IGCSE · Cambridge (CIE) · Maths

2 hours 17 questions

Non-Calculator Questions

Cumulative Frequency

Cumulative Frequency / Drawing Cumulative Frequency Diagrams / Interpreting Cumulative Frequency Diagrams

Easy (5 questions)	/13
Medium (9 questions)	/50
Hard (3 questions)	/29
Total Marks	**/92**

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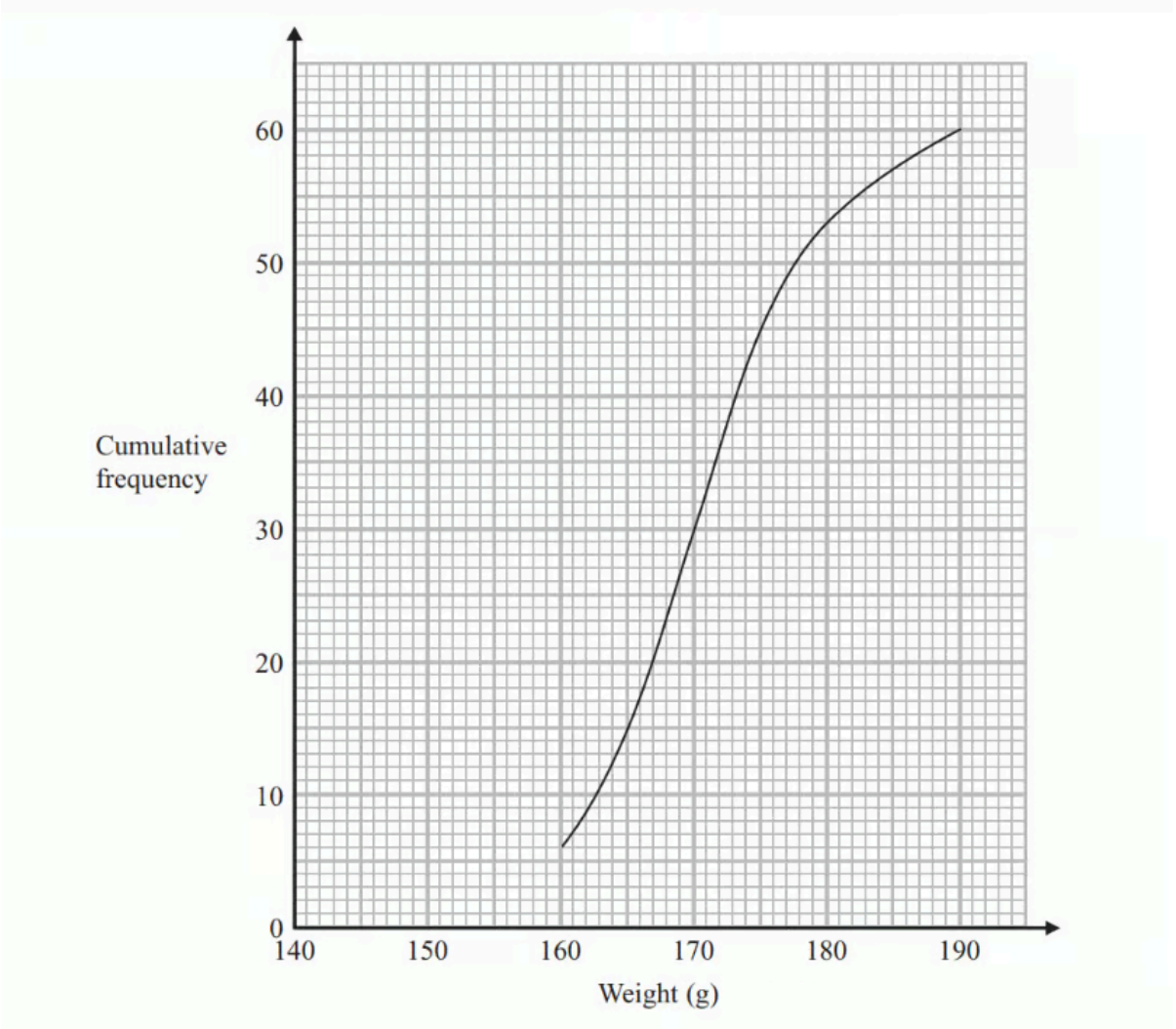
Easy Questions

1 Harry grows tomatoes. This year he put his tomato plants into two groups, group A and group B.

Harry gave fertiliser to the tomato plants in group A. He did not give fertiliser to the tomato plants in group B.

Harry weighed 60 tomatoes from group A. The cumulative frequency graph shows some information about these weights.



Use the graph to find an estimate for the median weight.

(1 mark)

2 20 students each record the mass, p grams, of their pencil case. The table below shows the results.

Mass (p grams)	$0 < p \leq 50$	$50 < p \leq 100$	$100 < p \leq 125$	$125 < p \leq 150$	$150 < p \leq 200$
Frequency	2	5	4	6	3

Use the frequency table to complete the cumulative frequency table.

Mass (p grams)	$p \leq 50$	$p \leq 100$	$p \leq 125$	$p \leq 150$	$p \leq 200$
Cumulative frequency					20

(2 marks)

3 (a) The table gives information about the marks gained by some students in an exam.

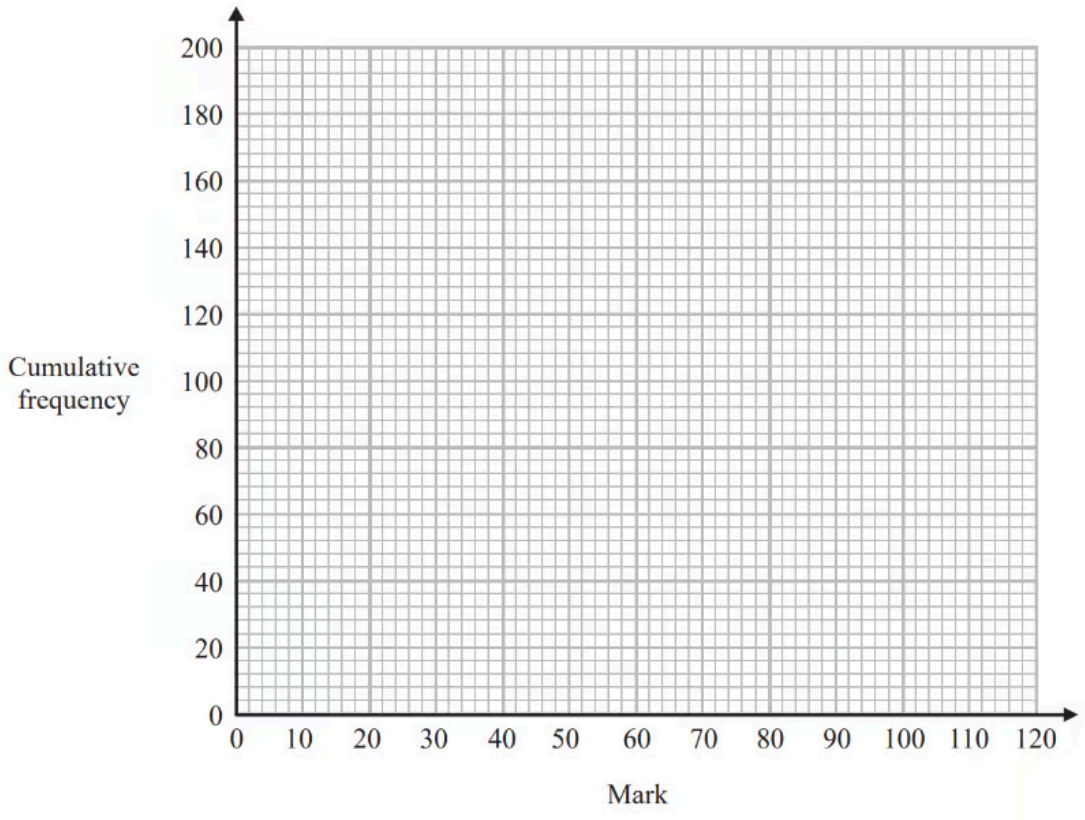
Mark (m)	**Frequency**
$0 < m \leqslant 20$	40
$20 < m \leqslant 40$	70
$40 < m \leqslant 60$	60
$60 < m \leqslant 80$	15
$80 < m \leqslant 100$	10
$100 < m \leqslant 120$	5

Complete the cumulative frequency table for this information.

Mark (m)	Cumulative frequency
$0 < m \leqslant 20$	
$0 < m \leqslant 40$	
$0 < m \leqslant 60$	
$0 < m \leqslant 80$	
$0 < m \leqslant 100$	
$0 < m \leqslant 120$	

(1 mark)

(b) On the grid, draw a cumulative frequency graph for your table.

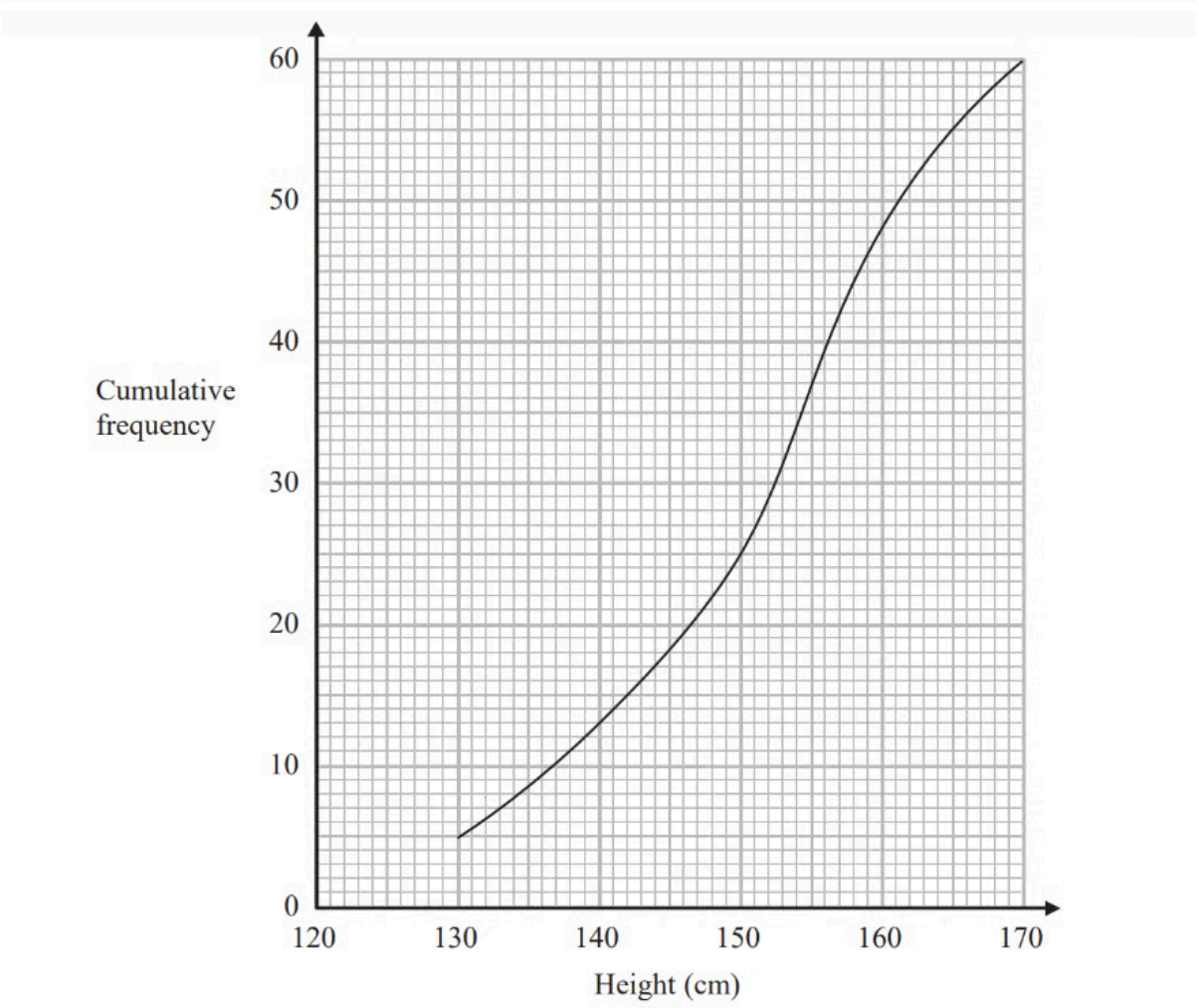


(2 marks)

(c) Use your graph to find an estimate for the number of students who gained a mark of more than 54

(2 marks)

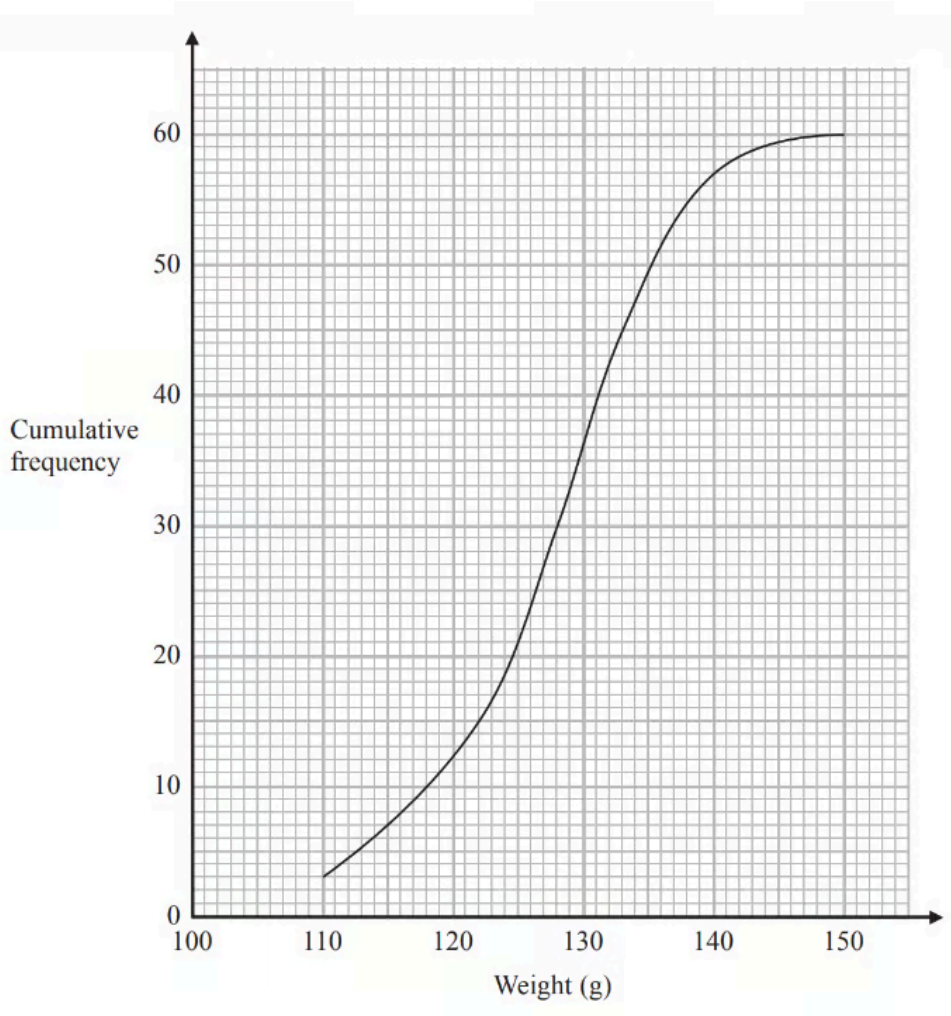
4 The cumulative frequency graph shows some information about the heights, in cm, of 60 students.



Work out an estimate for the number of these students with a height greater than 160 cm.

(2 marks)

5 (a) The cumulative frequency graph shows information about the weights of 60 apples.



Use the graph to find an estimate for the median weight.

(1 mark)

(b) Use the graph to find an estimate for the interquartile range of the weights.

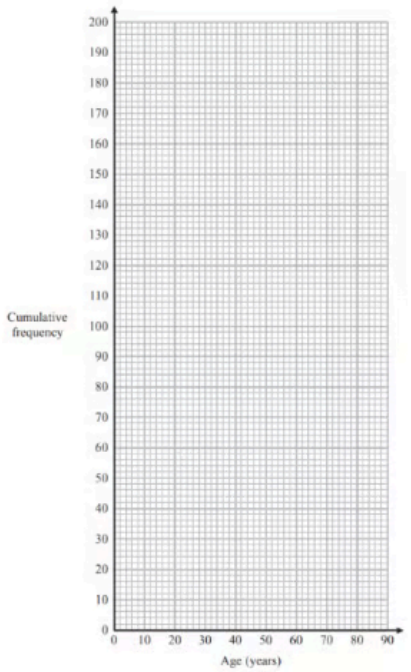
(2 marks)

Medium Questions

1 (a) There are 200 workers at a factory.
The cumulative frequency table gives information about their ages.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	25
$0 < a \leqslant 30$	70
$0 < a \leqslant 40$	138
$0 < a \leqslant 50$	175
$0 < a \leqslant 60$	186
$0 < a \leqslant 70$	194
$0 < a \leqslant 80$	200

On the grid opposite, draw a cumulative frequency graph for this information.



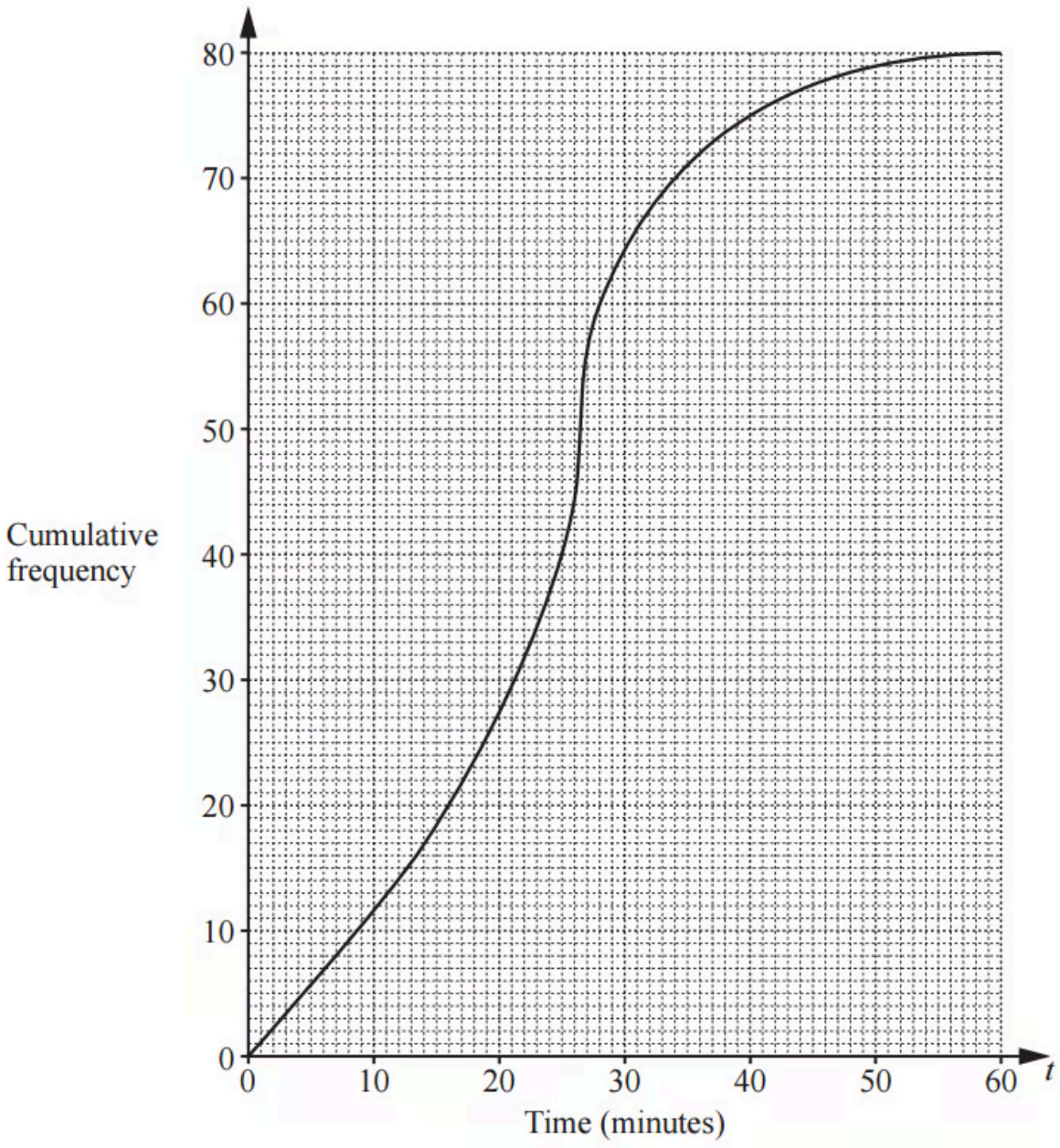
(2 marks)

(b) Graham says,
"10% of workers at the factory are older than 65"

Is Graham correct?
You must show how you get your answer.

(2 marks)

2 (a) The time, t minutes, 80 students each spend completing their homework is recorded.
The cumulative frequency diagram shows the results.



Use the cumulative frequency diagram to find an estimate of the median.

..... min

(1 mark)

(b) Use the cumulative frequency diagram to find an estimate of the interquartile range.

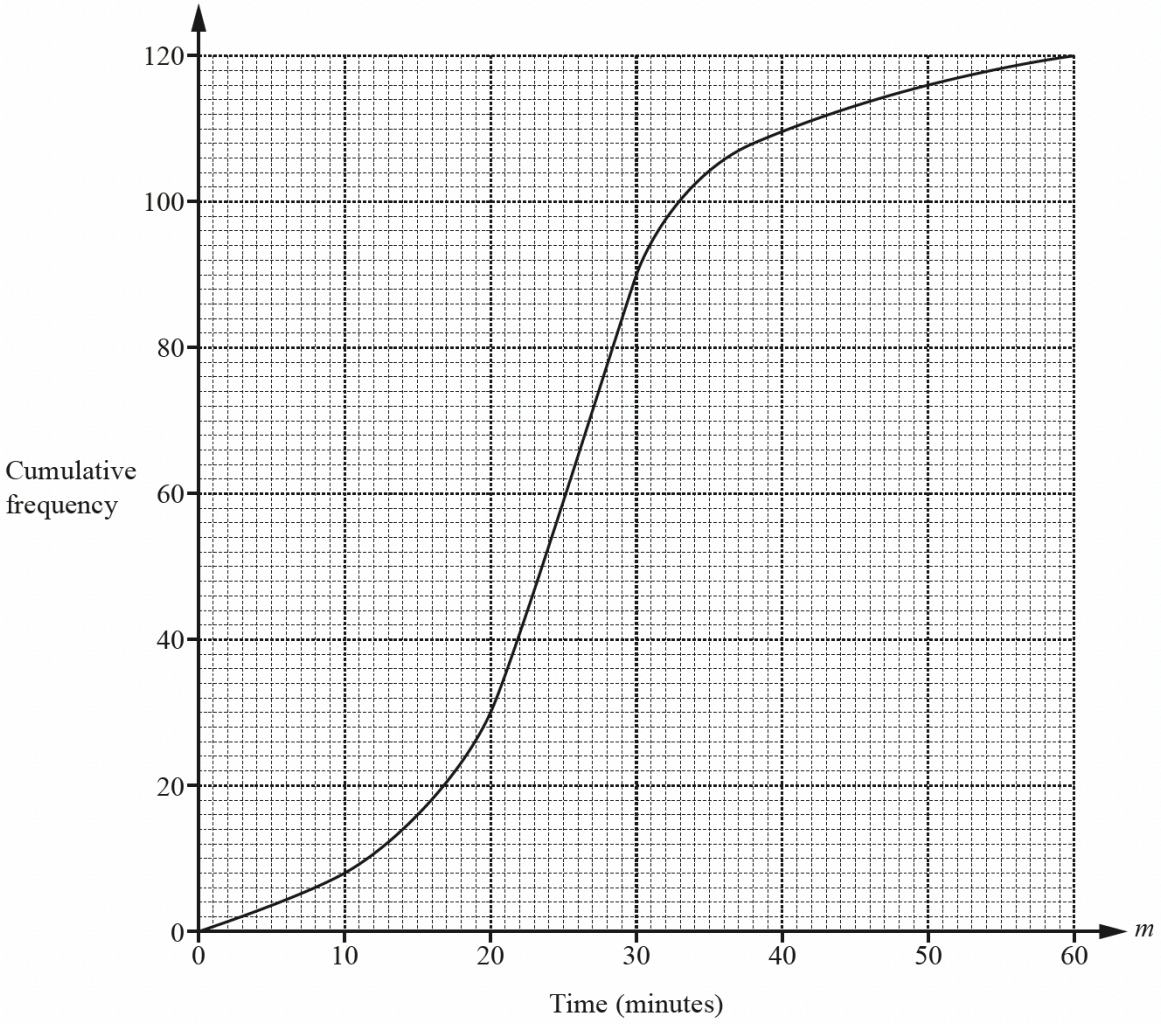
..... min

(2 marks)

(c) Use the cumulative frequency diagram to find an estimate of the number of students who spend more than 40 minutes completing their homework.

(2 marks)

3 (a) The cumulative frequency diagram shows information about the time, m minutes, taken by 120 students to complete some homework.



Use the cumulative frequency diagram to find an estimate of the interquartile range.

.....min

(2 marks)

(b) Use the cumulative frequency diagram to find an estimate of the number of students who took more than 50 minutes to complete the homework.

(2 marks)

4 (a) The table shows information about the speeds of 100 lorries.

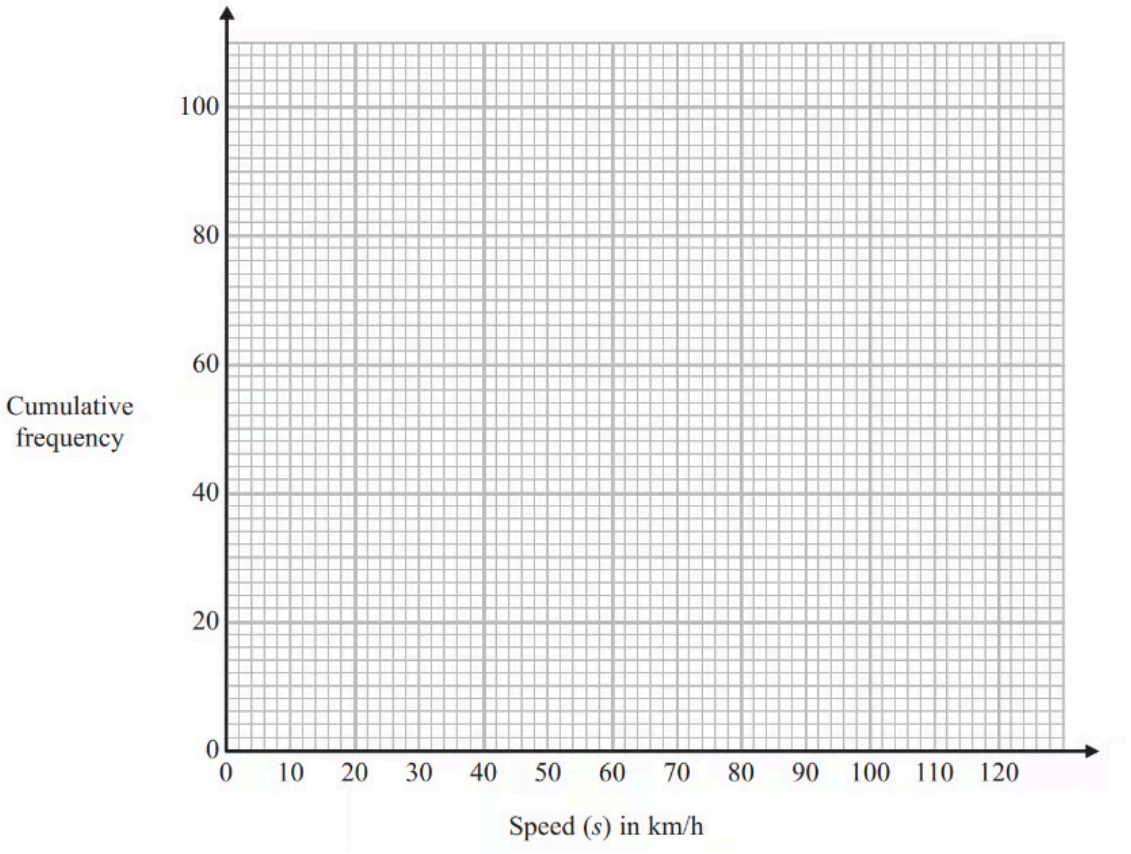
Speed (s) in km/h	Frequency
$0 < s \leqslant 20$	2
$20 < s \leqslant 40$	9
$40 < s \leqslant 60$	23
$60 < s \leqslant 80$	31
$80 < s \leqslant 100$	27
$100 < s \leqslant 120$	8

Complete the cumulative frequency table for this information.

Speed (s) in km/h	Cumulative frequency
$0 < s \leqslant 20$	2
$0 < s \leqslant 40$	
$0 < s \leqslant 60$	
$0 < s \leqslant 80$	
$0 < s \leqslant 100$	
$0 < s \leqslant 120$	

(1 mark)

(b) On the grid, draw a cumulative frequency graph for your table.



(2 marks)

(c) Find an estimate for the number of lorries with a speed of more than 90 km/h.

(2 marks)

5 (a) The speed, v km/h, of each of 200 cars passing a building is measured.
The table shows the results.

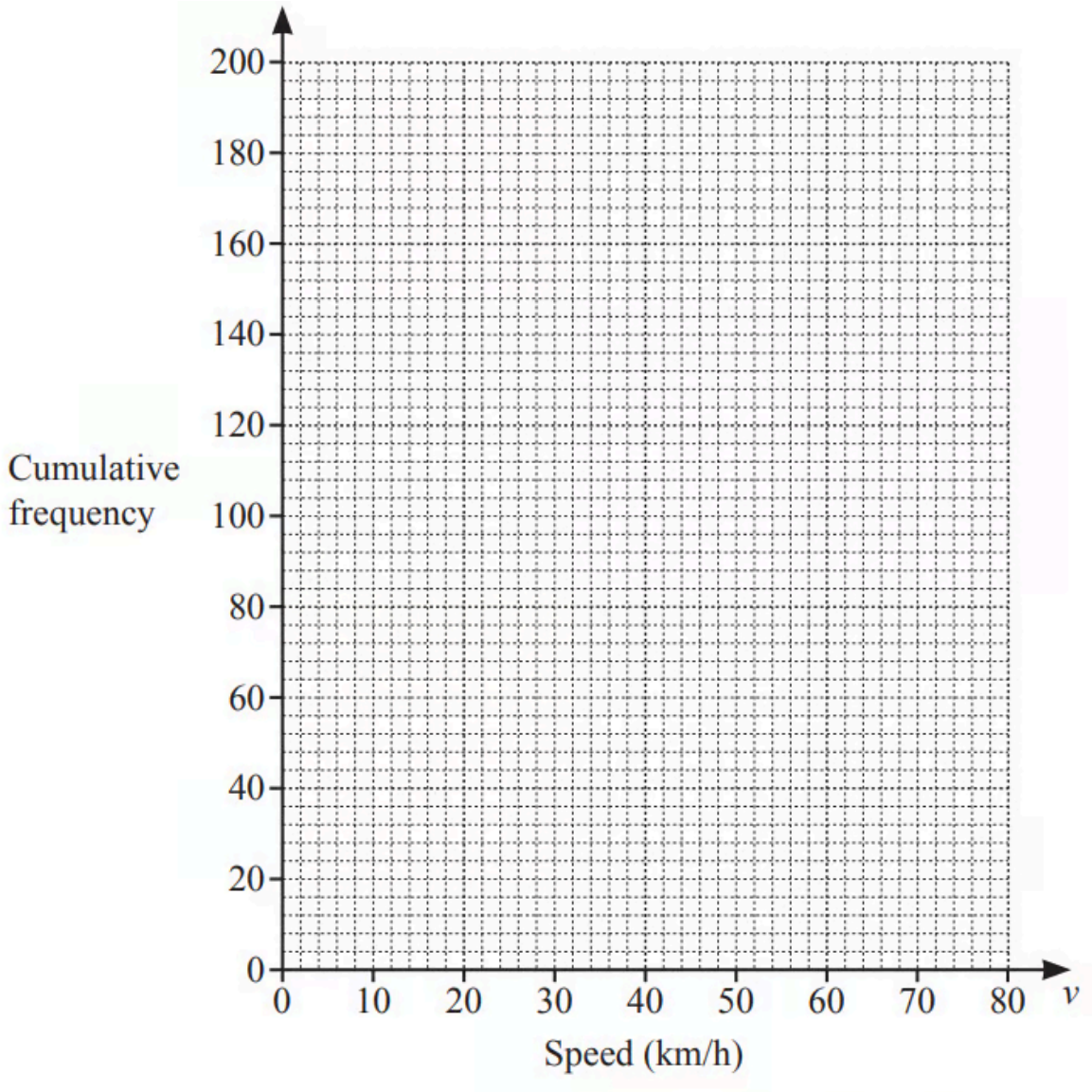
Speed (v km/h)	$0 < v \leq 20$	$20 < v \leq 40$	$40 < v \leq 45$	$45 < v \leq 50$	$50 < v \leq 60$	$60 < v \leq 80$
Frequency	16	34	62	58	26	4

i) Use the frequency table to complete the cumulative frequency table.

Speed (v km/h)	$v \leq 20$	$v \leq 40$	$v \leq 45$	$v \leq 50$	$v \leq 60$	$v \leq 80$
Cumulative Frequency	16	50			196	200

[1]

ii) On the grid, draw a cumulative frequency diagram.



[3]
(4 marks)

(b) Use your diagram to find an estimate of

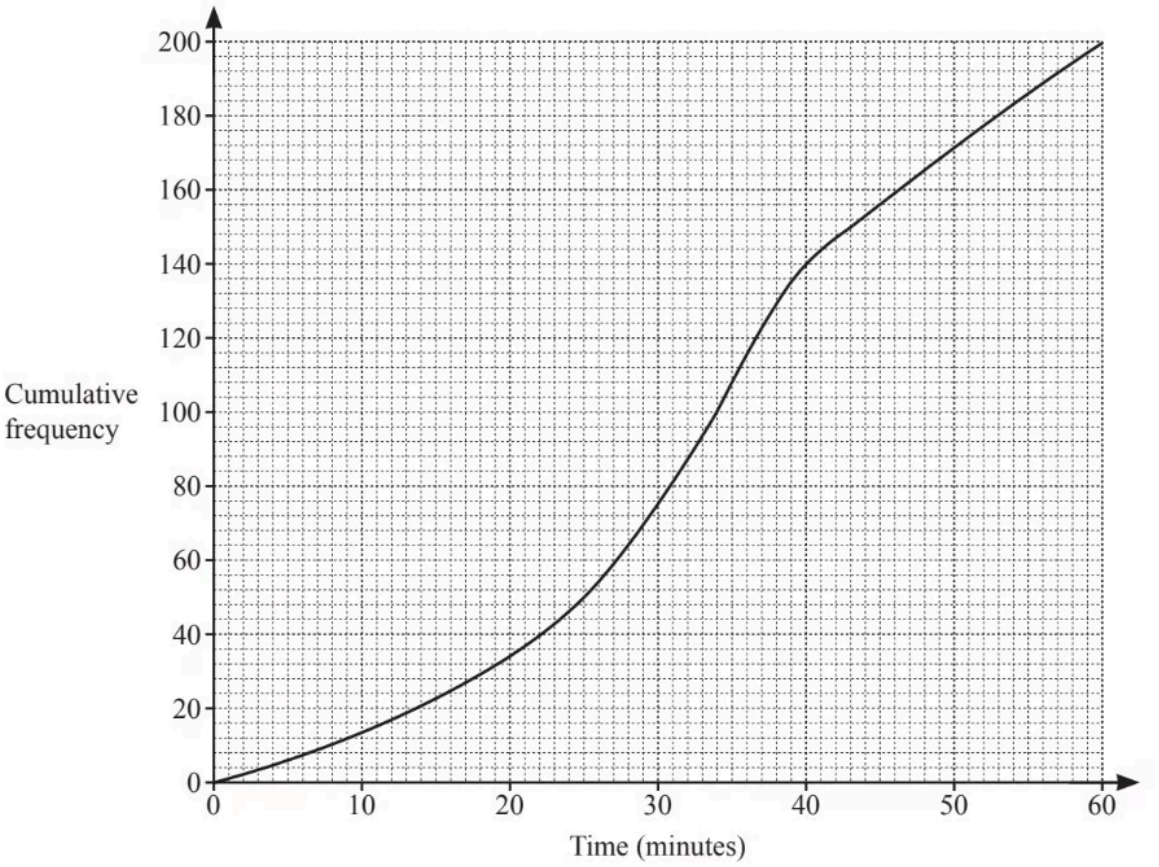
i) the upper quartile,

..... km/h [1]

ii) the number of cars with a speed greater than 35 km/h.

[2]
(3 marks)

6



Use the cumulative frequency diagram to find an estimate for

i) the median,

..... min [1]

ii) the interquartile range,

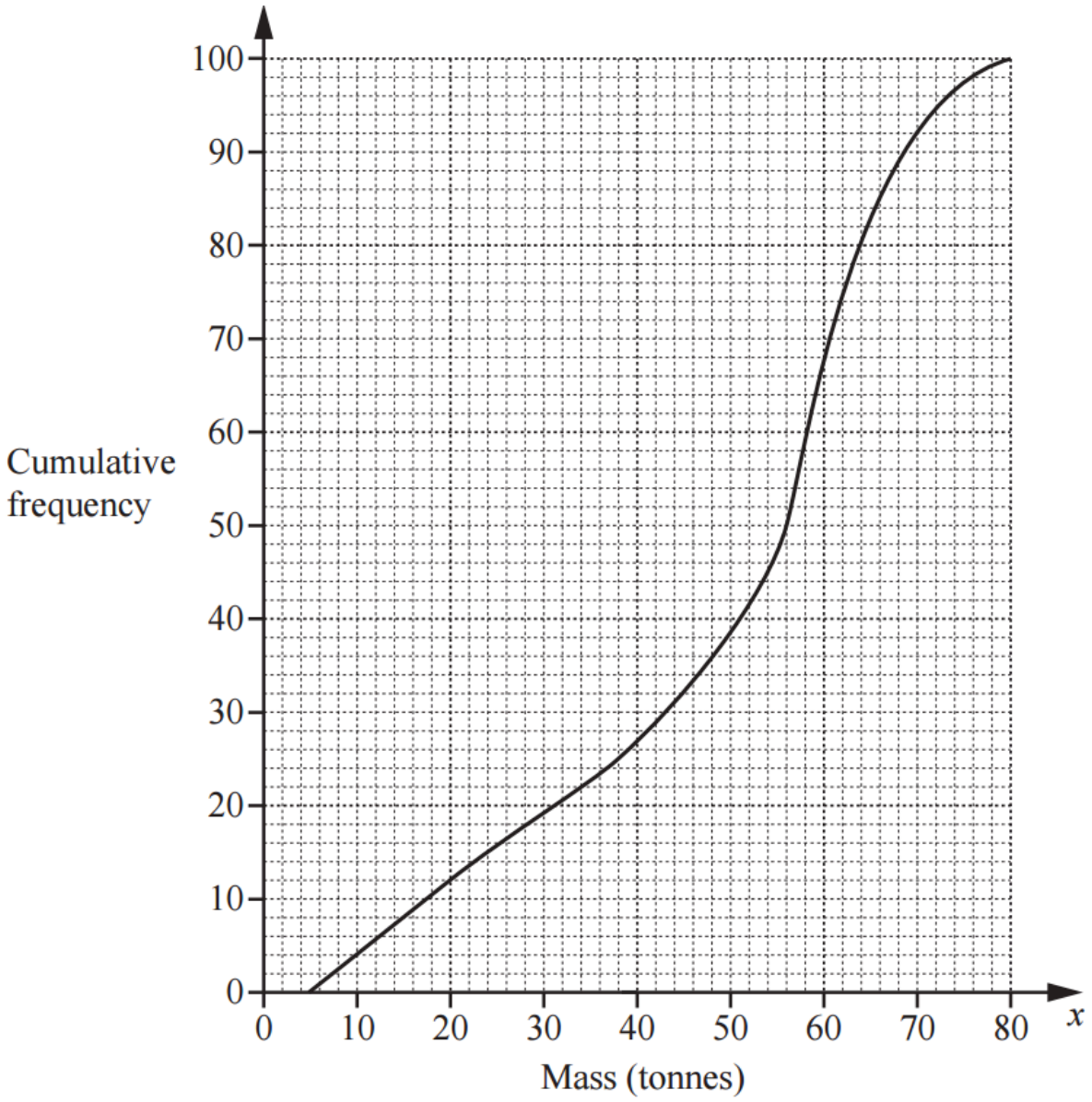
..... min [2]

iii) the number of students who took more than 40 minutes.

[2]

(5 marks)

7 A factory recycles metal.
The mass, x tonnes, of metal is measured each day for a number of days.
The cumulative frequency diagram shows the results.



i) For how many days was the mass measured?

[1]

ii) Find an estimate of the median.

..... tonnes [1]

iii) Find an estimate of the upper quartile.

..... tonnes [1]

iv)Find an estimate of the interquartile range.

.....tonnes [1]

v)Find an estimate of the number of days when the mass was greater than 20 tonnes.

[2]

(6 marks)

8 (a) The heights, metres, of the 120 boys in an athletics club are recorded.
The table shows information about the heights of the boys.

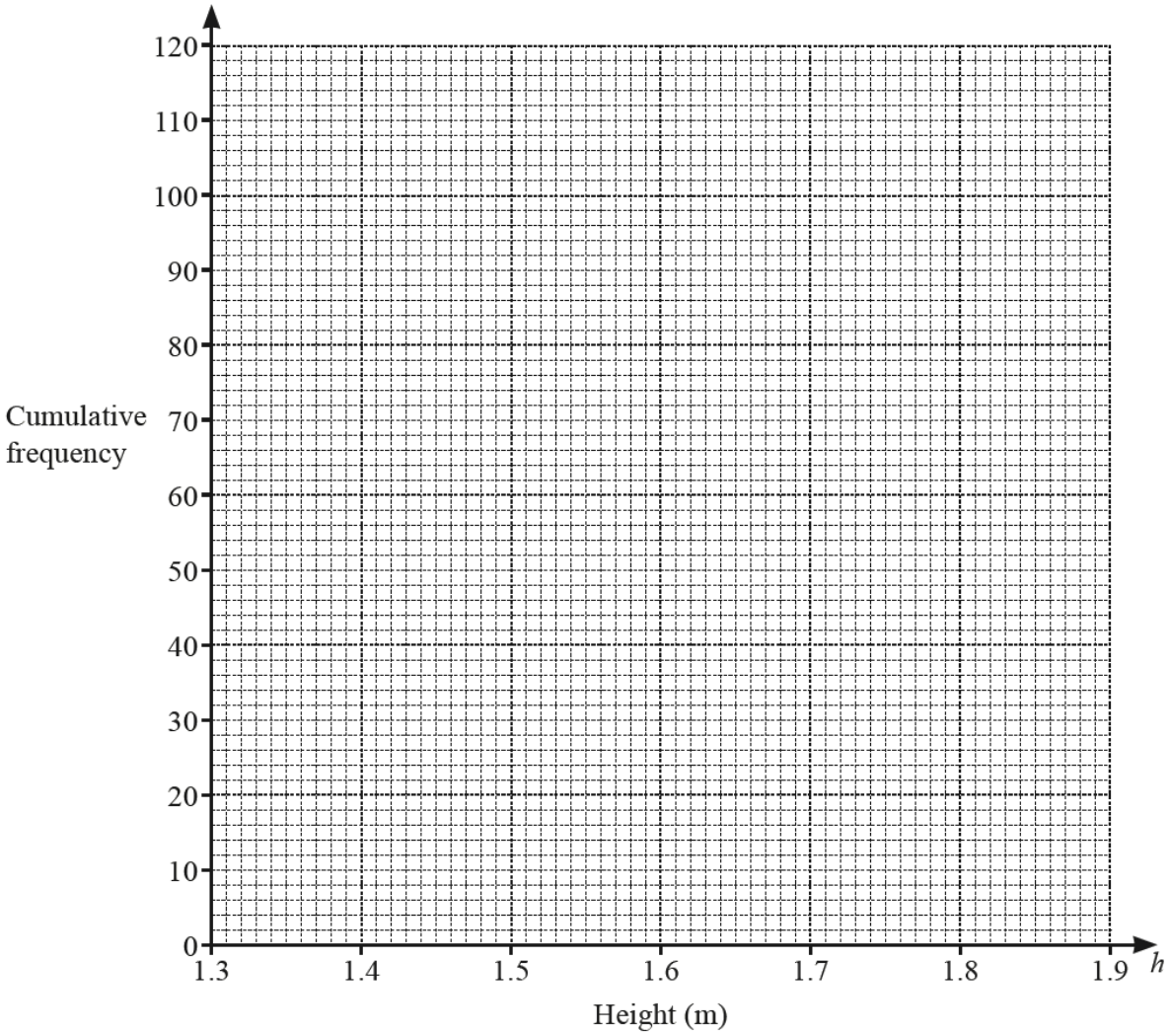
Height (h metres)	$1.3 < h \leq 1.4$	$1.4 < h \leq 1.5$	$1.5 < h \leq 1.6$	$1.6 < h \leq 1.7$	$1.7 < h \leq 1.8$	$1.8 < h \leq 1.9$
Frequency	7	18	30	24	27	14

i) Use the frequency table to complete the cumulative frequency table.

Height (h metres)	$h \leq 1.4$	$h \leq 1.5$	$h \leq 1.6$	$h \leq 1.7$	$h \leq 1.8$	$h \leq 1.9$
Cumulative frequency	7	25				

[2]

ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(5 marks)

(b) Use your diagram to find an estimate for

i) the median height,

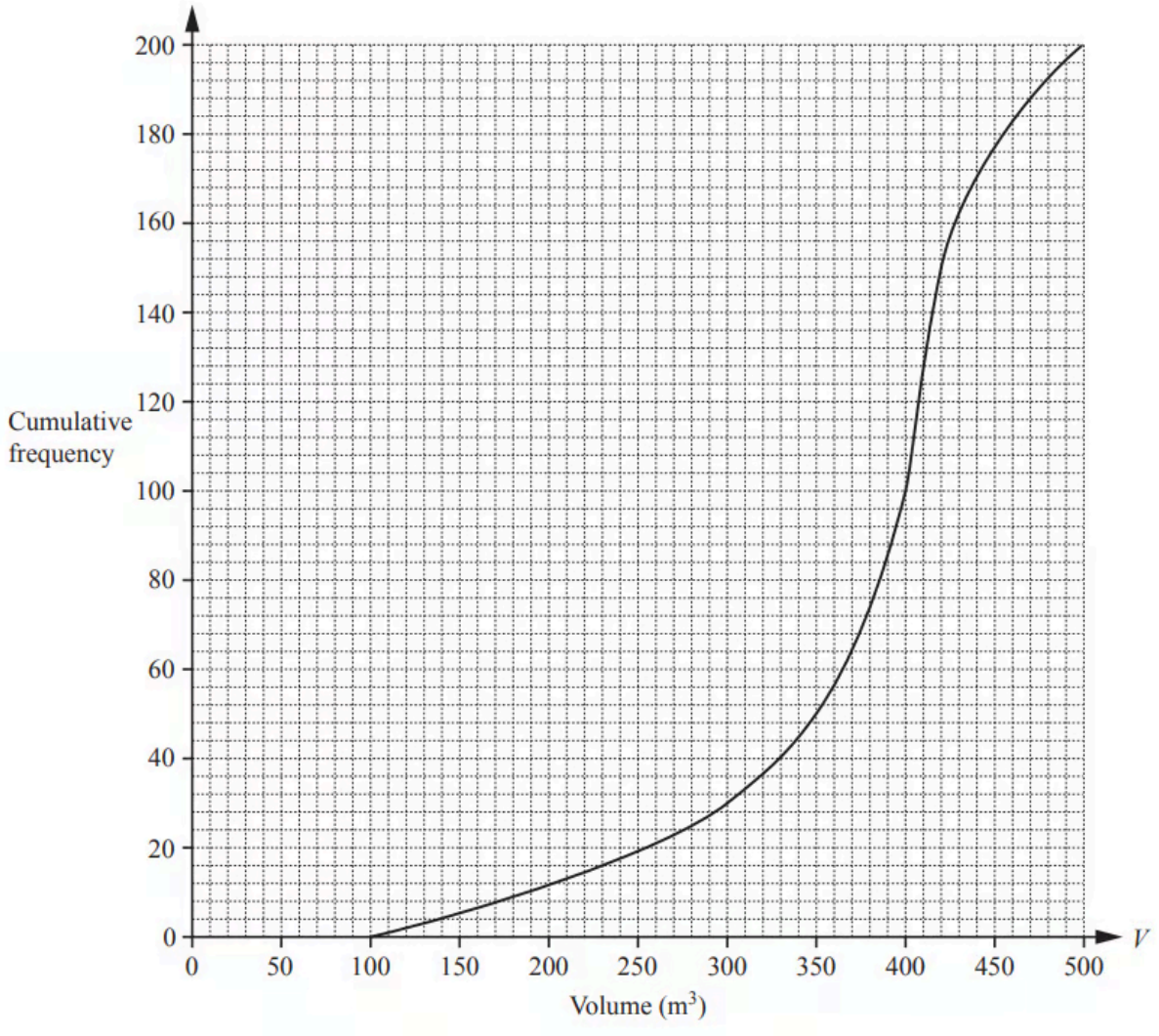
..... m [1]

ii) the 40th percentile.

..... m [2]

(3 marks)

9 200 students estimate the volume, $V\,\text{m}^3$, of a classroom.
The cumulative frequency diagram shows their results.



Use the graph to find an estimate of

i) the median,

..... m^3 [1]

ii) the interquartile range,

..... m^3 [2]

iii) the 60^{th} percentile,

..... m^3 [1]

iv) the number of students who estimate that the volume is greater than 300 m^3.

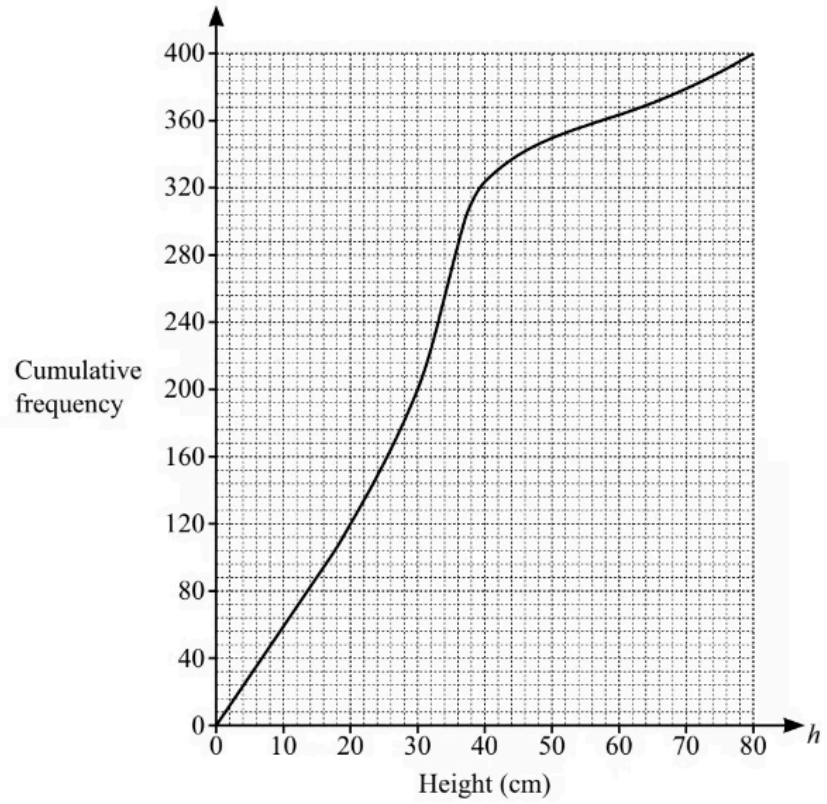
[2]

(6 marks)

Hard Questions

1 A student measures the height, h cm, of each of 400 plants.

The cumulative frequency diagram shows the results.



Use the diagram to find an estimate for

i) the median

..... cm[1]

ii) the interquartile range

..... cm[2]

iii) the 80th percentile

..... cm[2]

iv) the number of plants with a height greater than 60cm.

[2]

(7 marks)

2 (a) 100 students were each asked how much money, $\$m$, they spent in one week. The frequency table shows the results.

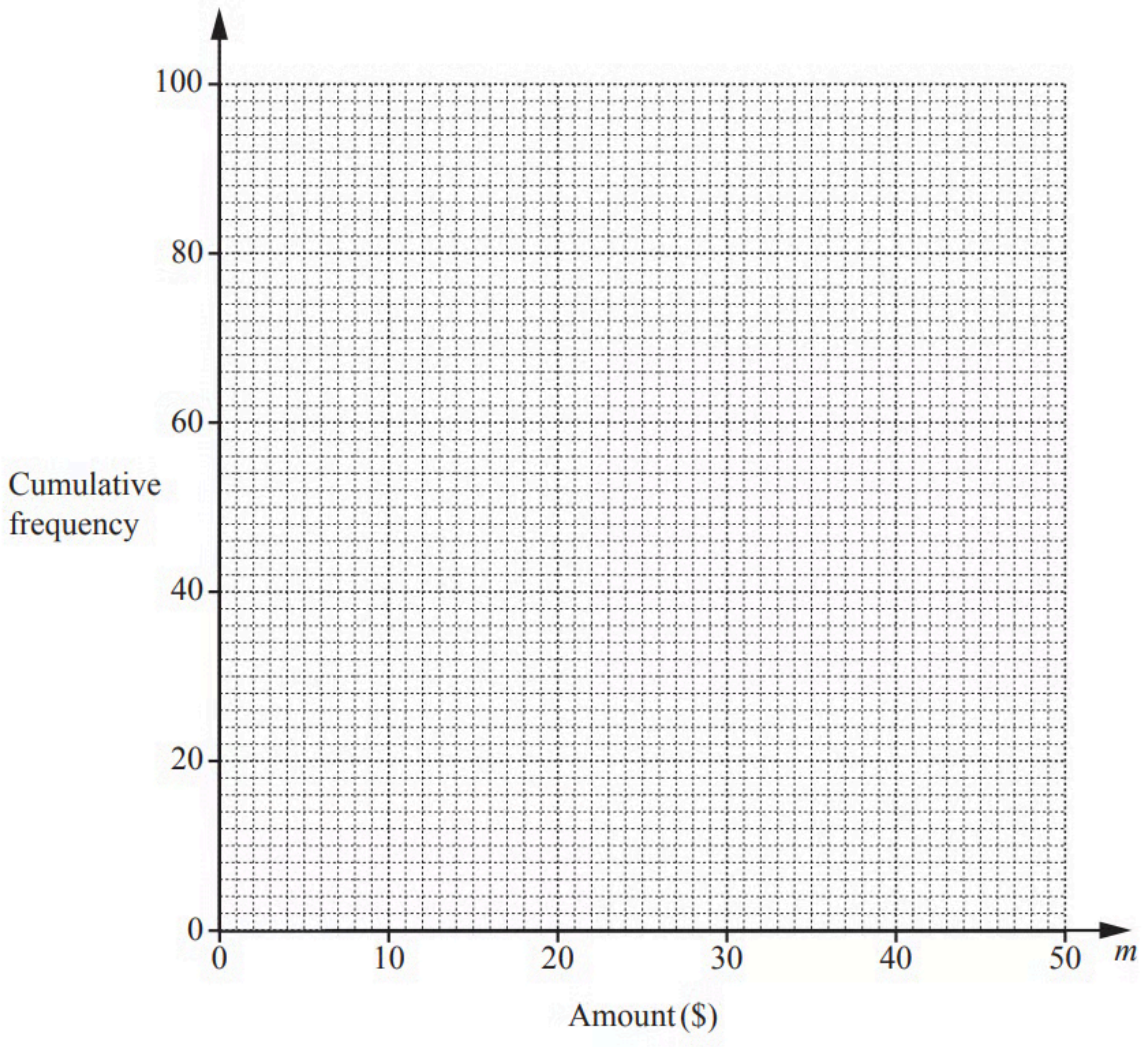
Amount $(\$m)$	$0 < m \leq 5$	$5 < m \leq 10$	$10 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 50$
Frequency	16	38	30	9	7

Complete the cumulative frequency table below.

Amount $(\$m)$	$m \leq 5$	$m \leq 10$	$m \leq 20$	$m \leq 30$	$m \leq 50$
Cumulative Frequency	16				100

(2 marks)

(b) On the grid, draw the cumulative frequency diagram.



(3 marks)

(c) Use your cumulative frequency diagram to find an estimate for

i) the median,

$ ..... [1]

ii) the interquartile range,

$ ..... [2]

iii) the number of students who spent more than $25.

[2]

(5 marks)

3 (a) The frequency table shows information about the time, m minutes, that each of 160 people spend in a library.

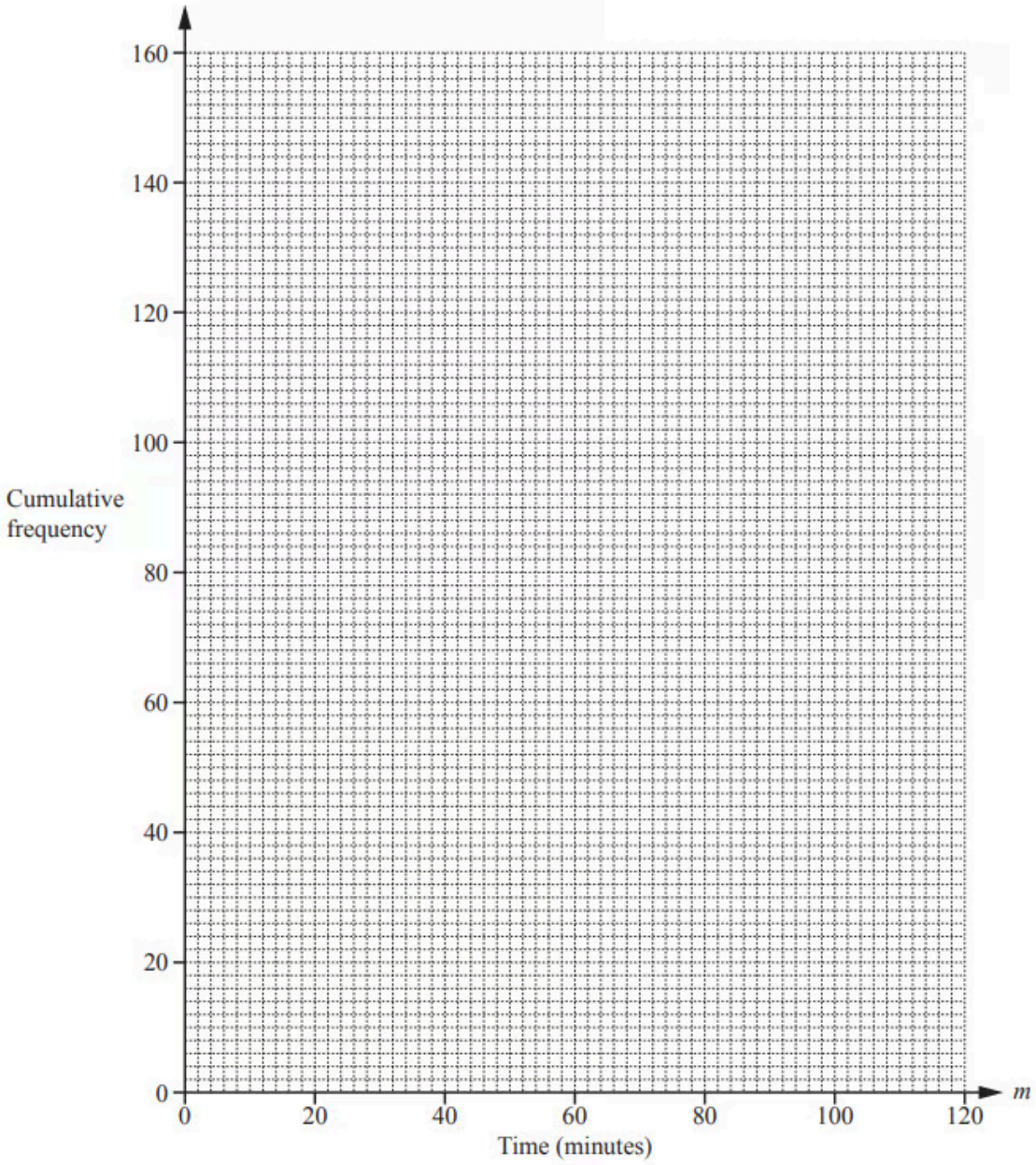
Time (m minutes)	$0 < m \leq 10$	$10 < m \leq 40$	$40 < m \leq 60$	$60 < m \leq 90$	$90 < m \leq 100$	$100 < m \leq 120$
Frequency	3	39	43	55	11	9

i) Complete the cumulative frequency table.

Time (m minutes)	$m \leq 10$	$m \leq 40$	$m \leq 60$	$m \leq 90$	$m \leq 100$	$m \leq 120$
Cumulative frequency	3	42				

[2]

ii) On the grid, draw the cumulative frequency diagram.



[3]

(5 marks)

(b) Use your cumulative frequency diagram to find

i) the median,

..... min [1]

ii) the interquartile range,

..... min [2]

iii) the 90^{th} percentile,

..... min [2]

iv) the number of people who spend more than 30 minutes in the library.

[2]

(7 marks)