1. The cumulative frequency table below shows the ages of 200 students at a college.

Age	Number of Students	Cumulative Frequency
17	3	3
18	72	75
19	62	137
20	31	m
21	12	180
22	9	189
23–25	5	194
> 25	6	n

(a) What are the values of m and n?

(b) How many students are younger than 20?

(c) Find the value in years of the lower quartile.

(Total 8 marks)

2. The cumulative frequency graph shows the amount of time in minutes, 200 students spend waiting for their train on a particular morning.
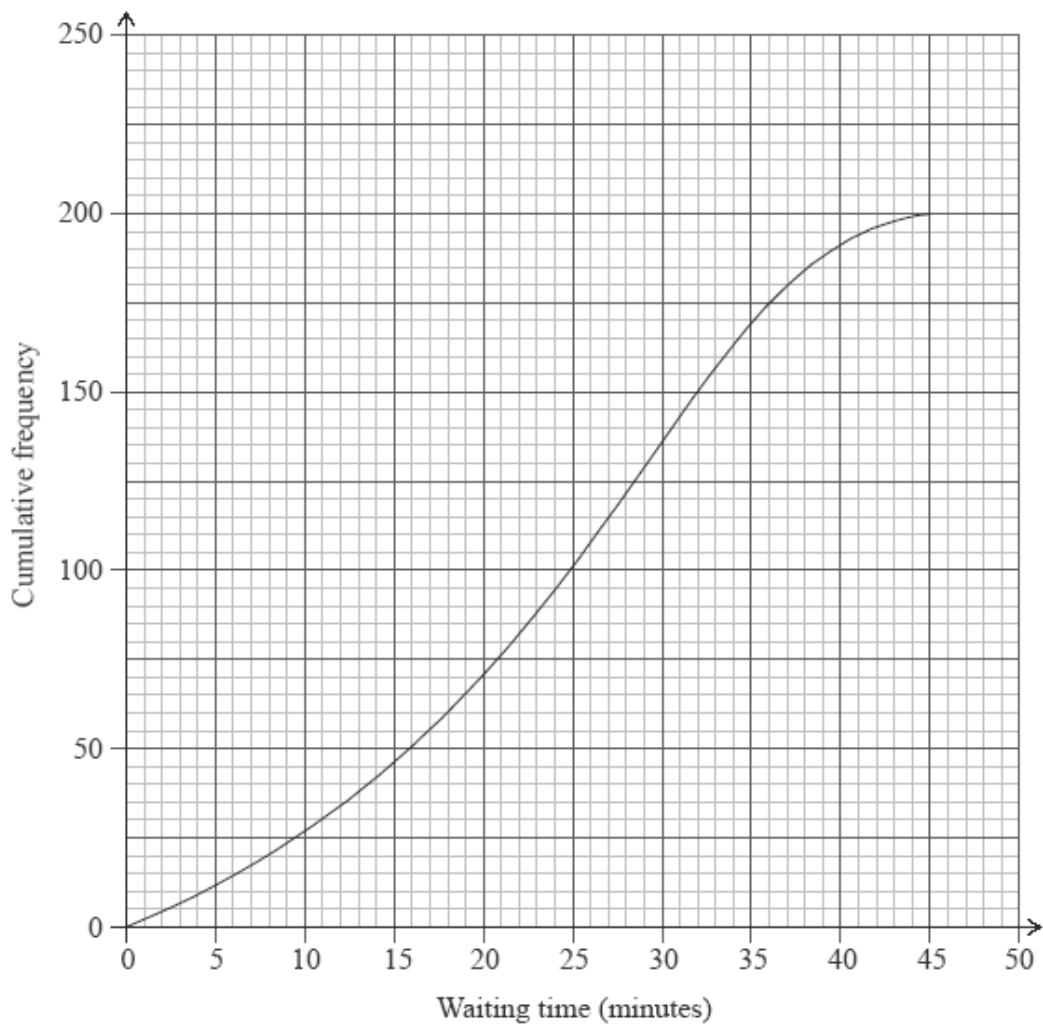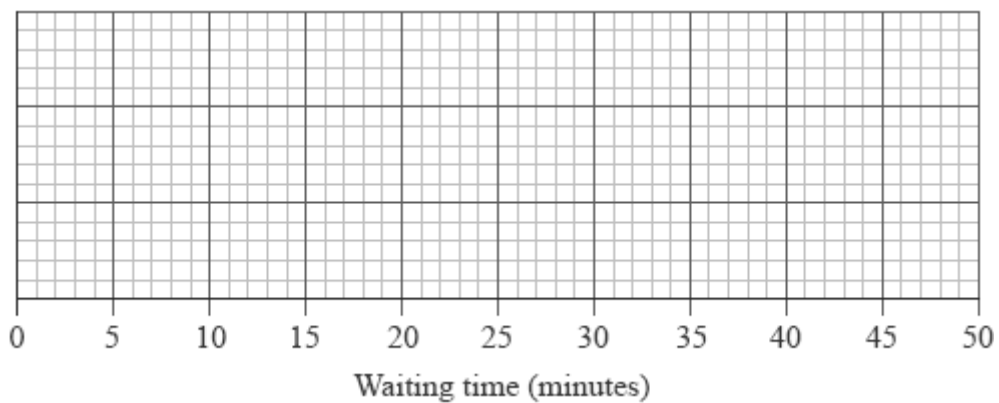

(a) Write down the median waiting time.

(1)

(b) Find the interquartile range for the waiting time.

(2)

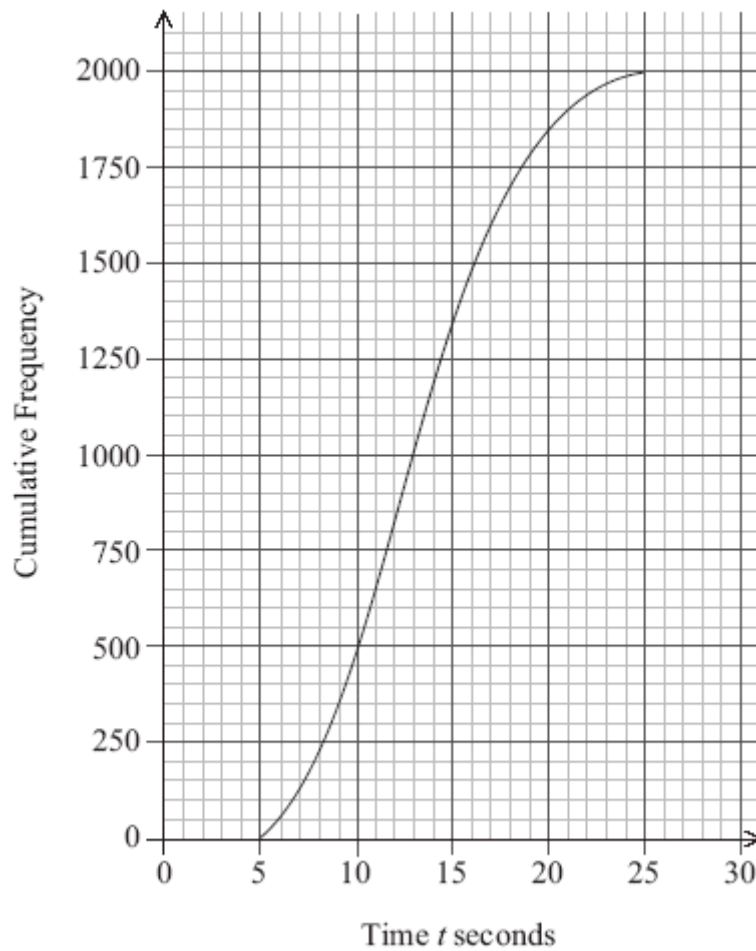The minimum waiting time is zero and the maximum waiting time is 45 minutes.

(c) Draw a box and whisker plot on the grid below to represent this information.

Waiting time (minutes)

(3)
(Total 6 marks)

3. The diagram shows the cumulative frequency graph for the time *t* taken to perform a certain task by 2000 men.

Time *t* seconds

(a) Use the diagram to estimate

(i) the median time;

(ii) the upper quartile and the lower quartile;

(iii) the interquartile range.

(4)

(b) Find the number of men who take **more than** 11 seconds to perform the task.

(3)

(c) 55 % of the men took less than *p* seconds to perform the task. Find *p*.

(2)

The times taken for the 2000 men were grouped as shown in the table below.

Time	Frequency
$5 \leq t < 10$	500
$10 \leq t < 15$	850
$15 \leq t < 20$	*a*
$20 \leq t < 25$	*b*

(d) Write down the value of

 (i) *a*;

 (ii) *b*.

(2)

(e) Use your graphic display calculator to find an estimate of

 (i) the mean time;
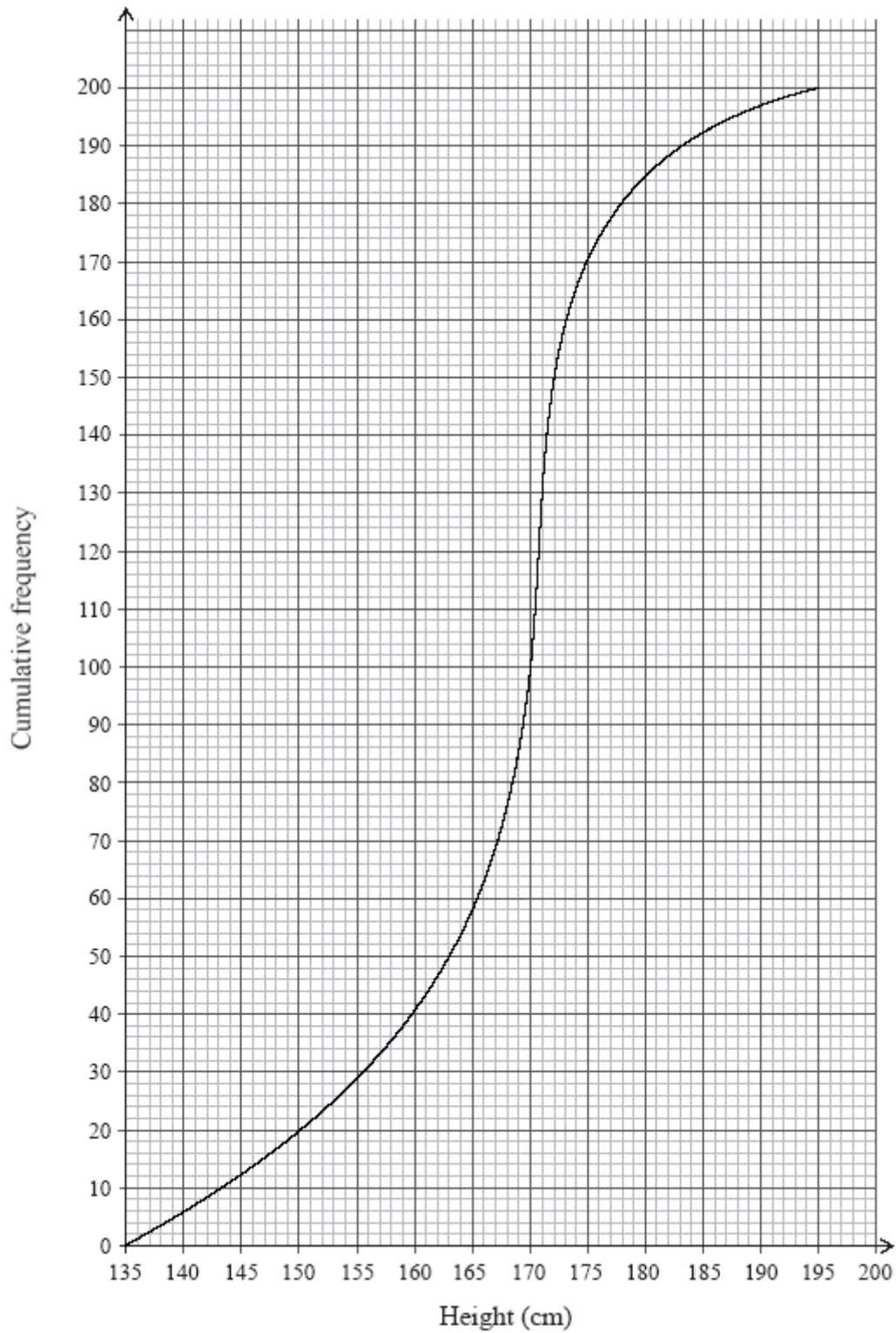
 (ii) the standard deviation of the time.

(3)

Everyone who performs the task in **less than** one standard deviation **below** the mean will receive a bonus. Pedro takes 9.5 seconds to perform the task.

(f) Does Pedro receive the bonus? Justify your answer.

(3)
(Total 17 marks)

4. A cumulative frequency graph is given below which shows the height of students in a school.

(a) Write down the median height of the students.

(1)

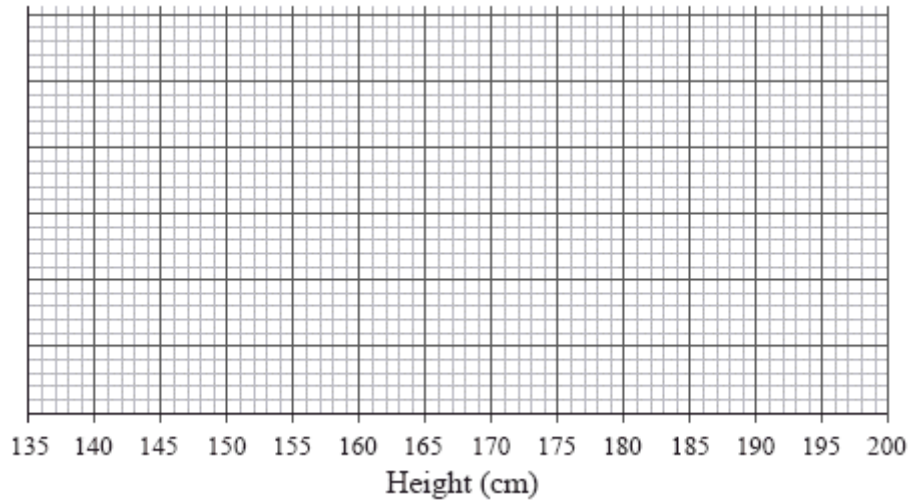(b) Write down the 25th percentile.

(1)

(c)   Write down the 75th percentile.

(1)

The height of the tallest student is 195 cm and the height of the shortest student is 136 cm.
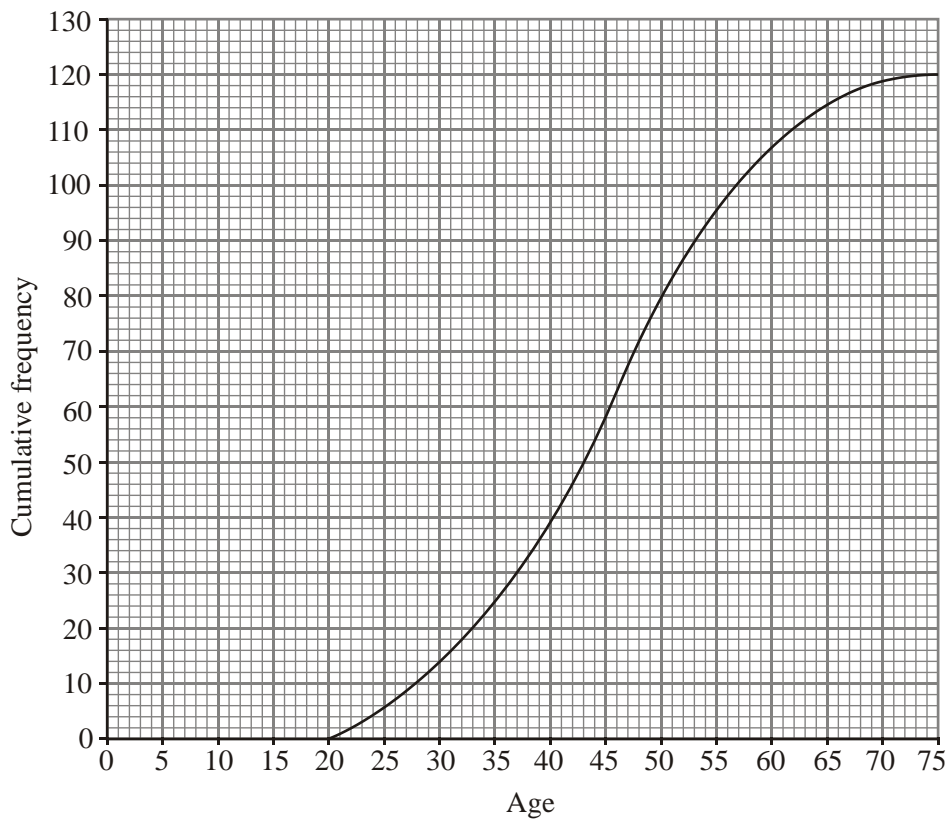
(d)   Draw a box and whisker plot on the grid below to represent the heights of the students in the school.

135   140   145   150   155   160   165   170   175   180   185   190   195   200

Height (cm)

(3)
(Total 6 marks)

5. There are 120 teachers in a school. Their ages are represented by the cumulative frequency graph below.
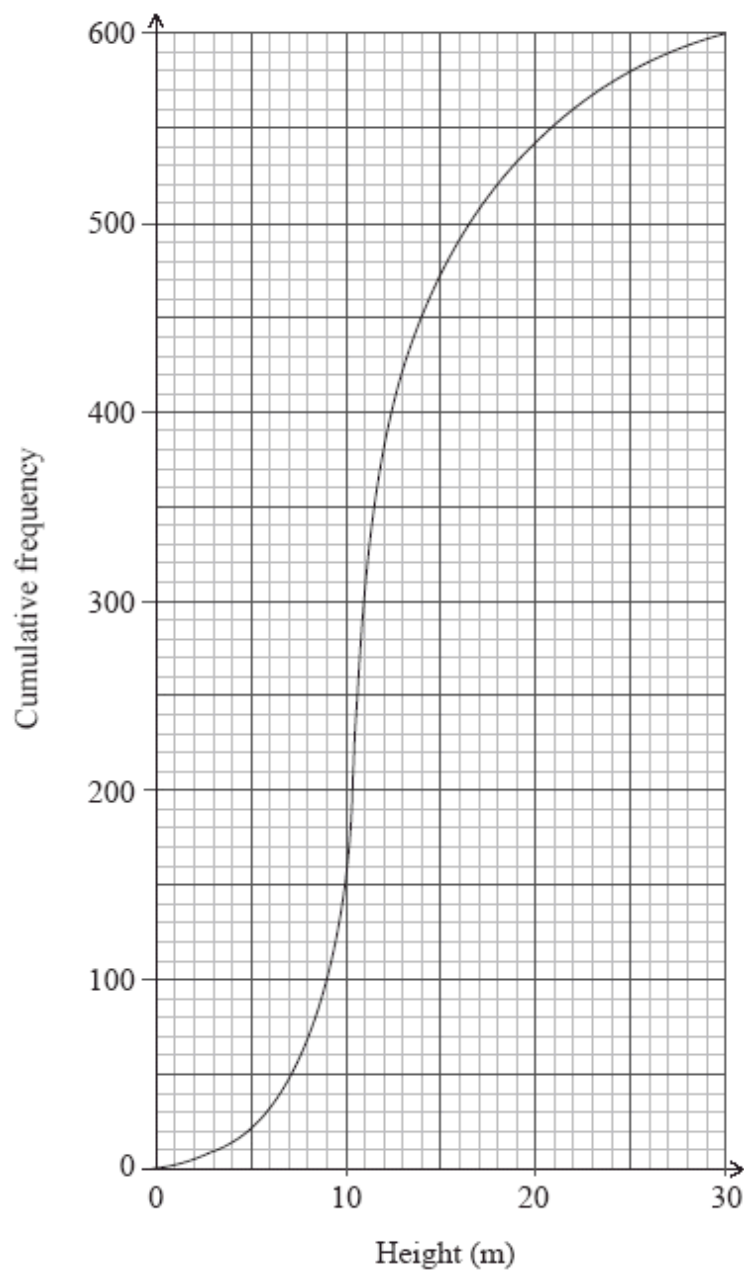

(a) Write down the median age.

(1)

(b) Find the interquartile range for the ages.

(2)

(c) Given that the youngest teacher is 21 years old and the oldest is 72 years old, represent the information on a box and whisker plot using the scale below.
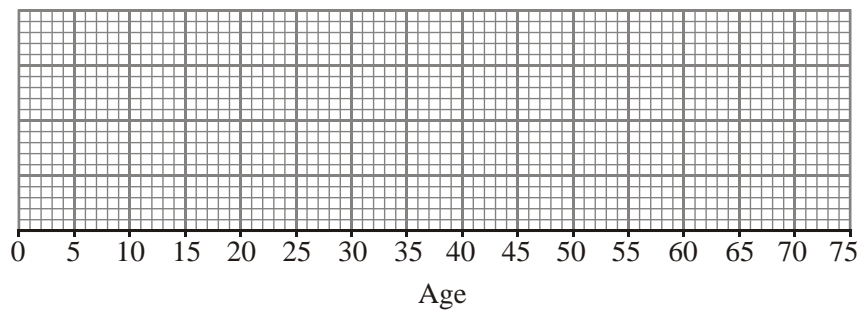

(3)
(Total 6 marks)

6. The diagram below shows the cumulative frequency distribution of the heights in metres of 600 trees in a wood.

(a) Write down the median height of the trees.

(1)

(b) Calculate the interquartile range of the heights of the trees.

(2)

(c) Given that the smallest tree in the wood is 3 m high and the tallest tree is 28 m high, draw the box and whisker plot on the grid below that shows the distribution of trees in the wood.
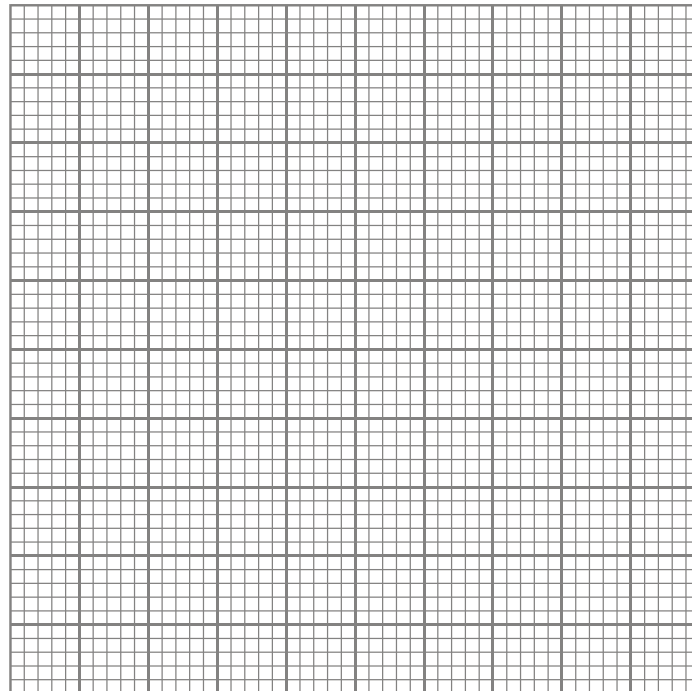
0   10   20   30

Height (m)
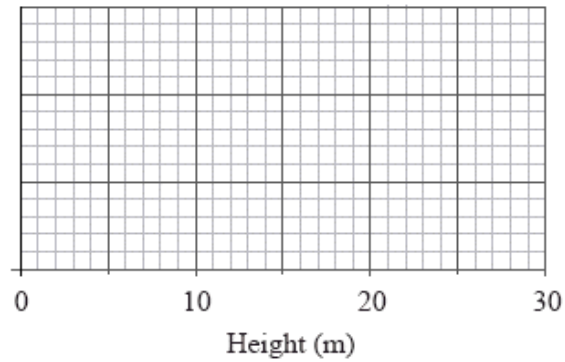
(3)
(Total 6 marks)

7. The local council has been monitoring the number of cars parked near a supermarket on an hourly basis. The results are displayed below.

| Parked Cars/Hour	Frequency	Cumulative Frequency
0–19	3	3
20–39	15	18
40–59	25	*w*
60–79	35	78
80–99	17	95

(a) Write down the value of *w*.

(b) Draw and label the **Cumulative Frequency** graph for this data.

(c) Determine the median number of cars per hour parked near the supermarket.

(Total 8 marks)

8. The cumulative frequency graph has been drawn from a frequency table showing the time it takes a number of students to complete a computer game.
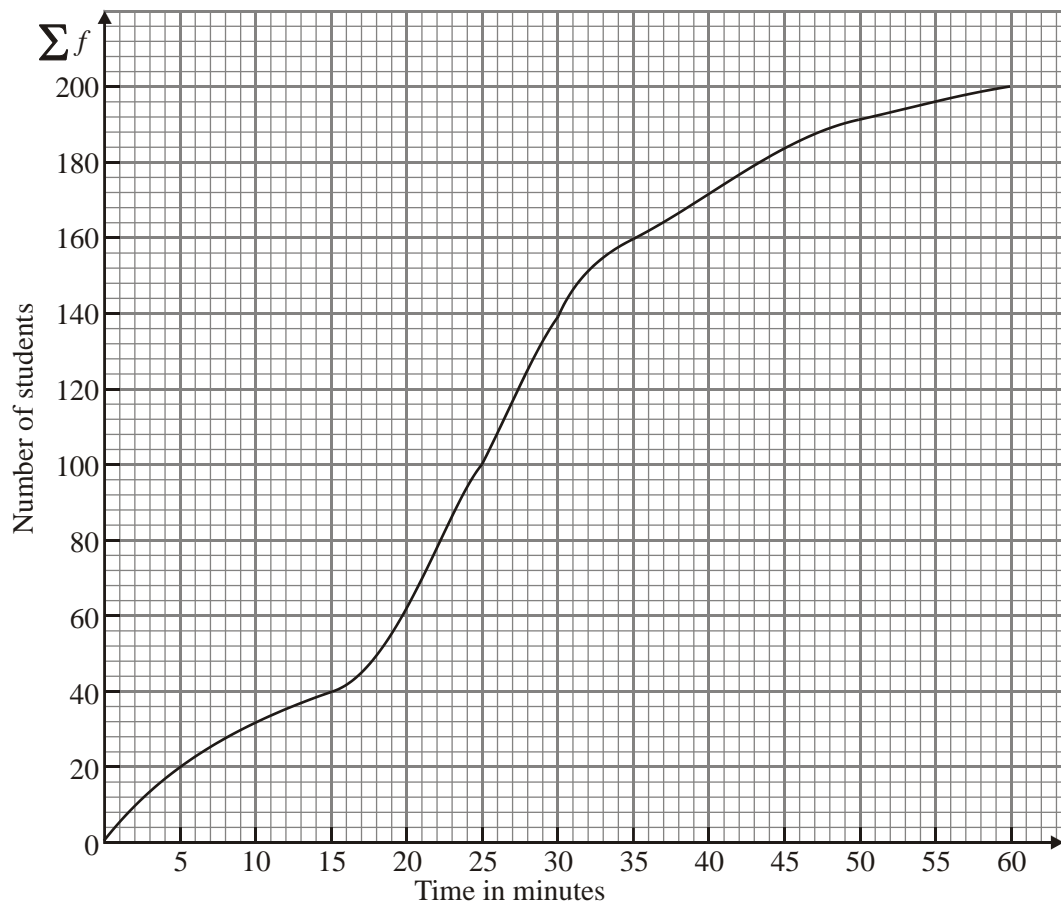
(a) From the graph find

    (i) the median time;

    (ii) the interquartile range.

(5)

The graph has been drawn from the data given in the table below.

Time in minutes	Number of students
$0 < x \le 5$	20
$5 < x \le 15$	20
$15 < x \le 20$	p
$20 < x \le 25$	40
$25 < x \le 35$	60
$35 < x \le 50$	q
$50 < x \le 60$	10

(b) Using the graph, find the values of p and q.

(2)

(c)   Calculate an estimate of the mean time taken to finish the computer game.

(4)
(Total 11 marks)

9.   The heights of 200 students are recorded in the following table.

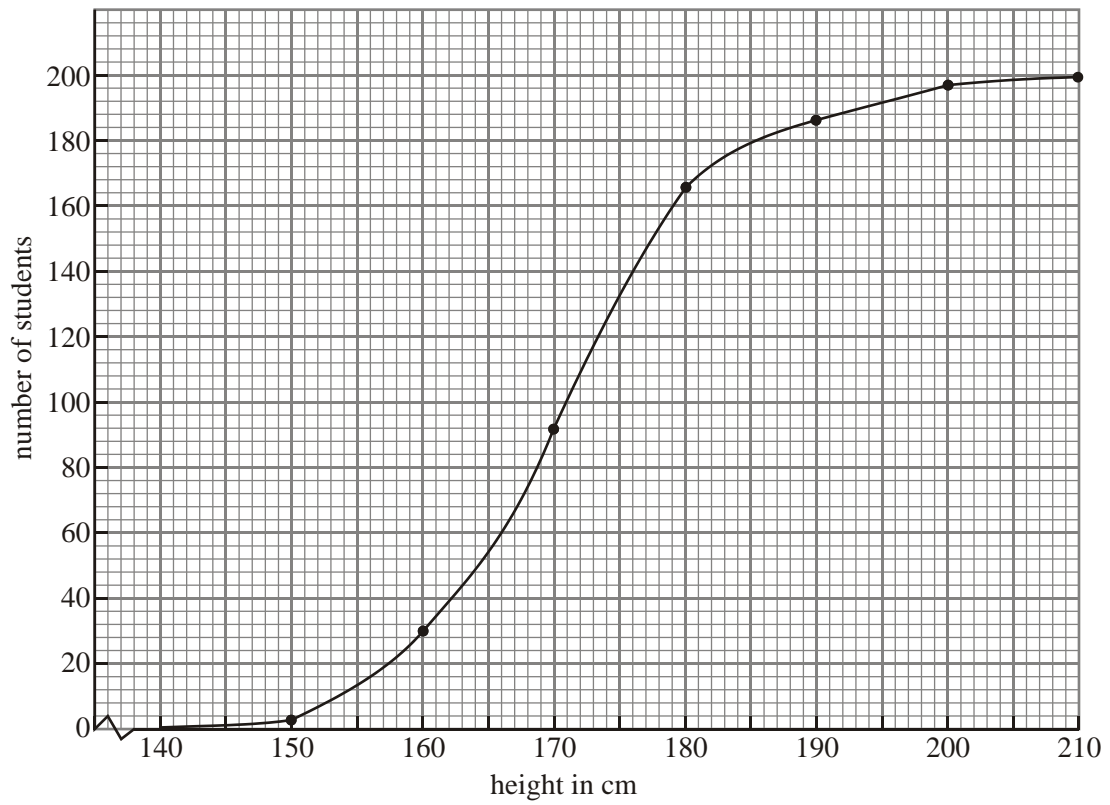| Height (h) in cm	Frequency
$140 \leq h < 150$	2
$150 \leq h < 160$	28
$160 \leq h < 170$	63
$170 \leq h < 180$	74
$180 \leq h < 190$	20
$190 \leq h < 200$	11
$200 \leq h < 210$	2

(a)   Write down the modal group.

(1)

(b)   Calculate an estimate of the mean and standard deviation of the heights.

(4)

The cumulative frequency curve for this data is drawn below.

(c) Write down the median height.

(1)

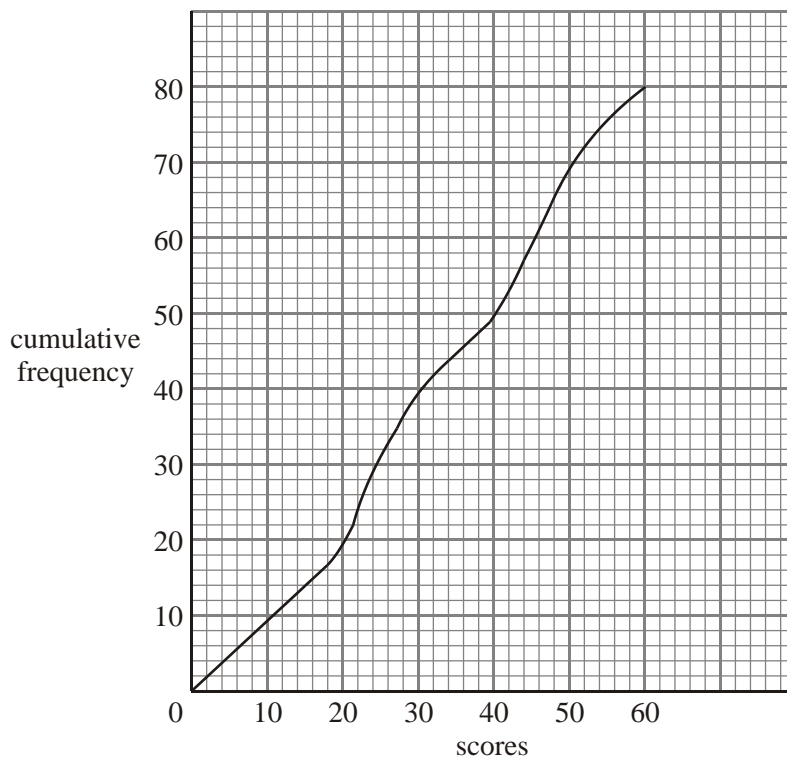(d) The upper quartile is 177.3 cm. Calculate the interquartile range.

(2)

(e) Find the percentage of students with heights less than 165 cm.

(2)
(Total 10 marks)

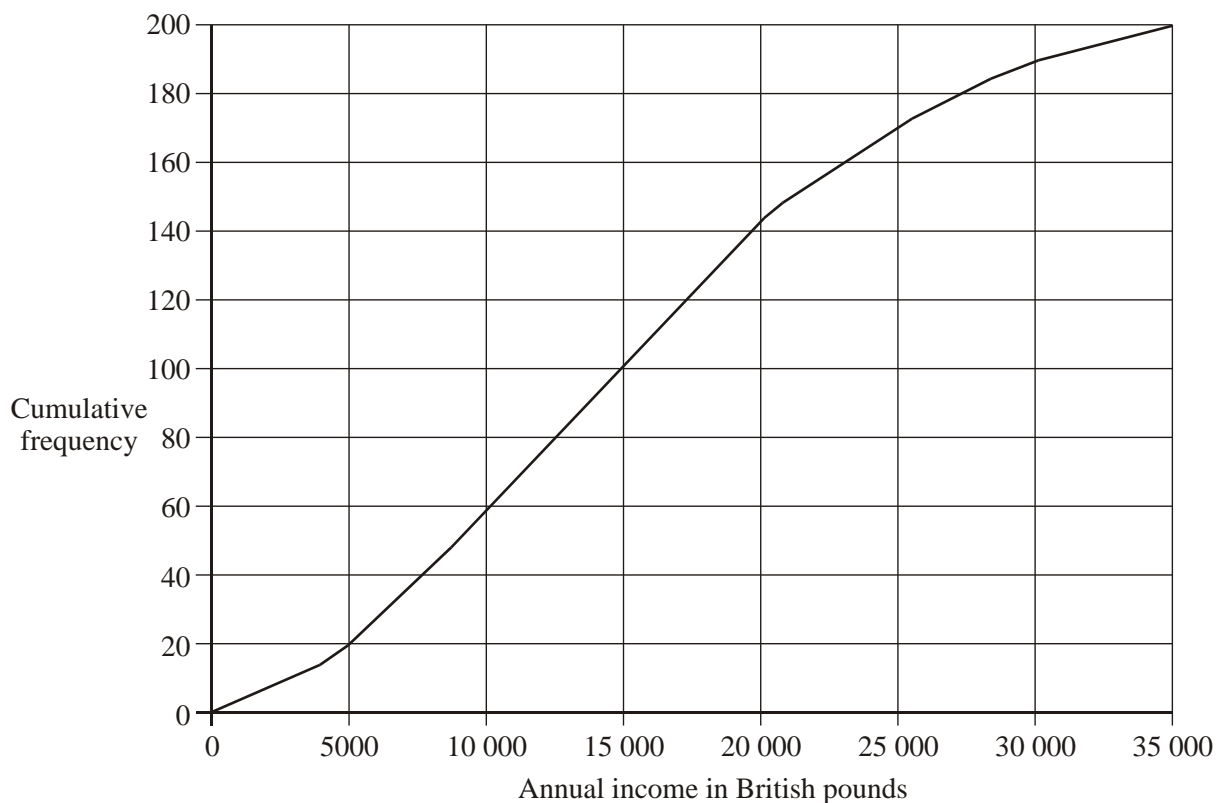**10.** The cumulative frequency graph below shows the examination scores of 80 students.

From the graph find

(a) the median value;

(b) the interquartile range;

(c) the 35th percentile;

(d) the percentage of students who scored 50 or above on this examination.

(Total 8 marks)

**11.** The graph below shows the cumulative frequency for the yearly incomes of 200 people.


Use the graph to estimate

(a)   the number of people who earn less than 5000 British pounds per year;

(b)   the median salary of the group of 200 people;

(c)   the lowest income of the richest 20% of this group.

(Total 4 marks)

12. A random sample of 200 females measured the length of their hair in cm. The results are displayed in the cumulative frequency curve below.
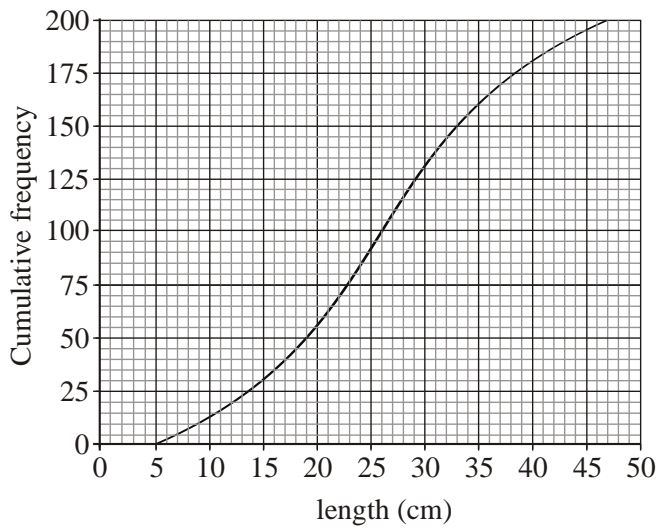

(a) Write down the median length of hair in the sample.

(1)

(b) Find the interquartile range for the length of hair in the sample.

(2)

(c) Given that the shortest length was 6 cm and the longest 47 cm, draw and label a box and whisker plot for the data on the grid provided below.
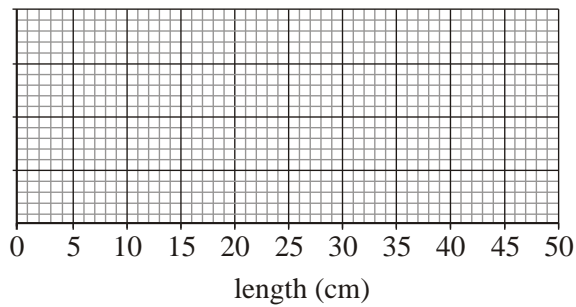
(3)
(Total 6 marks)

13. 120 Mathematics students in a school sat an examination. Their scores (given as a percentage) were summarized on a cumulative frequency diagram. This diagram is given below.
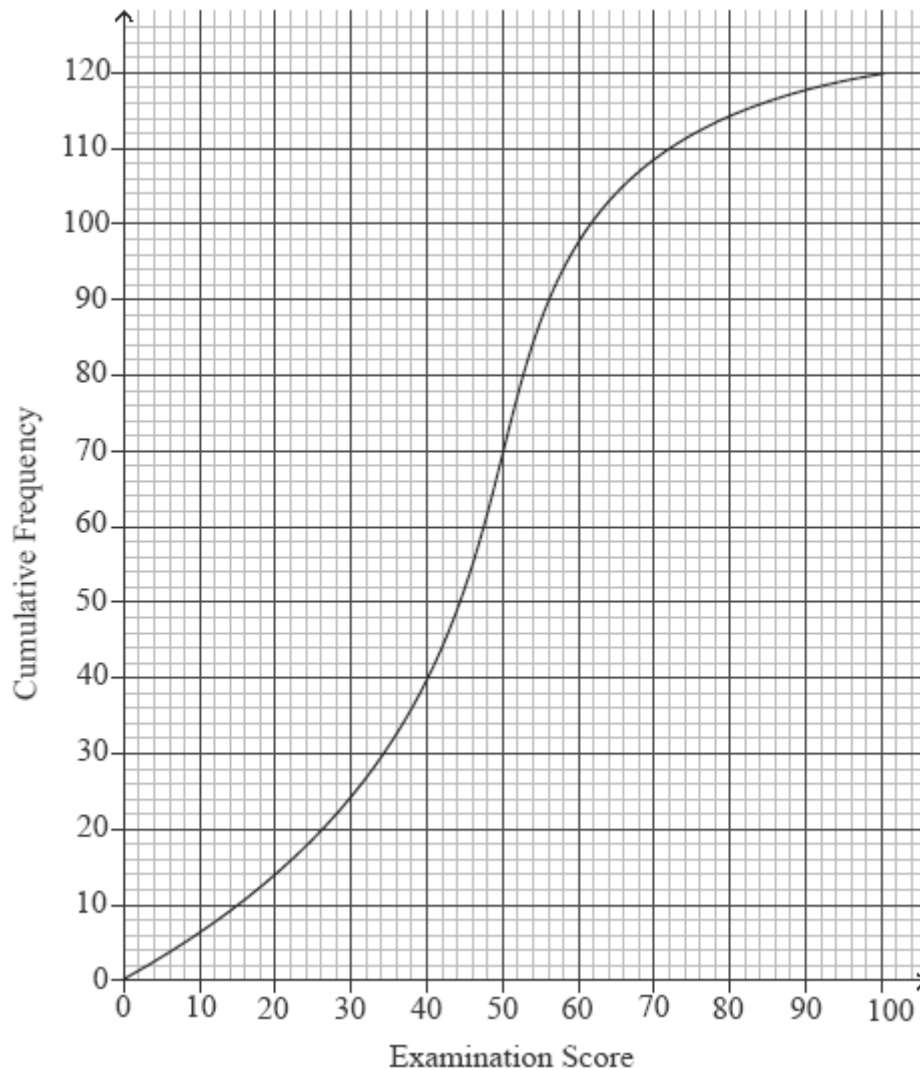
(a) Complete the grouped frequency table for the students.

Examination Score x (%)	$0 \leq x \leq 20$	$20 < x \leq 40$	$40 < x \leq 60$	$60 < x \leq 80$	$80 < x \leq 100$
Frequency	14	26			

(3)

(b) Write down the mid-interval value of the $40 < x \leq 60$ interval.

(1)

(c) Calculate an estimate of the mean examination score of the students.

(2)
(Total 6 marks)