...set are arranged in ascending or descending order.

24.6 Median for Raw Data :

(15) Find the median of 7, 8, 4, 3 and 10.

16 Find the median of : 7, 12, 15, 6, 20, 8, 4 and 10

17 The following numbers are written in descending order of their values :

68, 60, 52, x − 3, x − 8, x − 11, 30, 25, 22 and 20.

If their median is 39, find the value of x.

24.7 Median for Tabulated Data :

18 The weights of 45 children in a class were recorded, to the nearest kg, as follows :

Wt. (in nearest kg)	46	48	50	52	53	54	55
No. of children	7	5	8	12	10	2	1

Calculate the median weight.

(19) Find the median for the following distribution :

C.I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	7	10	8	5

(19) Find the median for the following distribution :

C.I.	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	5	7	10	8	5

Solution :

Using the given data construct a cumulative frequency table as shown alongside. On a graph paper, mark class-intervals (C.I.) along x-axis and cumulative frequencies along y-axis.

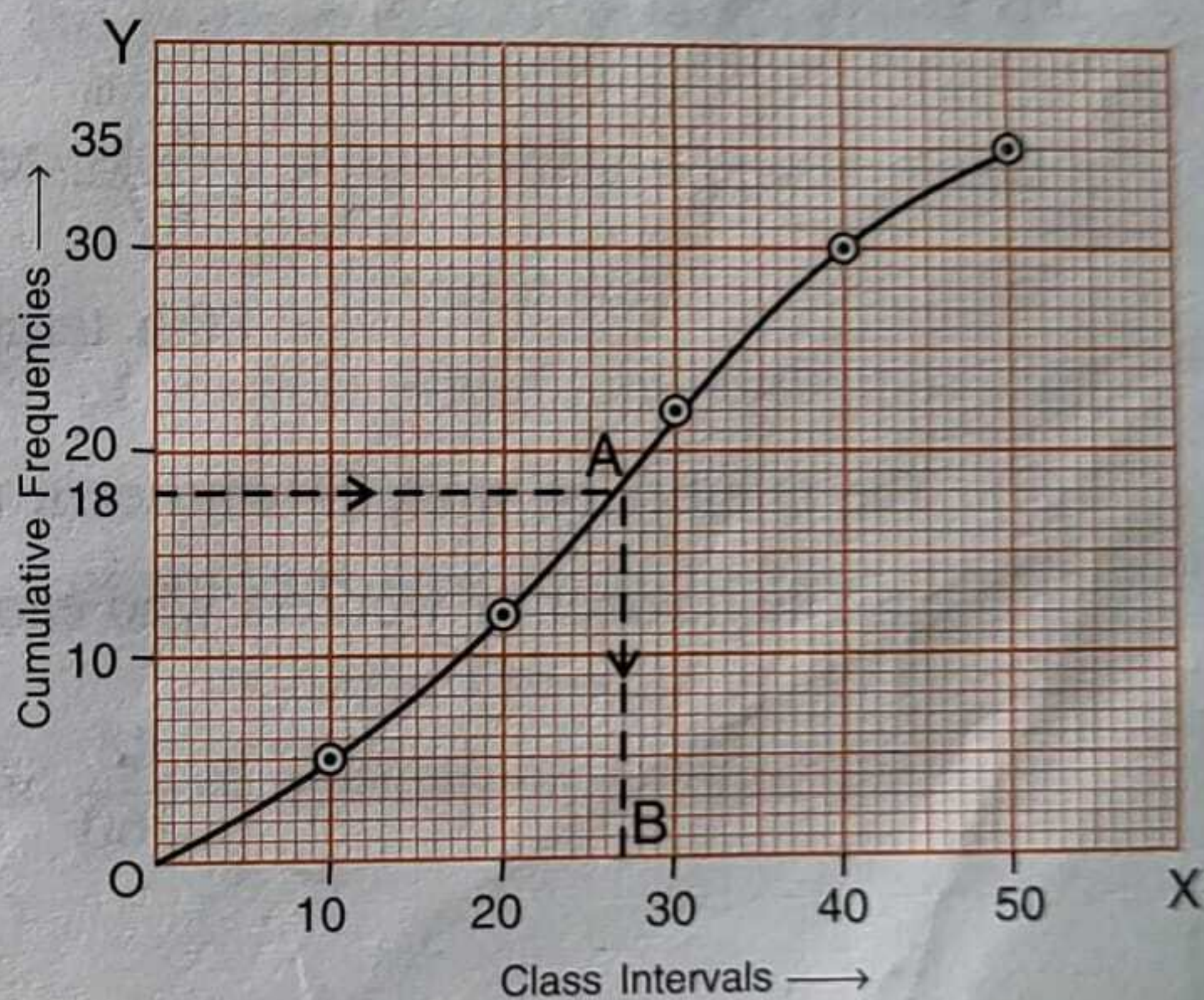On this graph mark points (10, 5), (20, 12), (30, 22), (40, 30) and (50, 35).

C.I.	Frequency	Cumulative Frequency
0 – 10	5	5
10 – 20	7	12
20 – 30	10	22
30 – 40	8	30
40 – 50	5	35
$n = \Sigma f = 35$		

Then draw a free-hand curve passing through the points marked, starting from the lower limit of first class and terminating at upper limit of the last class. The curve (graph) so obtained is ogive as shown below.

Since, the no. of terms, $n = 35$

$\therefore$ Median $= \left(\dfrac{n+1}{2}\right)^{th}$ term

$= \left(\dfrac{35+1}{2}\right)^{th}$ term

$= 18^{th}$ term

Through mark 18 on y-axis, draw a horizontal line which meets the curve at point A.

the *median class*. For the example, given above, the median class = 20 – 30. ... given data belongs, is called

(20) The daily wages of 160 workers in a building project are given below :

Wages in ₹	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Workers	12	20	30	38	24	16	12	8

Using a graph paper, draw an Ogive for the above distribution.
Use your Ogive to estimate :

(i) the median wage of the workers

(ii) the percentage of workers who earn more than ₹ 45 a day ?

Solution :

$\left(\frac{n}{2}\right)$ or $\left(\frac{n+1}{2}\right)$ term which is the median of given distribution.

Find the median for the following distribution :

C.I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	5	7	10	8	5

Solution :

Using the given data construct a cumulative frequency table as shown alongside. On a graph paper, mark class-intervals (C.I.) along x-axis and cumulative frequencies along y-axis.

On this graph mark points (10, 5), (20, 12), (30, 22), (40, 30) and (50, 35).

C.I.	Frequency	Cumulative Frequency
0 – 10	5	5
10 – 20	7	12
20 – 30	10	22
30 – 40	8	30
40 – 50	5	35
$n = \Sigma f = 35$		

Then draw a free-hand curve passing through the points marked, starting from the lower limit of first class and terminating at upper limit of the last class. The curve (graph) so obtained is ogive as shown below.
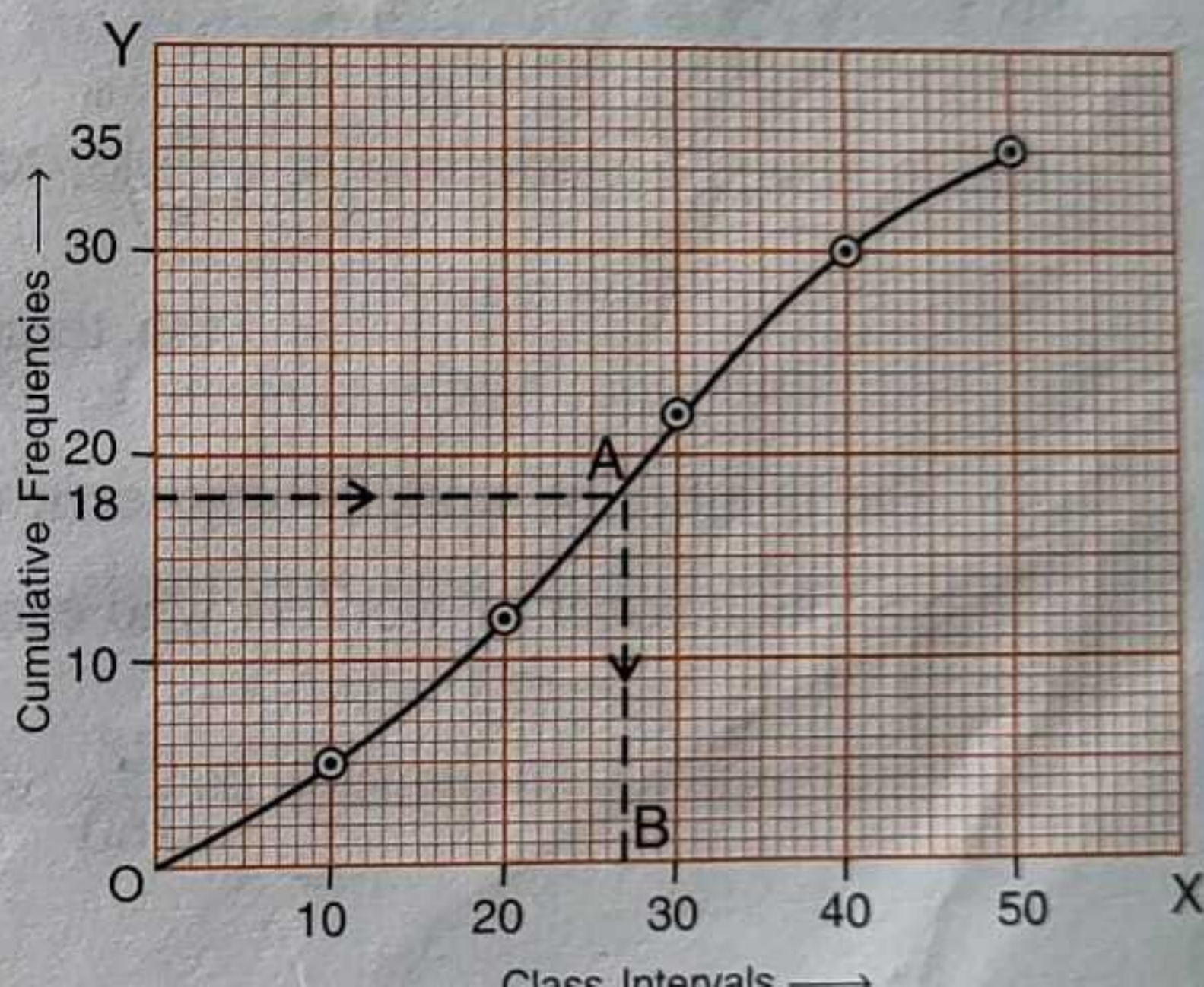
Since, the no. of terms, $n = 35$

$\therefore$ Median $= \left(\frac{n+1}{2}\right)^{th}$ term

$= \left(\frac{35+1}{2}\right)^{th}$ term

$= 18^{th}$ term

Through mark 18 on y-axis, draw a horizontal line which meets the curve at point A.

Plot the points (10, 12), (20, 32), (30, 62), (40, 100), (50, 124), (60, 140), (70, 152) and (80, 160) on a properly marked graph paper. Then draw a free hand curve passing through the points marked, starting from the lower limit of first class and terminating at upper limit of last class. The ogive so drawn is shown on the next page. Using this graph, we get :

(i) $\qquad$ **Median** $= \left(\dfrac{n}{2}\right)^{th}$ term $= \left(\dfrac{160}{2}\right)^{th}$ term

$\qquad\qquad\qquad = 80\text{th term} \qquad = 35 \text{ (approximately)}$ **Ans.**

(ii) The number of workers who earn upto ₹ 45 per day $= 112$

$\Rightarrow$ The number of workers who earn more than ₹ 45 per day $= 160 - 112 = 48$

$\therefore$ **Required percentage** $= \dfrac{48}{160} \times 100\% = 30\%$ **Ans.**
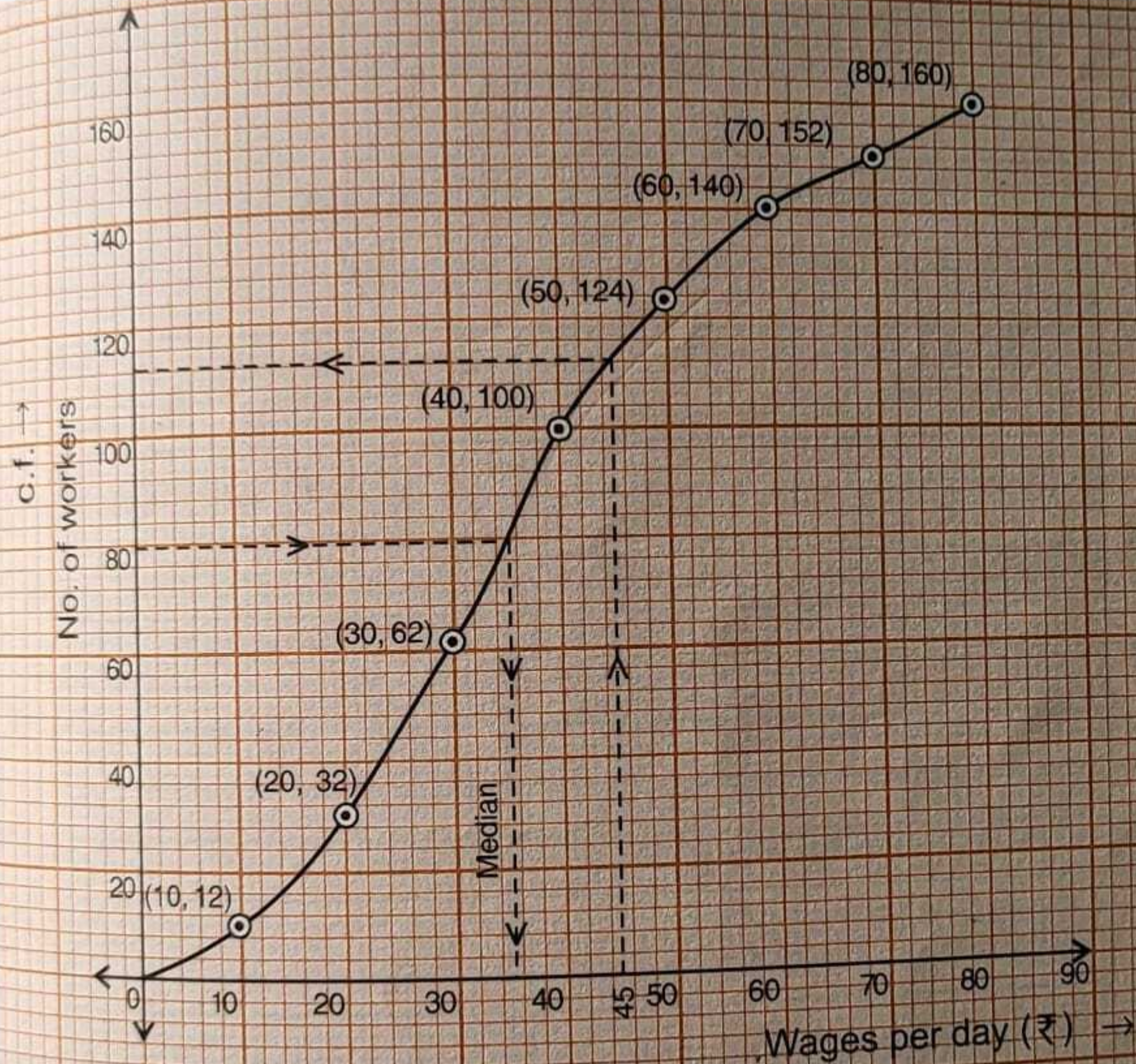
Solution :

Wages in ₹	No. of workers (f)	Cumulative frequency (c.f.)
0 – 10	12	12
10 – 20	20	32
20 – 30	30	62
30 – 40	38	100
40 – 50	24	124
50 – 60	16	140
60 – 70	12	152
70 – 80	8	160

Solution :

Marks	f	c.f.
0 – 10	05	05
10 – 20	10	15
20 – 30	11	26
30 – 40	20	46
40 – 50	27	73
50 – 60	38	111
60 – 70	40	151
70 – 80	29	180
80 – 90	14	194
90 – 100	06	200

(21) The marks obtained by 200 students in an examination are given below :

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	05	10	11	20	27	38	40	29	14	06

Using a graph paper, draw an Ogive for the above distribution. Use your Ogive to estimate:

(i) the median;

(ii) the number of students who obtained more than 80% marks in the examination and

(iii) the number of students who did not pass, if the pass percentage was 35.

Use the scale as 2 cm = 10 marks on one axis and

2 cm = 20 students on the other axis.

(23) From the following frequency distribution table, find :

(i) Lower quartile
(ii) Upper quartile
(iii) Inter-quartile range

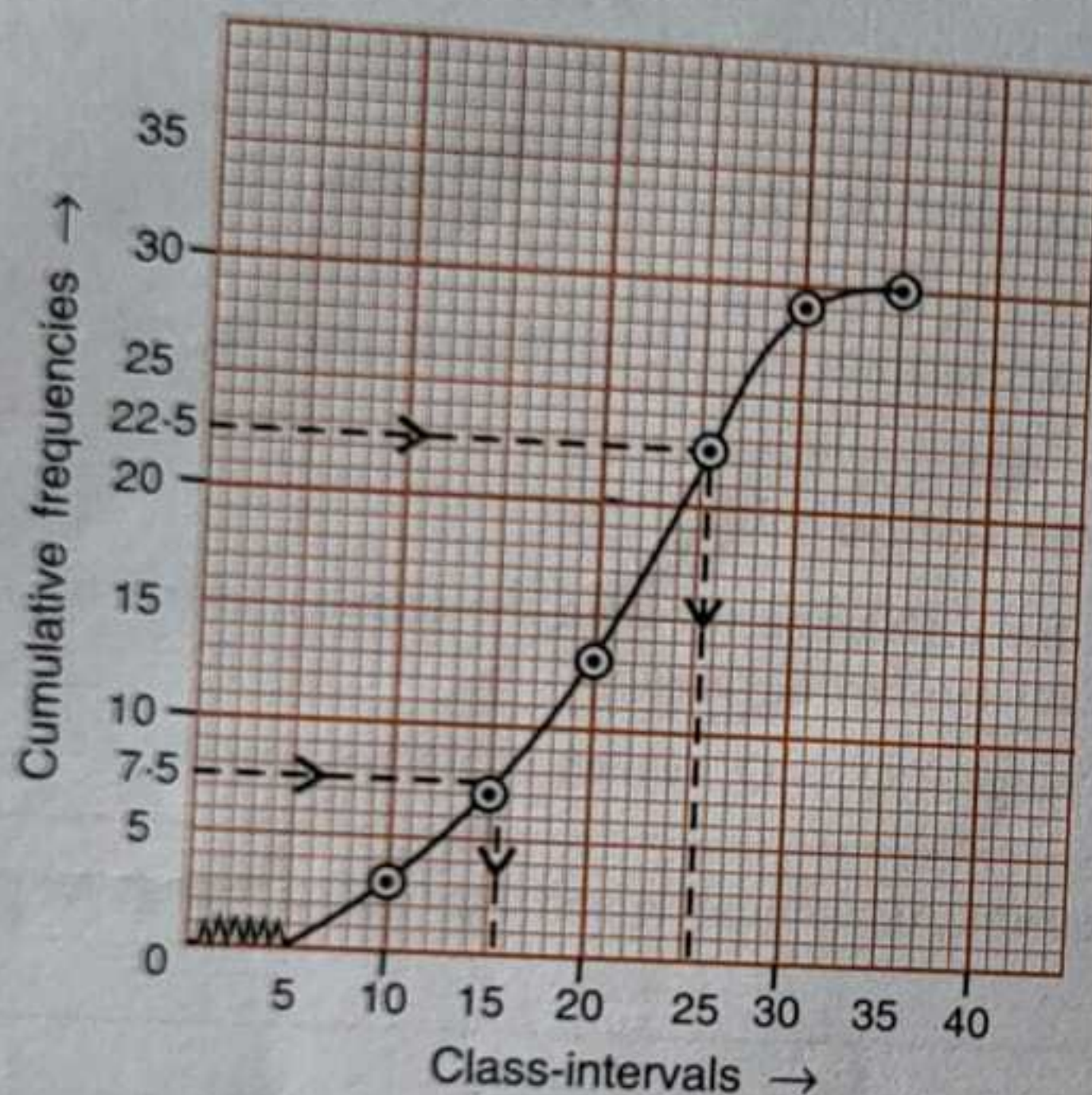| C.I.	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	3	4	6	9	7	1

Solution :

First of all, construct a cumulative frequency table for the given distribution.

On a graph paper, plot the points $(10, 3)$, $(15, 7)$, $(20, 13)$, $(25, 22)$, $(30, 29)$ and $(35, 30)$.

C.I.	Frequency	Cumulative Frequency
5 – 10	3	3
10 – 15	4	7
15 – 20	6	13
20 – 25	9	22
25 – 30	7	29
30 – 35	1	30

Draw an ogive as shown below :

(i) Lower quartile $(Q_1) = \left(\dfrac{30}{4}\right)^{th}$ term $= 7{\cdot}5^{th}$ term $= 15{\cdot}5$ Ans.

(ii) Upper quartile $(Q_3) = \left(\dfrac{3\times 30}{4}\right)^{th}$ term $= 22{\cdot}5^{th}$ term $= 25{\cdot}5$ Ans.

(iii) Inter-quartile range $= Q_3 - Q_1 = 25{\cdot}5 - 15{\cdot}5 = 10$ Ans.
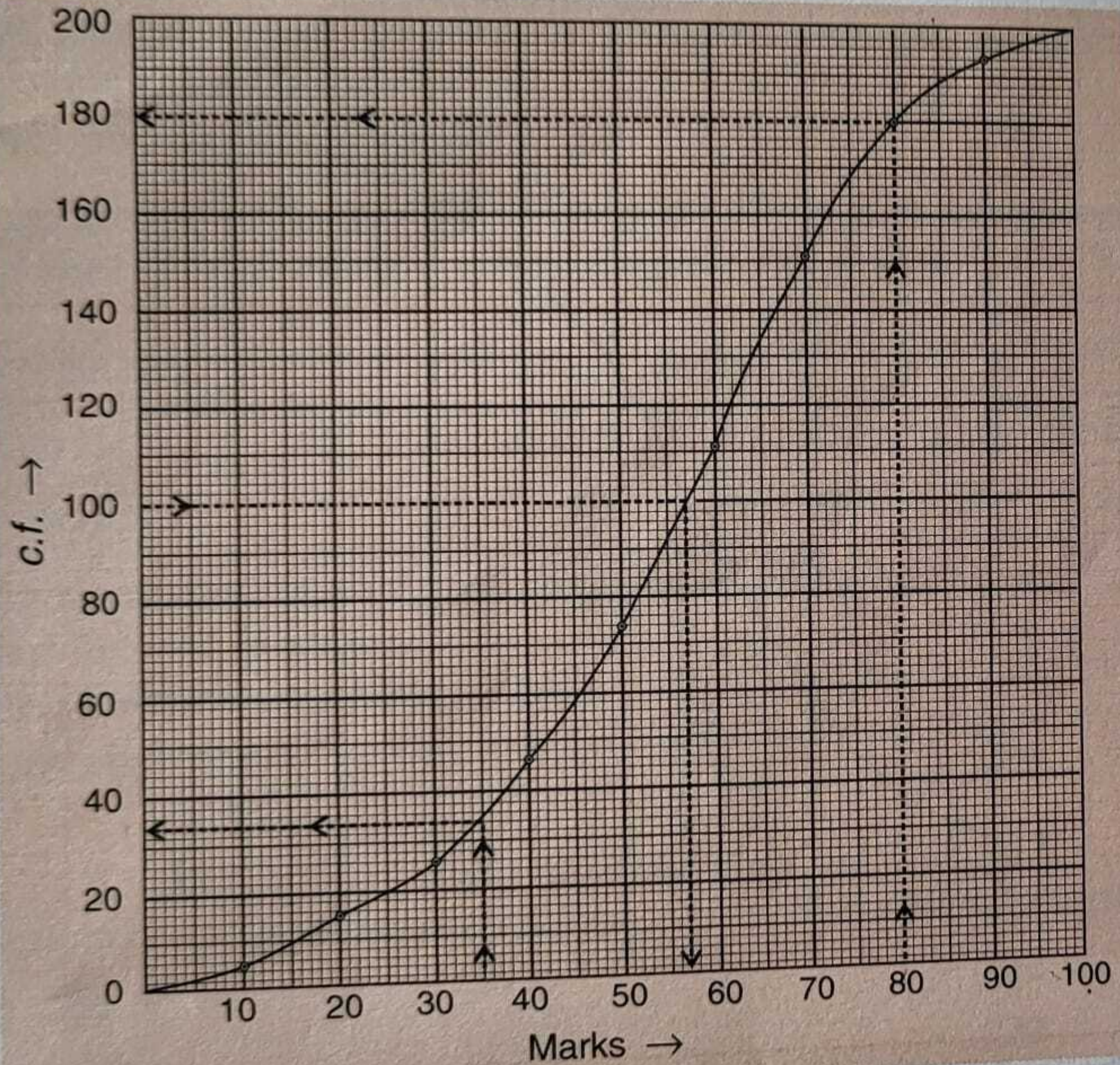
Solution :

Scores	f	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
	N = 120	
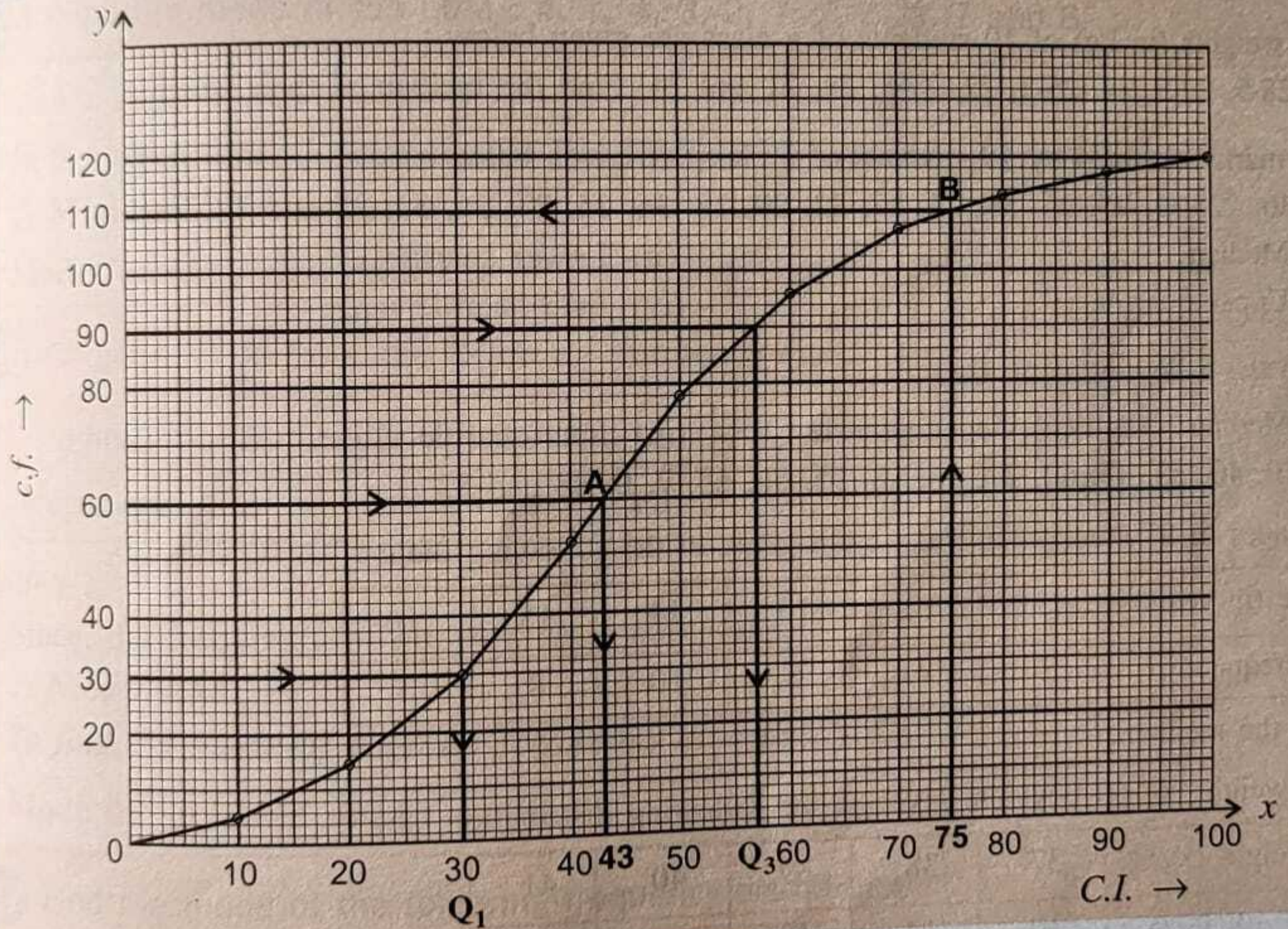
24 The table below shows the distribution of the scores obtained by 120 shooters in a shooting competition. Using a graph sheet, draw an ogive for the distribution.

Score obtained	Number of shooters
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

Use your ogive to estimate :

(i) The median.

(ii) The interquartile range.

(iii) The number of shooters who obtained more than 75% scores.

$$\text{Upper quartile } (Q_3) = \left(\frac{3 \times 120}{4}\right)^{\text{th}} \text{term} = 90^{\text{th}} \text{term} = 57$$

$$\therefore \quad \text{Inter-quartile range} = Q_3 - Q_1$$

$$= 57 - 30 = 27 \quad \textbf{Ans.}$$

(iii) Since, 75% scores = 75% of 100 = 75

Through mark for 75 on x-axis, draw a vertical line which meets the ogive drawn at point B. Through the point B, draw a horizontal line which meets the y-axis at the mark of 110.

$\therefore$ The number of shooters who obtained more than 75% scores

$$= 120 - 110 = 10 \quad \textbf{Ans.}$$

Scale : x-axis : 2 units = 10 scores

y-axis : 2 units = 20 shooters

(i)   Median = $\left(\dfrac{N}{2}\right)^{th}$ term = $\left(\dfrac{120}{2}\right)^{th}$ term = 60th term

Through mark for 60 on y-axis, draw a horizontal line which meets the ogive drawn at point A. Through point A, draw a vertical line which meets the x-axis at the mark of 43.

∴   Median = 43   **Ans.**

(ii)   Since, number of terms = 120

Lower quartile (Q_1) = $\left(\dfrac{120}{4}\right)^{th}$ term = 30th term = 30

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