

Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Box Plot and Cumulative Frequency

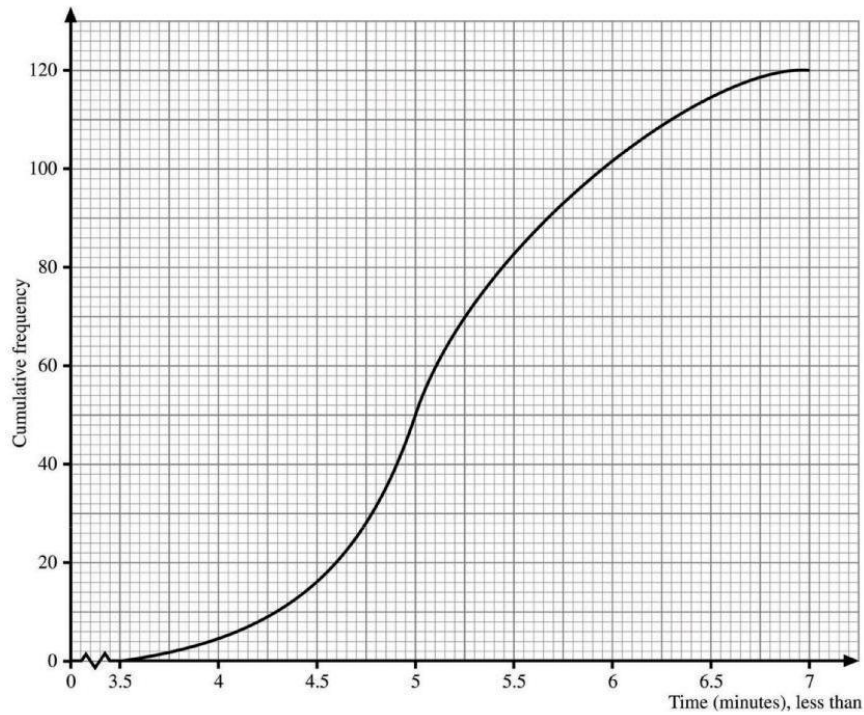
Calculator Allowed

INSTRUCTIONS TO CANDIDATES

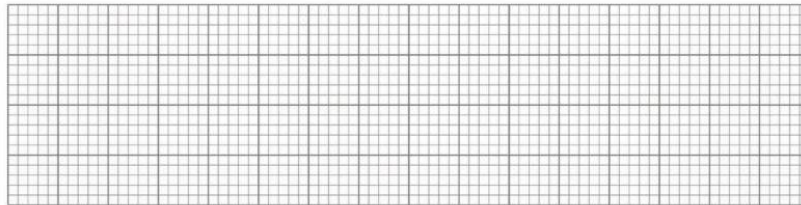
- Write your name in the space provided.
- Write your answers in the spaces provided in this question paper.
- Answer ALL questions.
- Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
- You should have a ruler, compass and protractor where required.

Total Marks :

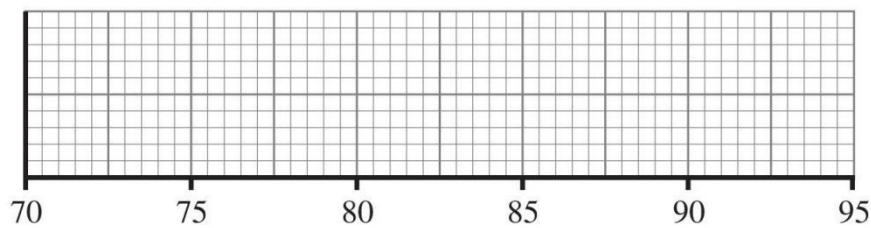
- 1) The cumulative frequency curve represents the times taken to run 1500 m by each of the 120 members of an athletics club.



Draw a box plot to illustrate the data.



- 2) The median of the scores in an archery competition is 80 and the lower and upper quartiles are 73 and 84. The scores ranged from 71 to 94. Draw a box plot for the scores.



[3]

- 3) Eileen constructed a cumulative frequency table from her mobile phone bill to display her call times over the previous month. The results are shown in the table below.

Time in minutes	Cumulative frequency
<5	29
<10	62
<15	114
<20	153
<25	179
<30	195

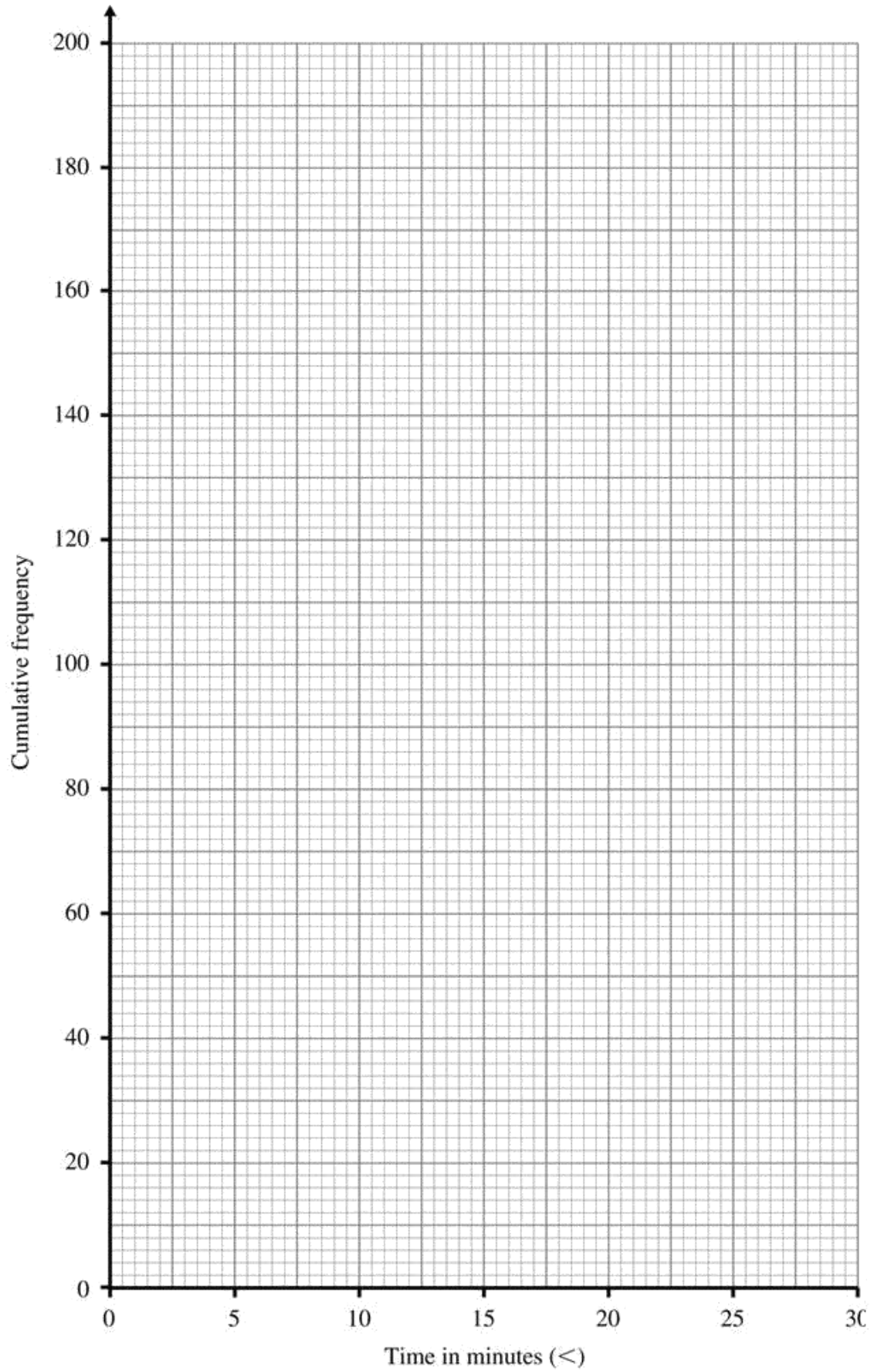
- (a) Draw a cumulative frequency graph, on the opposite page, to display the data. [3]
- (b) From your graph, estimate the median for Eileen's call times.

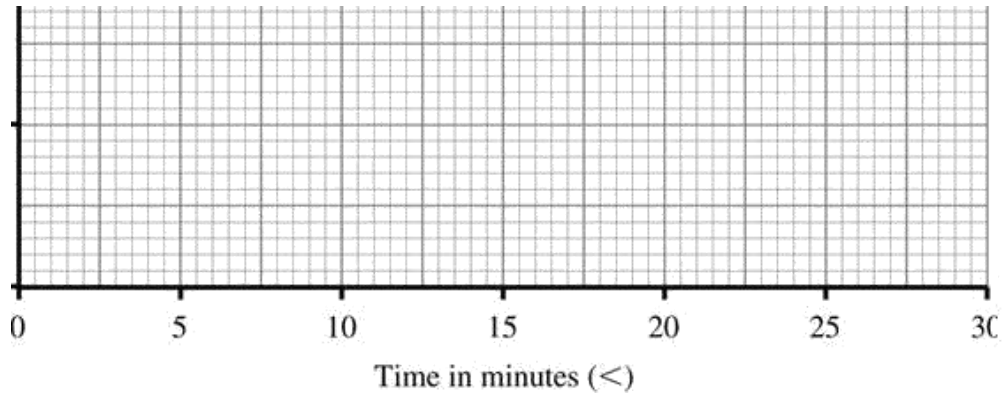
Answer _____ minutes [1]

- (c) Eileen's pricing plan with the phone company allows her free calls provided that they last no more than 12 minutes.
From your graph, estimate the number of calls which will be charged to Eileen's account by the phone company.

Answer _____ calls [2]

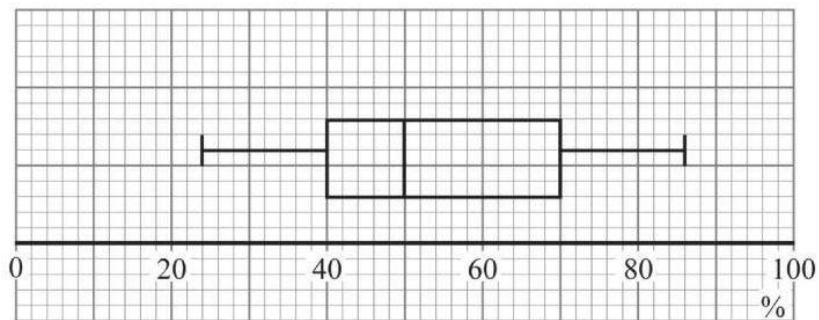
- (d) The shortest call took one minute and the longest took 29 minutes.
Draw a box plot on the grid below the cumulative frequency graph to illustrate the data. [3]



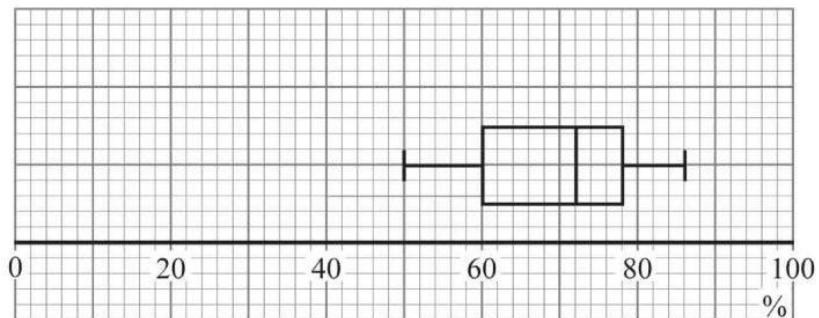


4) The box plots show the distribution of test results for two different classes.

Class P



Class Q



Comment on **two** differences between the classes.

(i) _____
 _____ [1]

(ii) _____
 _____ [1]

5) Peter is a gardener. He recorded how much money he earned each week for 40 weeks.

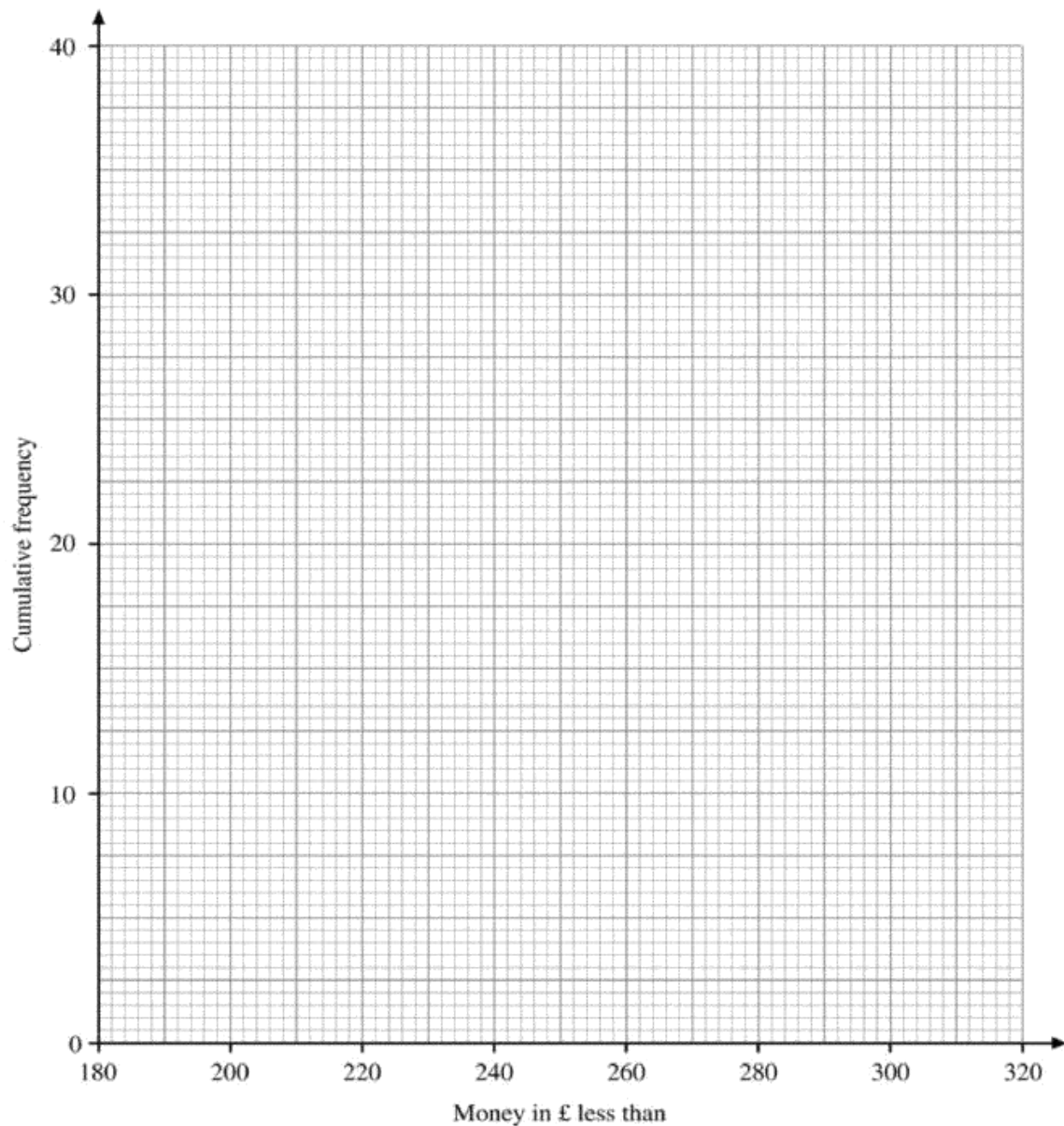
Money in £ (m)	Frequency	Money in £	Cumulative Frequency
$180 \leq m < 200$	4	<200	4
$200 \leq m < 220$	7	<220	11
$220 \leq m < 240$	12	<240	
$240 \leq m < 260$	9		
$260 \leq m < 280$	5		
$280 \leq m < 300$	2		
$300 \leq m < 320$	1		

(a) Complete the table.

[1]

(b) Draw the cumulative frequency graph:

[3]



(c) Use the graph to estimate

(i) the median,

Answer £ _____ [1]

(ii) the inter-quartile range,

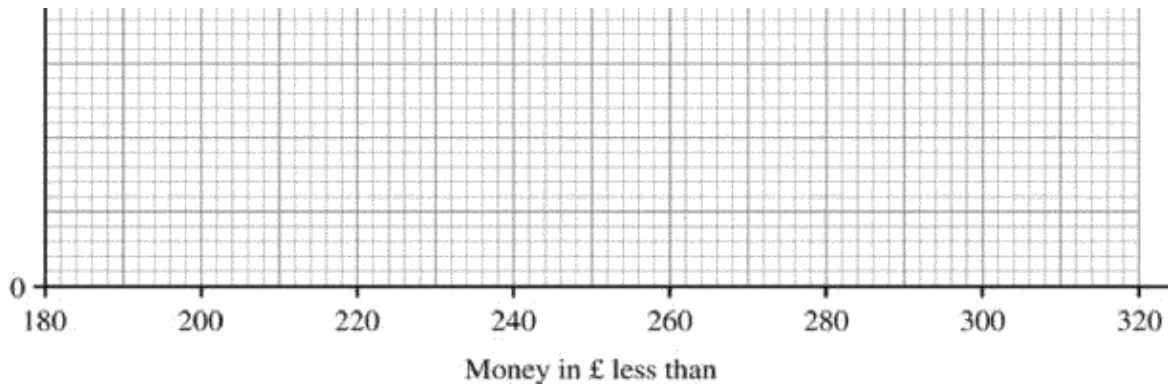
Answer £ _____ [2]

(iii) in how many weeks Peter earned more than £225.

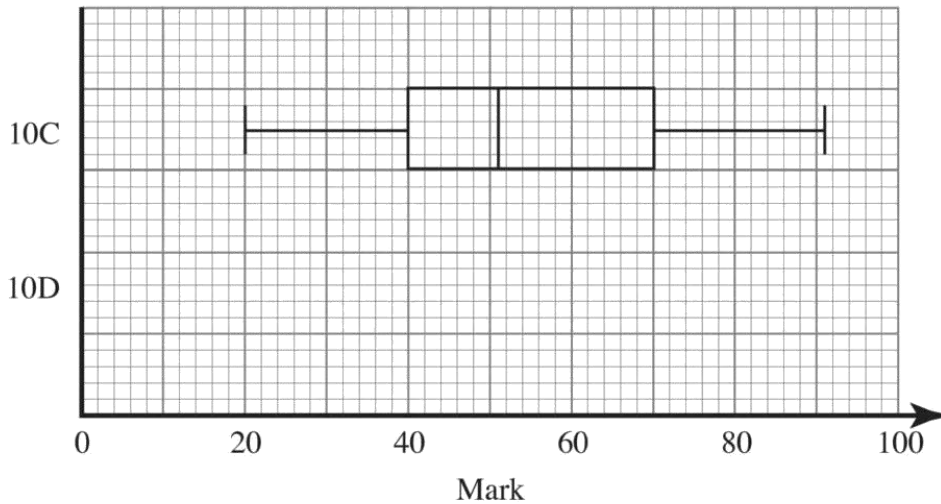
Answer _____ weeks [2]

(d) The lowest amount Peter earned was £185 and the highest amount was £315.

Draw a box plot opposite to illustrate Peter's earnings. [3]



6) The box plot shows the marks in a test for class 10C.



- (a) Class 10D did the same test and the median mark was 52, the lower quartile was 35, the upper quartile was 82, the lowest mark was 22 and the highest mark was 93.

Draw a box plot for 10D on the grid above. [2]

- (b) The head of the mathematics department says that these classes performed similarly in the test. Do you agree with her comment? Give **two** reasons to support your decision.

Answer _____ because _____

_____ [2]

7) The graph opposite shows the cumulative frequency of scores obtained in a darts tournament.

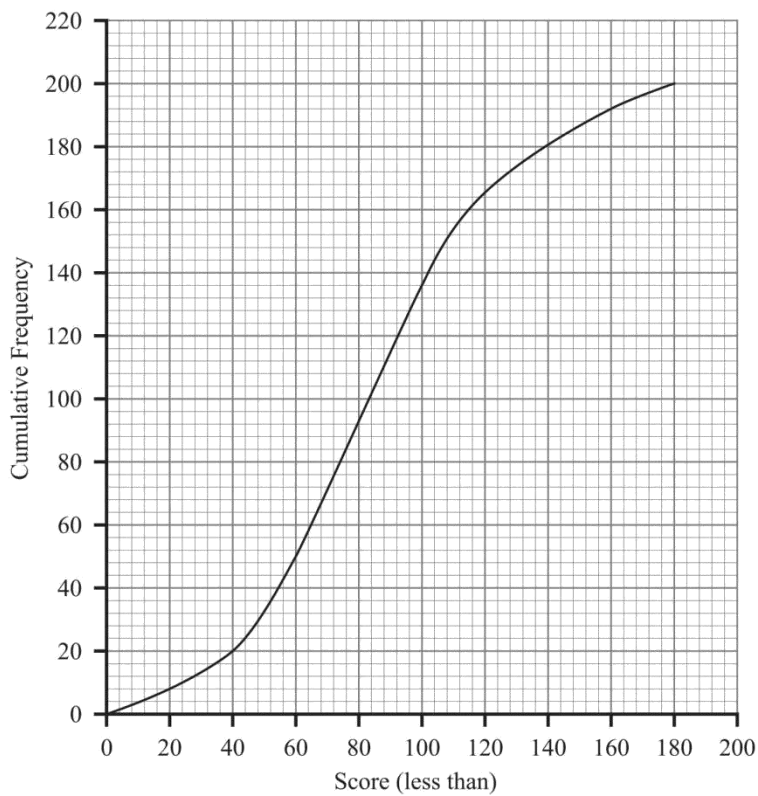
(a) Use the graph to estimate

(i) the median,

Answer _____ [1]

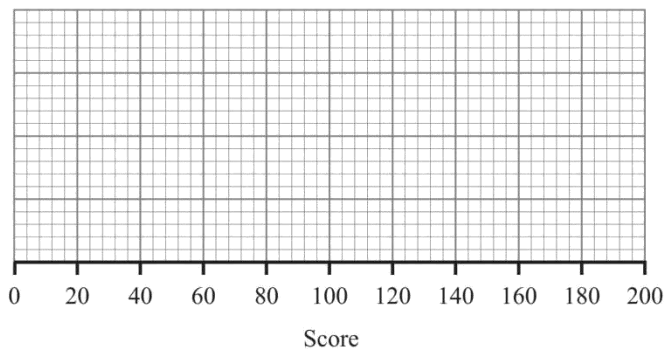
(ii) how many scores were more than 150

Answer [2]



(b) From the graph draw a box plot.

[3]



- 8) Freya visits the gym on 60 occasions. She records the length of time she spends on the treadmill on each of these 60 occasions.



Freya has grouped her data in 5 minute intervals.
 Her first interval is $0 < \text{time} \leq 5$ minutes.
 Her final interval is $35 < \text{time} \leq 40$ minutes.
 Freya drew a cumulative frequency diagram.

From her results she gives you the following information:

- The shortest time she spent on the treadmill was 5 minutes and this happened only once.
- The range of her times is 35 minutes.
- Her median time is 18 minutes.
- Her lower quartile is 10 minutes.
- Her interquartile range is 14 minutes.
- There were only 5 occasions when Freya spent more than 30 minutes on the treadmill.

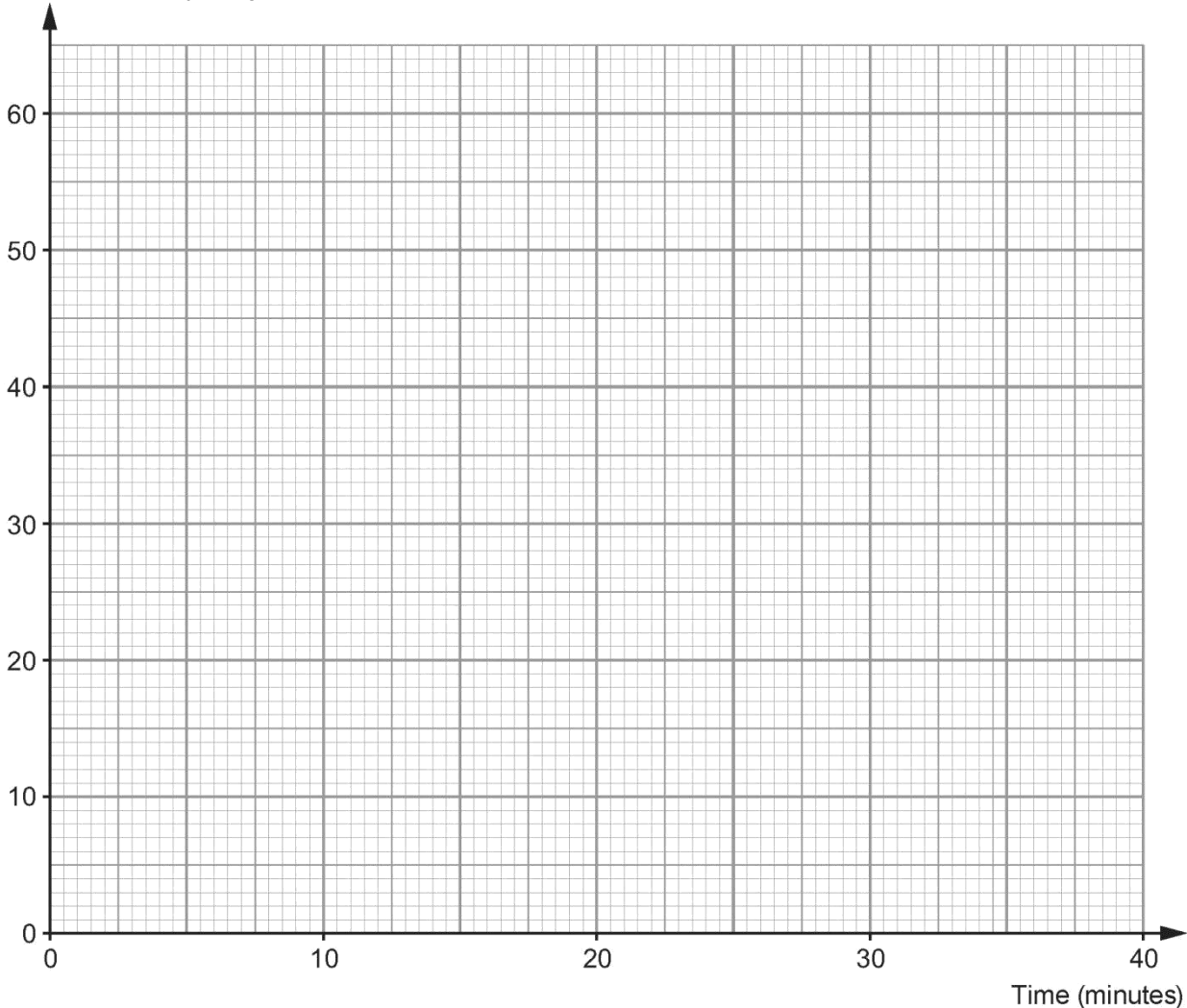
- (a) Use this information to complete a possible cumulative frequency diagram on the axes given below. [7]

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Cumulative frequency



- (b) The cumulative frequency diagram you have drawn is not exactly the same as the one Freya had drawn.
Explain why your cumulative frequency diagram is different from Freya's cumulative frequency diagram. [1]

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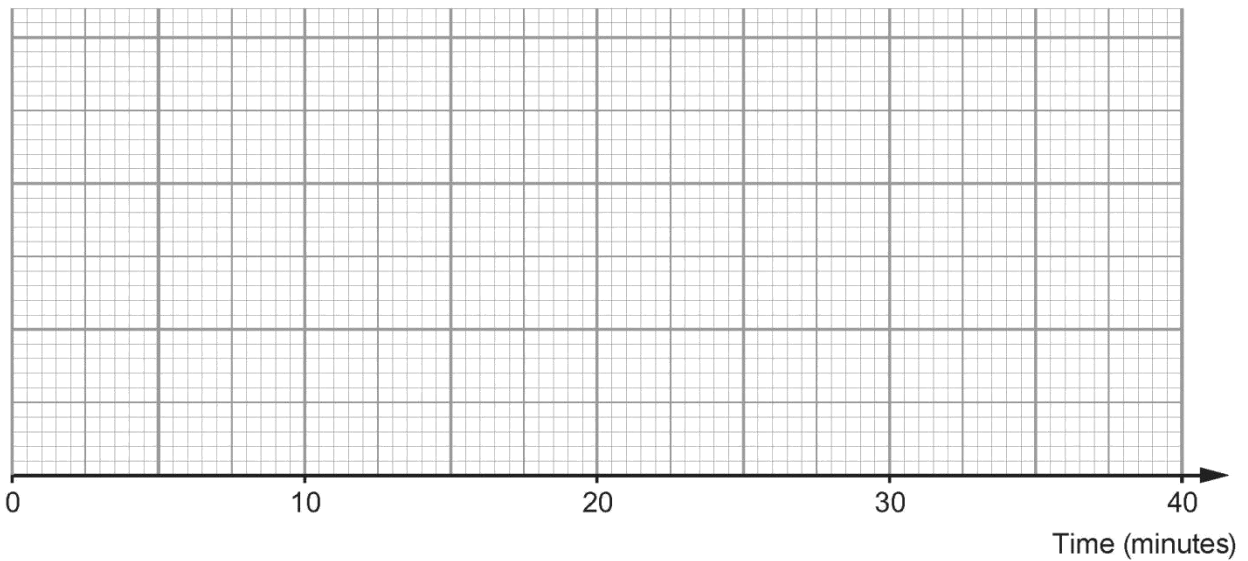
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- (c) Use the information given and your cumulative frequency diagram to draw a box-and-whisker diagram on the graph paper below. [3]

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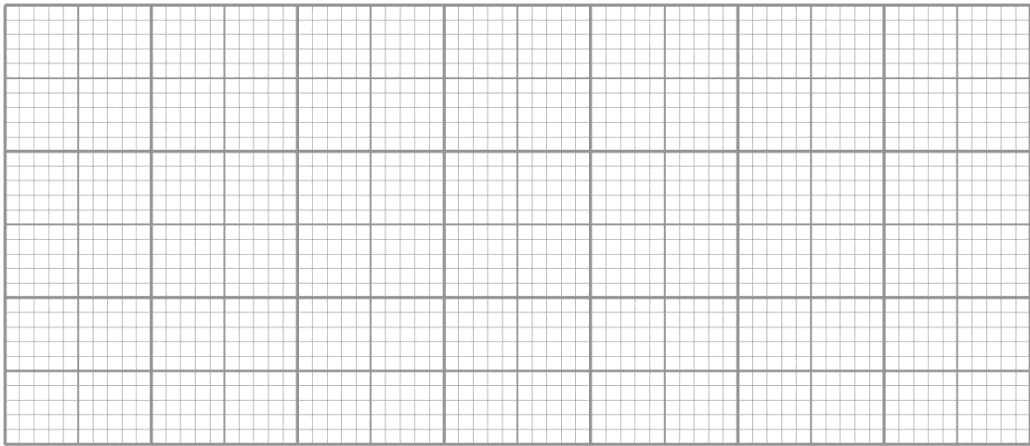
- 9) Iona needs to give a presentation to her work team.
 Her boss has asked her to include a box-and-whisker plot in her presentation.
 Iona works in a sales team, selling new telephone systems to large companies.
 She had been given some sales data by her boss, as shown below.

Cheapest system sold	£30
Most expensive system sold	£140
Median price of systems sold	£60
Lower quartile price of a system	£50
Upper quartile price of a system	£100

On the graph paper below, draw a box-and-whisker plot using the data that Iona has been given.

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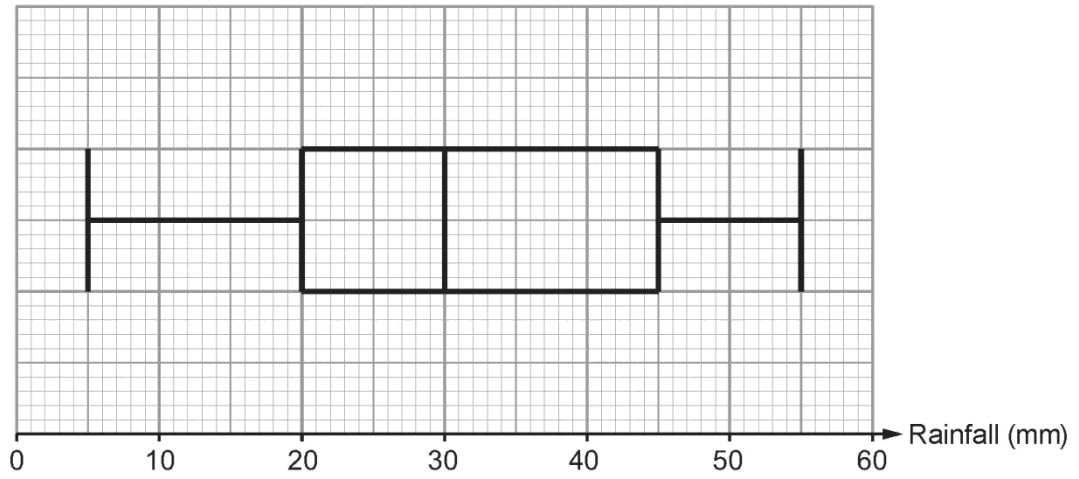
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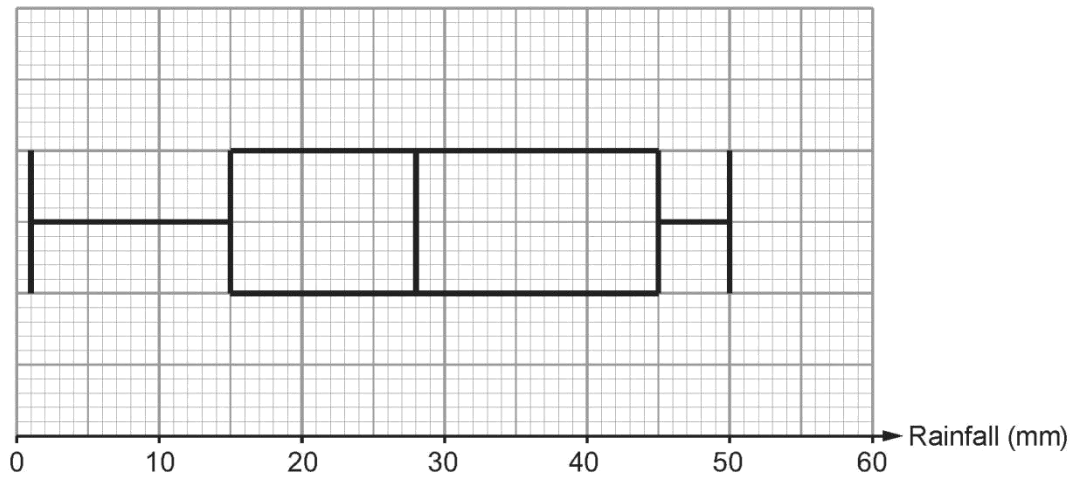
[4]

10) The following box-and-whisker plots illustrate the daily rainfall for April 2016 in Trefwen and in Nawrby.

April rainfall in Trefwen



April rainfall in Nawrby



(a) Complete the following table.

[4]

	Range	Median	Interquartile range
Trefwen mm mm mm
Nawrby mm mm mm

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(b) Iona is going on holiday next April.
She is hoping for good weather, with hardly any rain.
She decides to go to Nawrby.
Give a reason to support Iona's decision.
Include values for both Trefwen and Nawrby.

[1]

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11) The table gives a grouped frequency distribution of the arm lengths of 100 women each measured correct to the nearest centimetre.

Arm length, a cm	156 to 158	159 to 161	162 to 164	165 to 167	168 to 170
Number of women	5	15	35	40	5

(a) Complete the following cumulative frequency table.

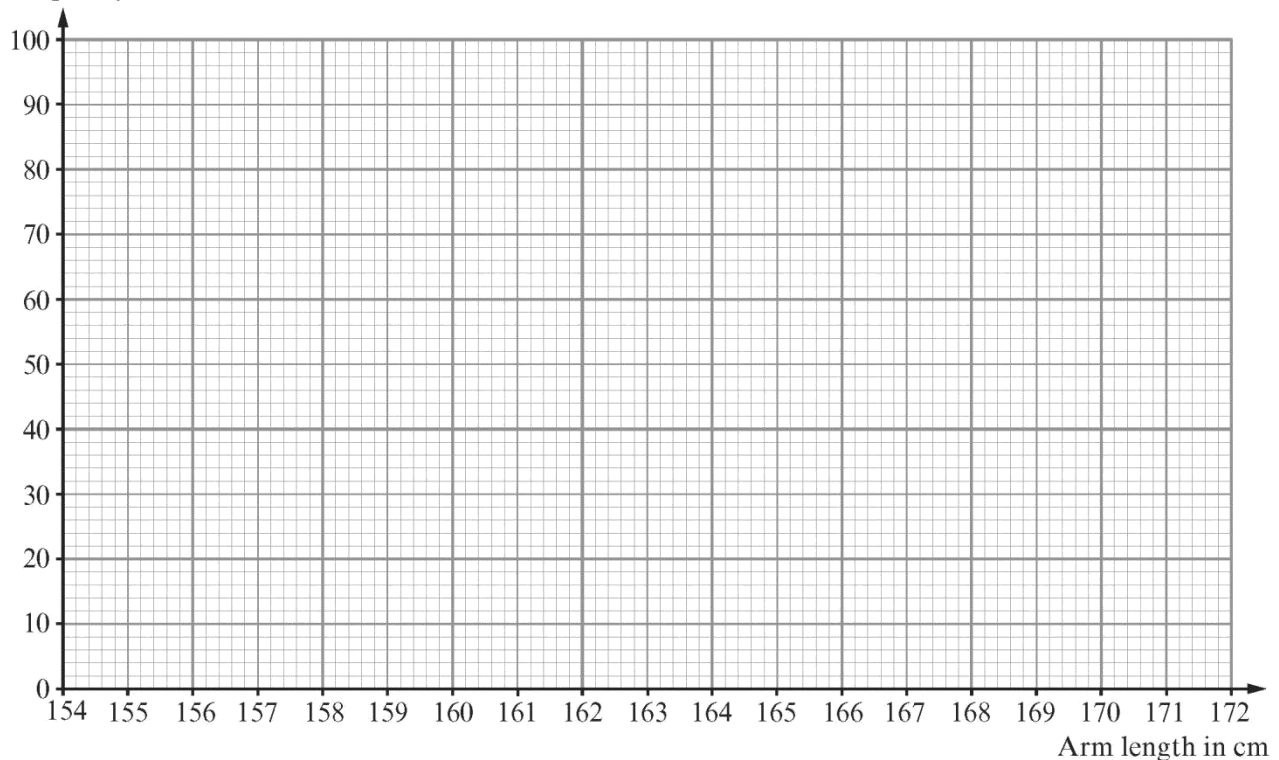
Arm length, a cm	$a < 155.5$	$a < 158.5$	$a < 161.5$	$a < 164.5$	$a < 167.5$	$a < 170.5$
Cumulative frequency	0	5				

[1]

(b) On the graph paper below, draw a cumulative frequency diagram to show this information.

[2]

Cumulative frequency

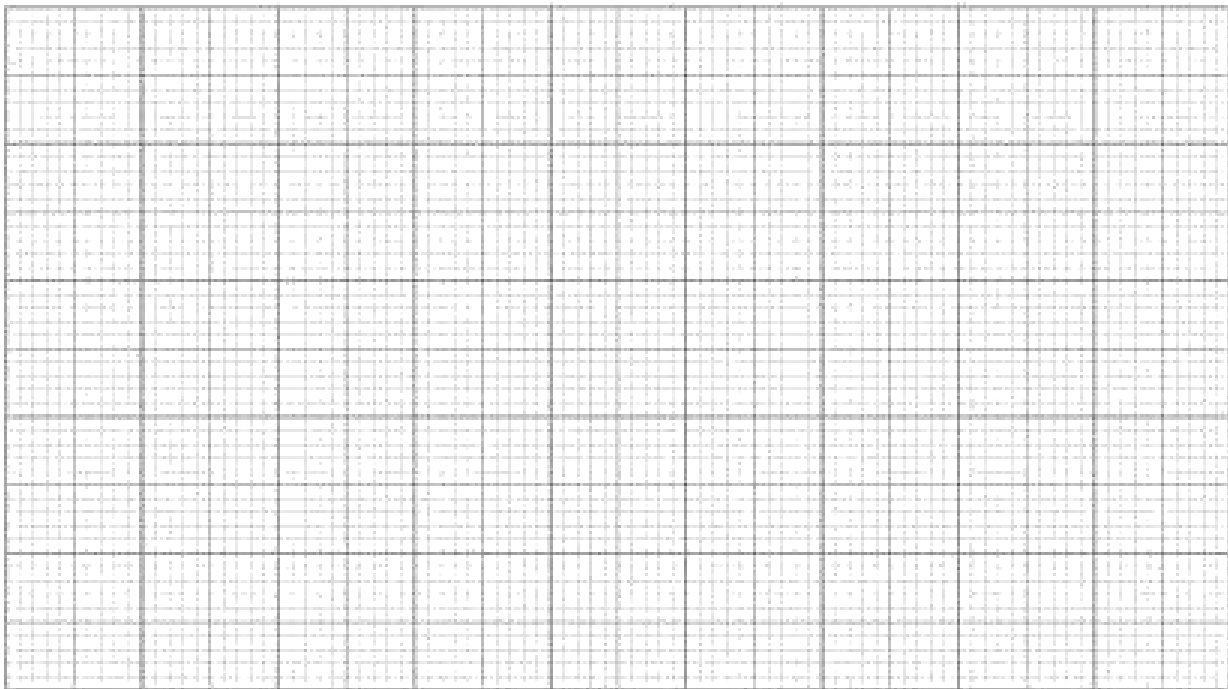


(c) Use your cumulative frequency diagram to estimate the median and the interquartile range.

Median Interquartile range.....

[3]

(d) Use the graph paper below to draw a box and whisker diagram to show these results.



[4]

12)



The table gives the grouped frequency distribution for the lengths of the electrical cords of 80 toasters.

Length, to the nearest cm	49-53	54-58	59-63	64-68
Number of toasters	6	38	32	4

(a) Complete the following cumulative frequency table.

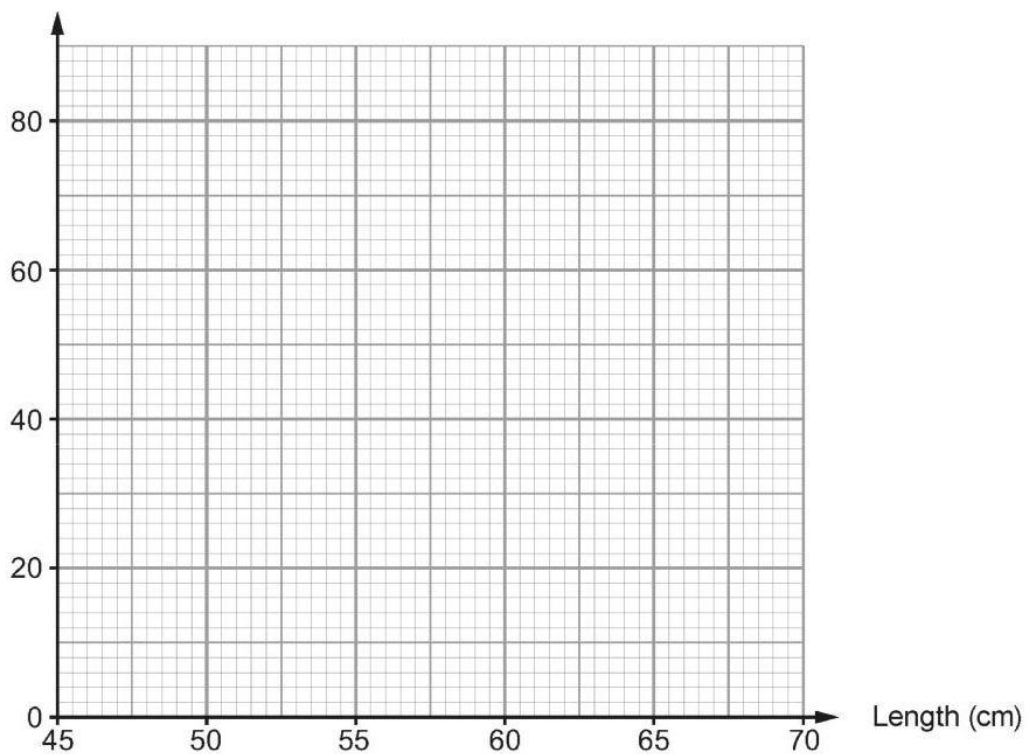
[1]

Length (cm)	<48.5	<53.5	<58.5	<63.5	<68.5
Cumulative frequency	0	6			

(b) On the graph paper below, draw a cumulative frequency diagram to show this information.

[2]

Cumulative frequency



- (c) Use your cumulative frequency diagram to find an estimate for the median, the lower quartile, the upper quartile and the interquartile range of the lengths of the electrical cords in centimetres. [4]

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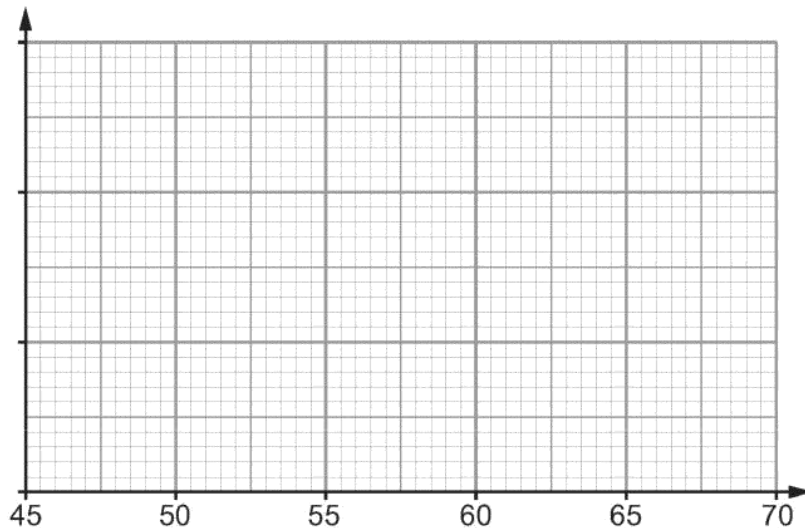
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Median	
Lower quartile	
Upper quartile	
Interquartile range	

- (d) The length of the shortest electrical cord is 50 cm.
 The length of the longest electrical cord is 68 cm.
 Draw a box and whisker diagram to illustrate the lengths of the electrical cords. [3]



- 13) A company is considering changes to its price list for delivering parcels in a local area. The company is considering a charge based on the distance between the warehouse and the destination of the parcel. The table gives the grouped frequency distribution for the distances, measured to the nearest km, for 60 parcels.

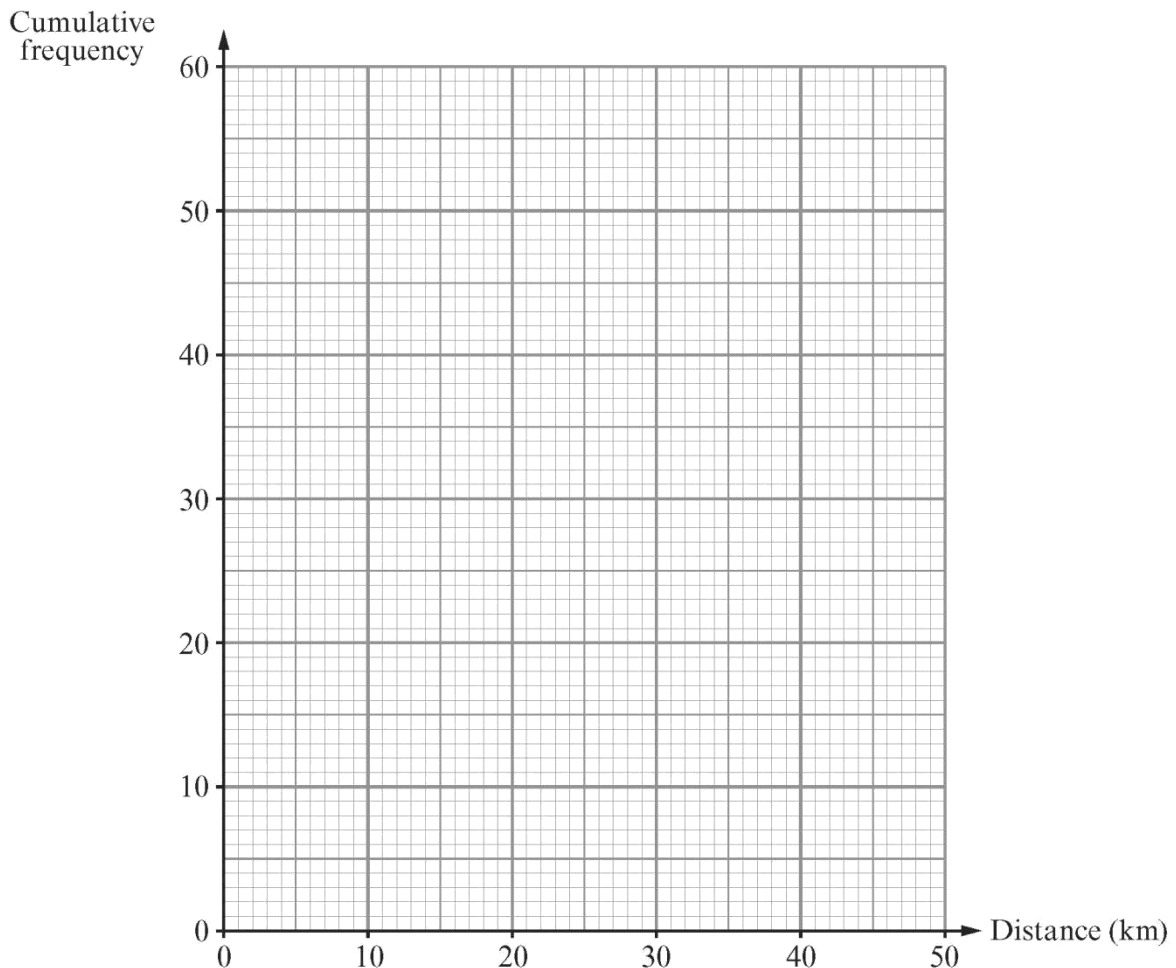
Distance, to the nearest km	1 - 10	11 - 20	21 - 30	31 - 40
Number of parcels	10	30	15	5

- (a) Complete the following cumulative frequency table.

Distance (km)	<0.5	<10.5	<20.5	<30.5	<40.5
Cumulative frequency	0	10			

[1]

- (b) On the graph paper below, draw a cumulative frequency diagram to show this information.



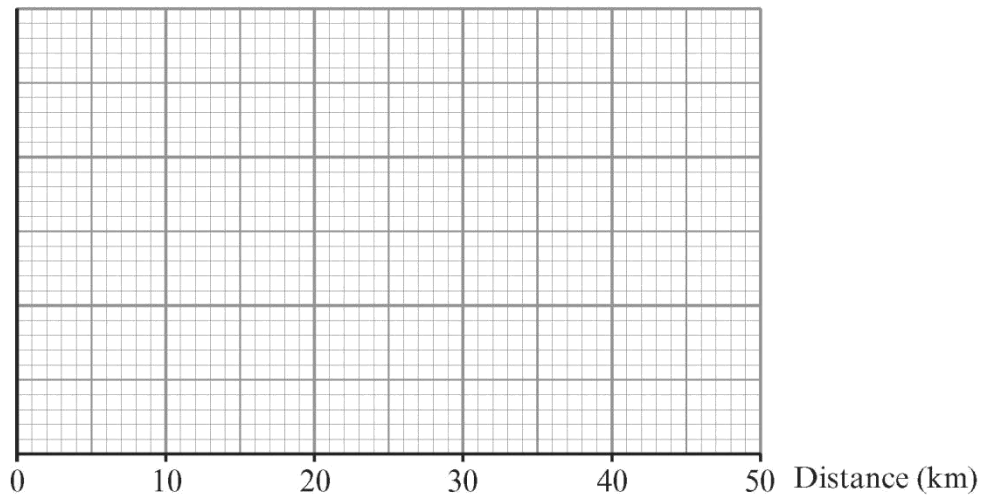
[2]

- (c) Use your cumulative frequency diagram to find an estimate for the median and the interquartile range of the delivery distances.
You **must** show your working.

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Median Interquartile range [3]

- (d) For these 60 parcels, the shortest delivery distance is 2km and the longest delivery distance is 37 km.
Draw a box and whisker diagram to illustrate this information.



[4]

- (e) Previously, the delivery charge was £2 for each parcel.

The new pricing plan being considered is:

- free delivery for all parcels up to the median delivery distance;
- £4 per parcel for all other deliveries.

Would you expect the company to profit from the new pricing for parcel delivery?
Explain your answer.

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[3]

14) **Amount of rainfall per week during year (mm)**

Year	Median	Lower Quartile	Upper Quartile	Inter Quartile range
2003	18	15	21	6
2004	19	15	21	6
2005	18	17	23	6

A radio report said ‘These figures suggest that year X was a much wetter year than the other two’. Which year was X?
Explain your answer.

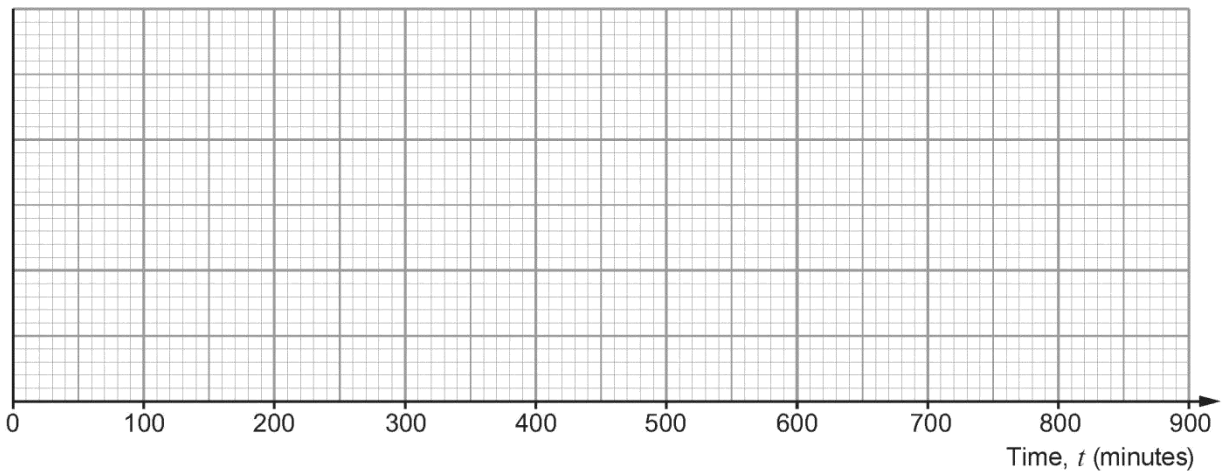
Answer: X was _____ because _____
_____ [2]

15) Last Friday, 72 people answered our survey on how many minutes they spent using social media. We now know that:

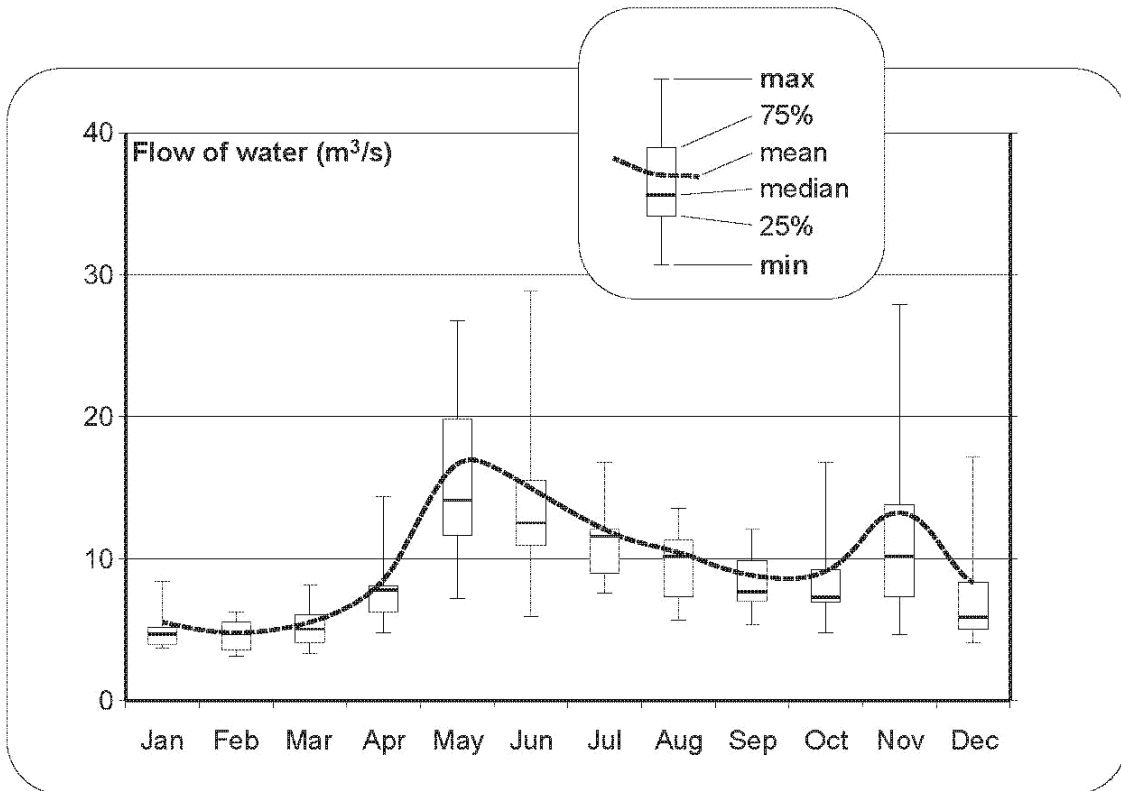
- The median time was 300 minutes.
- The lower quartile was 100 minutes.
- The upper quartile was 550 minutes.
- The shortest time was exactly 1 hour.
- The longest time was exactly 14 hours.

Draw a box and whisker diagram to illustrate this information. [4]

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16) The information board shown below was seen by a river in the Italian mountains.



The information board gives monthly data about the volume of water flowing past a cross-section of the river every second.

- (a) Write down the month with the greatest mean flow of water.
 Estimate this greatest mean flow of water, giving the units of your answer. [3]

Month

Greatest mean flow

- (b) Which month had the smallest range of water flow?
Estimate this range.
Your **must** show all your working.

[2]

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Month

Range

- (c) Which month had the greatest interquartile range of water flow?
Estimate this interquartile range.
You **must** show all your working.

[3]

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Month

Interquartile range

- (d) The local newspaper publishes a picture of the river with a caption.



The mean flow of the river for the year was

- Complete this caption.
You **must** show all your working.

[3]

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