9

80 – 90	7
90 – 100	6

Calculate the mean by:

(i) Short – cut method

(ii) Step – deviation method

Solution:

(i) Short – cut method

Marks	No. of boys (f_i)	Mid-value x_i	A = 65	$f_i d_i$
			$d_i = x - A$	
30 – 40	10	35	-30	-300
40 – 50	12	45	-20	-240
50 – 60	14	55	-10	-140
60 – 70	12	A = 65	0	0
70 – 80	9	75	10	90
80 – 90	7	85	20	140
90 – 100	6	95	30	180
Total	70			-270

Here, A = 65

$$\bar{x} = A + \frac{\sum f_i d_i}{\sum f_i} = 65 + \left(\frac{-270}{70} \right) = 65 - 3.86 = 61.14$$

(ii) Step – deviation method

Marks	No. of boys (f_i)	Mid-value x_i	$A = 65$	$f_i u_i$
$u_i = (x_i - A)/h$				
30 – 40	10	35	-3	-30
40 – 50	12	45	-2	-24
50 – 60	14	55	-1	-14
60 – 70	12	$A = 65$	0	0
70 – 80	9	75	1	9
80 – 90	7	85	2	14
90 – 100	6	95	3	18
Total	70			-27

Here, $A = 65$ and $h = 10$

$$\bar{x} = A + h \times \frac{\sum f_i u_i}{\sum f_i} = 65 + 10 \times \left(\frac{-27}{70} \right) = 65 - 3.86 = 61.14$$

4. Find mean by step – deviation method:

C. I.	63-70	70-77	77-84	84-91	91-98	98-105	105-112
Freq	9	13	27	38	32	16	15

Solution:

C. I.	Frequency (f_i)	Mid-value x_i	$A = 87.50$	$f_i u_i$
$u_i = (x_i - A)/h$				
63 – 70	9	66.50	-3	-27
70 – 77	13	73.50	-2	-26

77 – 84	27	80.50	-1	-27
84 – 91	38	A = 87.50	0	0
91 – 98	32	94.50	1	32
98 – 105	16	101.50	2	32
105 – 112	15	108.50	3	45
Total	150			29

Here, A = 87.50 and h = 7

$$\bar{x} = A + h \times \frac{\sum f_i u_i}{\sum f_i} = 87.5 + 7 \times \frac{29}{150} = 87.5 + 1.35 = 88.85$$

5. The mean of the following frequency distribution is $21\frac{1}{7}$. Find the value of 'f'.

C. I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
freq	8	22	31	f	2

Solution:

Given,

$$\bar{x} = 21\frac{1}{7} = \frac{148}{7}$$

C. I.	frequency	Mid-value (x_i)	$f_i x_i$
0-10	8	5	40
10-20	22	15	330
20-30	31	25	775
30-40	f	35	35f
40-50	2	45	90
Total	63 + f		1235 + 35f

$$\begin{aligned}\bar{x} &= \frac{\sum f_i x_i}{\sum f_i} = \frac{1235 + 35f}{63 + f} \\ \Rightarrow \frac{148}{7} &= \frac{1235 + 35f}{63 + f} \\ \Rightarrow 9324 + 148f &= 8645 + 245f \\ \Rightarrow 245f - 148f &= 9324 - 8645 \\ \Rightarrow f &= \frac{679}{97} \\ \Rightarrow f &= 7\end{aligned}$$

$$9324 + 148f = 8645 + 245f$$

$$245f - 148f = 9324 - 8645$$

$$f = 679/97$$

Thus, $f = 7$

ICSE Class 10 Maths Selina Solutions Chapter 24 Exercise 24(C) Page No: 372

1. A student got the following marks in 9 questions of a question paper.

3, 5, 7, 3, 8, 0, 1, 4 and 6.

Find the median of these marks.

Solution:

Arranging the given data in descending order:

8, 7, 6, 5, 4, 3, 3, 1, 0

Clearly, the middle term is 4 which is the 5th term.

Hence, median = 4

2. The weights (in kg) of 10 students of a class are given below:

21, 28.5, 20.5, 24, 25.5, 22, 27.5, 28, 21 and 24.

Find the median of their weights.

Solution:

Arranging the given data in descending order:

28.5, 28, 27.5, 25.5, 24, 24, 22, 21, 21, 20.5

It's seen that,

The middle terms are 24 and 24, 5th and 6th terms

Thus,

$$\text{Median} = (24 + 24) / 2 = 48 / 2 = 24$$

3. The marks obtained by 19 students of a class are given below:

27, 36, 22, 31, 25, 26, 33, 24, 37, 32, 29, 28, 36, 35, 27, 26, 32, 35 and 28. Find:

(i) median (ii) lower quartile

(iii) upper quartile (iv) interquartile range

Solution:

Arranging in ascending order:

22, 24, 25, 26, 26, 27, 27, 28, 28, 29, 21, 32, 32, 33, 35, 35, 36, 36, 37

(i) The middle term is 10th term i.e. 29

Hence, median = 29

(ii) Lower quartile

$$q_1 = \frac{n+1}{4} \text{ term}$$

$$q_1 = \frac{19+1}{4} \text{ term}$$

$$q_1 = 5^{\text{th}} \text{ term} = 26$$

(iii) Upper quartile =

$$q_3 = \left[\frac{3(n+1)}{4} \right]^{\text{th}} \text{ term}$$

$$q_3 = \left[\frac{3(19+1)}{4} \right]^{\text{th}} \text{ term}$$

$$q_3 = 15^{\text{th}} \text{ term} = 35$$

(iv) Interquartile range = $q_3 - q_1 = 35 - 26 = 9$

4. From the following data, find:

(i) Median

(ii) Upper quartile

(iii) Inter-quartile range

25, 10, 40, 88, 45, 60, 77, 36, 18, 95, 56, 65, 7, 0, 38 and 83

Solution:

Arranging the given data in ascending order, we have:

0, 7, 10, 18, 25, 36, 38, 40, 45, 56, 60, 65, 77, 83, 88, 95

(i) Median is the mean of 8th and 9th term

Thus, median = $(40 + 45) / 2 = 85 / 2 = 42.5$

(ii) Upper quartile =

$$q_3 = \left(\frac{3(n)}{4} \right)^{\text{th}} \text{ term}$$

$$q_3 = \frac{3 \times 16}{4} \text{ term} = 12^{\text{th}} \text{ term} = 65$$

(iii) Interquartile range is given by,

$$q_1 = 16^{\text{th}} / 4 \text{ term} = 18; q_3 = 65$$

$$\text{Interquartile range} = q_3 - q_1$$

Thus,

$$q_3 - q_1 = 65 - 18 = 47$$

5. The ages of 37 students in a class are given in the following table:

Age (in years)	11	12	13	14	15	16
Frequency	2	4	6	10	8	7

Find the median.

Solution:

Age	Frequency	Cumulative
(in years)		Frequency
11	2	2
12	4	6
13	6	12
14	10	22
15	8	30
16	7	37

Number of terms (n) = 37

Median =

$$\frac{37 + 1^{\text{th}}}{2} \text{ term} = 19^{\text{th}} \text{ term}$$

And, the 19th term is 14

Therefore, the median = 14

ICSE Class 10 Maths Selina Solutions Chapter 24 Exercise 24(D) Page No: 374

1. Find the mode of the following data:

(i) 7, 9, 8, 7, 7, 6, 8, 10, 7 and 6

(ii) 9, 11, 8, 11, 16, 9, 11, 5, 3, 11, 17 and 8

Solution:

(i) It's seen that 7 occurs 4 times in the given data.

Hence, mode = 7

(ii) Mode = 11

As 11 occurs 4 times in the given data.

2. The following table shows the frequency distribution of heights of 50 boys:

Height (cm)	120	121	122	123	124
Frequency	5	8	18	10	9

Find the mode of heights.

Solution:

Clearly,

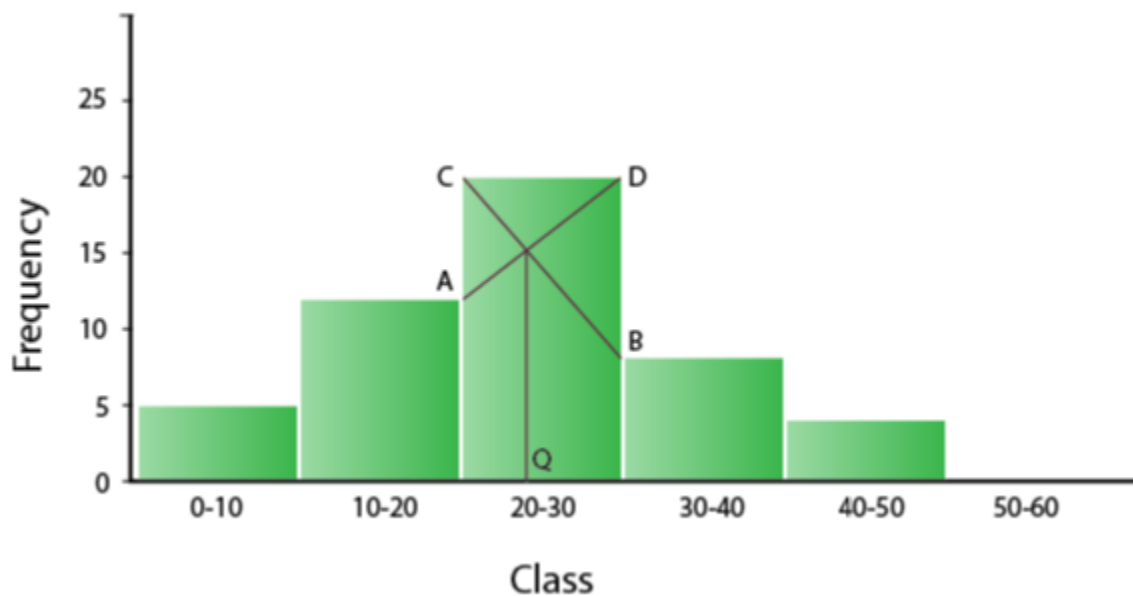
Mode is 122 cm because it has occurred the maximum number of times.

i.e. frequency is 18.

3. Find the mode of following data, using a histogram:

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	12	20	9	4

Solution:



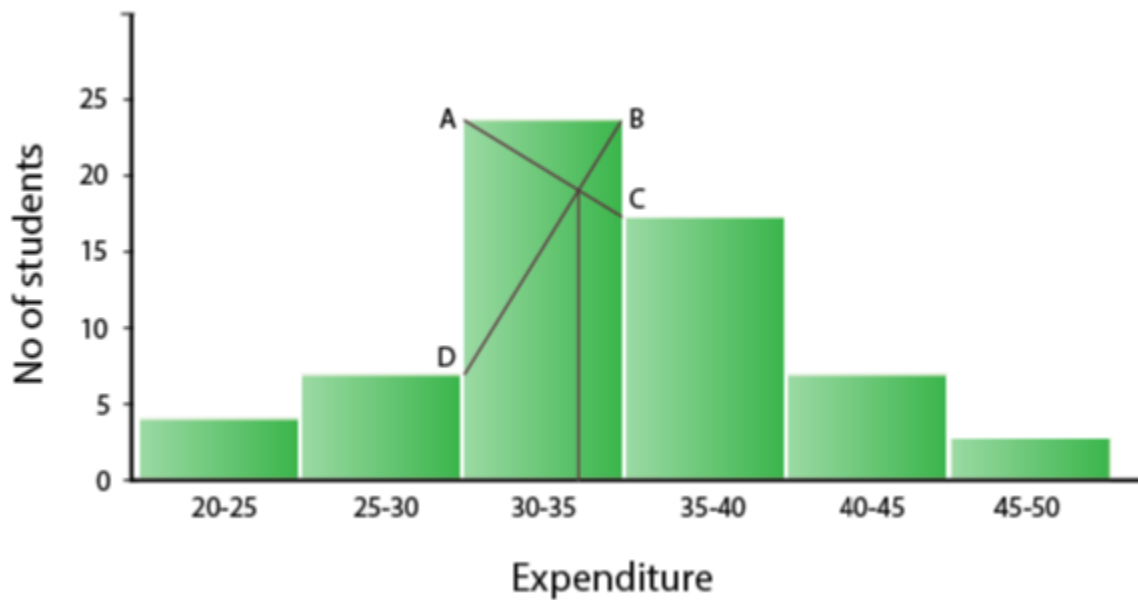
Clearly,

Mode is in 20-30, because in this class there are 20 frequencies.

4. The following table shows the expenditure of 60 boys on books. Find the mode of their expenditure:

Expenditure (Rs)	No. of students
20-25	4
25-30	7
30-35	23
35-40	18
40-45	6
45-50	2

Solution:



Clearly,

Mode is in 30-35 because it has the maximum frequency.

ICSE Class 10 Maths Selina Solutions Chapter 24 Exercise 24(E) Page No: 375

1. The following distribution represents the height of 160 students of a school.

Height (in cm)	No. of Students
140 – 145	12
145 – 150	20
150 – 155	30
155 – 160	38
160 – 165	24
165 – 170	16
170 – 175	12
175 – 180	8

Draw an ogive for the given distribution taking 2 cm = 5 cm of height on one axis and 2 cm = 20 students on the other axis. Using the graph, determine:

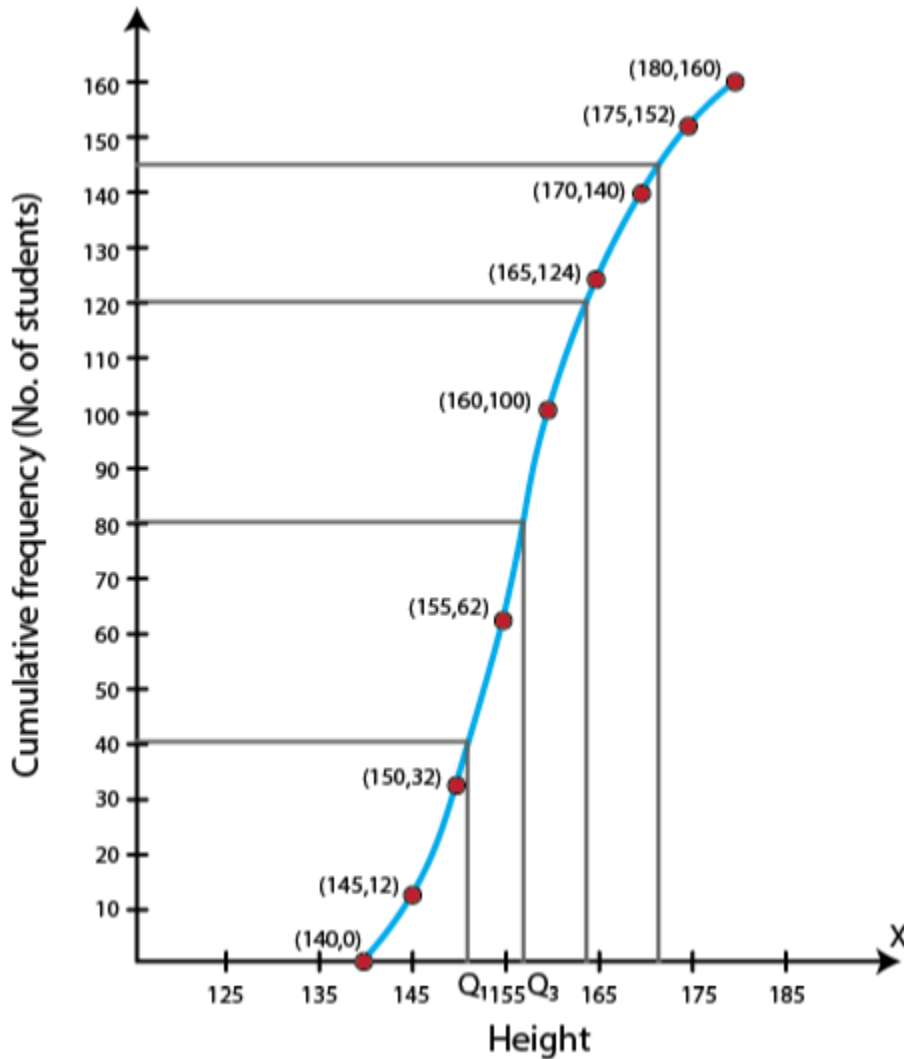
- i. The median height.**
- ii. The interquartile range.**
- iii. The number of students whose height is above 172 cm.**

Solution:

Height (in cm)	No. of Students	Cumulative frequency
140 – 145	12	12
145 – 150	20	32
150 – 155	30	62
155 – 160	38	100
160 – 165	24	124
165 – 170	16	140

170 – 175	12	152
175 – 180	8	160
N = 160		

Now, let's draw an ogive taking height of student along x-axis and cumulative frequency along y-axis.



(i) So,

$$\text{Median} = 160/2 = 80^{\text{th}} \text{ term}$$

Through mark for 80, draw a parallel line to x-axis which meets the curve; then from the curve draw a vertical line which meets the x-axis at the mark of 157.5.

(ii) As, the number of terms = 160

Lower quartile (Q_1) = $(160/4) = 40^{\text{th}}$ term = 152

Upper quartile (Q_3) = $(3 \times 160/4) = 120^{\text{th}}$ term = 164

Inner Quartile range = $Q_3 - Q_1$

= $164 - 152$

= 12

(iii) Through mark for 172 on x-axis, draw a vertical line which meets the curve; then from the curve draw a horizontal line which meets the y-axis at the mark of 145.

Now,

The number of students whose height is above 172 cm

= $160 - 144 = 16$

2. Draw ogive for the data given below and from the graph determine: (i) the median marks.

(ii) the number of students who obtained more than 75% marks.

Marks	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	90 – 99
No. of students	14	16	22	26	18	11	6	4	3

Solution:

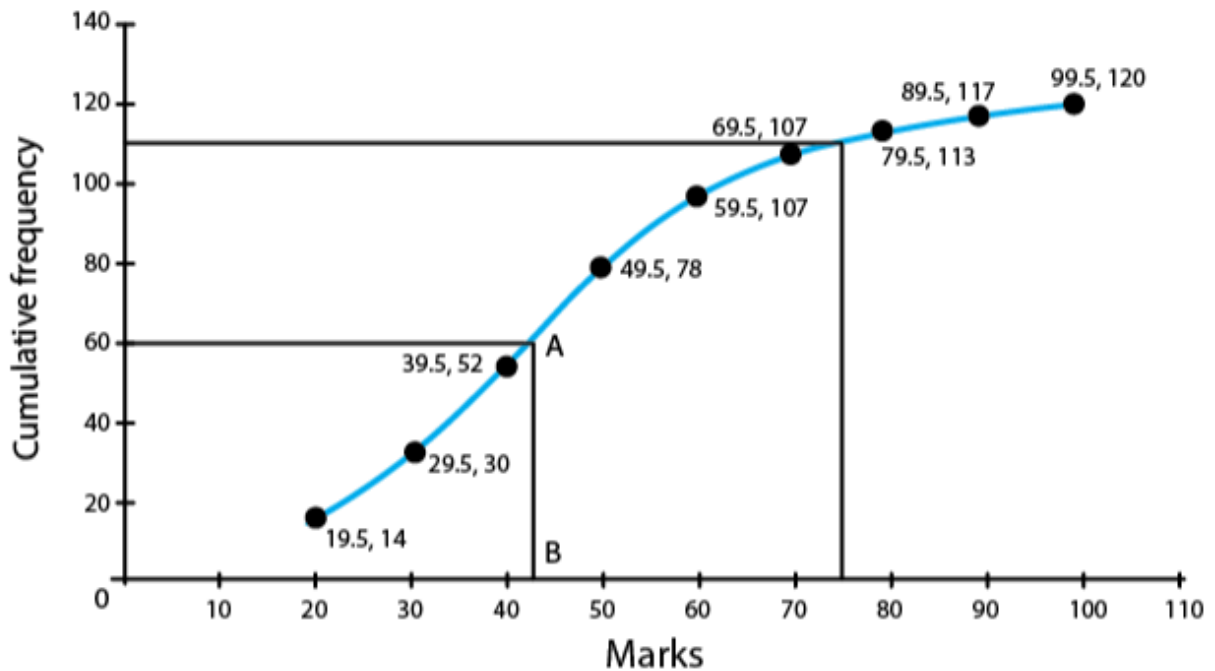
Marks	No. of students	Cumulative frequency
9.5 – 19.5	14	14
19.5 – 29.5	16	30
29.5 – 39.5	22	52
39.5 – 49.5	26	78
49.5 – 59.5	18	96
59.5 – 69.5	11	107

69.5 – 79.5	6	113
79.5 – 89.5	4	117
89.5 – 99.5	3	120

Scale:

1cm = 10 marks on X axis

1cm = 20 students on Y axis



(i) So, the median = $120 / 2 = 60^{\text{th}}$ term

Through mark 60, draw a parallel line to x-axis which meets the curve at A. From A, draw a perpendicular to x-axis meeting it at B.

The value of point B is the median = 43

(ii) Total marks = 100

75% of total marks = $75/100 \times 100 = 75$ marks

Hence, the number of students getting more than 75% marks = $120 - 111 = 9$ students.

3. The mean of 1, 7, 5, 3, 4 and 4 is m. The numbers 3, 2, 4, 2, 3, 3 and p have mean $m - 1$ and median q. Find p and q.

Solution:

Mean of 1, 7, 5, 3, 4 and 4 = $(1 + 7 + 5 + 3 + 4 + 4) / 6 = 24/6 = 4$

So, $m = 4$

Now, given that

The mean of 3, 2, 4, 2, 3, 3 and $p = m - 1 = 4 - 1 = 3$

Thus, $17 + p = 3 \times n$, where $n = 7$

$$17 + p = 21$$

$$p = 4$$

Arranging the terms in ascending order, we have:

2, 2, 3, 3, 3, 3, 4, 4

Mean = 4th term = 3

Hence, $q = 3$

4. In a malaria epidemic, the number of cases diagnosed were as follows:

Date (July)	1	2	3	4	5	6	7	8	9	10	11	12
Number	5	12	20	27	46	30	31	18	11	5	0	1

On what days do the mode and upper and lower quartiles occur?

Solution:

Date	Number	C.f.
1	5	5
2	12	17
3	20	37
4	27	64
5	46	110
6	30	140

7	31	171
8	18	189
9	11	200
10	5	205
11	0	205
12	1	206

(i) Mode = 5th July as it has maximum frequencies.

(ii) Total number of terms = 206

Upper quartile = $206 \times (3/4) = 154.5^{\text{th}} = 7^{\text{th}}$ July

Lower quartile = $206 \times (1/4) = 51.5^{\text{th}} = 4^{\text{th}}$ July

5. The income of the parents of 100 students in a class in a certain university are tabulated below.

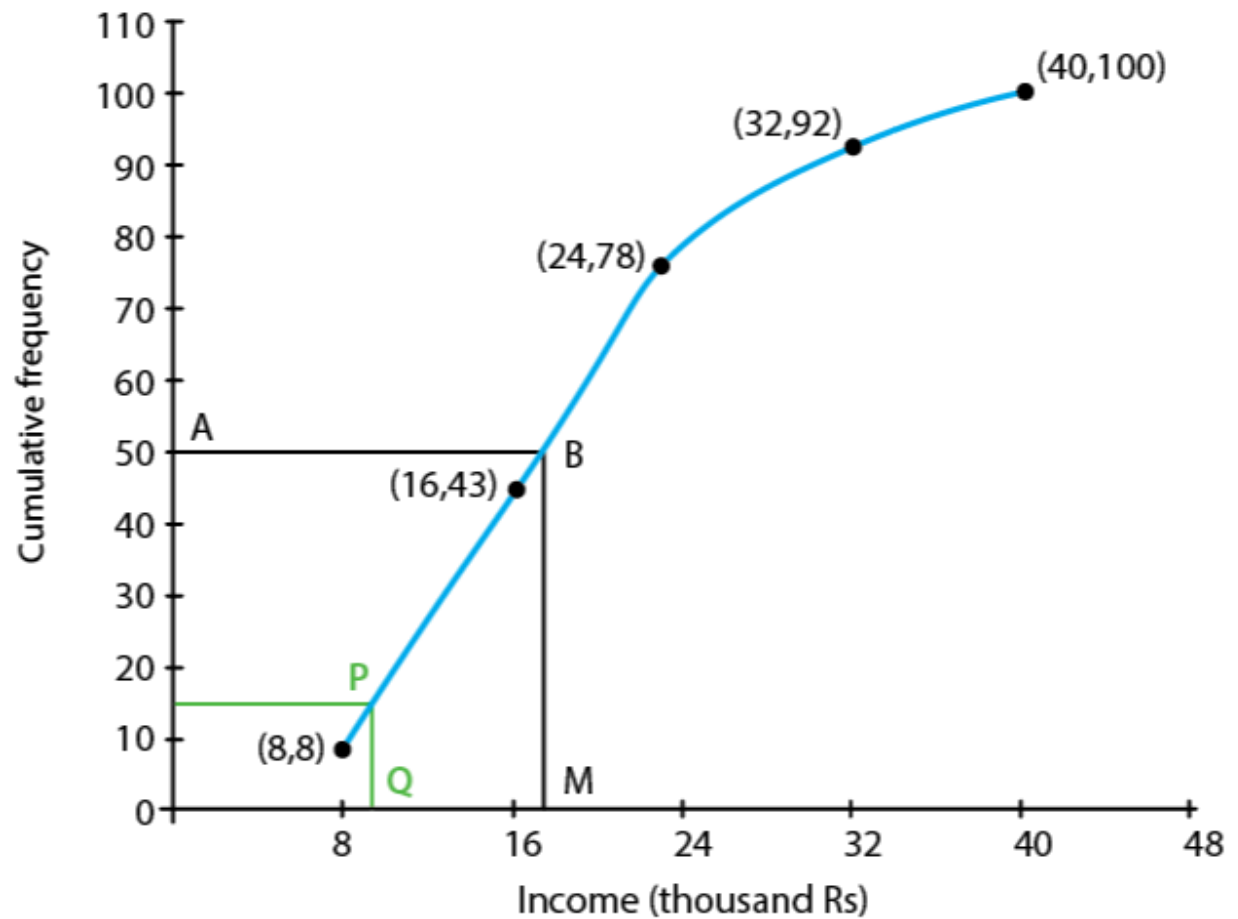
Income (in thousand Rs)	0 – 8	8 – 16	16 – 24	24 – 32	32 – 40
No. of students	8	35	35	14	8

(i) Draw a cumulative frequency curve to estimate the median income.

(ii) If 15% of the students are given freeships on the basis of the basis of the income of their parents, find the annual income of parents, below which the freeships will be awarded.

(iii) Calculate the Arithmetic mean.

Solution:



(i) Cumulative Frequency Curve

Income	No. of students	Cumulative	Class mark	fx
(in thousand Rs.)	f	Frequency	x	
0 – 8	8	8	4	32
8 – 16	35	43	12	420
16 – 24	35	78	20	700
24 – 32	14	92	28	392
32 – 40	8	100	36	288
	$\Sigma f = 100$			$\Sigma fx = 1832$

We plot the points (8, 8), (16, 43), (24, 78), (32, 92) and (40, 100) to get the curve as follows:

Here, $N = 100$

$$N/2 = 50$$

At $y = 50$, affix A.

Through A, draw a horizontal line meeting the curve at B.

Through B, a vertical line is drawn which meets OX at M.

$$OM = 17.6 \text{ units}$$

Hence, median income = 17.6 thousands

$$(ii) 15\% \text{ of } 100 \text{ students} = (15 \times 100)/100 = 15$$

From c.f. 15, draw a horizontal line which intersects the curve at P.

From P, draw a perpendicular to x – axis meeting it at Q which is equal to 9.6

Thus, freeship will be awarded to students provided annual income of their parents is upto 9.6 thousands.

$$(ii) \text{ Mean} = \frac{\sum fx}{\sum f} = 1832/100 = 18.32$$

6. The marks of 20 students in a test were as follows:

2, 6, 8, 9, 10, 11, 11, 12, 13, 13, 14, 14, 15, 15, 15, 16, 16, 18, 19 and 20.

Calculate:

(i) the mean (ii) the median (iii) the mode

Solution:

Arranging the terms in ascending order:

2, 6, 8, 9, 10, 11, 11, 12, 13, 13, 14, 14, 15, 15, 15, 16, 16, 18, 19, 20

Number of terms = 20

$$\begin{aligned} \sum x &= 2 + 6 + 8 + 9 + 11 + 11 + 12 + 13 + 13 + 14 + 14 + 15 + 15 + 15 + 15 + 16 + 16 + 18 + 19 \\ &+ 20 = 257 \end{aligned}$$

$$(i) \text{ Mean} = \frac{\sum x}{\sum n} = 257/20 = 12.85$$

(ii) Median = $(10^{\text{th}} \text{ term} + 11^{\text{th}} \text{ term}) / 2 = (13 + 14) / 2 = 27 / 2 = 13.5$

(iii) Mode = 15 since it has maximum frequencies i.e. 3

7. The marks obtained by 120 students in a mathematics test is given below:

Marks	No. of students
0-10	5
10-20	9
20-30	16
30-40	22
40-50	26
50-60	18
60-70	11
70-80	6
80-90	4
90-100	3

Draw an ogive for the given distribution on a graph sheet. Use a suitable scale for your ogive. Use your ogive to estimate:

(i) the median

(ii) the number of students who obtained more than 75% in test.

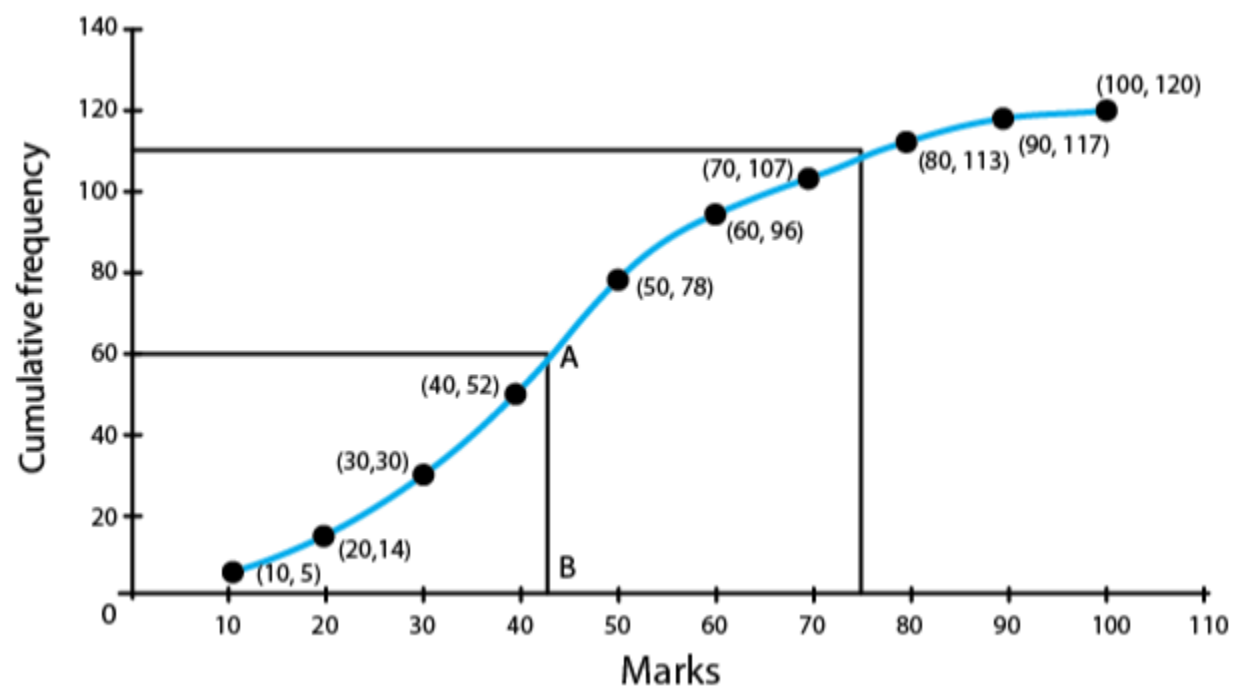
(iii) the number of students who did not pass in the test if the pass percentage was 40.

(iv) the lower quartile

Solution:

Marks	No. of students	c.f.
0-10	5	5
10-20	9	14
20-30	16	30

30-40	22	52
40-50	26	78
50-60	18	96
60-70	11	107
70-80	6	113
80-90	4	117
90-100	3	120



(i) Median = $(120 + 1) / 2 = 60.5^{\text{th}}$ term

Through mark 60.5, draw a parallel line to x-axis which meets the curve at A. From A draw a perpendicular to x-axis meeting it at B.

Then, the value of point B is the median = 43

(ii) Number of students who obtained up to 75% marks in the test = 110

Number of students who obtained more than 75% marks in the test = $120 - 110 = 10$

(iii) Number of students who obtained less than 40% marks in the test = 52 (from the graph; $x = 40$, $y = 52$)

(iv) Lower quartile = $Q_1 = 120 \times (1/4) = 30^{\text{th}}$ term = 30

8. Using a graph paper, draw an ogive for the following distribution which shows a record of the width in kilograms of 200 students.

Weight	Frequency
40 – 45	5
45 – 50	17
50 – 55	22
55 – 60	45
60 – 65	51
65 – 70	31
70 – 75	20
75 – 80	9

Use your ogive to estimate the following:

(i) The percentage of students weighing 55 kg or more

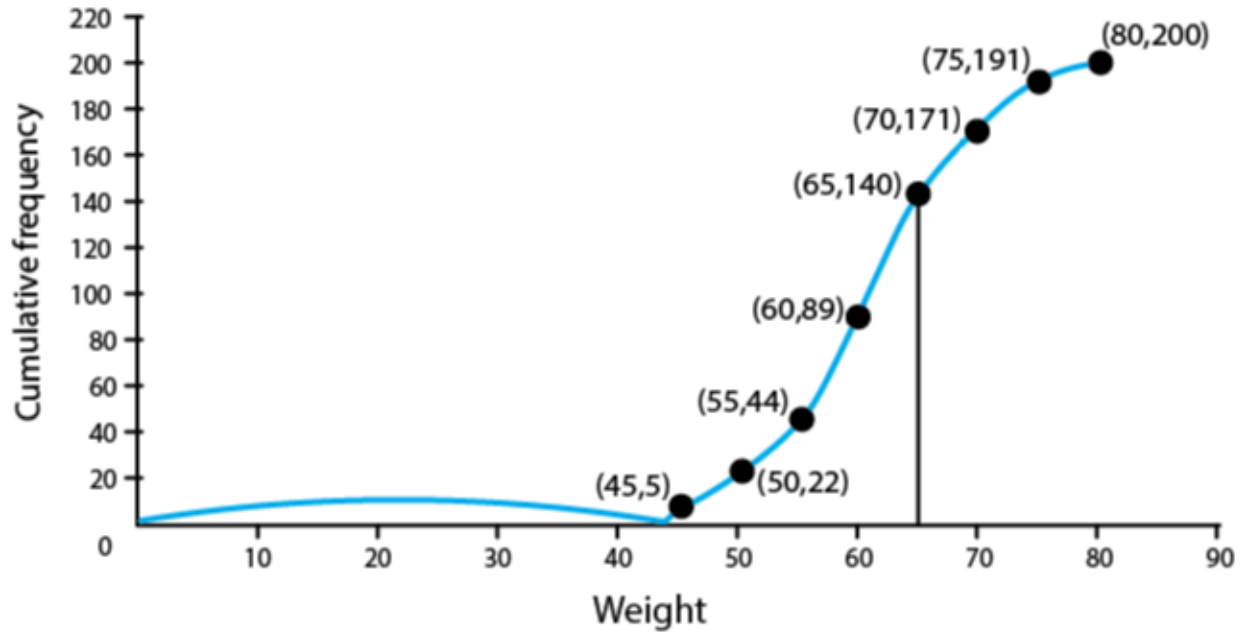
(ii) The weight above which the heaviest 30% of the student fall

(iii) The number of students who are (a) underweight (b) overweight, if 55.70 kg is considered as standard weight.

Solution:

Weight	Frequency	c. f.
40-45	5	5
45-50	17	22
50-55	22	44
55-60	45	89
60-65	51	140
65-70	31	171

70-75	20	191
75-80	9	200



(i) The number of students weighing more than 55 kg = $200 - 44 = 156$

Thus, the percentage of students weighing 55 kg or more = $(156/200) \times 100 = 78\%$

(ii) 30% of students = $(30 \times 200) / 100 = 60$

Heaviest 60 students in weight = $9 + 21 + 30 = 60$

Weight = 65 kg (From table)

(iii) (a) underweight students when 55.70 kg is standard = 46 (approx.) from graph

(b) overweight students when 55.70 kg is standard = $200 - 55.70 = 154$ (approx.) from graph

9. The distribution, given below, shows the marks obtained by 25 students in an aptitude test. Find the mean, median and mode of the distribution.

Marks obtained	5	6	7	8	9	10
No. of students	3	9	6	4	2	1

Solution:

Marks obtained(x)	No. of students (f)	c.f.	fx
5	3	3	15
6	9	12	54
7	6	18	42
8	4	22	32
9	2	24	18
10	1	25	10
Total	25		171

Number of terms = 25

(i) Mean = $171/25 = 6.84$

(ii) Median = $(25 + 1)/2 = 13^{\text{th}}$ term = 7

(iii) Mode = 6 since it has the maximum frequency i.e. 6

10. The mean of the following distribution is 52 and the frequency of class interval 30 – 40 is 'f'. Find f.

Class Interval	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	5	3	f	7	2	6	13

Solution:

C.I.	Frequency(f)	Mid value (x)	fx
10-20	5	15	75
20-30	3	25	75
30-40	f	35	35f
40-50	7	45	315
50-60	2	55	110
60-70	6	65	390

70-80	13	75	975
Total	36 + f		1940 + 35f

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{(1940 + 35f)}{(36 + f)} \dots\dots (i)$$

$$\text{But, given mean} = 52 \dots\dots (ii)$$

From (i) and (ii), we have

$$\frac{(1940 + 35f)}{(36 + f)} = 52$$

$$1940 + 35f = 1872 + 52f$$

$$17f = 68$$

$$\text{Thus, } f = 4$$

11. The monthly income of a group of 320 employees in a company is given below:

Monthly Income (thousands)	No. of employees
6 – 7	20
7 – 8	45
8 – 9	65
9 – 10	95
10 – 11	60
11 – 12	30
12 – 13	5

Draw an ogive of the given distribution on a graph paper taking 2 cm = Rs 1000 on one axis and 2 cm = 50 employees on the other axis. From the graph determine:

(i) the median wage.

(ii) number of employees whose income is below Rs 8500.

(iii) if salary of a senior employee is above Rs 11,500, find the number of senior employees in the company.

(iv) the upper quartile.

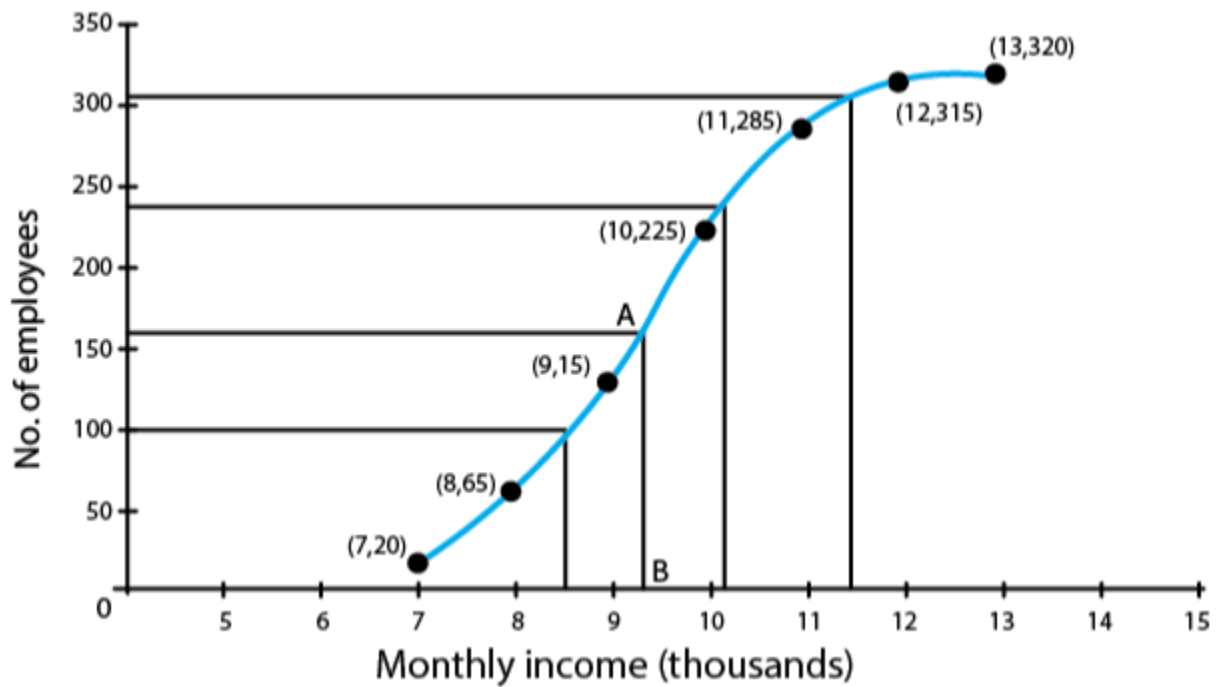
Solution:

Monthly Income (thousands)	No. of employees	Cumulative frequency
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(f)

6-7	20	20
7-8	45	65
8-9	65	130
9-10	95	225
10-11	60	285
11-12	30	315
12-13	5	320
Total	320	

Number of employees = 320



(i) Median = $320/2 = 160^{\text{th}}$ term

Through mark 160, draw a parallel line to x-axis which meets the curve at A, From A draw a perpendicular to x-axis meeting it at B.

The value of point B is the median = Rs 9.3 thousands

(ii) The number of employees with income below Rs 8,500 = 95 (approx from the graph)

(iii) Number of employees with income below Rs 11,500 = 305 (approx from the graph)

Thus, the number of employees (senior employees) = $320 - 305 = 15$

(iv) Upper quartile = $Q_3 = 320 \times (3/4) = 240^{\text{th}}$ term = 10.3 thousands = Rs 10,300

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- **Comprehensive Understanding:** These solutions provide detailed explanations of concepts like mean, median, quartiles, and mode, helping students understand the fundamental principles of data analysis.
- **Step-by-Step Solutions:** Each problem is solved step-by-step, making it easier for students to follow the logic and methodology used to arrive at the correct answer.
- **Exam Preparation:** The solutions align with the ICSE curriculum and exam pattern helping students to be well-prepared for their exams.
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