

1 The frequency table gives information about the ages of the 80 people in a train carriage.

Age (a years)	Frequency
$0 < a \leq 20$	9
$20 < a \leq 30$	19
$30 < a \leq 40$	17
$40 < a \leq 50$	18
$50 < a \leq 60$	13
$60 < a \leq 70$	4

(a) Complete the cumulative frequency table.

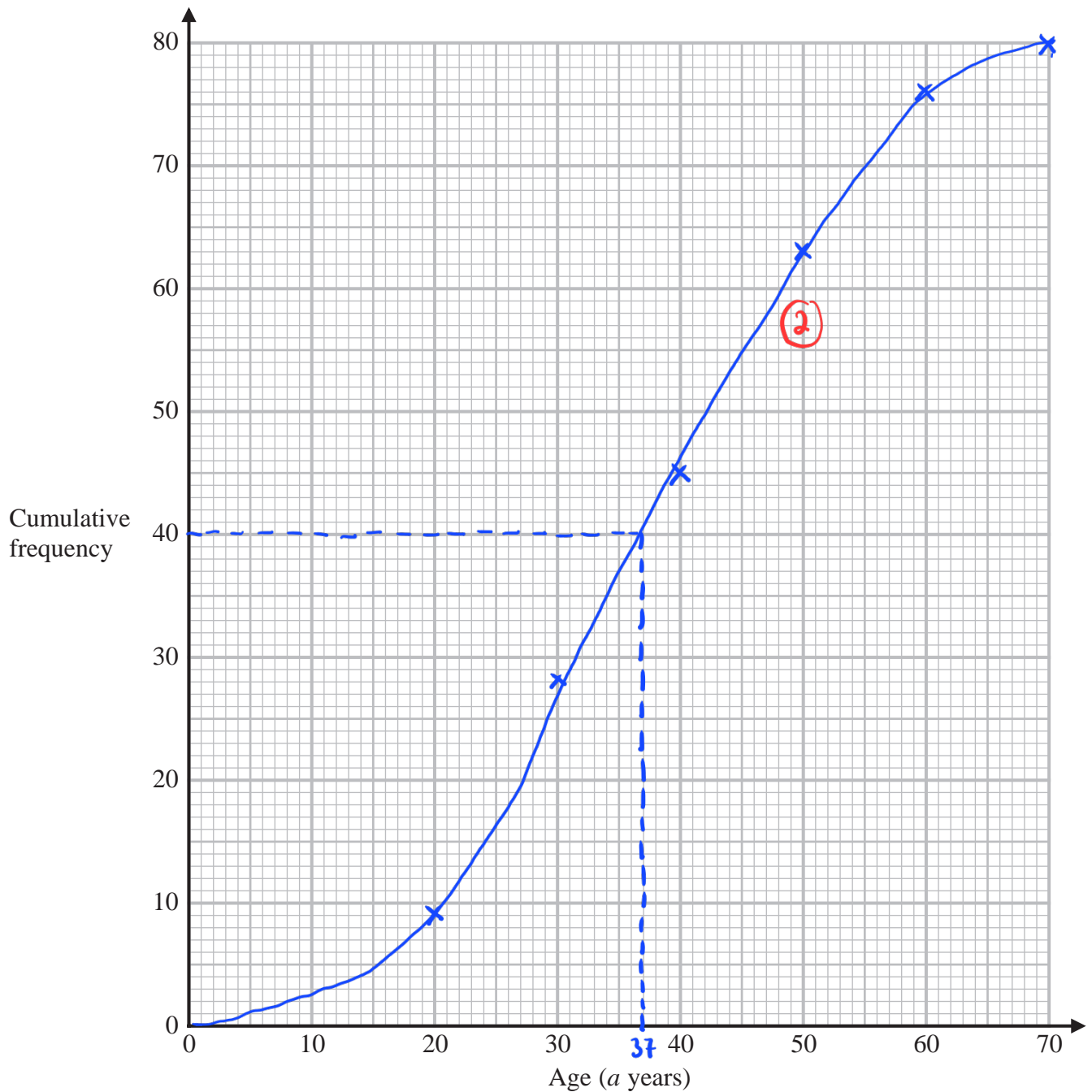
Age (a years)	Cumulative frequency
$0 < a \leq 20$	9
$0 < a \leq 30$	28
$0 < a \leq 40$	45
$0 < a \leq 50$	63
$0 < a \leq 60$	76
$0 < a \leq 70$	80

①

$$\begin{aligned} & 9 + 19 = 28 \\ & 28 + 17 = 45 \\ & \vdots \\ & \text{etc} \end{aligned}$$

(1)

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



(2)

(c) Use your graph to find an estimate for the median age of the people in the train carriage.

$$\text{median} = \frac{80}{2} = 40 \text{ (from graph)}$$

37 years
 (2)

(Total for Question 1 is 5 marks)

2 The table shows information about the number of minutes each of 120 buses was late last Monday.

Number of minutes late (L)	Frequency
$0 < L \leq 10$	10
$10 < L \leq 20$	16
$20 < L \leq 30$	44
$30 < L \leq 40$	29
$40 < L \leq 50$	15
$50 < L \leq 60$	6

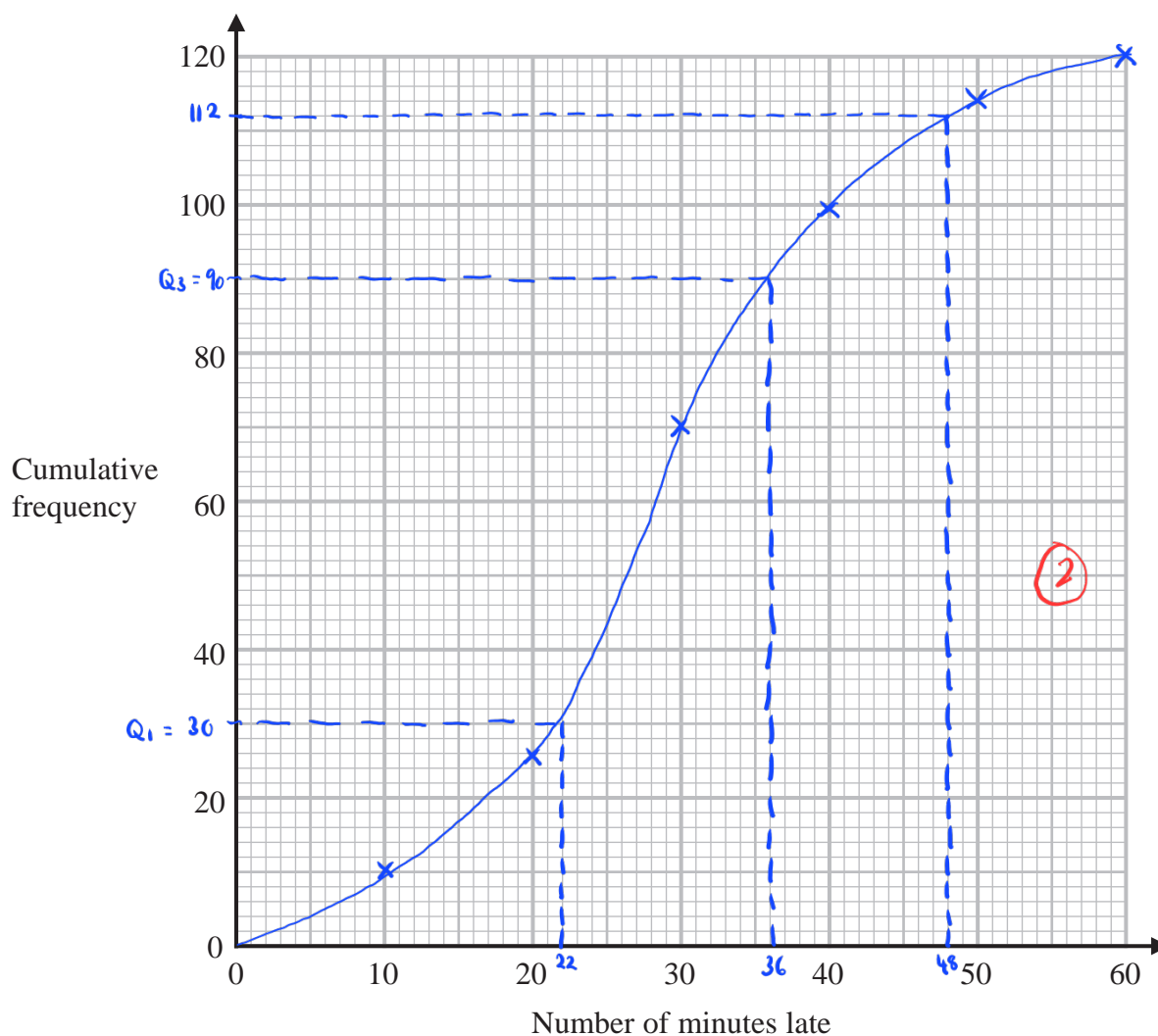
(a) Complete the cumulative frequency table below.

Number of minutes late (L)	Cumulative frequency
$0 < L \leq 10$	10
$0 < L \leq 20$	26
$0 < L \leq 30$	70
$0 < L \leq 40$	99
$0 < L \leq 50$	114
$0 < L \leq 60$	120

(1)

(1)

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



(2)

(c) Use your graph to find an estimate for the interquartile range.

$$Q_1 = \frac{1}{4} \times 120 = 30^{\text{th}} = 22 \text{ (from graph)} \quad Q_3 = \frac{3}{4} \times 120 = 90^{\text{th}} = 36 \text{ (from graph)}$$

(1)

$$IQR = Q_3 - Q_1$$

$$= 36 - 22 = 14 \quad (1)$$

14 minutes
(2)

(d) Use your graph to find an estimate for the number of buses that were more than 48 minutes late last Monday.

$$\text{More than 48 minutes} = 120 - 112 \quad (1)$$

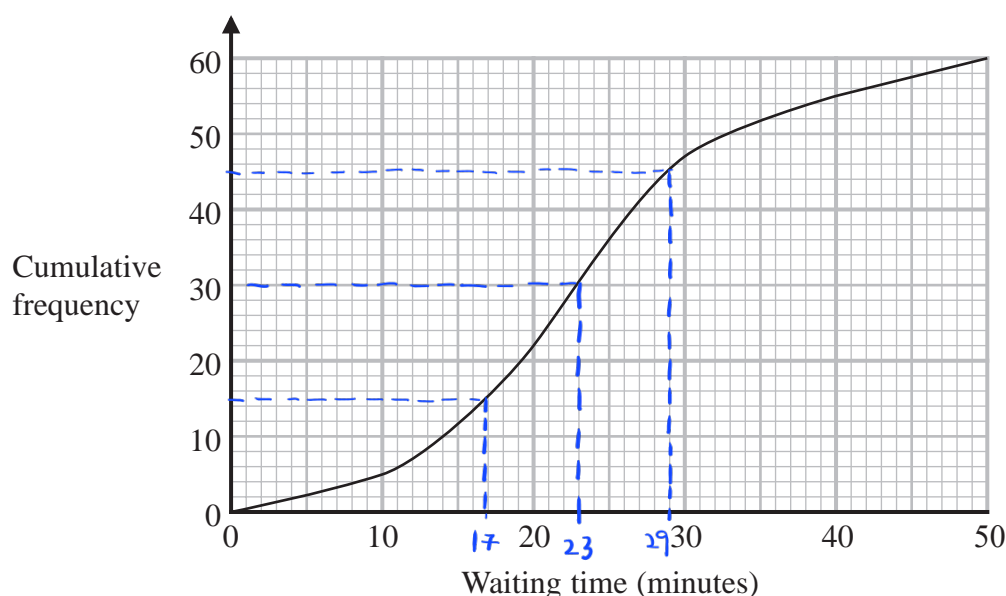
$$= 8 \quad (1)$$

8

(2)

(Total for Question 2 is 7 marks)

- 3 The cumulative frequency graph gives information about the waiting times, in minutes, of people with appointments at Hospital A.



- (a) Use the graph to find an estimate of the median waiting time at Hospital A.

half of
cumulative frequency

23 (1) minutes
(1)

- (b) Use the graph to find an estimate of the interquartile range of the waiting times at Hospital A.

Interquartile range = $Q_3 - Q_1$

$$IQR = 29 - 17 = 12$$

12 (1) minutes
(2)

At a different hospital, Hospital B, the median waiting time is 28 minutes and the interquartile range of the waiting times is 19 minutes.

- (c) Compare the waiting times at Hospital A with the waiting times at Hospital B.

Hospital A has a lower waiting time than Hospital B because its

(1) median is lower than Hospital B. The waiting time for Hospital A is less spread than Hospital B because the interquartile range is lower.

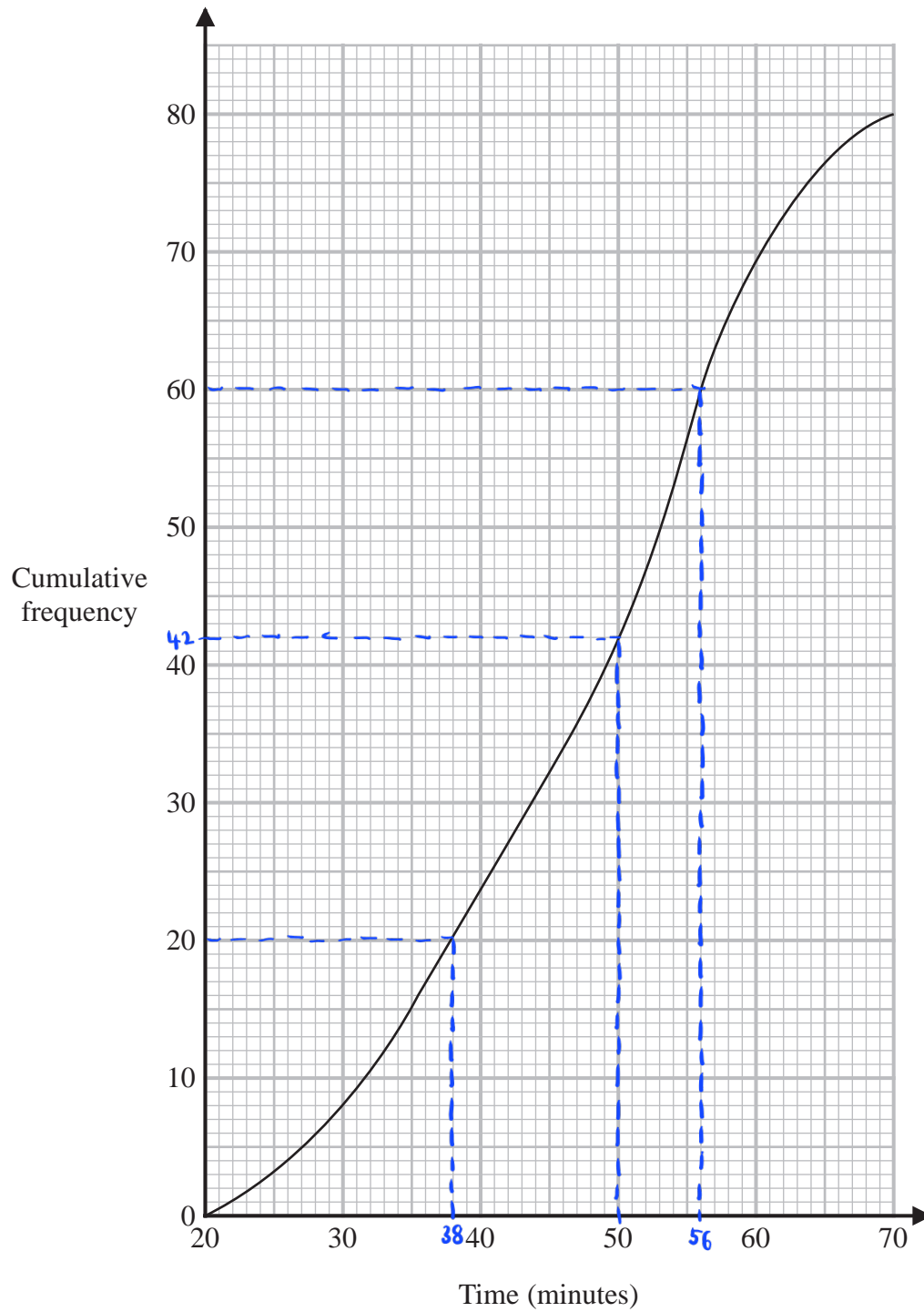
(1)

(2)

(Total for Question 3 is 5 marks)

- 4 A total of 80 men and women took part in a race.

The cumulative frequency graph gives information about the times, in minutes, they took for the race.



(a) Use the graph to find an estimate for the interquartile range.

$$Q_1 = \frac{1}{4} \times 80 = 20 \quad Q_3 = \frac{3}{4} \times 80 = 60$$

$$Q_1 = 38 \quad Q_3 = 56$$

$$\begin{aligned} \text{Interquartile range} &: 56 - 38 \quad (1) \\ &= 18 \quad (1) \end{aligned}$$

$$\begin{aligned} &18 \text{ minutes} \\ &\quad (2) \end{aligned}$$

60% of the men took 50 minutes or less for the race.

No women took 50 minutes or less for the race.

(b) Work out an estimate for the number of men who took part in the race.

From graph: 42 men took 50 minutes or less for the race. (1)

$$42 = 60\% \text{ of the men}$$

$$\begin{aligned} \text{Total men} &: \frac{100}{60} \times 42 \quad (1) \\ &= 70 \quad (1) \end{aligned}$$

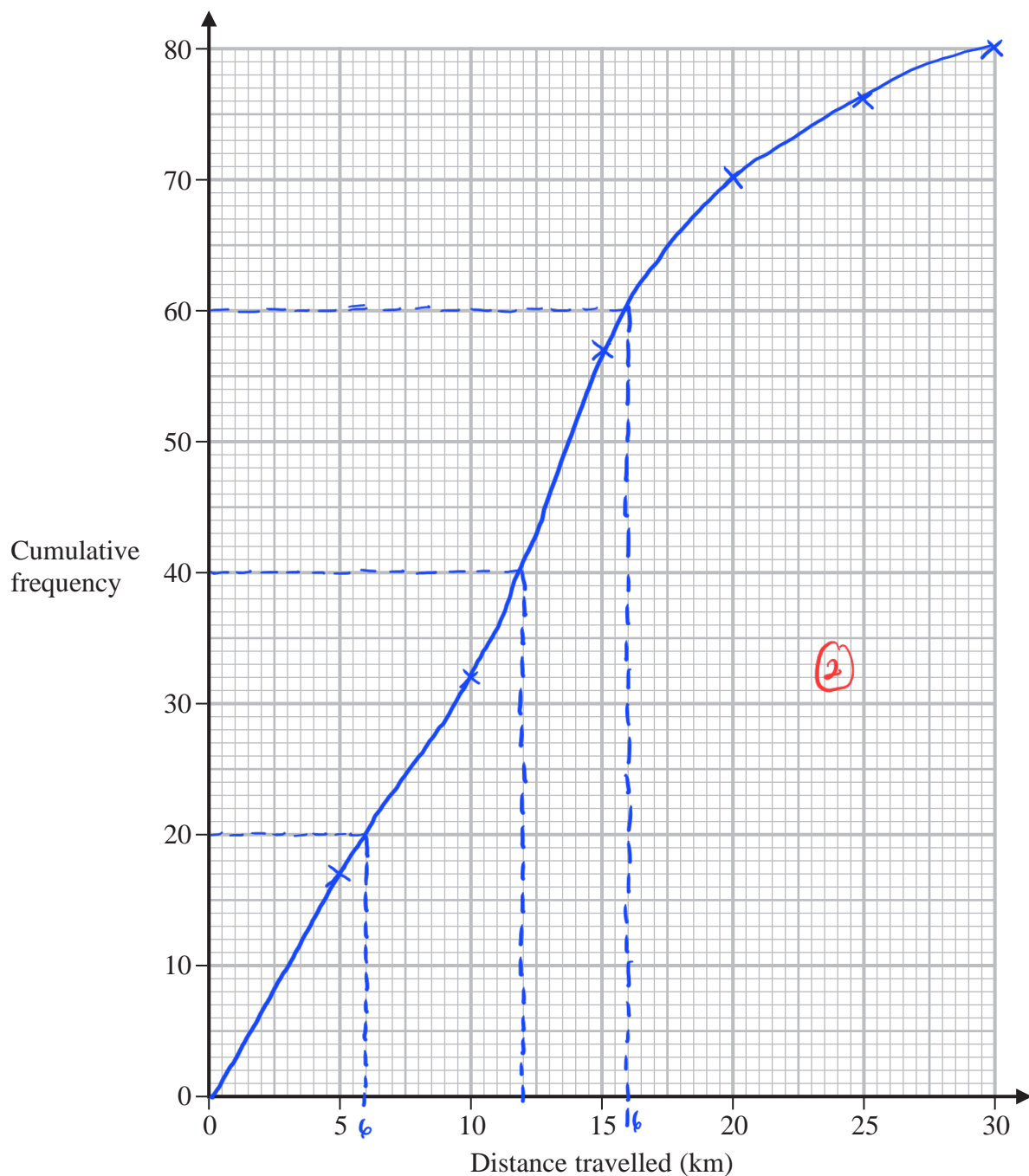
$$\begin{aligned} &70 \\ &\quad (3) \end{aligned}$$

(Total for Question 4 is 5 marks)

- 5 The cumulative frequency table gives information about the distance, in kilometres, that each of 80 workers travel from home to work at Office A.

Distance travelled (d km)	Cumulative frequency
$0 < d \leq 5$	17
$0 < d \leq 10$	32
$0 < d \leq 15$	57
$0 < d \leq 20$	70
$0 < d \leq 25$	76
$0 < d \leq 30$	80

- (a) On the grid below, draw a cumulative frequency graph for the information in the table.



(b) Use your graph to find an estimate for the median distance travelled.

$$\text{Median} = \frac{80}{2} = 40 \text{ - from graph}$$

..... 12 km
(1)

(c) Use your graph to find an estimate for the interquartile range of the distances travelled.

$$Q_1 : \frac{1}{4} \times 80 = 20 \quad Q_3 : \frac{3}{4} \times 80 = 60$$

$$\begin{aligned} \text{Interquartile range} &= 16 - 6 \quad (1) \\ &= 10 \quad (1) \end{aligned}$$

..... 10 km
(2)

For Office B, the median distance workers travel from home to work is 15 km and the interquartile range is 5 km.

(d) Use the information above to compare the distances that workers at Office A and workers at Office B travel from home to work.
Write down **two** comparisons.

1..... workers in Office B travels further than workers in Office A since the median
is higher. (1)

2..... The distance travelled by workers in Office A is more spread out as the
interquartile range is bigger. (1)

(2)

(Total for Question 5 is 7 marks)

- 6 The manager of a call centre asked the 120 people, who rang the call centre last week, how long they each waited before their call was answered.

The table gives information about their replies.

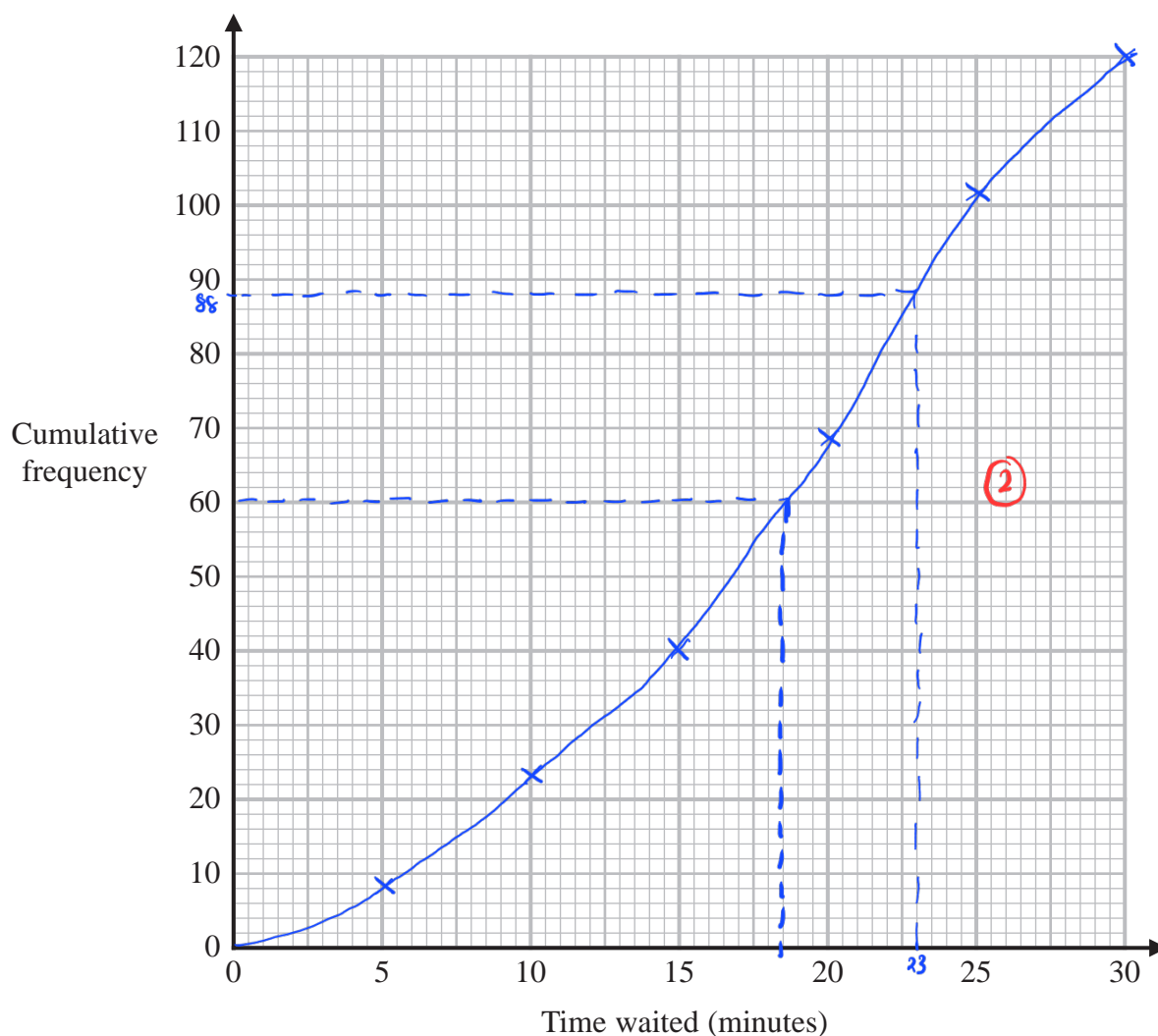
Time waited (t minutes)	Frequency
$0 < t \leq 5$	8
$5 < t \leq 10$	15
$10 < t \leq 15$	17
$15 < t \leq 20$	28
$20 < t \leq 25$	33
$25 < t \leq 30$	19

- (a) Complete the cumulative frequency table.

Time waited (t minutes)	Cumulative frequency
$0 < t \leq 5$	8
$0 < t \leq 10$	23
$0 < t \leq 15$	40
$0 < t \leq 20$	68
$0 < t \leq 25$	101
$0 < t \leq 30$	120

(1)

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



(2)

(c) Use your graph to find an estimate for the median of the times waited.

$$\text{median} = \frac{120}{2} = 60$$

18.5 (1)

..... minutes
(1)

(d) Using your graph, find an estimate for the percentage of the 120 people who said that they waited longer than 23 minutes before their call was answered.
Show your working clearly.

From graph, 23 minutes = 88

$$120 - 88 = 32 \quad (1)$$

Percentage of people waited longer than 23 minutes :

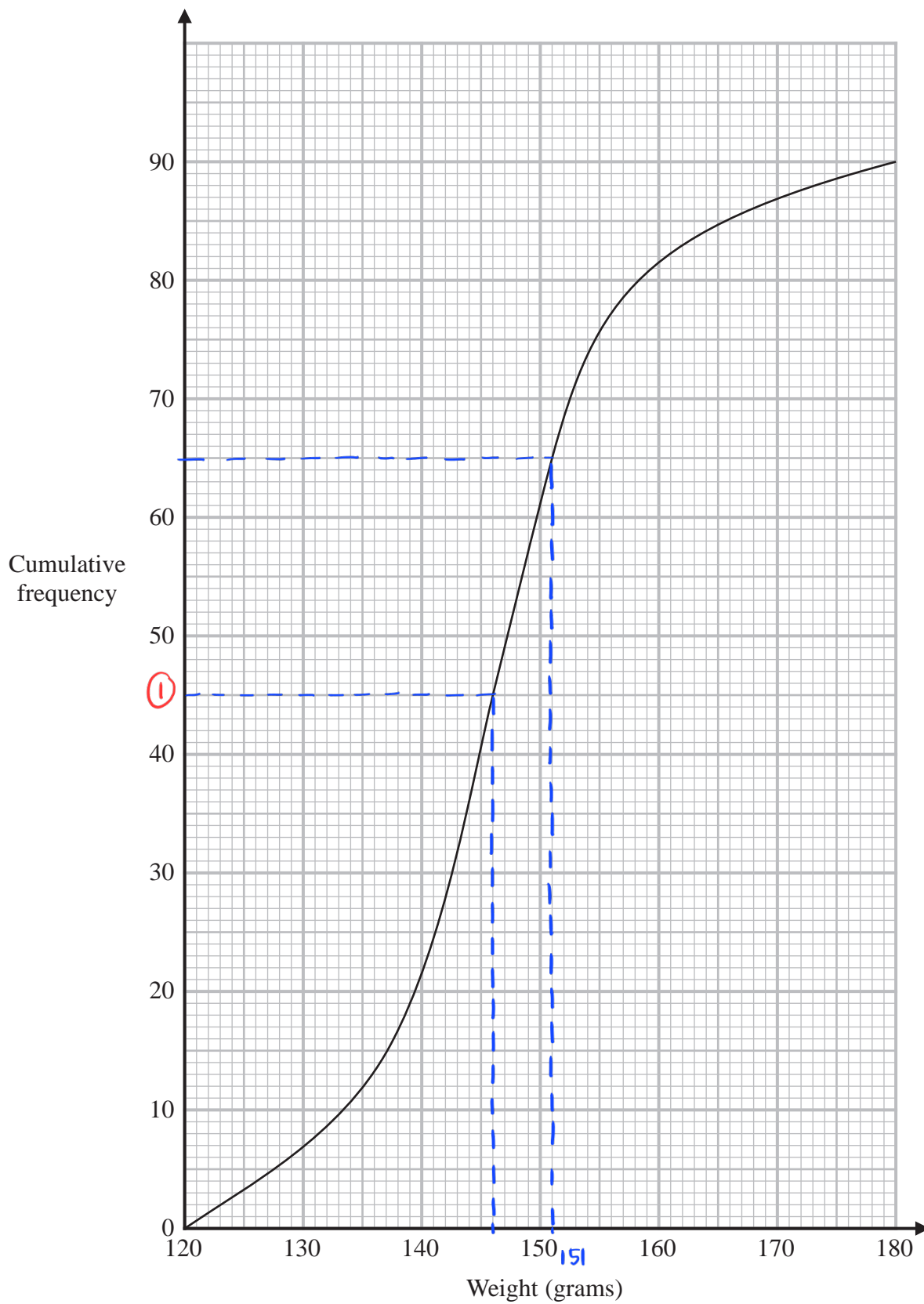
$$\frac{32}{120} \times 100\% = 26.7\% \quad (1)$$

26.7

..... %
(2)

(Total for Question 6 is 6 marks)

- 7 The cumulative frequency graph gives information about the weights, in grams, of 90 bags of sweets.



(a) Find an estimate for the median of the weights of these bags of sweets.

$$\begin{array}{r} 146 \text{ (1)} \\ \hline \text{(2)} \end{array} \text{ grams}$$

Roberto sells the bags of sweets to raise money for charity.

Bags with a weight greater than d grams are labelled large bags and sold for 3.75 euros each bag.

The total amount of money he receives by selling all the large bags is 93.75 euros.

(b) Find the value of d .

$$\text{number of large bags} = x$$

$$3.75x = 93.75$$

$$\begin{aligned} x &= 93.75 \div 3.75 \\ &= 25 \text{ (1)} \end{aligned}$$

Look in the cumulative graph to find d

$$90 - 25 = 65 \text{ (1)}$$

$$d = 151 \text{ (1)}$$

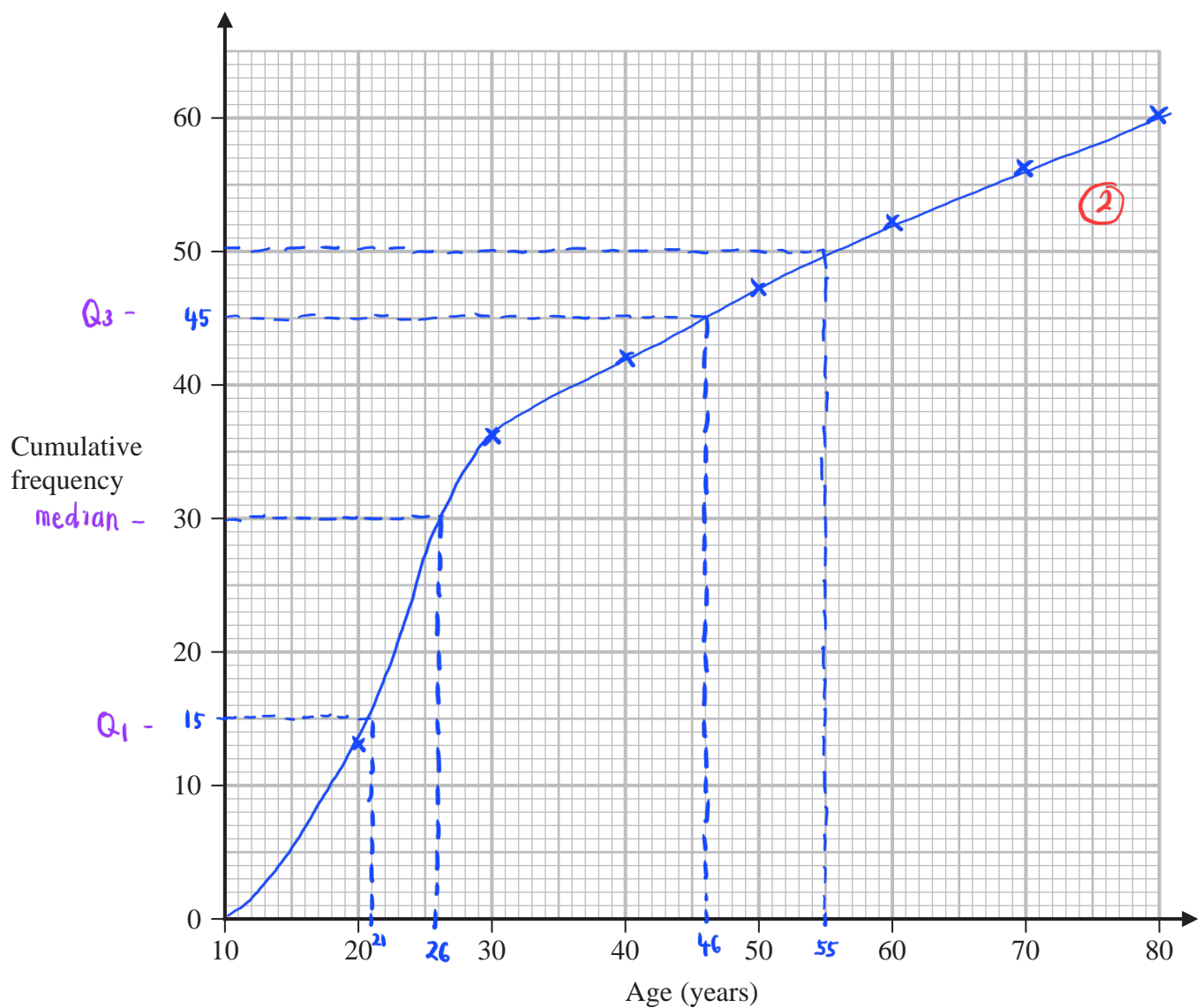
$$d = \begin{array}{r} 151 \\ \hline \text{(3)} \end{array}$$

(Total for Question 7 is 5 marks)

- 8 The cumulative frequency table shows information about the ages of 60 people who went to a gym on Saturday.

Age (a years)	Cumulative frequency
$10 < a \leq 20$	13
$10 < a \leq 30$	36
$10 < a \leq 40$	42
$10 < a \leq 50$	47
$10 < a \leq 60$	52
$10 < a \leq 70$	56
$10 < a \leq 80$	60

- (a) On the grid, draw a cumulative frequency graph for the information in the table.



(b) Use your graph to find an estimate for the median of the ages of these people.

$$\text{Median} : \frac{60}{2} = 30 \text{ (from graph)}$$

26 ①
..... years
(1)

(c) Use your graph to find an estimate for the interquartile range of the ages of these people.

$$Q_1 = \frac{1}{4} \times 60 = 15 \text{ (from graph)}$$

$$Q_3 = \frac{3}{4} \times 60 = 45 \text{ (from graph)}$$

$$\text{Interquartile range} = Q_3 - Q_1$$

$$= 46 - 21 \text{ ①}$$

$$= 25 \text{ ①}$$

25
..... years
(2)

(d) Use your graph to find an estimate for the number of these people who are older than 55 years.

From graph :

$$60 - 50 \text{ ①}$$

$$= 10 \text{ ①}$$

10
.....
(2)

(Total for Question 8 is 7 marks)

9 The table gives information about the ages, in years, of 80 people in a train carriage.

Age (a years)	Frequency
$0 < a \leq 20$	7
$20 < a \leq 30$	25
$30 < a \leq 40$	20
$40 < a \leq 50$	14
$50 < a \leq 60$	8
$60 < a \leq 70$	6

(a) Complete the cumulative frequency table.

Age (a years)	Cumulative frequency
$0 < a \leq 20$	7
$0 < a \leq 30$	32
$0 < a \leq 40$	52
$0 < a \leq 50$	66
$0 < a \leq 60$	74
$0 < a \leq 70$	80

(1)

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

(2)

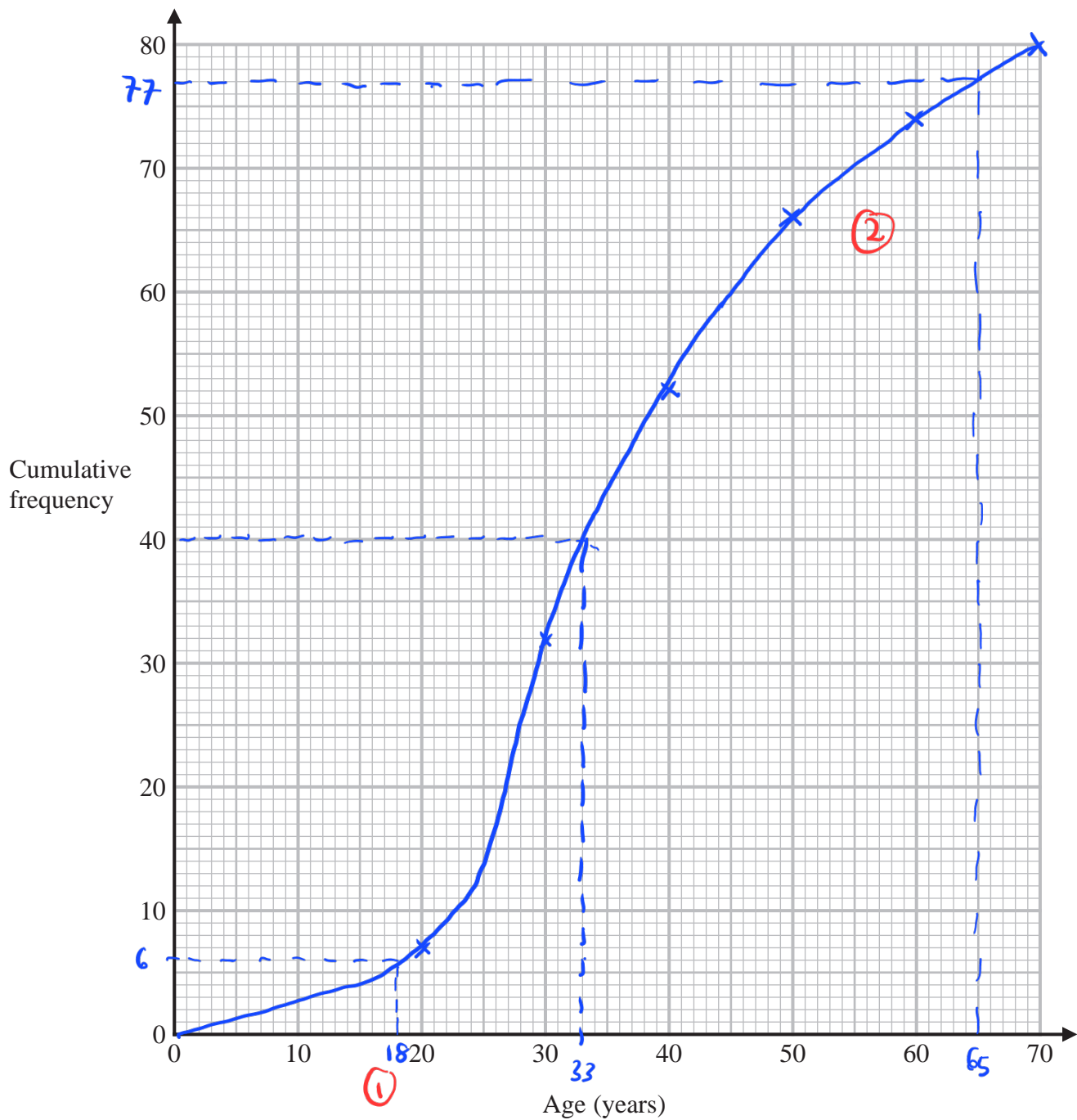
(c) Use your graph to find an estimate for the median age of the 80 people.

33

i

..... years

(1)



Of the people in the train carriage, 60% of those who are aged between 18 and 65 are going to work. None of the other people in the train carriage are going to work.

- (d) Use your graph to find an estimate for the number of people in the train carriage who are going to work.

$$\frac{60}{100} \times (77 - 6) = 42.6$$

$$\approx 43$$

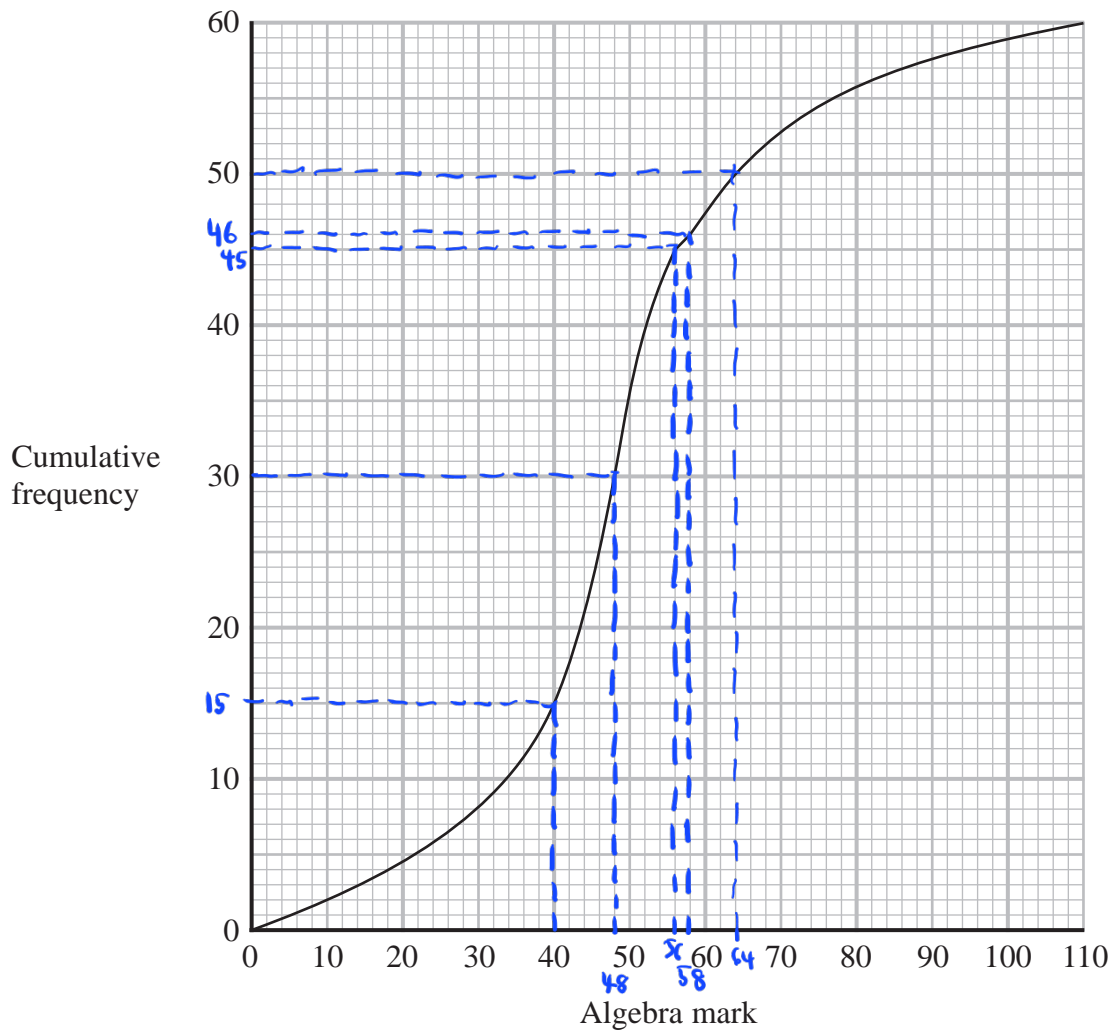
43

(3)

(Total for Question 9 is 7 marks)

- 10 A group of 60 students each sat an algebra test and a geometry test.
Each test was marked out of 110

The cumulative frequency graph gives information about the marks gained by the 60 students in the algebra test.



- (a) Use the graph to find an estimate for the median mark in the algebra test.

48 (1)

- (b) Use the graph to find an estimate for the number of students who gained 58 marks or less in the algebra test.

46 (1)

- (c) Use the graph to find an estimate for the interquartile range of the marks gained in the algebra test. $Q_3 = 56$

$$Q_1 = 40 \quad (1)$$

$$Q_3 - Q_1 = 56 - 40$$

$$= 16 \quad (1)$$

$$\frac{16}{(2)}$$

The interquartile range of the marks gained in the geometry test is 9

Luis says

“The students’ marks are more spread out in the algebra test than in the geometry test.”

- (d) Is Luis correct?

Give a reason for your answer.

Yes. Interquartile range for algebra test is greater than geometry test.

(1)

(1)

To be awarded a grade A in the algebra test, a student had to gain a mark greater than 64

Two students are to be selected at random from the 60 students in the group.

- (e) Use the graph to find an estimate for the probability that both of these students were awarded a grade A in the algebra test.

$$60 - 50 = 10 \quad (1)$$

$$\frac{10}{60} \times \frac{9}{59} = \frac{3}{118} \quad (1)$$

(1)

$$\frac{3}{118}$$

(3)

(Total for Question 10 is 8 marks)

- 11 The table gives information about the times, in minutes, taken by 80 customers to do their shopping in a supermarket.

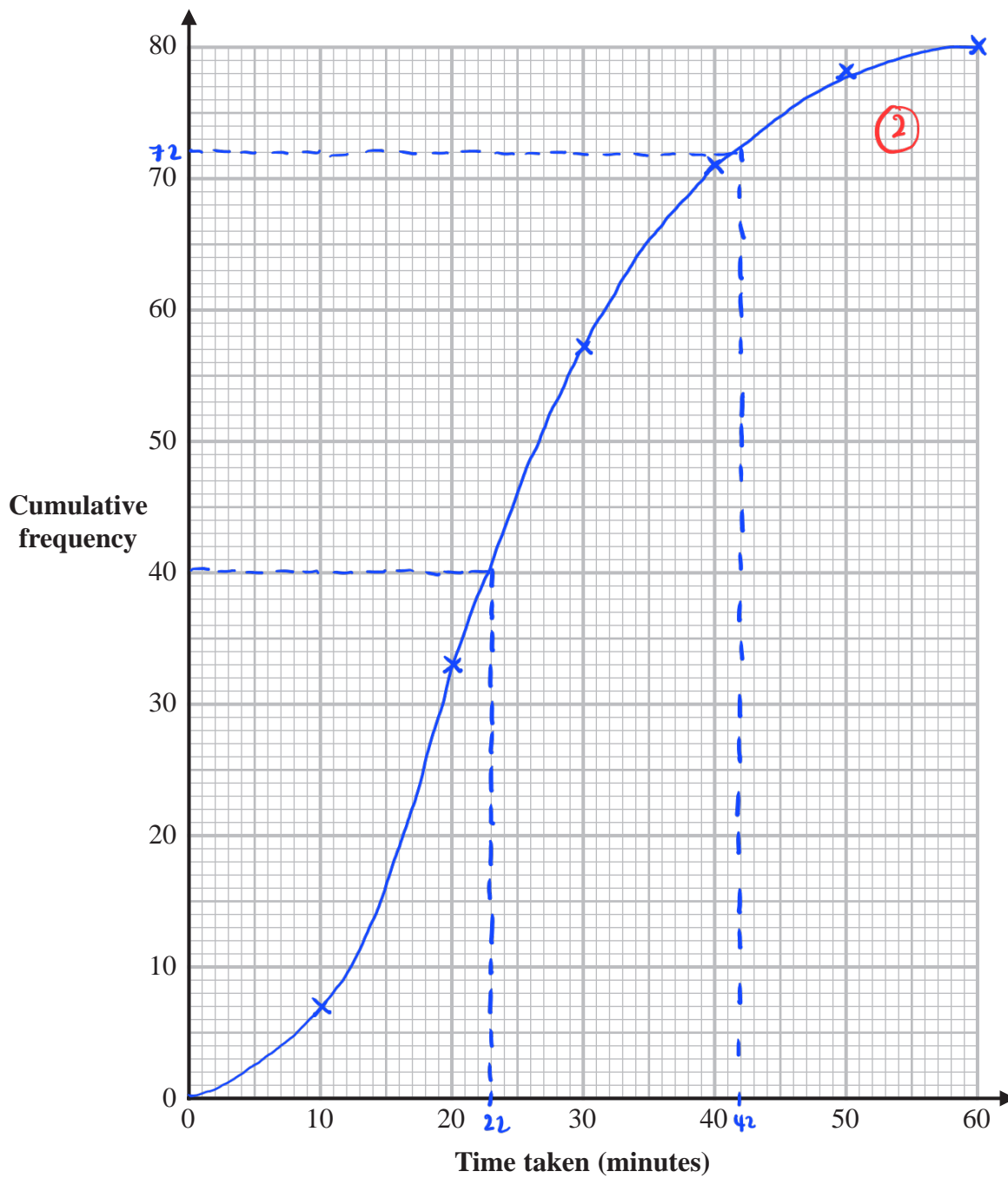
Time taken (t minutes)	Frequency
$0 < t \leq 10$	7
$10 < t \leq 20$	26
$20 < t \leq 30$	24
$30 < t \leq 40$	14
$40 < t \leq 50$	7
$50 < t \leq 60$	2

- (a) Complete the cumulative frequency table.

Time taken (t minutes)	Cumulative frequency
$0 < t \leq 10$	7
$0 < t \leq 20$	33
$0 < t \leq 30$	57
$0 < t \leq 40$	71
$0 < t \leq 50$	78
$0 < t \leq 60$	80

(1)

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



(2)

(c) Use your graph to find an estimate for the median time taken.

22 (1) minutes
(1)

One of the 80 customers is chosen at random.

(d) Use your graph to find an estimate for the probability that the time taken by this customer was more than 42 minutes.

$$80 - 72 = 8 \quad (1)$$

$$\frac{8}{80} \quad (1)$$

$$\frac{8}{80}$$

(2)

(Total for Question 11 is 6 marks)

- 12** The table shows information about the times, in minutes, that 80 patients had to wait to see a doctor.

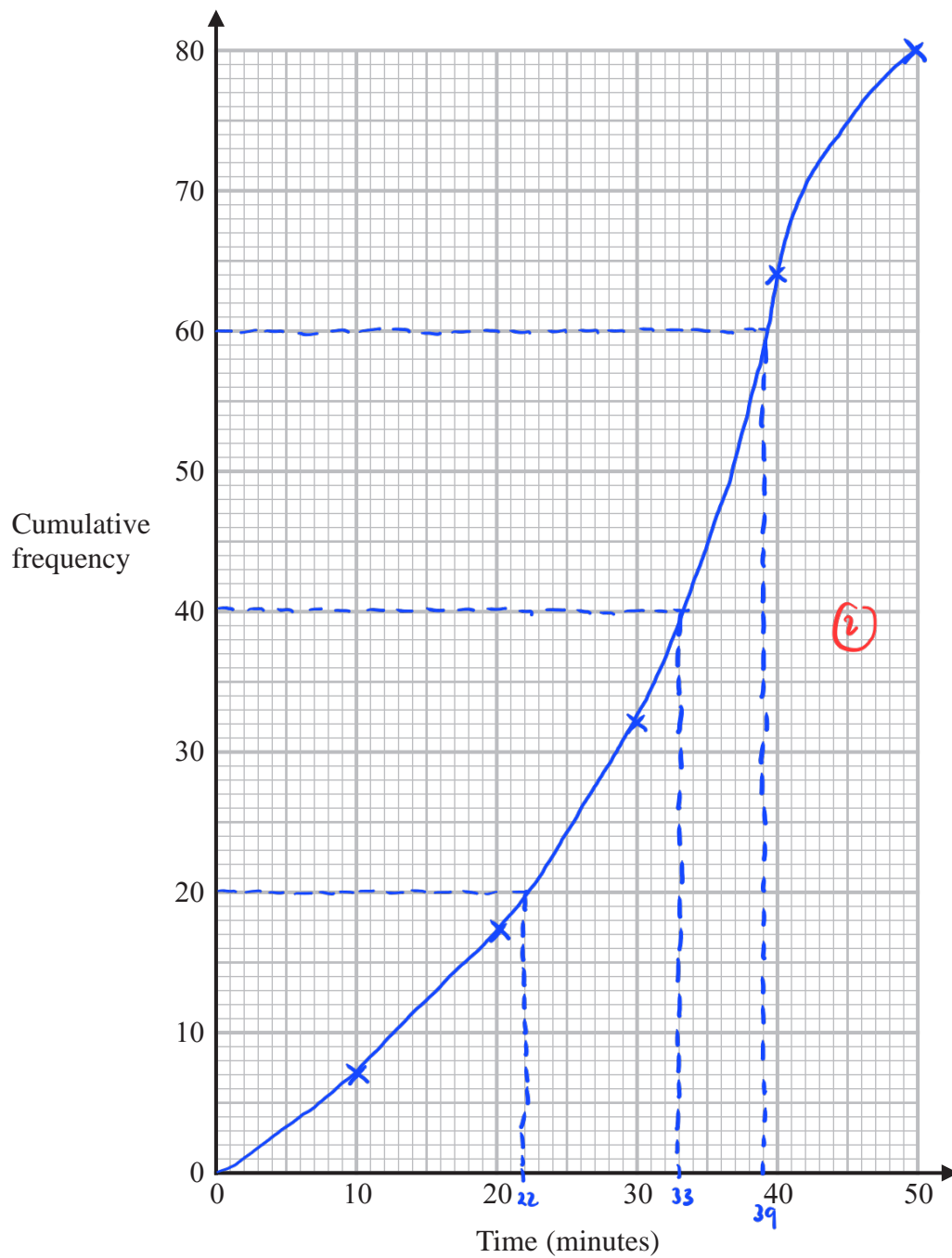
Time (W minutes)	Frequency
$0 < W \leq 10$	7
$10 < W \leq 20$	10
$20 < W \leq 30$	15
$30 < W \leq 40$	32
$40 < W \leq 50$	16

- (a) Complete the cumulative frequency table below.

Time (W minutes)	Cumulative frequency
$0 < W \leq 10$	7
$0 < W \leq 20$	17
$0 < W \leq 30$	32
$0 < W \leq 40$	64
$0 < W \leq 50$	80

(1)

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



(2)

(c) Use your graph to find an estimate for the median.

..... 33 ⁽¹⁾ minutes
(1)

(d) Use your graph to find an estimate for the interquartile range.

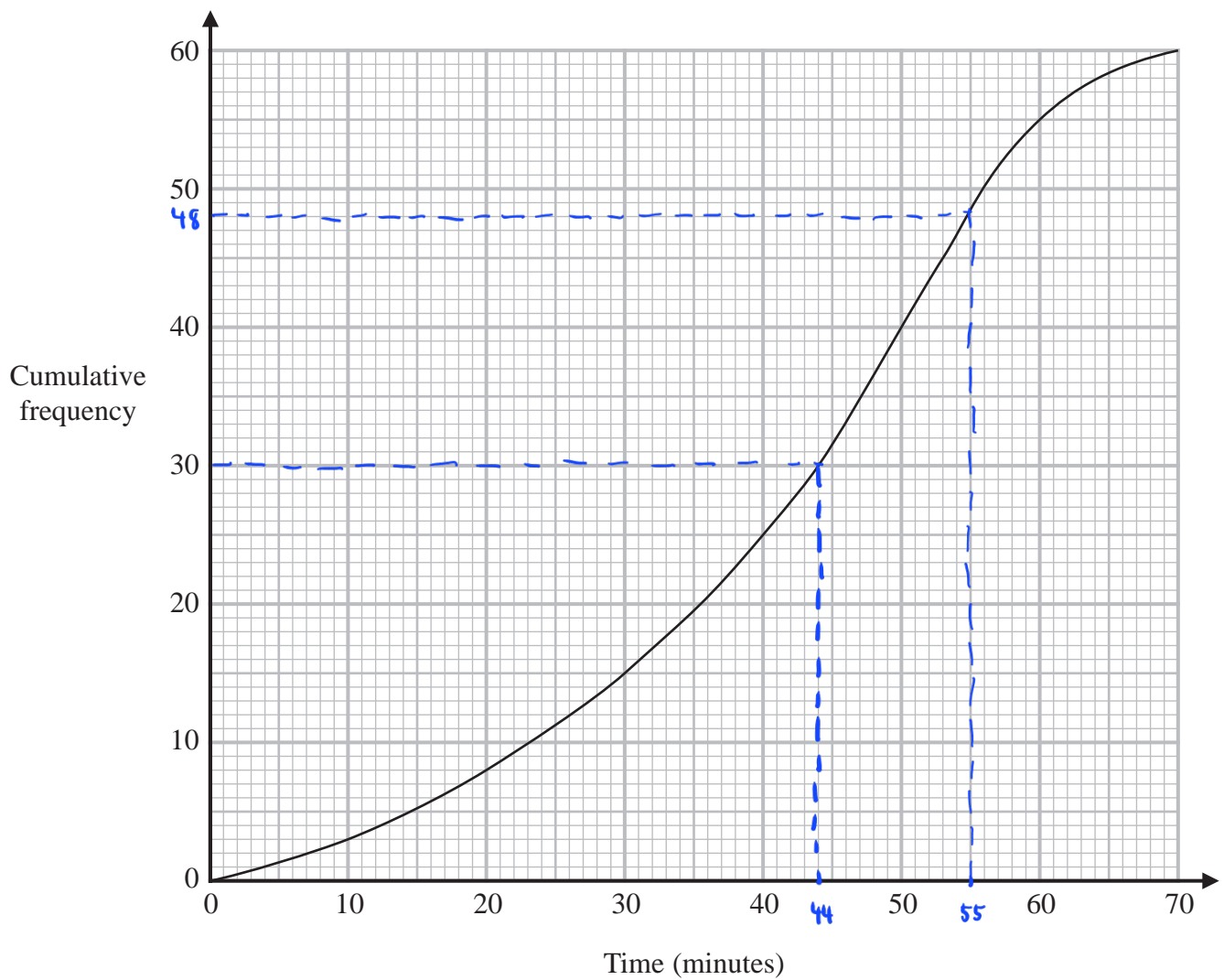
$$Q_1 = 22, Q_3 = 39$$

$$39 - 22 = 17$$

..... 17 ⁽²⁾ minutes
(2)

(Total for Question 12 is 6 marks)

- 13 The cumulative frequency graph gives information about the time, in minutes, each of 60 people took to shop in a market.



- (a) Use the graph to find an estimate for the median time people took to shop in the market.

..... 44 ⁽¹⁾ minutes
(1)

- (b) Use the graph to find an estimate for the number of people who took longer than 55 minutes to shop in the market.

$$\textcircled{1} \quad 60 - 48 = 12 \quad \textcircled{1}$$

..... 12
(2)

- (c) Use the graph to complete the frequency table to give information about the time, in minutes, each of the 60 people took to shop in the market.

Time taken to shop in the market (m minutes)	Frequency
$0 < m \leq 10$	3
$10 < m \leq 20$	5
$20 < m \leq 30$	7
$30 < m \leq 40$	10
$40 < m \leq 50$	15
$50 < m \leq 60$	15
$60 < m \leq 70$	5

(2)

(2)

(Total for Question 13 is 5 marks)

14 The table gives information about the times taken by 80 people to run a race.

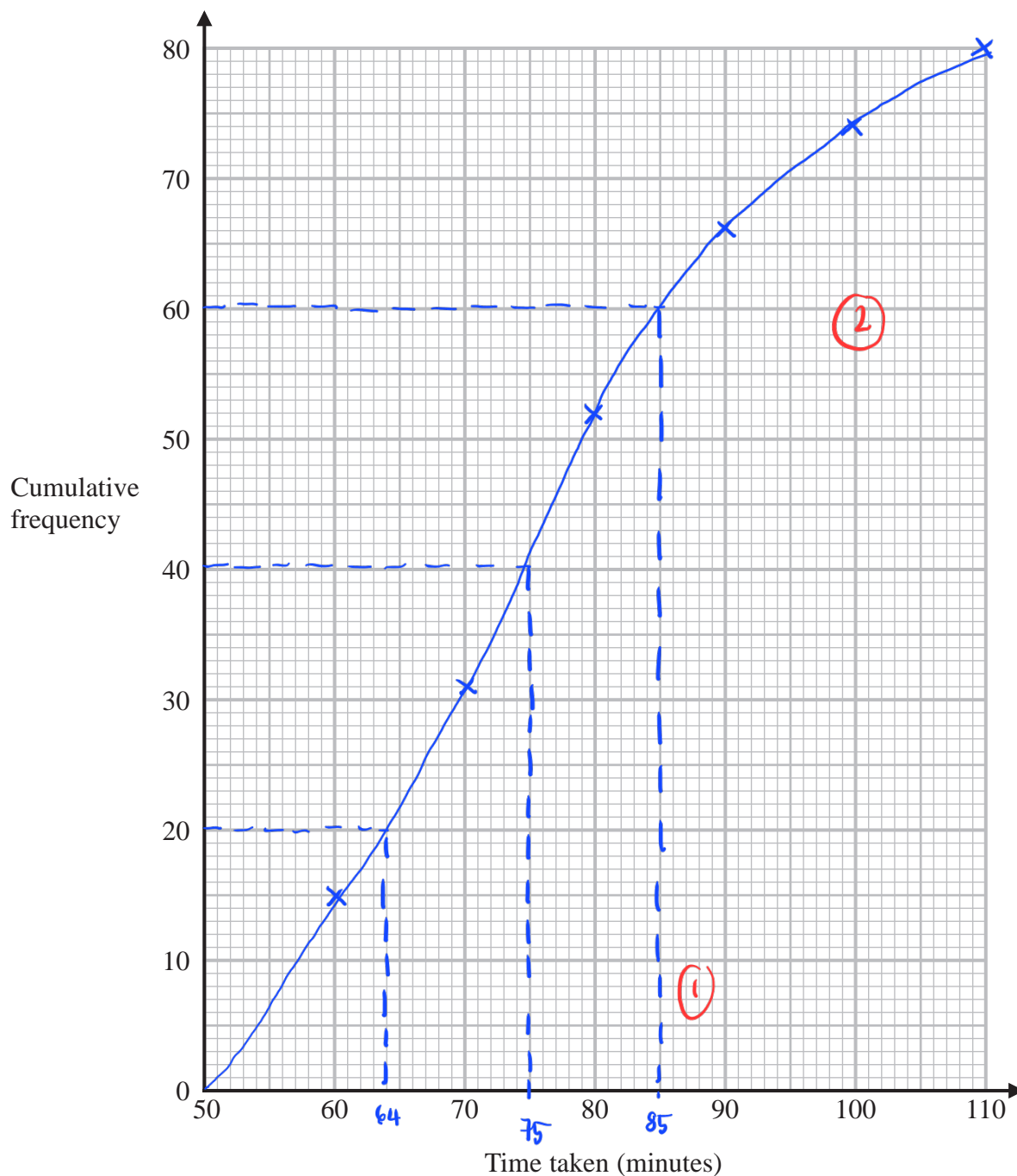
Time taken (t minutes)	Frequency
$50 < t \leq 60$	15
$60 < t \leq 70$	16
$70 < t \leq 80$	21
$80 < t \leq 90$	14
$90 < t \leq 100$	8
$100 < t \leq 110$	6

(a) Complete the cumulative frequency table.

Time taken (t minutes)	Cumulative frequency
$50 < t \leq 60$	15
$50 < t \leq 70$	31
$50 < t \leq 80$	52
$50 < t \leq 90$	66
$50 < t \leq 100$	74
$50 < t \leq 110$	80

(1)

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



(2)

(c) Use your graph to find an estimate for the median time taken.

..... 75 ⁽¹⁾ minutes
(1)

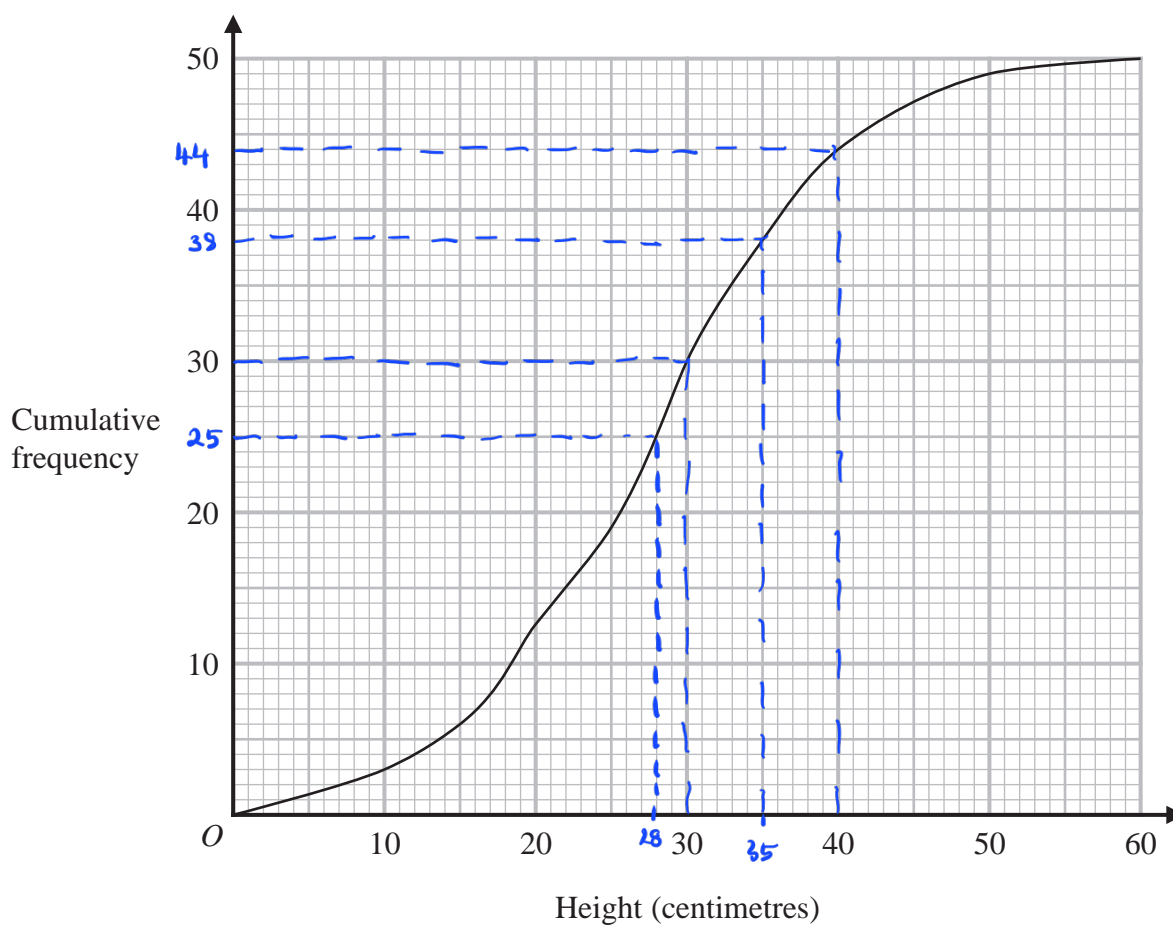
(d) Use your graph to find an estimate for the interquartile range of the times taken.

$$\begin{aligned} \text{IQR} &= 85 - 64 \\ &= 21 \end{aligned}$$

..... 21 ⁽¹⁾ minutes
(2)

(Total for Question 14 is 6 marks)

- 15 The cumulative frequency graph shows information about the heights, in centimetres, of 50 plants in a flowerbed.



- (a) Use the graph to find an estimate for the median height of these plants.

28 (1) centimetres
(1)

- (b) Use the graph to find the frequency for the class interval $30 < \text{Height} \leq 40$

$$44 - 30 = 14$$

14 (1)
(1)

- (c) Use the graph to find an estimate for the number of plants with a height greater than 35 centimetres.

$$50 - 38 = 12$$

12 (1)
(2)

(Total for Question 15 is 4 marks)