Cumulative Frequency

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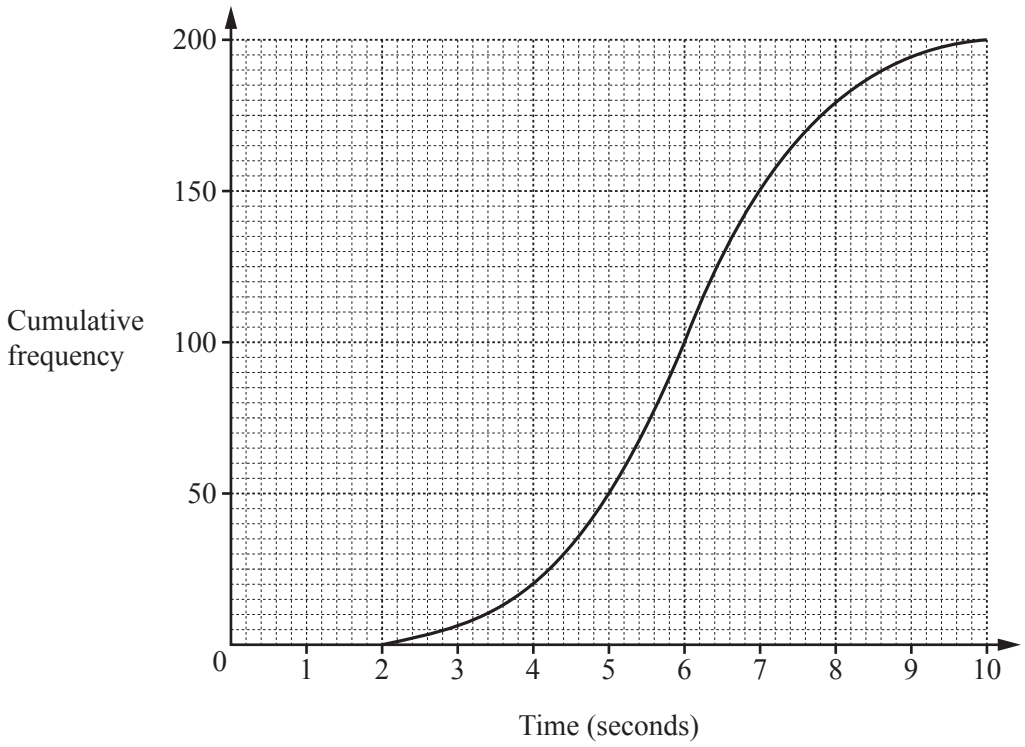
17



200 students take a reaction time test.
The cumulative frequency diagram shows the results.

Find

(a) the median,

Answer(a) ..... s [1]

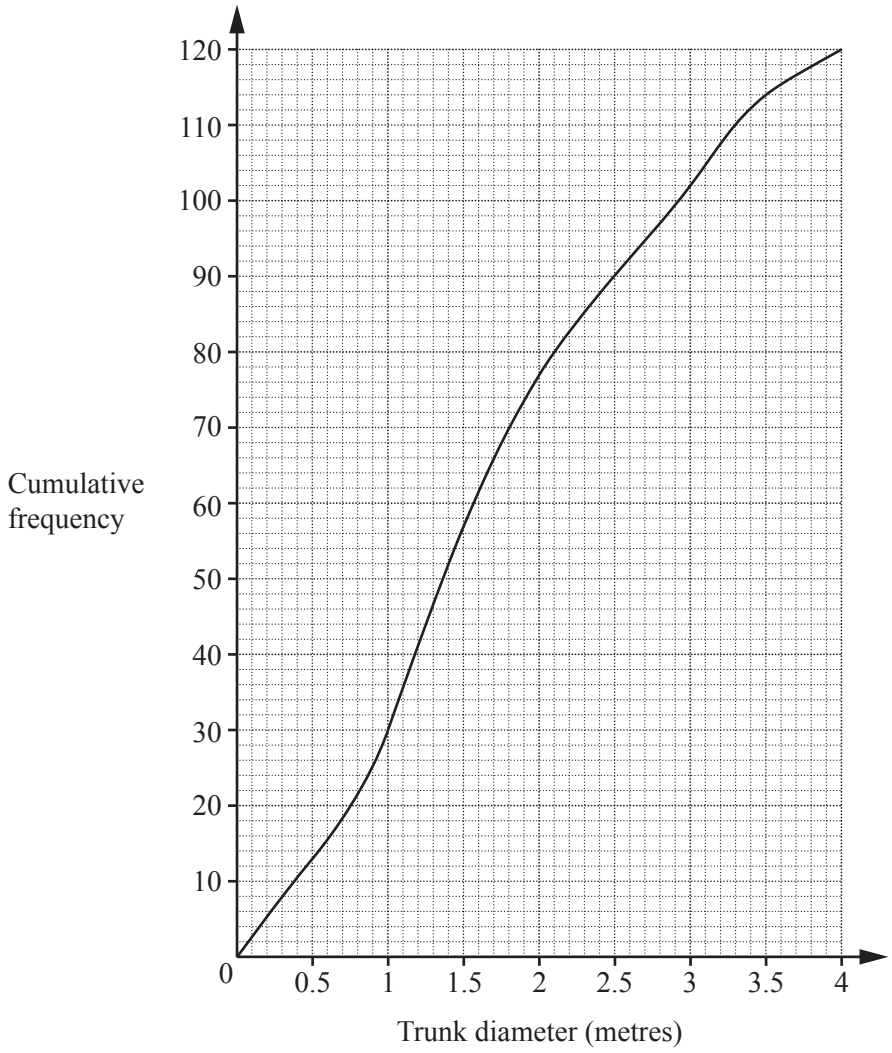
(b) the inter-quartile range,

Answer(b) ..... s [2]

(c) the number of students with a reaction time of more than 4 seconds.

Answer(c) ..... [2]

22 The cumulative frequency diagram shows information about the trunk diameter, in metres, of 120 trees.



Find

(a) the inter-quartile range,

..... m [2]

(b) the 95th percentile,

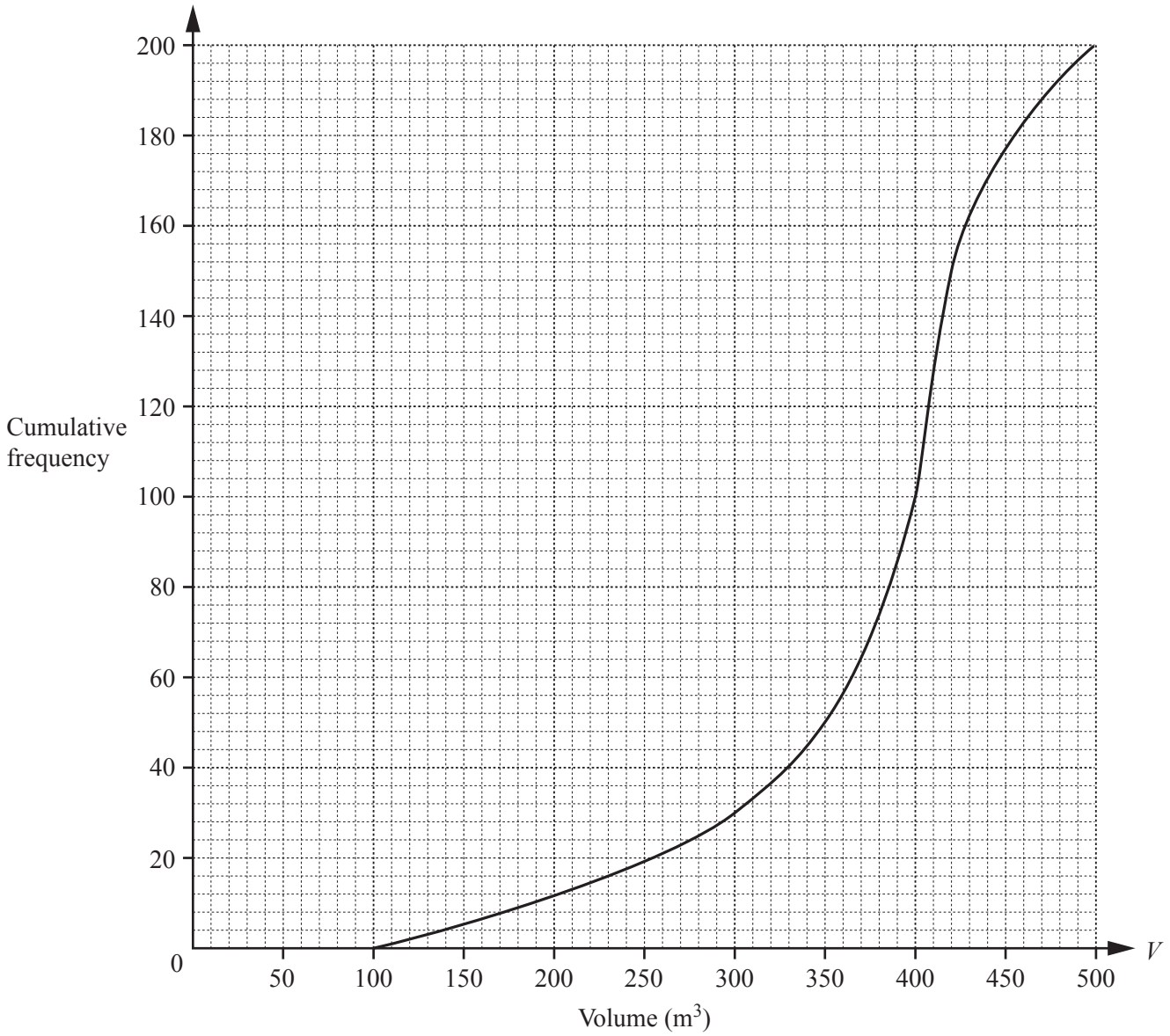
..... m [2]

(c) the number of trees with a trunk diameter greater than 3 metres.

..... [2]

Question 23 is printed on the next page.

3 **(a)** 200 students estimate the volume, V m^3, of a classroom.
The cumulative frequency diagram shows their results.



Find

(i) the median,

..... m^3 [1]

(ii) the lower quartile,

..... m^3 [1]

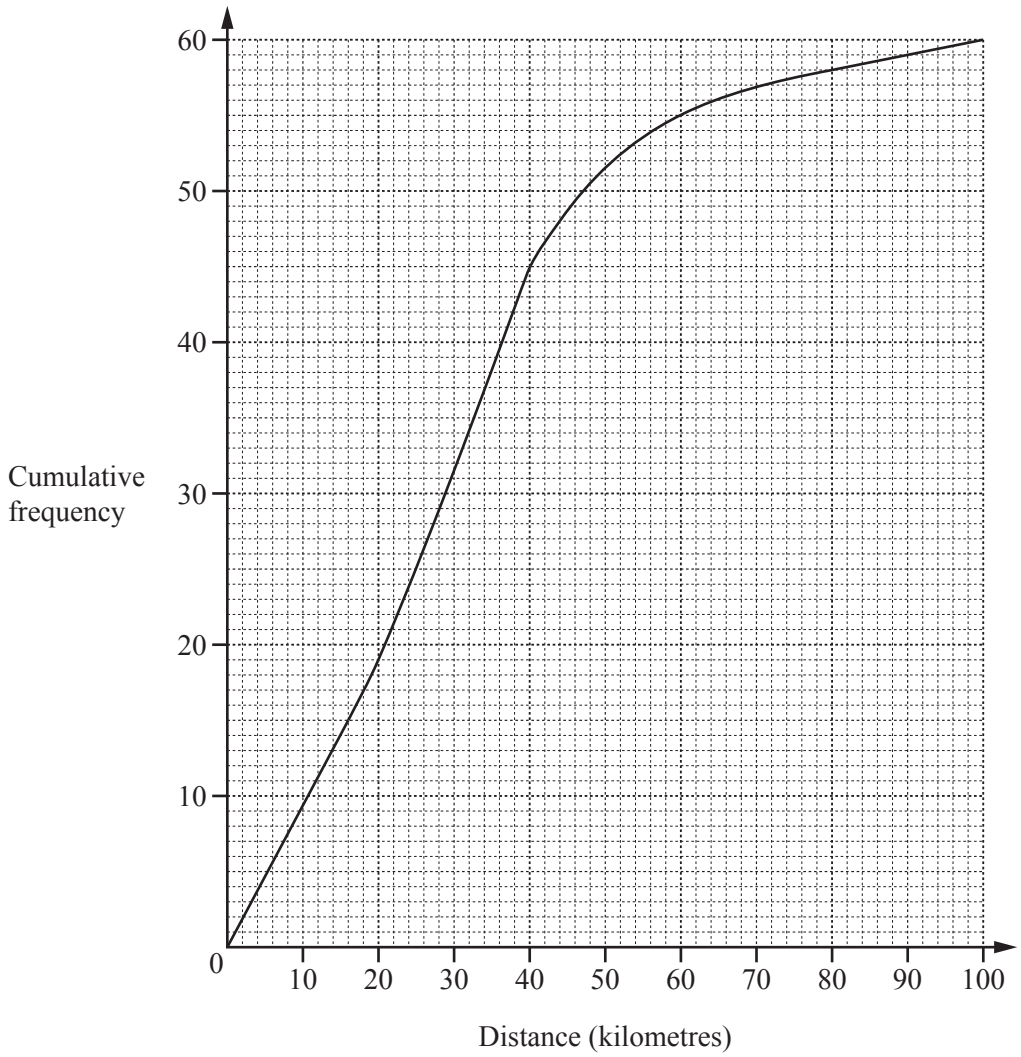
(iii) the inter-quartile range,

..... m^3 [1]

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

..... [2]

22 The cumulative frequency diagram shows information about the distances travelled, in kilometres, by 60 people.



Find

(a) the 80th percentile,

Answer(a) ..... km [2]

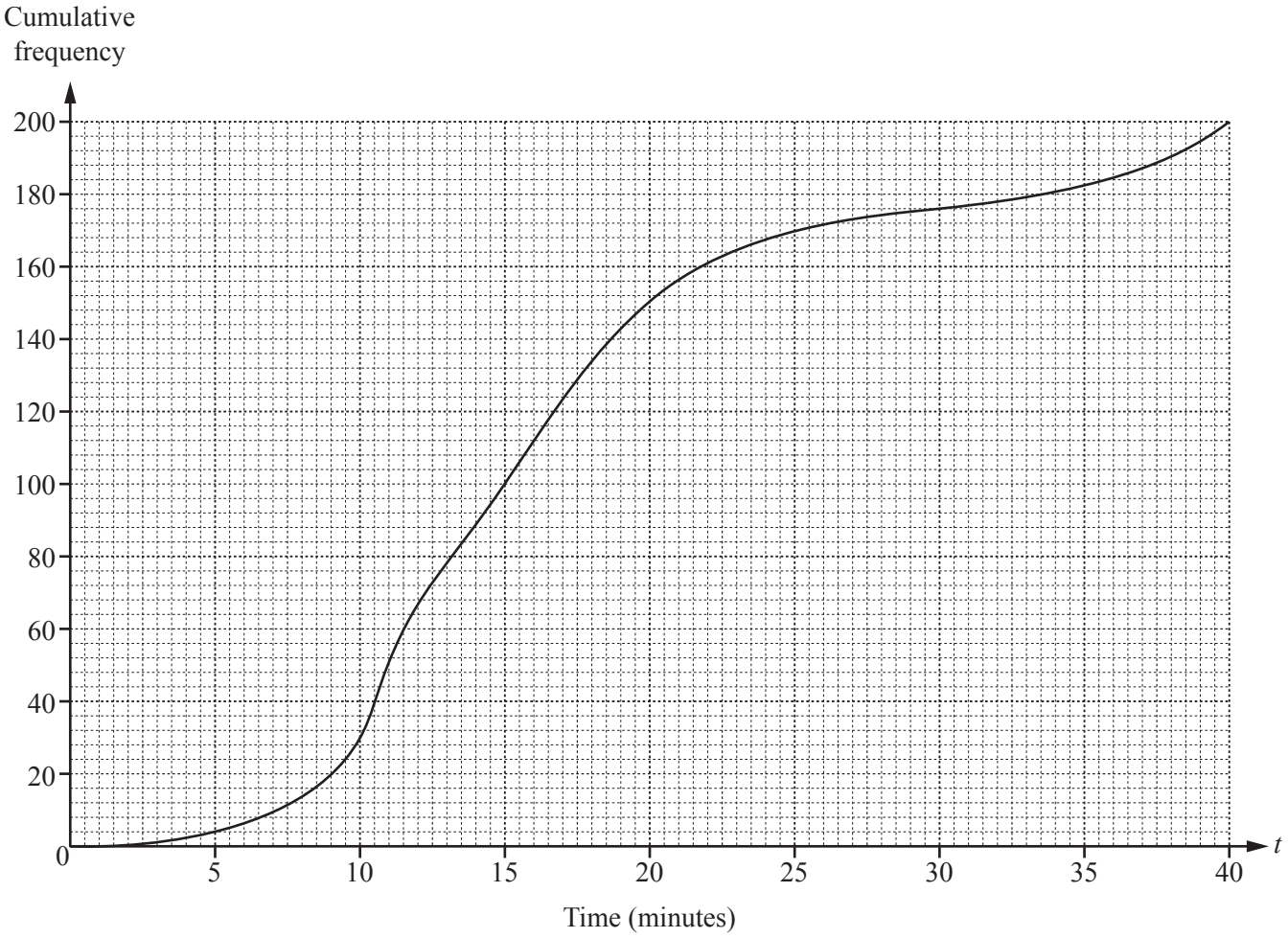
(b) the inter-quartile range,

Answer(b) ..... km [2]

(c) the number of people who travelled more than 60 km.

Answer(c) ..... [2]

2 **(a)** 200 students record the time, t minutes, for their journey from home to school.
The cumulative frequency diagram shows the results.



Find

(i) the median,

..... min [1]

(ii) the lower quartile,

..... min [1]

(iii) the inter-quartile range,

..... min [1]

(iv) the 15th percentile,

..... min [1]

(v) the number of students whose journey time was more than 30 minutes.

..... [2]

22 The table shows information about the numbers of pets owned by 24 students.

Number of pets	0	1	2	3	4	5	6
Frequency	1	2	3	5	7	3	3

(a) Calculate the mean number of pets.

Answer(a) ..... [3]

(b) Jennifer joins the group of 24 students.
When the information for Jennifer is added to the table, the new mean is 3.44 .

Calculate the number of pets that Jennifer has.

Answer(b) ..... [3]

6 The table shows the time, t minutes, that 400 people take to complete a test.

Time taken (t mins)	$0 < t \leqslant 10$	$10 < t \leqslant 24$	$24 < t \leqslant 30$	$30 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 70$
Frequency	10	90	135	85	70	10

(a) **(i)** Write down the modal time interval.

Answer(a)(i) ..... min [1]

(ii) Calculate an estimate of the mean time taken to complete the test.

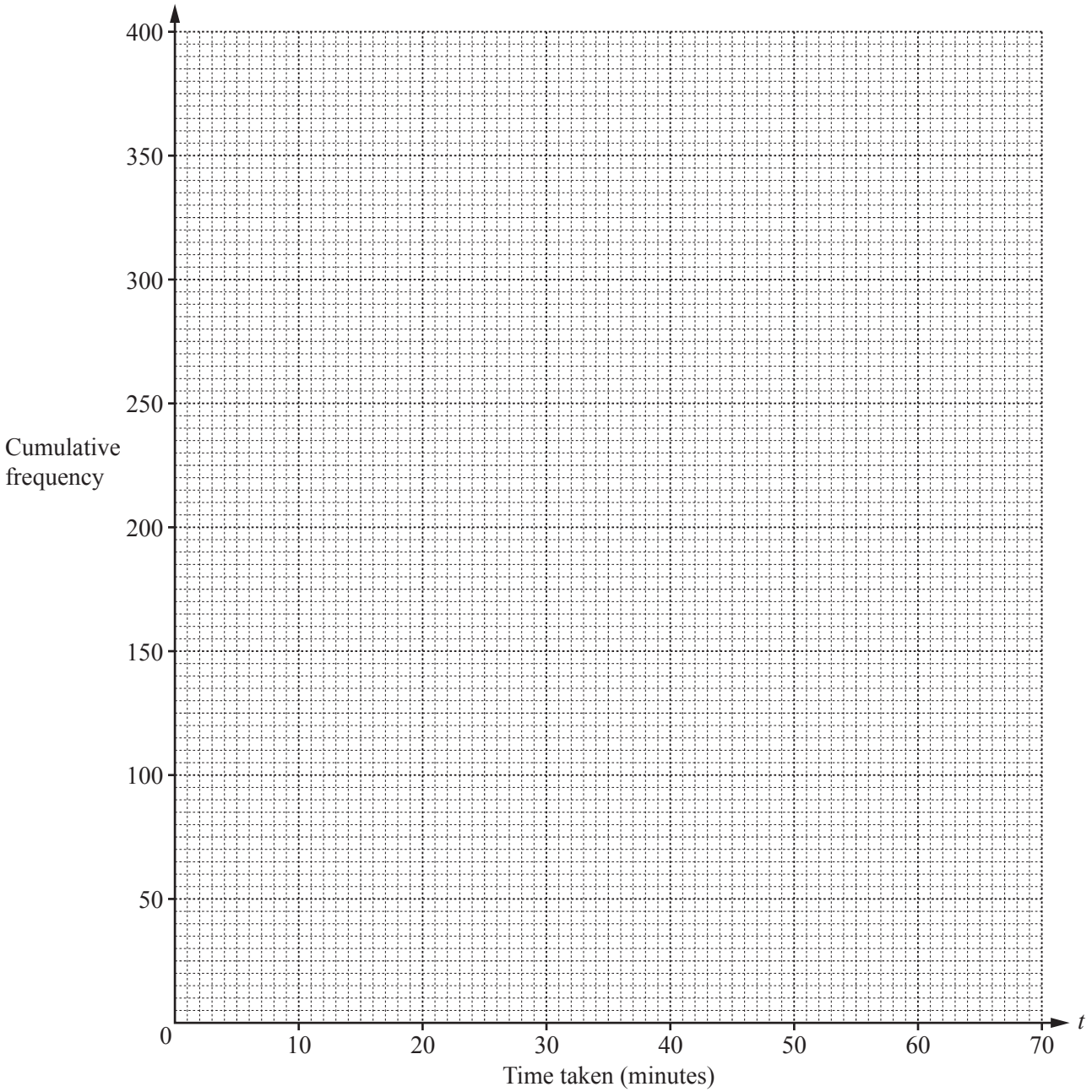
Answer(a)(ii) ..... min [4]

(b) **(i)** Complete the table of cumulative frequencies.

Time taken (t mins)	$t \leqslant 10$	$t \leqslant 24$	$t \leqslant 30$	$t \leqslant 40$	$t \leqslant 60$	$t \leqslant 70$
Cumulative frequency	10	100				400

[2]

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



[3]

(c) Use your graph to estimate

(i) the median time,

Answer(c)(i) ..... min [1]

(ii) the inter-quartile range,

Answer(c)(ii) ..... min [2]

(iii) the 15th percentile,

Answer(c)(iii) ..... min [2]

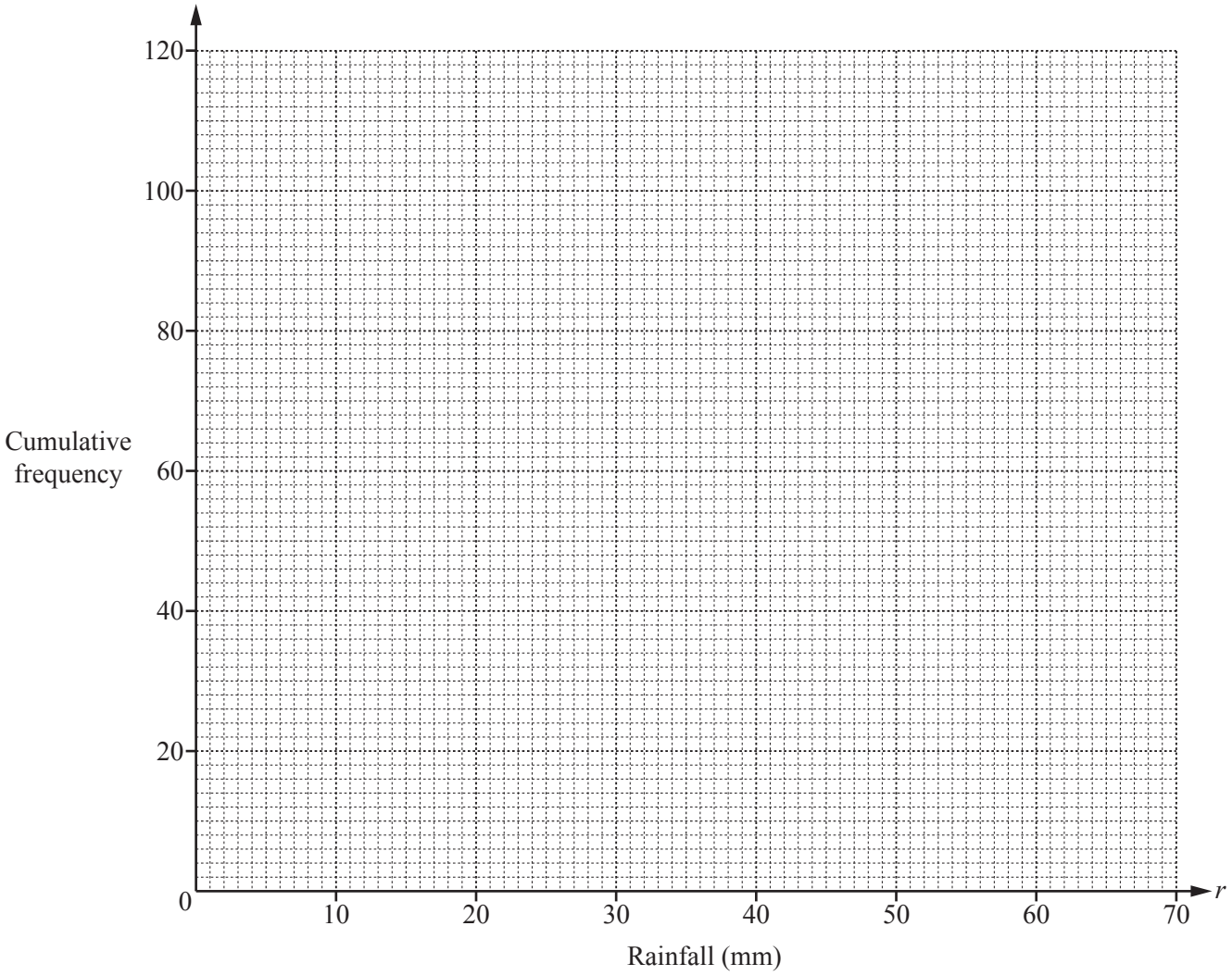
(iv) the number of people who took more than 50 minutes.

Answer(c)(iv) ..... [2]

3 Leo measured the rainfall each day, in millimetres, for 120 days.
The cumulative frequency table shows the results.

Rainfall (r mm)	$r \leqslant 20$	$r \leqslant 25$	$r \leqslant 35$	$r \leqslant 40$	$r \leqslant 60$	$r \leqslant 70$
Cumulative frequency	5	13	72	90	117	120

(a) On the grid below, draw a cumulative frequency diagram to show these results.



[3]

(b) **(i)** Find the median.

Answer(b)(i) ..... mm [1]

(ii) Use your diagram to find the number of days when the rainfall was more than 50 mm.

Answer(b)(ii) ..... [2]

6 120 students take a mathematics examination.

(a) The time taken, m minutes, for each student to answer question 1 is shown in this table.

Time (m minutes)	$0 < m \leqslant 1$	$1 < m \leqslant 2$	$2 < m \leqslant 3$	$3 < m \leqslant 4$	$4 < m \leqslant 5$	$5 < m \leqslant 6$
Frequency	72	21	9	11	5	2

Calculate an estimate of the mean time taken.

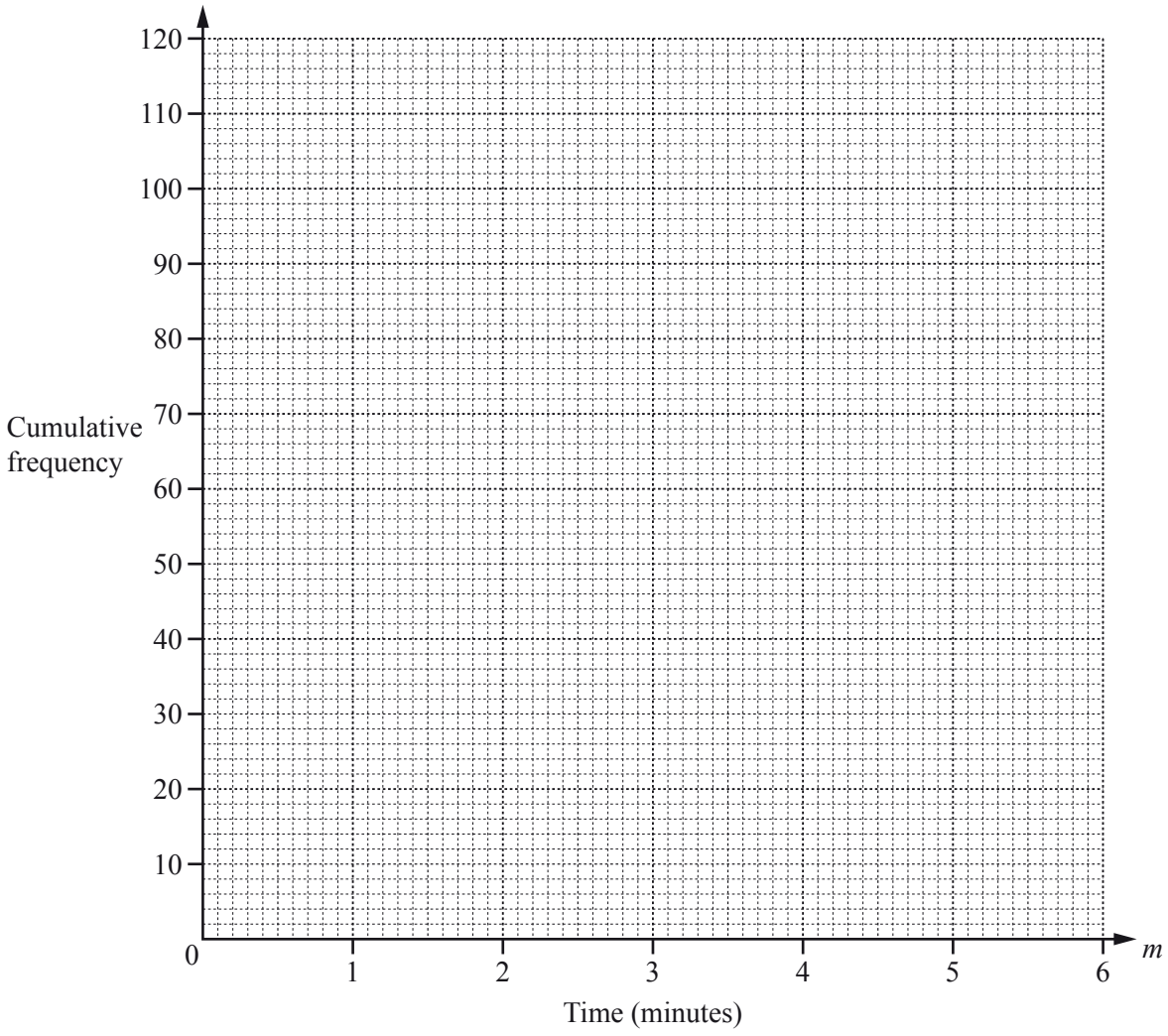
Answer(a) ..... min [4]

(b) **(i)** Using the table in **part (a)**, complete this cumulative frequency table.

Time (m minutes)	$m \leqslant 1$	$m \leqslant 2$	$m \leqslant 3$	$m \leqslant 4$	$m \leqslant 5$	$m \leqslant 6$
Cumulative frequency	72					120

[2]

(ii) Draw a cumulative frequency diagram to show the time taken.



[3]

(iii) Use your cumulative frequency diagram to find

(a) the median,

Answer(b)(iii)(a) ..... min [1]

(b) the inter-quartile range,

Answer(b)(iii)(b) ..... min [2]

(c) the 35th percentile.

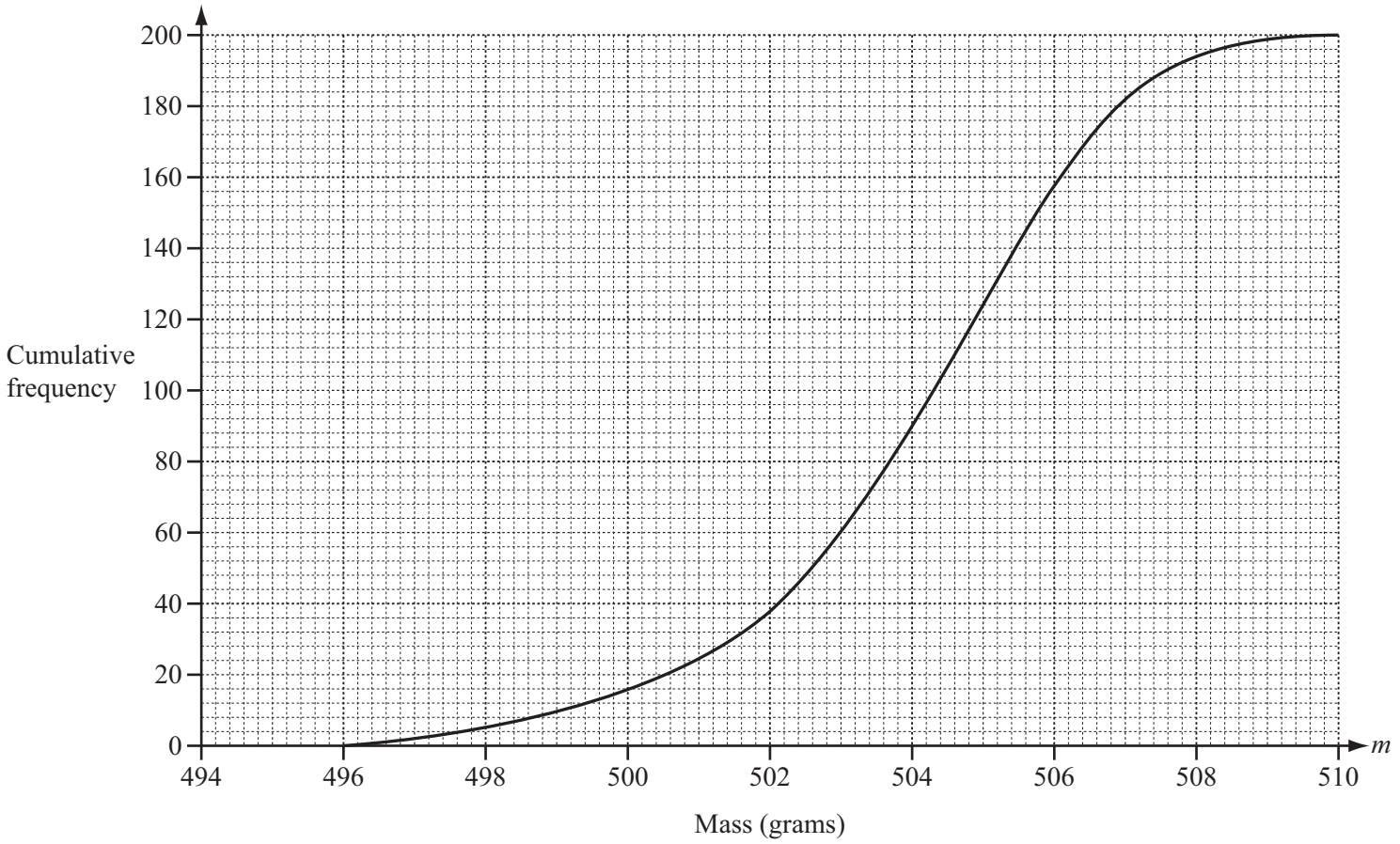
Answer(b)(iii)(c) ..... min [2]

(c) A new frequency table is made from the table shown in **part (a)**.

Time (m minutes)	$0 < m \leqslant 1$	$1 < m \leqslant 3$	$3 < m \leqslant 6$
Frequency	72		

(i) Complete the table above. [2]

17 The mass, m grams, of cornflakes in each of 200 boxes is recorded.
The cumulative frequency diagram shows the results.



(a) Use the diagram to estimate the inter-quartile range.

Answer(a) ..... g [2]

(b) Find the probability that a box chosen at random has a mass of 500 grams or less.

Answer(b) ..... [2]

(c)

Mass (m grams)	$496 < m \leqslant 500$	$500 < m \leqslant 504$	$504 < m \leqslant 508$	$508 < m \leqslant 510$
Frequency	16	74	104	6

The data in this frequency table is to be shown in a histogram.

Complete the frequency density table below.

Mass (m grams)	$496 < m \leqslant 500$	$500 < m \leqslant 504$	$504 < m \leqslant 508$	$508 < m \leqslant 510$
Frequency density	4			

[2]

6 A company tested 200 light bulbs to find the lifetime, T hours, of each bulb.
The results are shown in the table.

Lifetime (T hours)	Number of bulbs
$0 < T \leqslant 1000$	10
$1000 < T \leqslant 1500$	30
$1500 < T \leqslant 2000$	55
$2000 < T \leqslant 2500$	72
$2500 < T \leqslant 3500$	33

(a) Calculate an estimate of the mean lifetime for the 200 light bulbs.

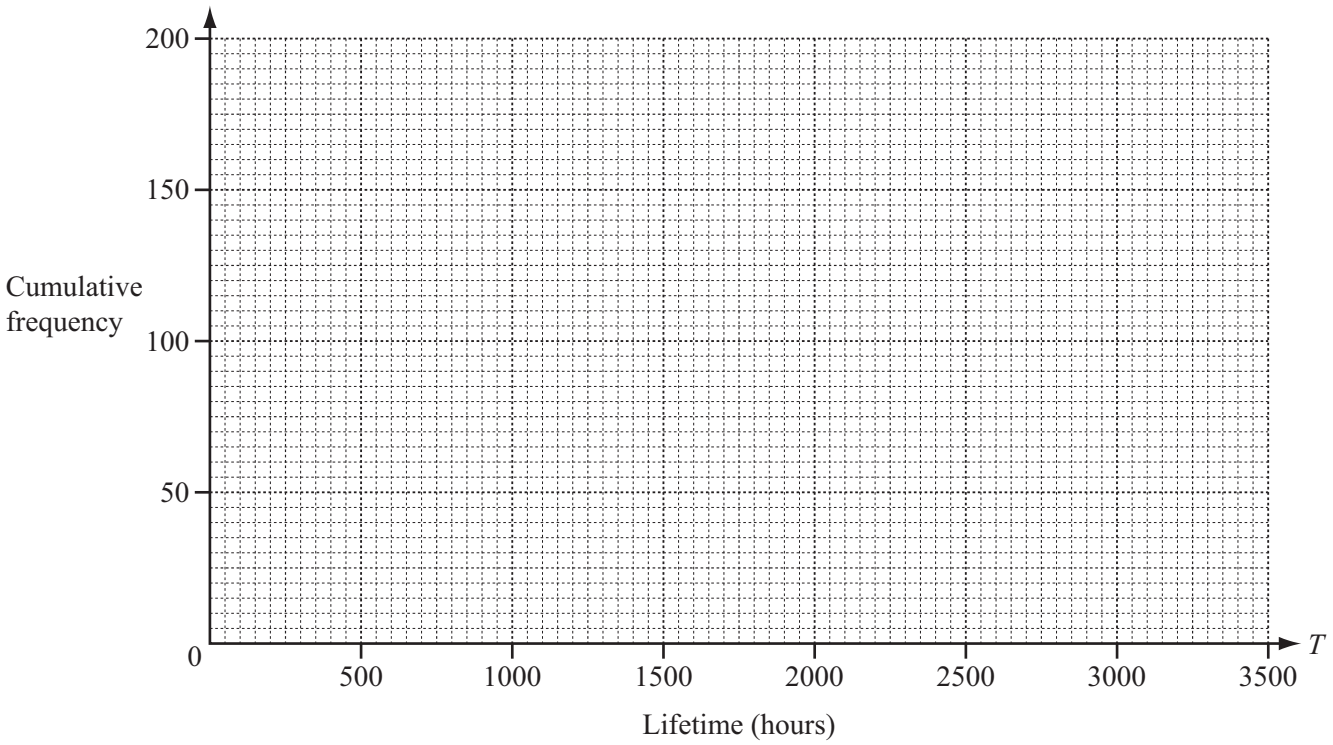
Answer(a) ..... hours [4]

(b) **(i)** Complete the cumulative frequency table.

Lifetime (T hours)	$T \leqslant 1000$	$T \leqslant 1500$	$T \leqslant 2000$	$T \leqslant 2500$	$T \leqslant 3500$
Number of bulbs					

[2]

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



[3]

(iii) The company says that the average lifetime of a bulb is 2200 hours.

Estimate the number of bulbs that lasted longer than 2200 hours.

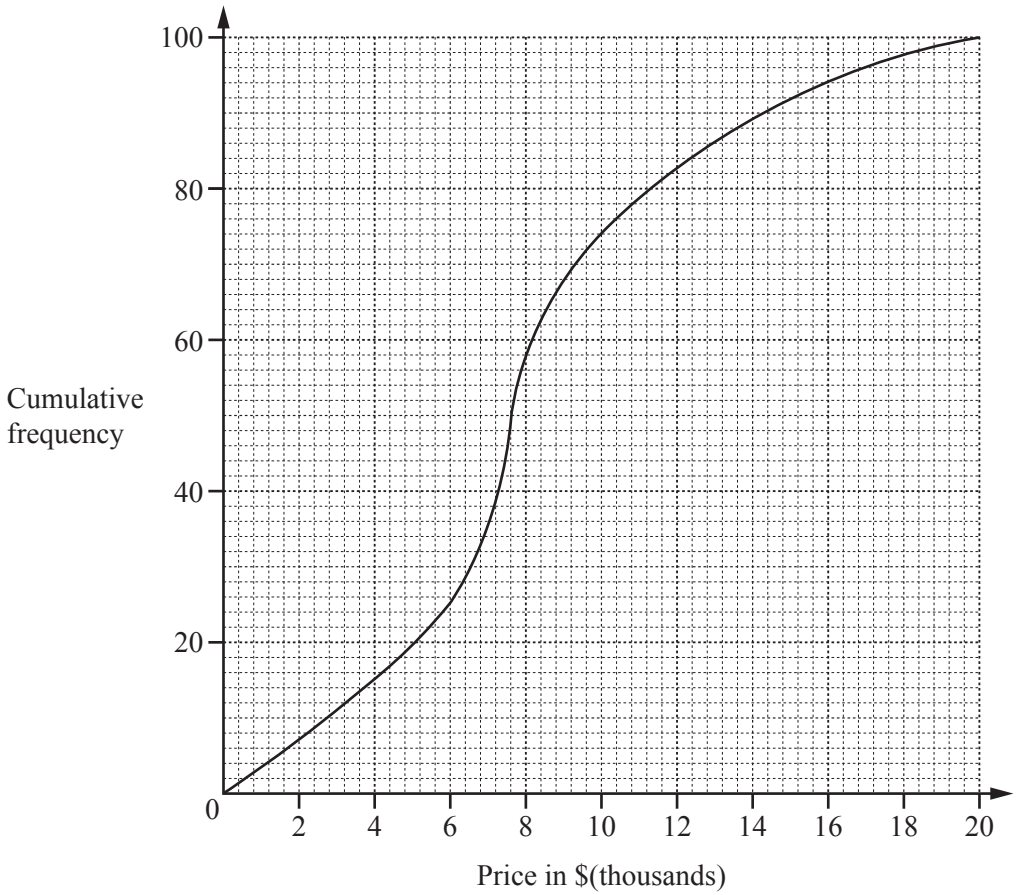
Answer(b)(iii) ..... [2]

(c) Robert buys one energy saving bulb and one halogen bulb.
The probability that the energy saving bulb lasts longer than 3500 hours is $\frac{9}{10}$.
The probability that the halogen bulb lasts longer than 3500 hours is $\frac{3}{5}$.

Work out the probability that exactly one of the bulbs will last longer than 3500 hours.

Answer(c) ..... [4]

7 **(a)** **(i)**



The cumulative frequency diagram shows information about the prices of 100 cars on Website A. Use the information to complete this table.

Lower quartile	Median	Upper quartile	Inter-quartile range
$	$7600	$	$

[2]

(ii) This table shows information about the prices of cars on Website B.

Lower quartile	Median	Upper quartile	Inter-quartile range
$7600	$10 800	$13 600	$6000

Here are two statements comparing the distributions of the prices of cars on Website A and Website B.

For each statement write True or False.
Give a reason for each answer, stating clearly which statistic you use to make your decision.

(a) The prices of cars on Website A are lower than the prices of cars on Website B.

..... because .....

..... [1]

(b) A greater percentage of cars have a price more than \$13 600 on Website A compared to Website B.

..... because .....

..... [1]

(b) The table shows the prices of cars on Website B.

Price (\$$P$)	Number of cars
$0 < P \leqslant 6\,000$	9
$6\,000 < P \leqslant 8\,000$	29
$8\,000 < P \leqslant 10\,000$	20
$10\,000 < P \leqslant 12\,000$	14
$12\,000 < P \leqslant 14\,000$	21
$14\,000 < P \leqslant 22\,000$	27

Calculate an estimate of the mean price of the 120 cars.

\$..... [4]

(c) The price of a car is \$8760.
Bryan pays a deposit of 25% of this price and then 24 equal monthly payments.
After 24 months, he will have paid a total of \$9948.

Calculate the cost of one monthly payment.

\$..... [3]