

Edexcel GCSE

Mathematics (Linear) – 1MA0

CUMULATIVE FREQUENCY & BOX PLOTS

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil



Instructions

Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1. All the students in Mathstown school had a test.

The lowest mark was 18

The highest mark was 86

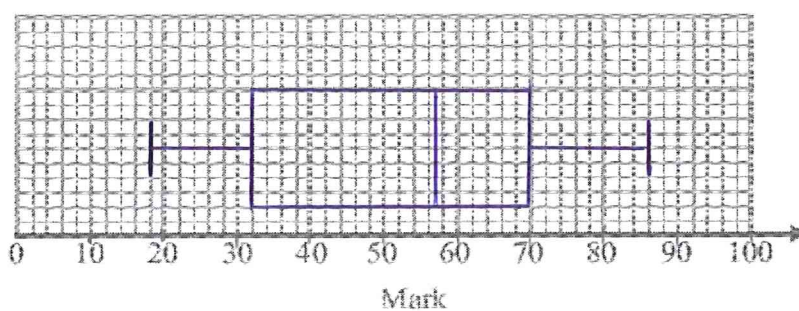
The median was 57

The lower quartile was 32

The interquartile range was 38

$$\begin{aligned}\text{Upper Quartile} &= LQ + IQR \\ &= 32 + 38 \\ &= 70\end{aligned}$$

On the grid, draw a box plot to show this information.



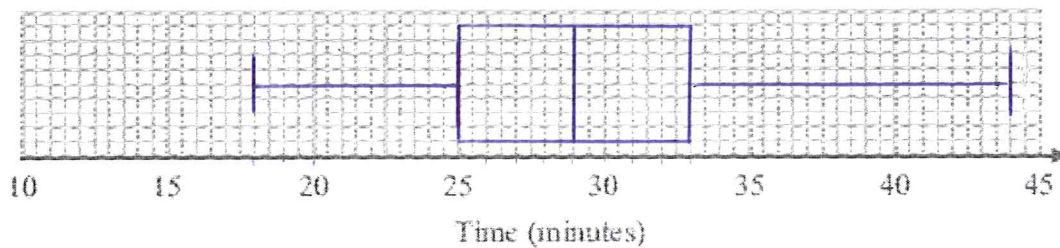
(3 marks)

2. Sameena recorded the times, in minutes, some girls took to do a jigsaw puzzle.

Sameena used her results to work out the information in this table.

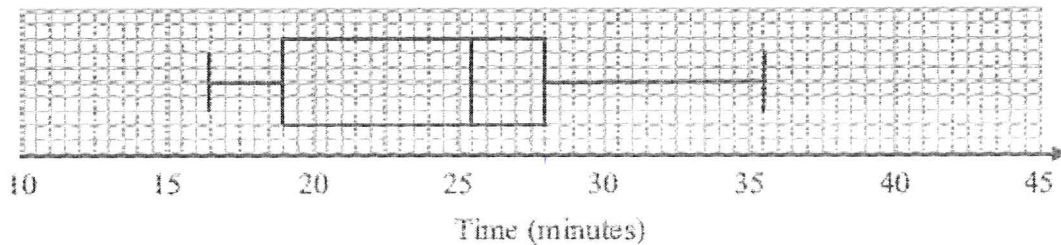
	Minutes
Shortest time	18
Lower quartile	25
Median	29
Upper quartile	33
Longest time	44

- (a) On the grid, draw a box plot to show the information in the table.



(2)

The box plot below shows information about the times, in minutes, some boys took to do the same jigsaw puzzle.



- (b) Compare the distributions of the girls' times and the boys' times.

The boys median time was less than that of the girls; Boys 25 mins, Girls 29 mins.

The spread of data for the interquartile range is smaller for the girls (8 mins) than for the boys (9 mins).

(2)

(4 marks)

3. This frequency table gives information about the ages of 60 teachers.

Age (A) in years	Frequency
$20 < A \leq 30$	12
$30 < A \leq 40$	15
$40 < A \leq 50$	18
$50 < A \leq 60$	12
$60 < A \leq 70$	3

- (a) Complete the cumulative frequency table.

Age (A) in years	Cumulative frequency
$20 < A \leq 30$	12
$20 < A \leq 40$	27
$20 < A \leq 50$	45
$20 < A \leq 60$	57
$20 < A \leq 70$	60

(1)

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

(2)

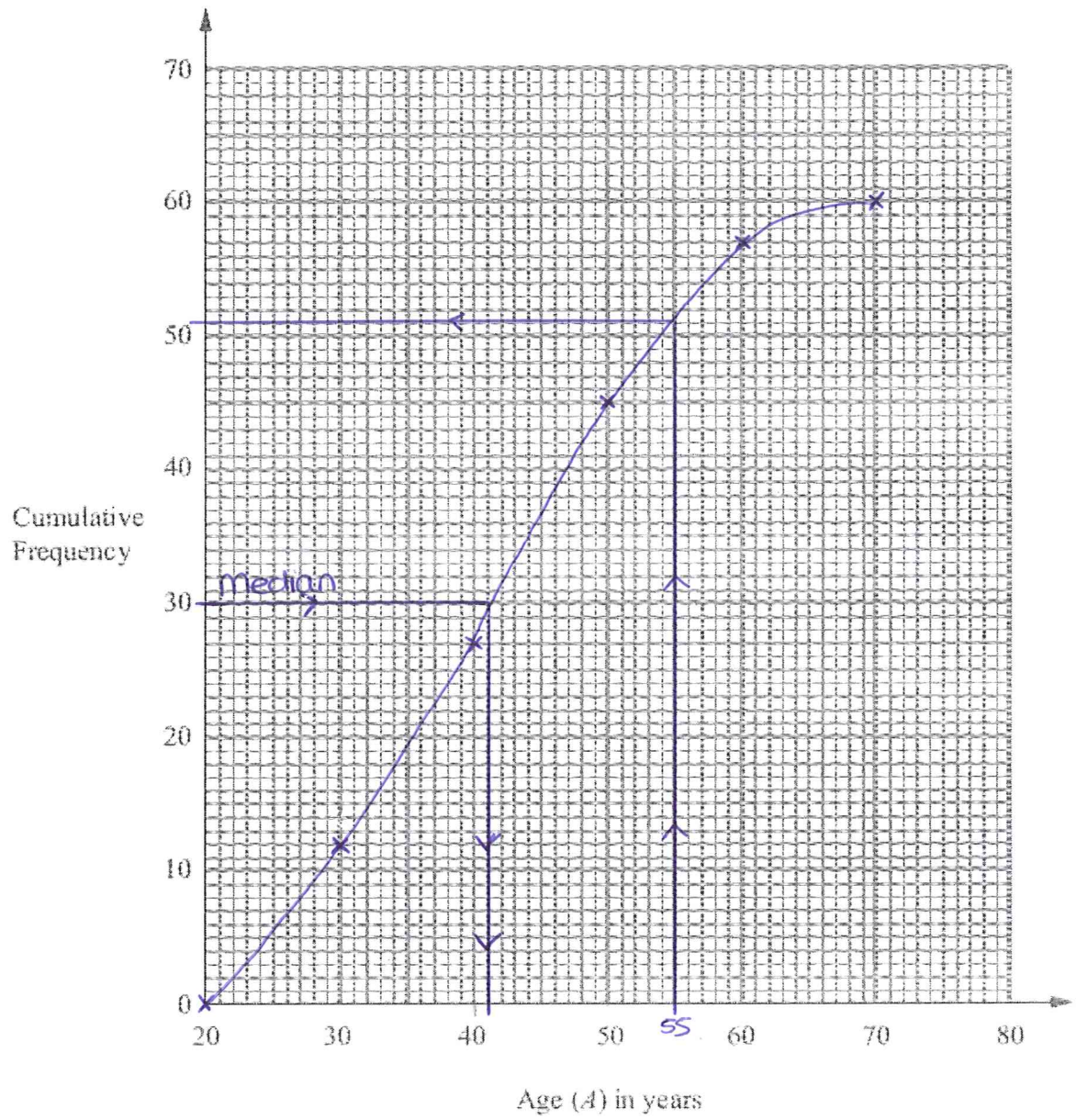
- (c) Use your cumulative frequency graph to find an estimate for the median age.

.....41..... years
(2)

- (d) Use your cumulative frequency graph to find an estimate for the number of teachers older than 55 years.

51 teachers are less than 55 years old, so $60 - 51 = 9$ are older.

.....9.....
(2)

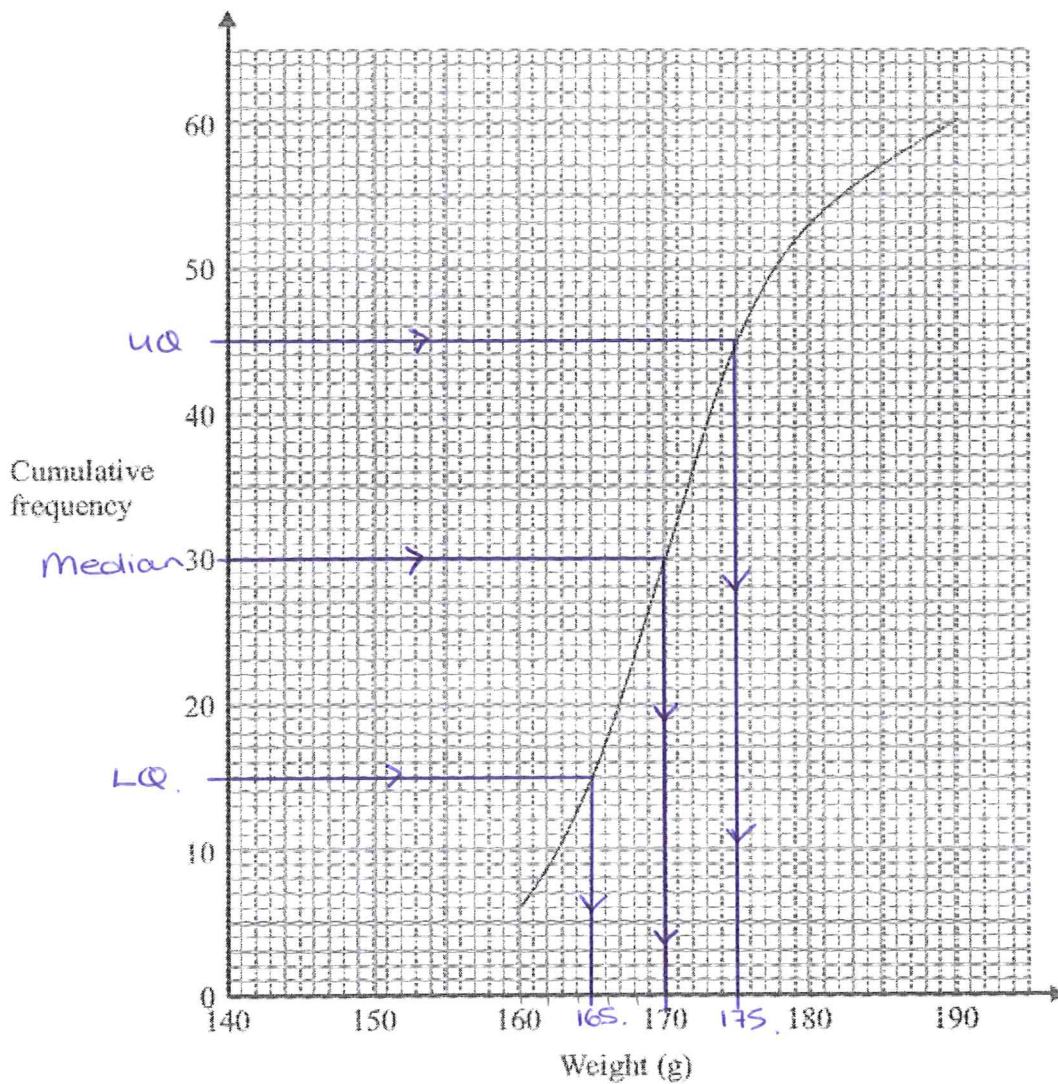


(7 marks)

4. 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.

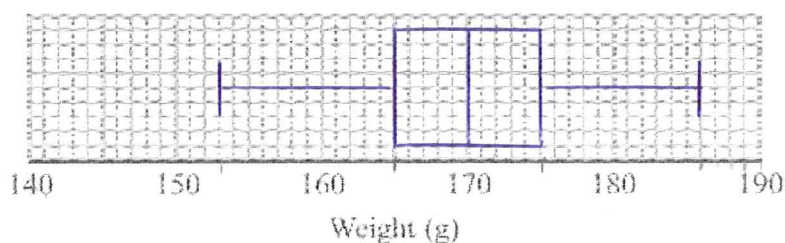


- (a) Use the graph to find an estimate for the median weight.

..... 170 g
(1)

The 60 tomatoes from group A
had a minimum weight of 153 grams
and a maximum weight of 186 grams.

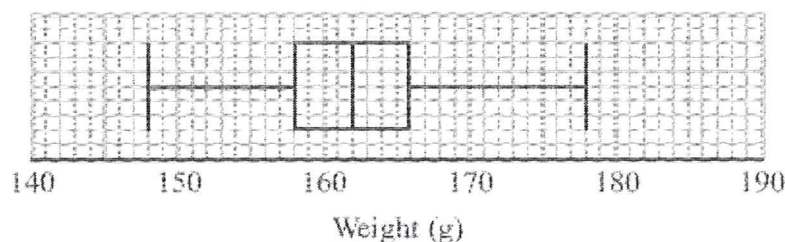
- (b) Use this information and the cumulative frequency graph to draw a box plot for the 60 tomatoes from group A.



(3)

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

Harry weighed 60 tomatoes from group B.
He drew this box plot for his results.



- (c) Compare the distribution of the weights of the tomatoes from group A with the distribution of the weights of the tomatoes from group B.

The median weight for tomatoes with fertiliser (Group A, 170g) was
higher than that for those without fertiliser (Group B, 162g).
The interquartile Range of the weights was also higher in Group
A, than in Group B.

(2)

(6 marks)

5. The table shows information about the speeds of 100 lorries.

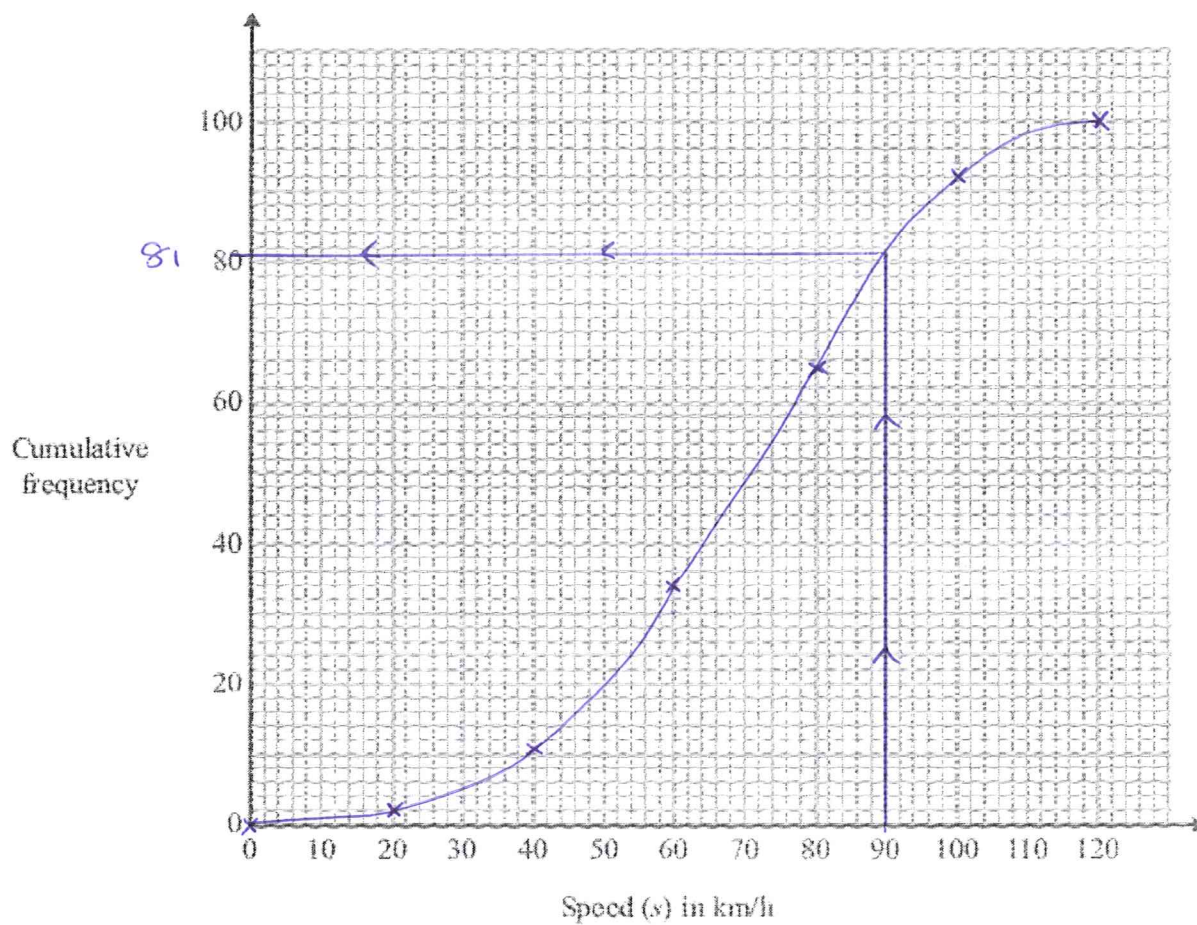
Speed (s) in km/h	Frequency
$0 < s \leq 20$	2
$20 < s \leq 40$	9
$40 < s \leq 60$	23
$60 < s \leq 80$	31
$80 < s \leq 100$	27
$100 < s \leq 120$	8

- (a) Complete the cumulative frequency table for this information.

Speed (s) in km/h	Cumulative frequency
$0 < s \leq 20$	2
$0 < s \leq 40$	11
$0 < s \leq 60$	34
$0 < s \leq 80$	65
$0 < s \leq 100$	92
$0 < s \leq 120$	100

(1)

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



(2)

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

81 lorries had a speed of less than 90 km/h,
 so $100 - 81 = 19$ had a speed of more than 90 km/h.

..... 19 lorries
 (2)

(5 marks)

6. The grouped frequency table shows information about the weekly wages of 80 factory workers.

Weekly wage (£ x)	Cumulative Frequency
$100 < x \leq 200$	8
$200 < x \leq 300$	15
$300 < x \leq 400$	30
$400 < x \leq 500$	17
$500 < x \leq 600$	7
$600 < x \leq 700$	3

- (a) Complete the cumulative frequency table.

Weekly wage (£ x)	Cumulative Frequency
$100 < x \leq 200$	8
$200 < x \leq 300$	23
$300 < x \leq 400$	53
$400 < x \leq 500$	70
$500 < x \leq 600$	77
$600 < x \leq 700$	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 interquartile range.

$$LQ = 285 \quad UQ = 435$$

$$IQR = 435 - 285 \\ = £150$$

$$£ \dots 150 \dots \dots \dots$$

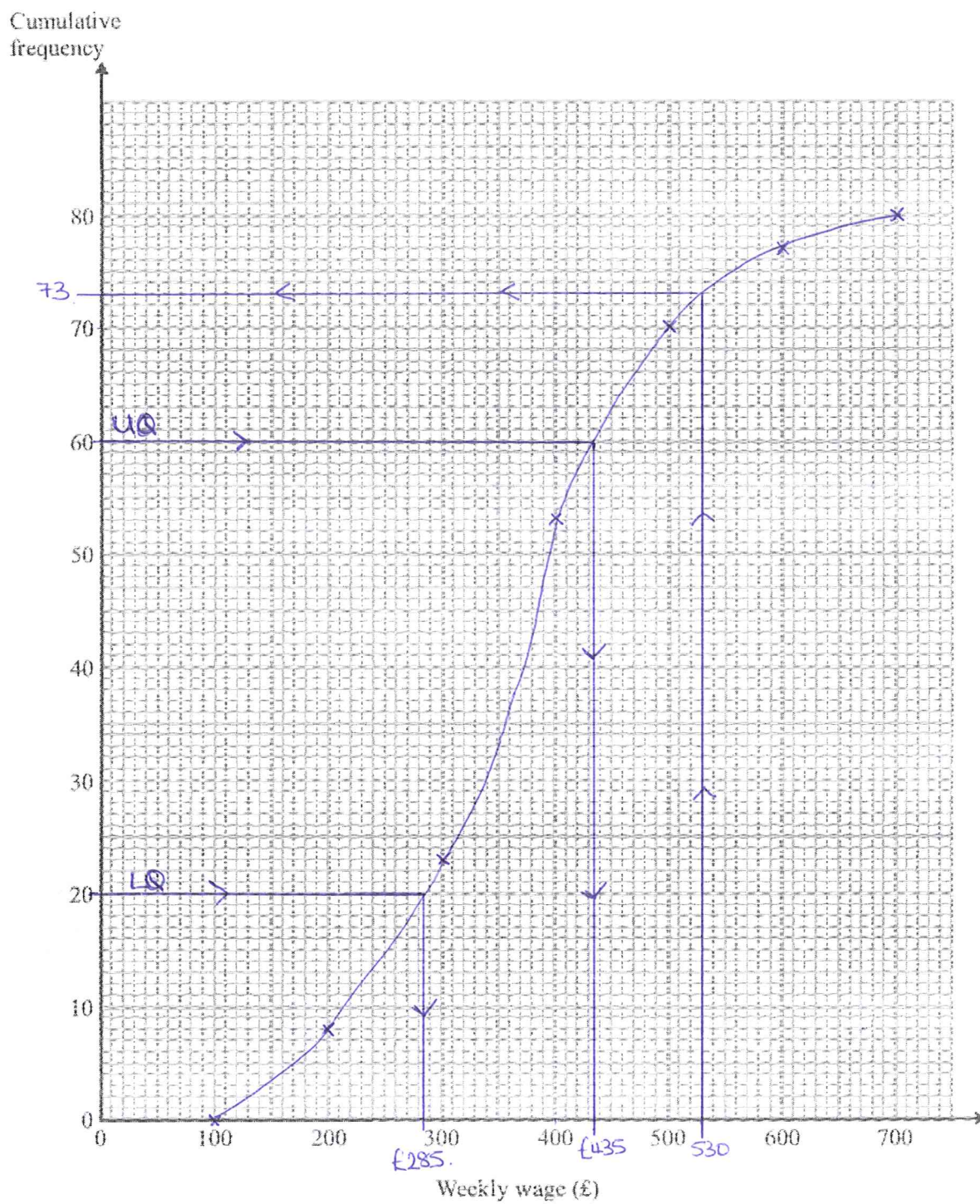
(2)

- (d) Use your graph to find an estimate for the number of workers with a weekly wage of more than £530

$$73 \text{ have a wage less than } £530. \\ \text{so } 80 - 73 = 7 \text{ have a wage more than } £530$$

$$\dots \dots \dots 7 \dots \dots \dots$$

(2)



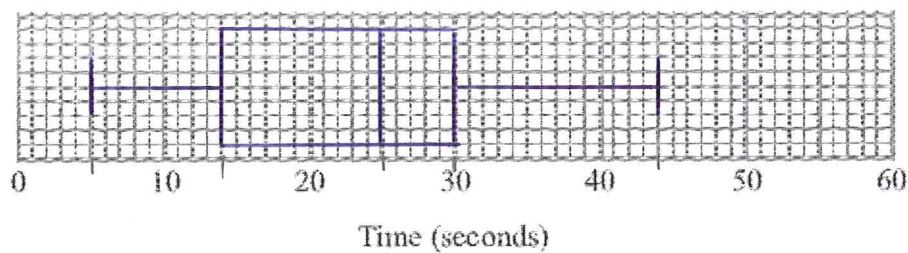
(7 marks)

7. Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

5 9 11 14 15 20 22 25 27 27 28 30 32 35 44

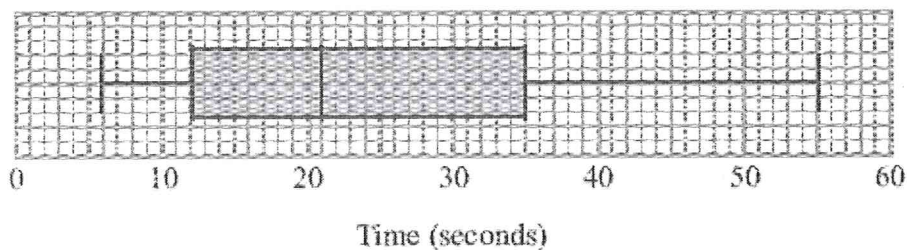
14 median 30

- (a) On the grid, draw a box plot for this information.



(3)

The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.



- (b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

There was a greater spread of waiting times in the interquartile range for Green's Garden centre than Rose's Garden centre.

The median waiting time is shorter at ^{Green's} ~~Rose's~~ than Rose's Garden centre.

(2)

(5 marks)