Name: _____

GCSE Statistics

Box Plots

Total marks available: 59

Total marks achieved: _____

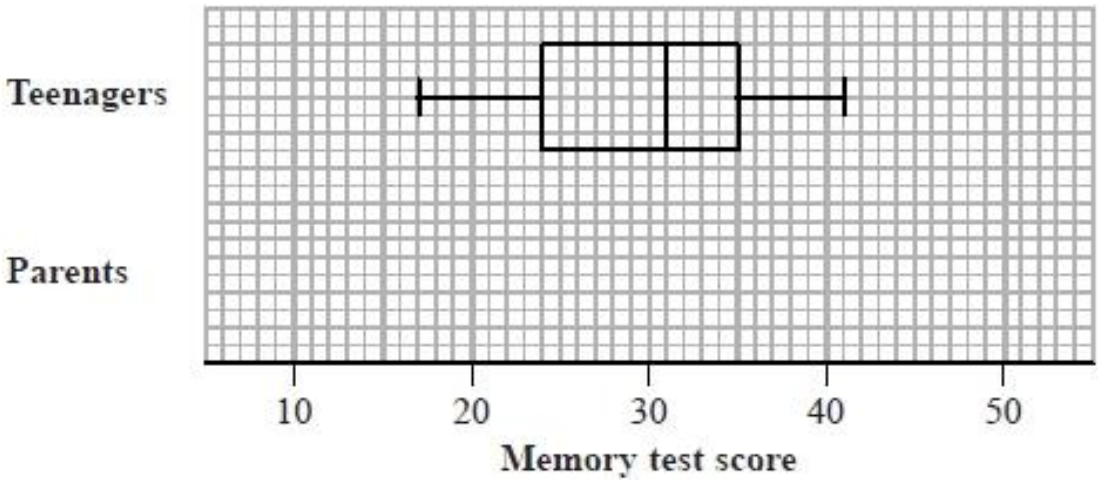
Instructions
• Use black ink or ball-point pen.
• Fill in the boxes at the top of this page with your name,
Centre number and candidate number.
• Answer all questions.
• Answer the questions in the spaces provided
– There may be more space than you need.
• Scientific calculators may be used.
• You must show all your working out with your answer clearly identified
At the end of your solution.

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.

Advice
• Read each question carefully before you start to answer it.
• Try to answer every question.
• Check your answers if you have time at the end.

Q1. Matthew recorded the scores in a memory test taken by some teenagers and by their parents. The teenagers took the same test as their parents.

The box plot shows information about the recorded test scores for the teenagers.



The table gives information about the recorded test scores for the parents.

Least score	Lower quartile	Median	Upper quartile	Greatest score
12	21	29	35	39

(a) On the grid above, draw a box plot for the recorded test scores for the parents.

(2)

(b) Compare the distributions.

Give three comparisons and interpret one of your comparisons.

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(4)

The information for the teenagers is based on data collected from 56 teenagers.

(c) Estimate the number of these teenagers whose recorded test score was greater than 24

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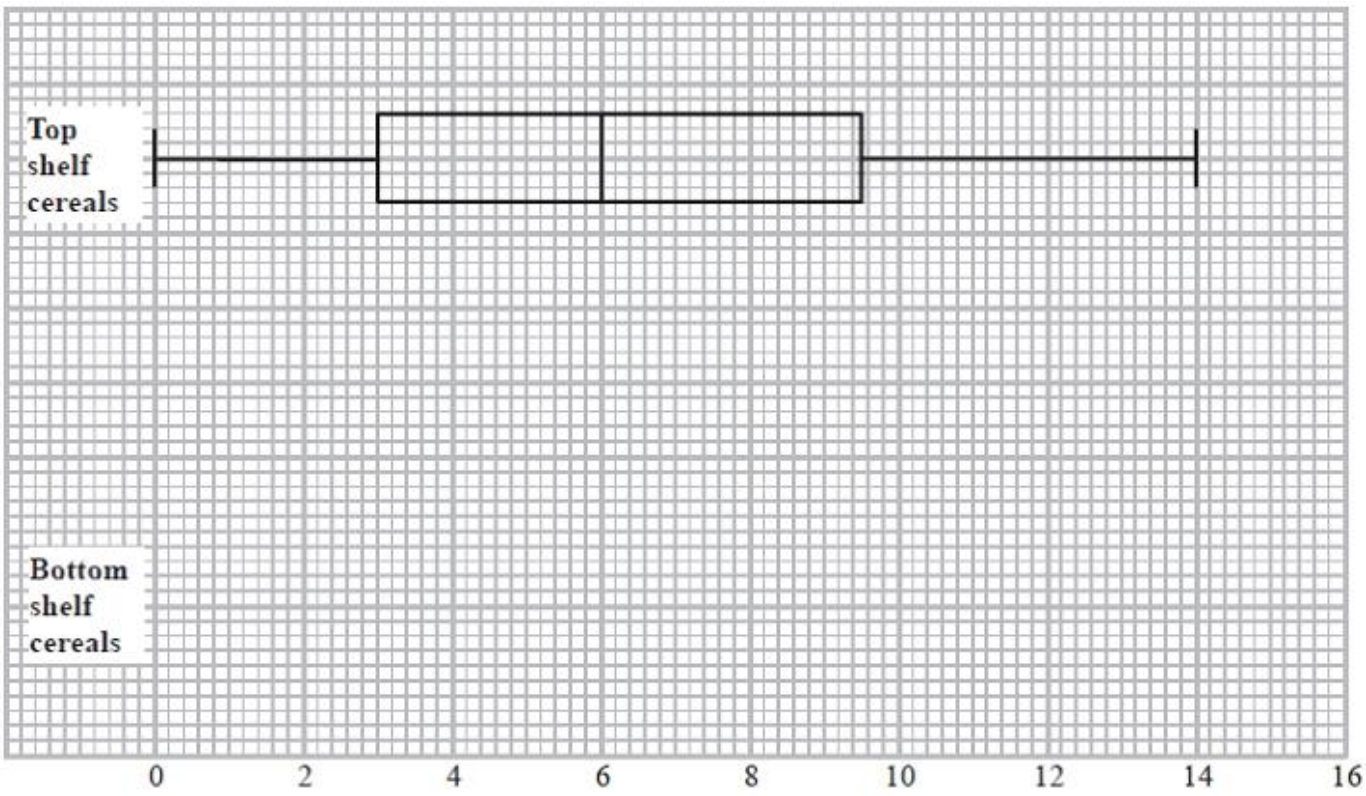
(2)

(Total for question = 8 marks)

Q2.

The box plot shows information about the weight of sugar (in grams per serving) in each of the breakfast cereals on the top shelf in a supermarket.



(Data source: Healthy Breakfast Study Carnegie Mellon University)

(a) Work out the interquartile range for the weights of sugar in the top shelf breakfast cereals.

..... Grams

(2)

The table gives some information about the weight of sugar (in grams per serving) in each of the breakfast cereals on the bottom shelf in the supermarket.

	Weight of sugar (grams per serving)
Lowest value	0
Lower quartile	2
Median	3
Upper quartile	10
Highest value	15

(b) On the grid above, construct a box plot to represent this information.

(3)

*(c) Discuss whether or not the distribution of weights of sugar for bottom shelf breakfast cereals is symmetrical.

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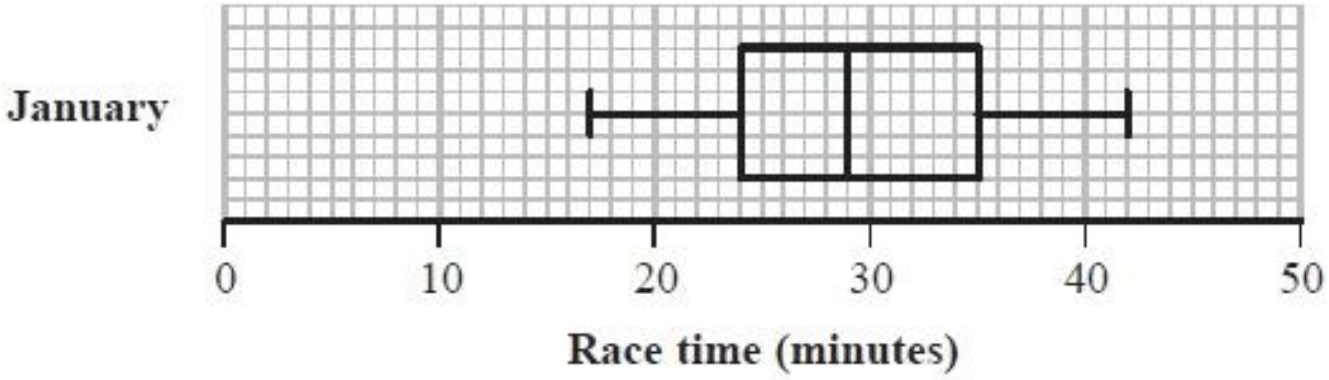
(2)

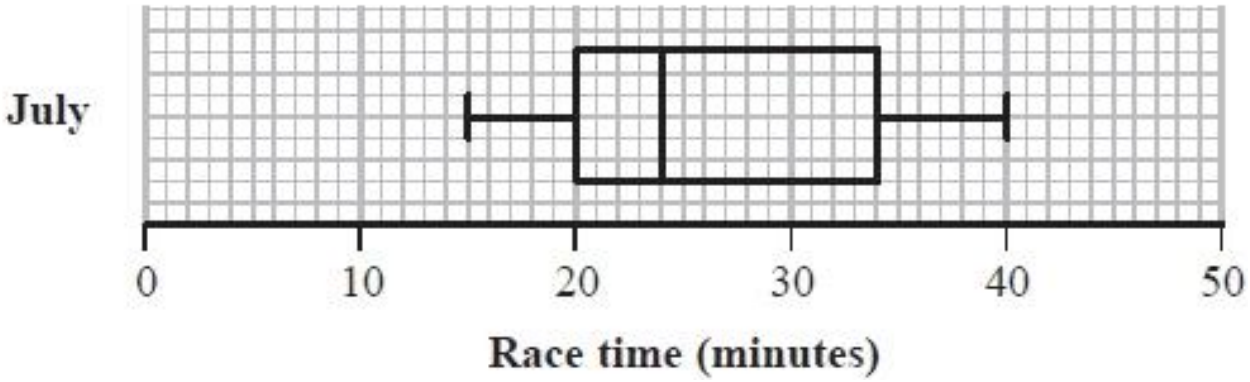
(Total for Question = 7 marks)

Q3.

Some athletes ran a 5 km race in January and in July.

The box plots give information about the times taken, in minutes, for the same athletes to complete these races.





*(a) Compare the distributions of the race times in January and in July.

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(2)

(b) Compare the proportion of athletes completing the race in less than 24 minutes in January and in July.

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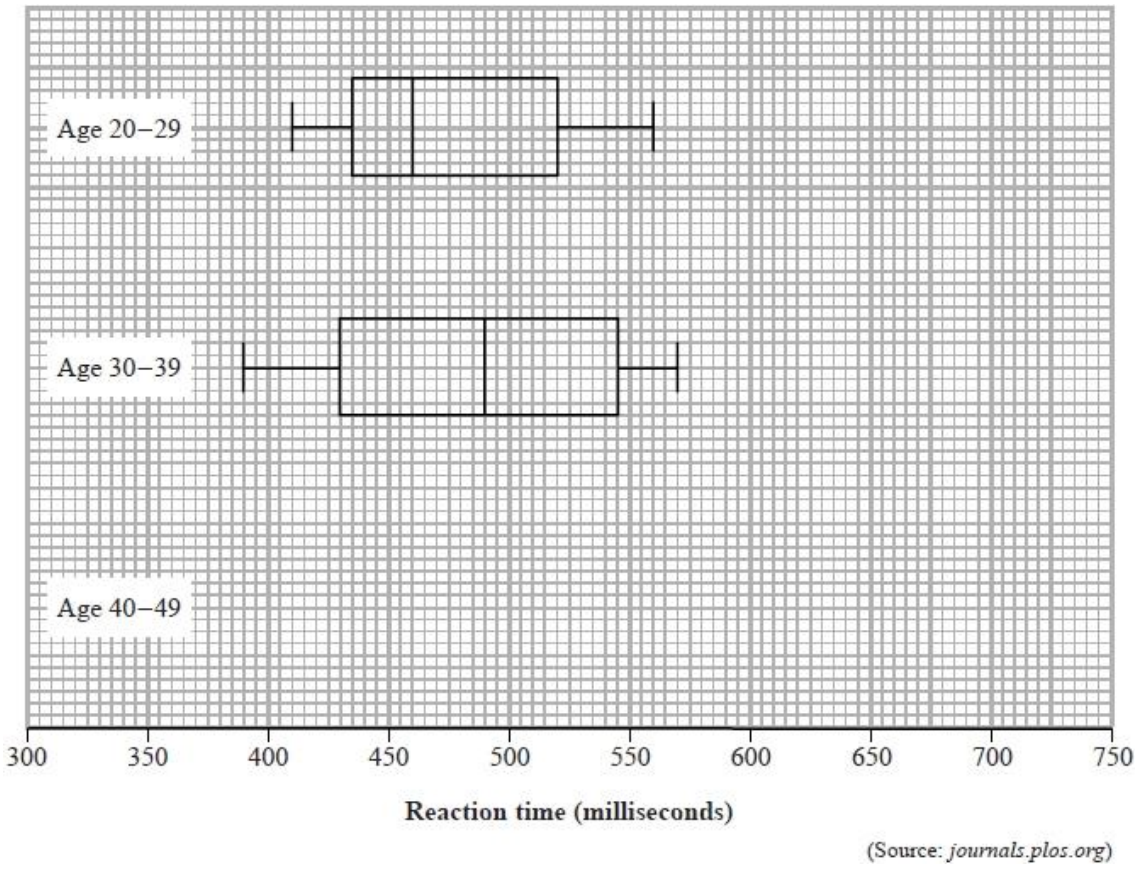
(2)

(Total for question = 4 marks)

Q4.

The box plots show information about the reaction times, in milliseconds, for 20–29 year old men and for 30–39 year old men.



(Source: *journals.plos.org*)

The table below gives information about the reaction times, in milliseconds, for 40–49 year old men.

Least time	Lower quartile	Median	Upper quartile	Greatest time
430	481	533	579	725

(a) On the grid above, draw a box plot for the information in the table.

(2)

(b) Compare the distributions of the reaction times.

Interpret one of your comparisons.

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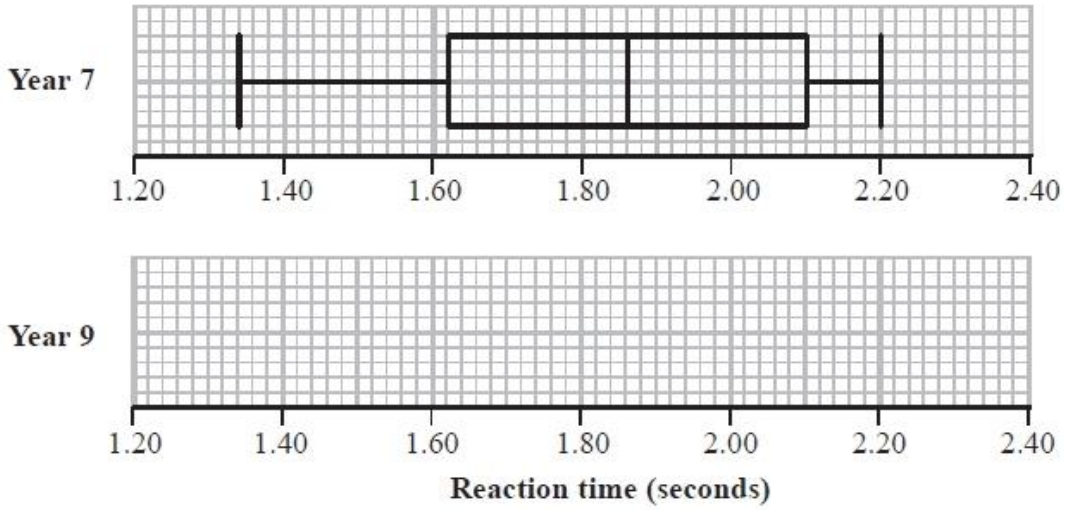
(4)

(Total for question = 6 marks)

Q5. Alexander measured the reaction times of Year 7 and Year 9 students.

The box plot shows information about the reaction times of the **Year 7** students.



The incomplete table shows some information about the reaction times of the **Year 9** students.

Minimum	Lower quartile	Median	Upper quartile	Maximum
1.40	1.68			2.26

The Year 7 and Year 9 distributions have the same median.

The Year 7 and Year 9 distributions have the same interquartile range.

(a) On the grid above, use this information to draw the box plot for the reaction times of the Year 9 students.

(3)

(b) Describe the skew of each distribution.

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(2)

The box plot for Year 7 was based on data collected from 76 students in Year 7

(c) Estimate the number of these Year 7 students with a reaction time less than 2.10 seconds.

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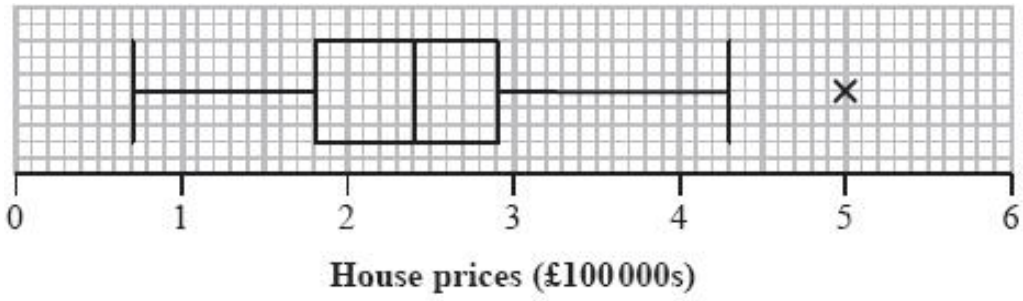
(2)

(Total for question = 7 marks)

Q6.

Ashley collected information about house prices in her town last year.

She drew this box plot for this information.



Source: Land Registry

Ashley says that more than half the houses had a price greater than £200 000

(a) Explain how the box plot can be used to support what Ashley says.

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(1)

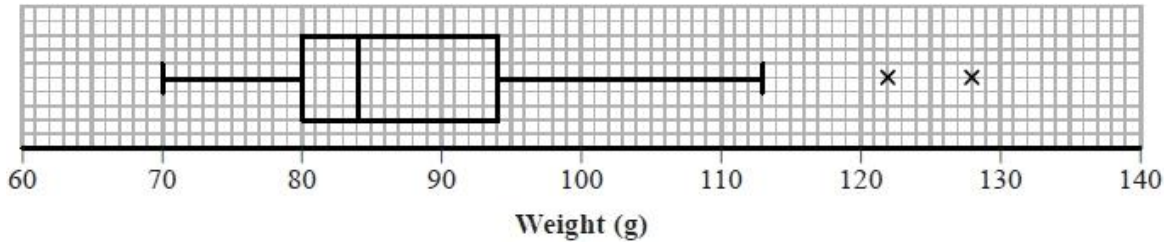
The greatest price was £500 000

(b) Show, by calculation, that this price is an outlier.

(3)

(Total for question = 4 marks)

Q7. The box plot shows the distribution of weights of a sample of salad potatoes.



(a) Find the median and the interquartile range (IQR).

Median =..... g

IQR =..... g

(3)

The mean and standard deviation of this sample are

Mean = 85.5 g standard deviation = 9.4 g

A sample of new potatoes has the following summary statistics

median	34 g	mean	35 g
IQR	7 g	standard deviation	4.4 g

Sally wants to compare the distributions of the weights of the sample of salad potatoes and the sample of new potatoes.

For the comparison she can use one of two options.

Option 1: the values of median and IQR.
Option 2: the values of mean and standard deviation.

*(b) Explain which of these options would be best for Sally to use to compare these distributions.

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(2)

*(c) Compare the distributions of the weights of the samples of salad potatoes and new potatoes.

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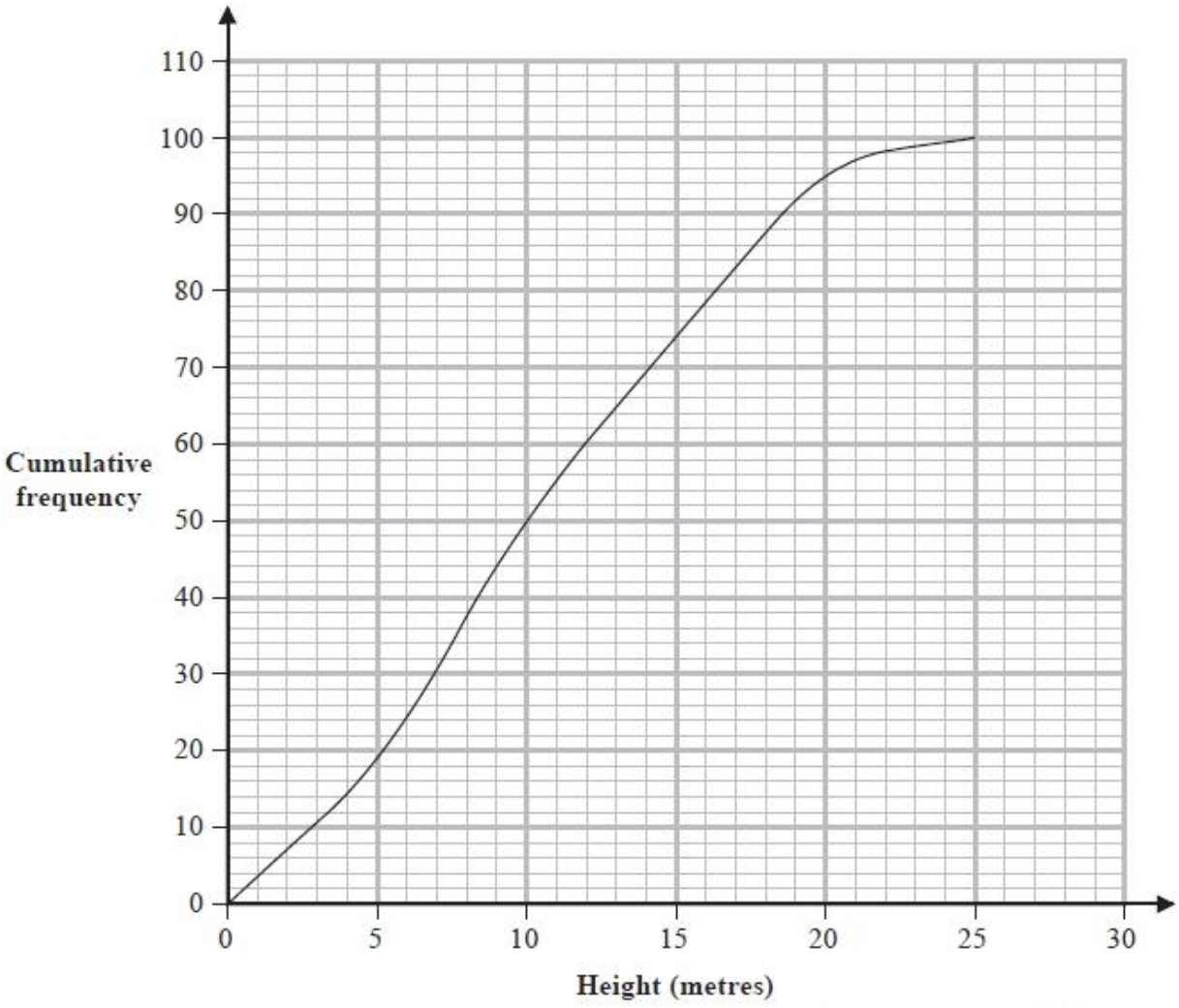
(2)

(Total for question = 7 marks)

Q8.

The cumulative frequency diagram gives information about the heights, in metres, of a sample of 100 oak trees in Camden, London.



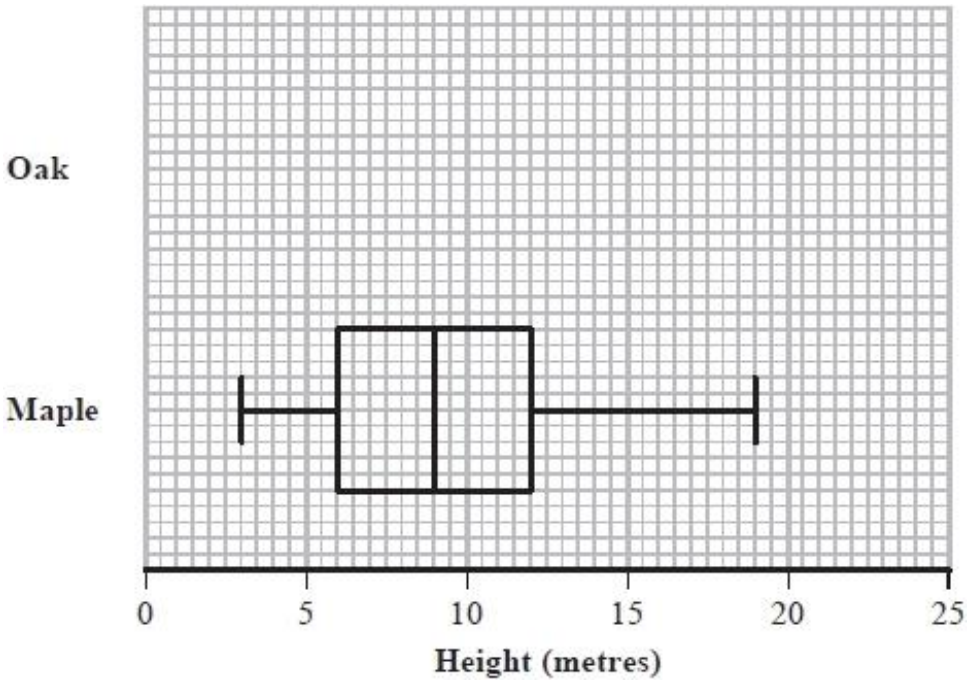
(Source: *opendata.camden.gov.uk*)

(a) Using the cumulative frequency diagram, complete the table below for the heights of these 100 trees.

Lower quartile	Median	Upper quartile

(2)

The box plot shows information about the heights, in metres, of a sample of maple trees in Camden, London.



For the sample of oak trees

The least height is 2.0 m
the greatest height is 22.3 m

(b) On the grid above, draw a box plot for the heights of the sample of oak trees.

(2)

(c) Compare the two distributions of heights.
Give **three** comparisons and interpret one of these comparisons.

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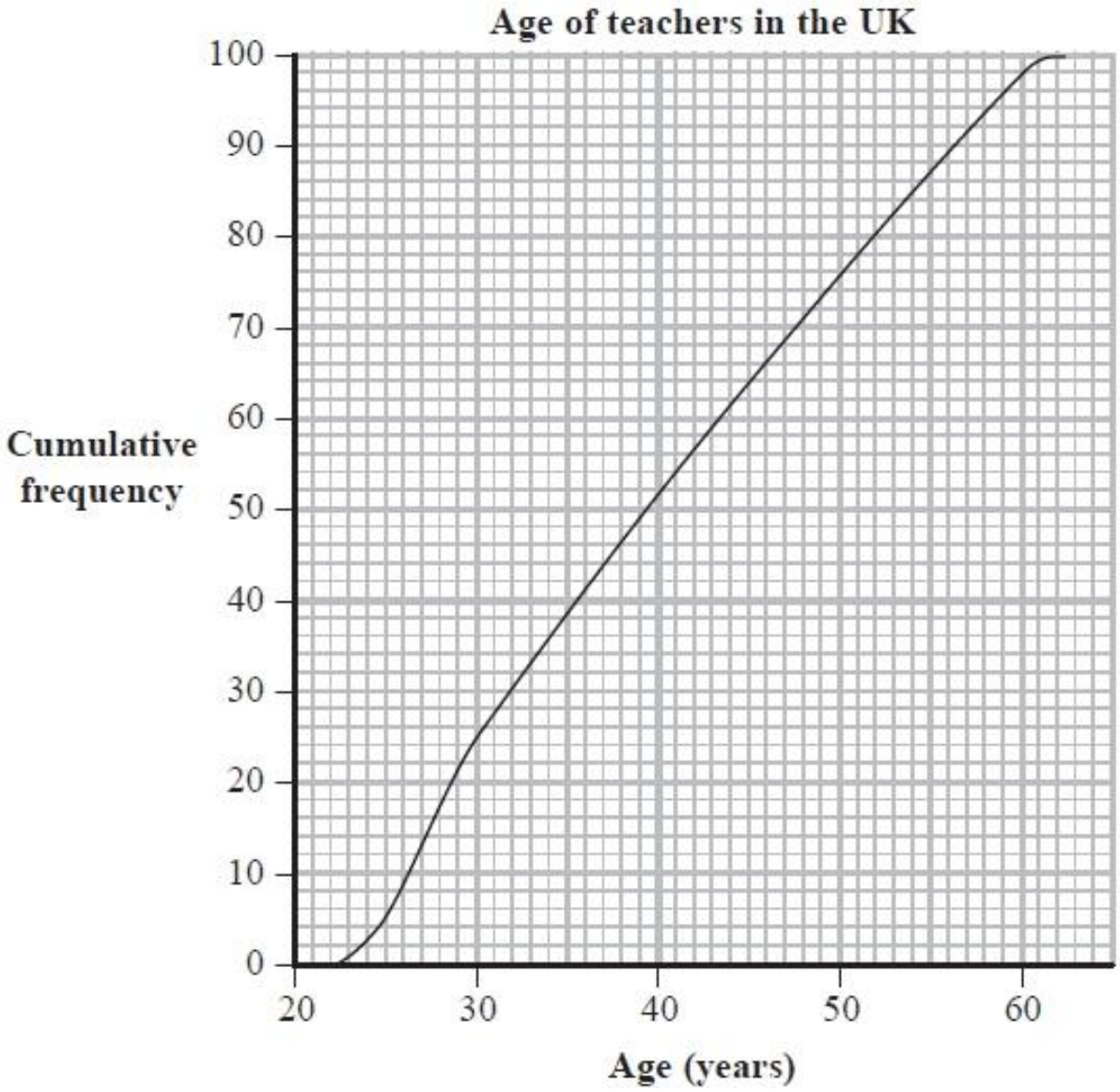
(4)

(Total for question = 8 marks)

Q9.

The cumulative frequency diagram shows the distribution of ages of a sample of 100 teachers in the UK.

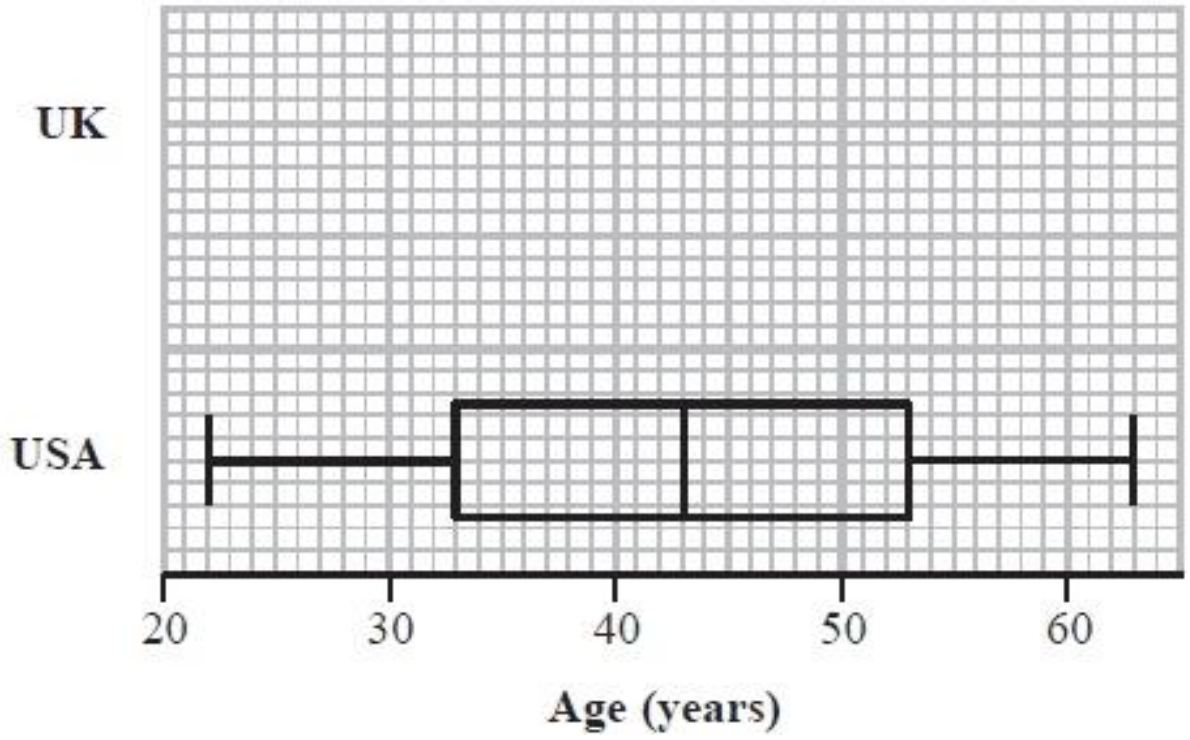


(a) Complete this table for the ages of these 100 teachers.

Lowest	Lower Quartile	Median	Upper Quartile	Highest
22				62

(2)

The box plot shows the distribution of ages of a sample of teachers in the USA.



(b) On the same grid, draw a box plot for the ages of the sample of teachers in the UK.

(2)

A Head teacher thinks that teachers in the UK are younger than teachers in the USA.

(c) Use the box plots to compare the distributions of the ages of the teachers in the UK and the ages of the teachers in the USA.

Is the Head teacher correct?

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(4)

(Total for Question = 8 marks)