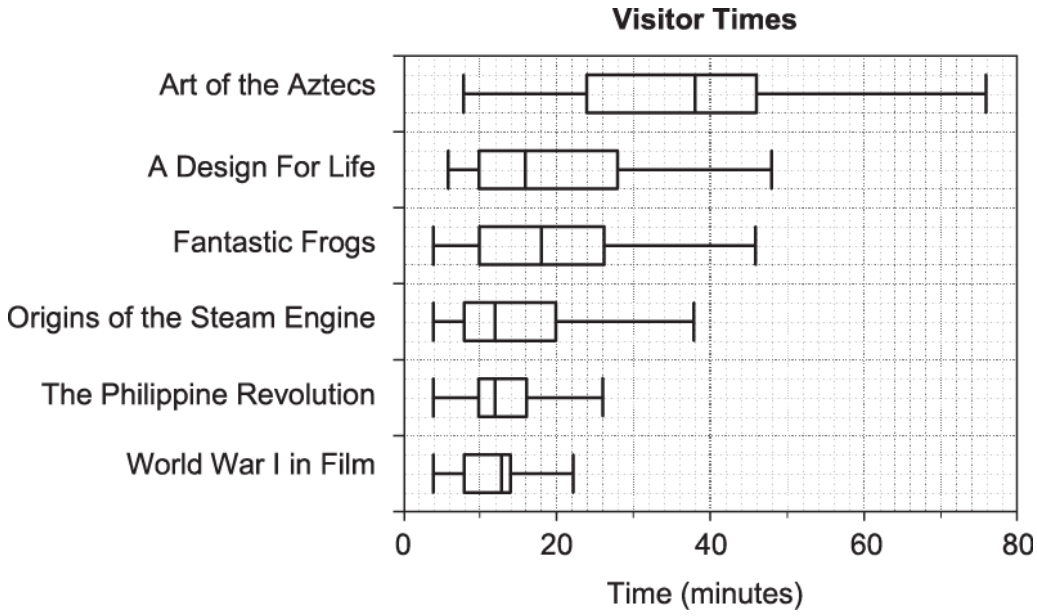
1(a). One day a museum monitored the time spent by visitors at six exhibitions.
The visitor times are summarised in the box plots below.



Is it possible to work out from the box plots which exhibition had the most visitors?
Justify your answer.

---

[2]

(b). Work out the **range** in visitor times at the **Fantastic Frogs** exhibition.

(a) _____ [2]

(c). At which exhibition were visitor times the most consistent?
Give a reason for your answer.

---

[2]

(d). Give one similarity and one difference between the **distributions** of the visitor times for **Origins of the Steam Engine** and **The Philippine Revolution**.

Similarity

Difference

---

[2]

2. For one home game, a football club sold these tickets:

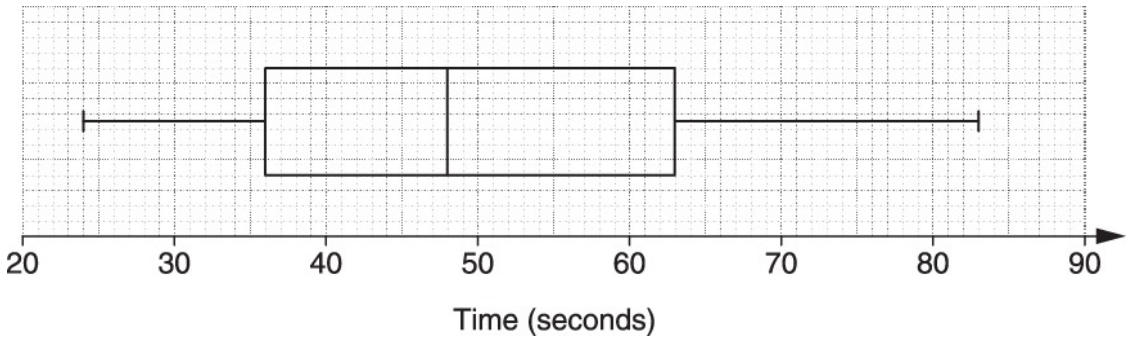
Category	Ticket price (£)	Number of tickets	
Executive boxes	43	417	
Adult	26	5238	
Concessions	14	2175	
Juniors	7	930	
	Totals	8760	

Calculate the mean price of these 8760 tickets.

£_____

[3]

3. This box plot represents the times taken to solve a puzzle by members of group 7S.



(i) Find the median time taken by group 7S.

(i) _____ seconds **[1]**

(ii) Find the interquartile range of the times taken by group 7S.

(ii) _____ seconds **[2]**

4(a). Imogen went fishing and recorded the weight of each fish she caught.
The table shows her results.

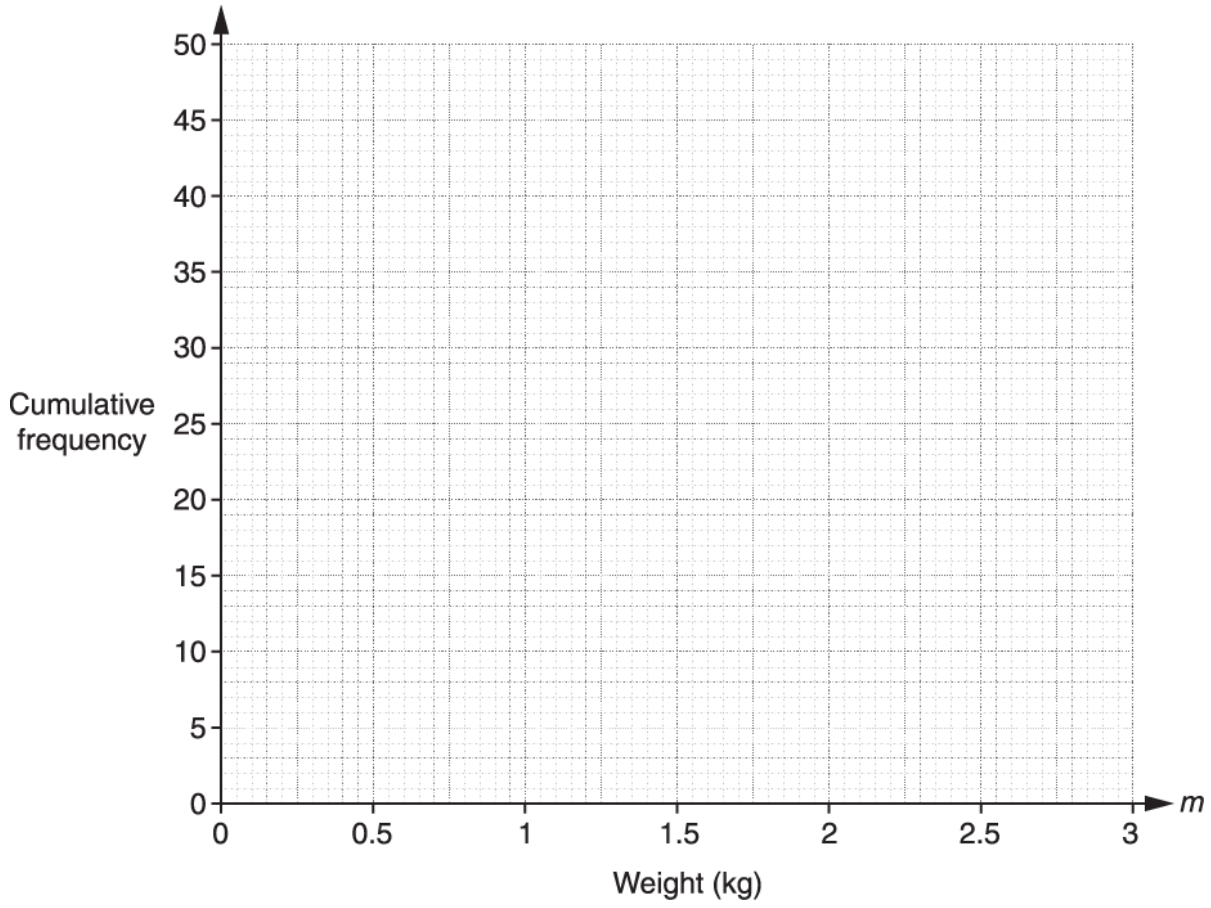
Weight (m kg)	$0 < m \leqslant 0.5$	$0.5 < m \leqslant 1$	$1 < m \leqslant 1.5$	$1.5 < m \leqslant 2$	$2 < m \leqslant 3$
Number of fish	10	5	15	16	4

Complete this cumulative frequency table for Imogen's results.

Weight (m kg)	$m \leqslant 0.5$	$m \leqslant 1$	$m \leqslant 1.5$	$m \leqslant 2$	$m \leqslant 3$
Cumulative frequency					

[2]

(b). Draw the cumulative frequency graph for her results.



[2]

(c). The median weight of fish Ruth caught is 1.2 kg.

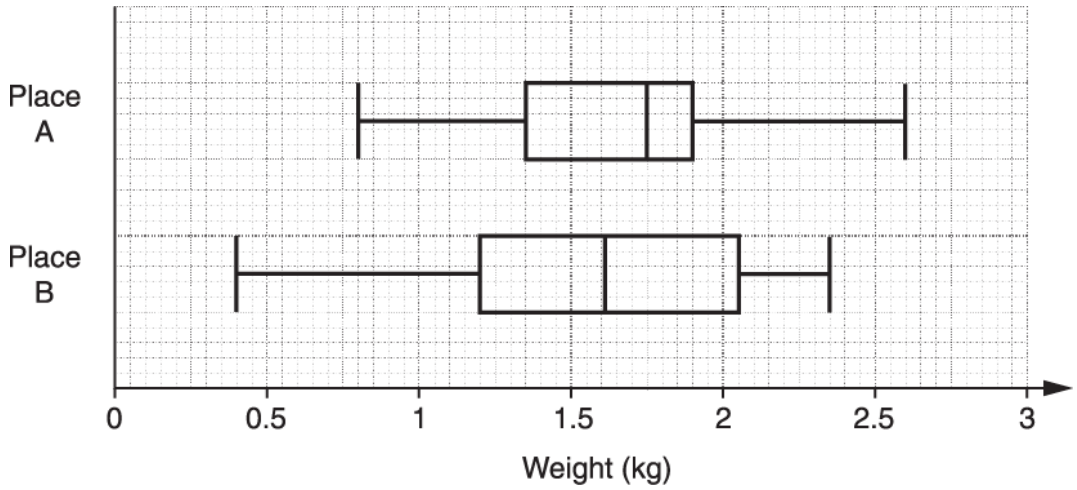
Is Imogen's median higher or lower than Ruth's?
Show how you decide.

---------- [1]

(d). Use your graph to work out the percentage of fish Imogen caught that were over 1.8 kg.

---------- % [3]

(e). The box plots summarise the weights of fish that Calvin caught at place A and place B.



Write **two** different comments comparing the weights of fish caught at the two places.

1

2

---

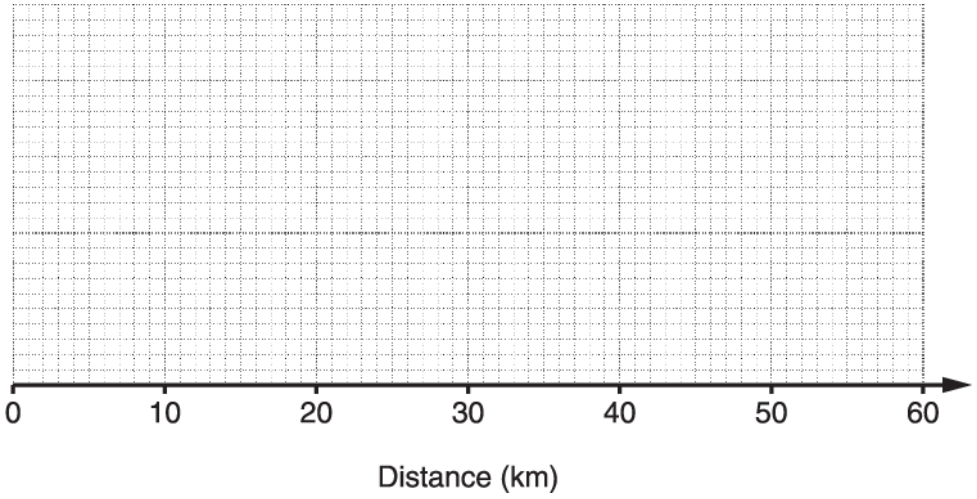
[2]

5. Sonia is doing a survey about people's journeys to work.

She asked people who work for one local company the distance they each travelled to get to work.
The table summarises the information she collected.

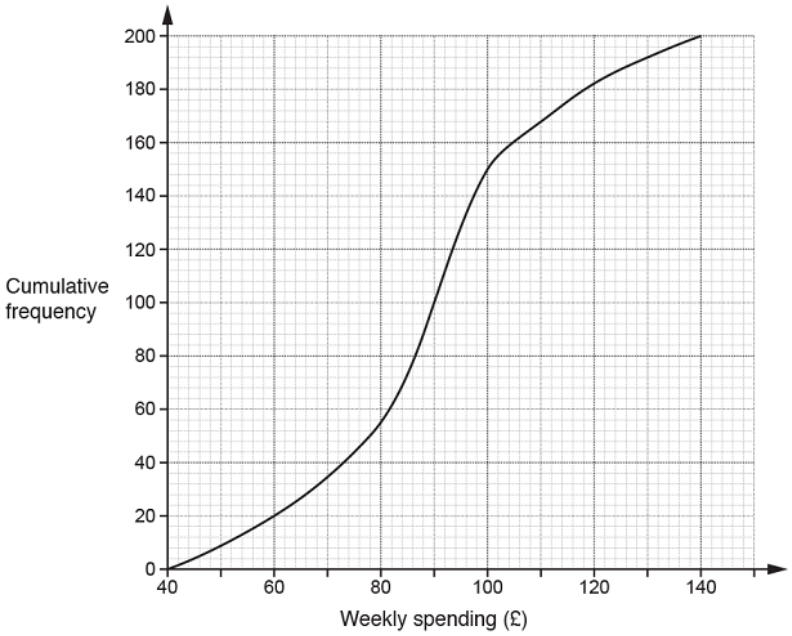
Minimum distance	0 km
Maximum distance	54 km
Median distance	8 km
Upper quartile	22 km
Interquartile range	17 km

On the grid below draw a box plot to show the distribution of the distances.



[3]

6(a). Iqrah carries out a survey of 200 families in the **north** of England on their weekly spending on food.
The cumulative frequency diagram summarises the results.



Find

(i) the median,

(i) £ ---------- [1]

(ii) the interquartile range.

(ii) £ ---------- [2]

(b). Iqrah says

15% of these families spent over £120.

Is her statement correct?
State the evidence you have used in making your decision.

---

[2]

(c). In a survey of 200 families in the **south** of England, the median weekly amount spent on food was £84 and the interquartile range was £28.

Make two comparisons between the weekly amounts spent on food in the north of England and the south of England.
State the evidence you have used in making your comparisons.

1 ---

---

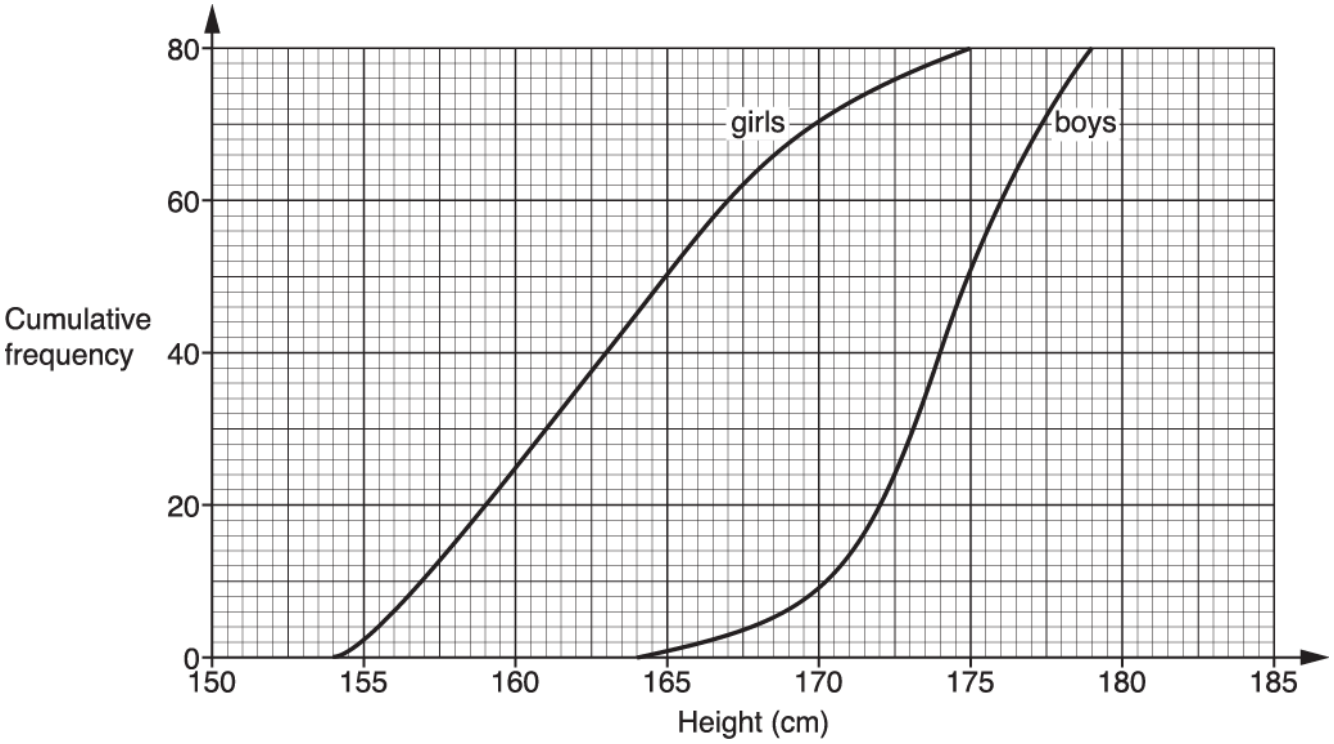
[2]

2 ---

---

[2]

7. The cumulative frequency diagram shows the distribution of heights of a group of 80 Year 11 girls and 80 Year 11 boys.



Use the diagram to find

(i) the median height of the girls,

_____ cm

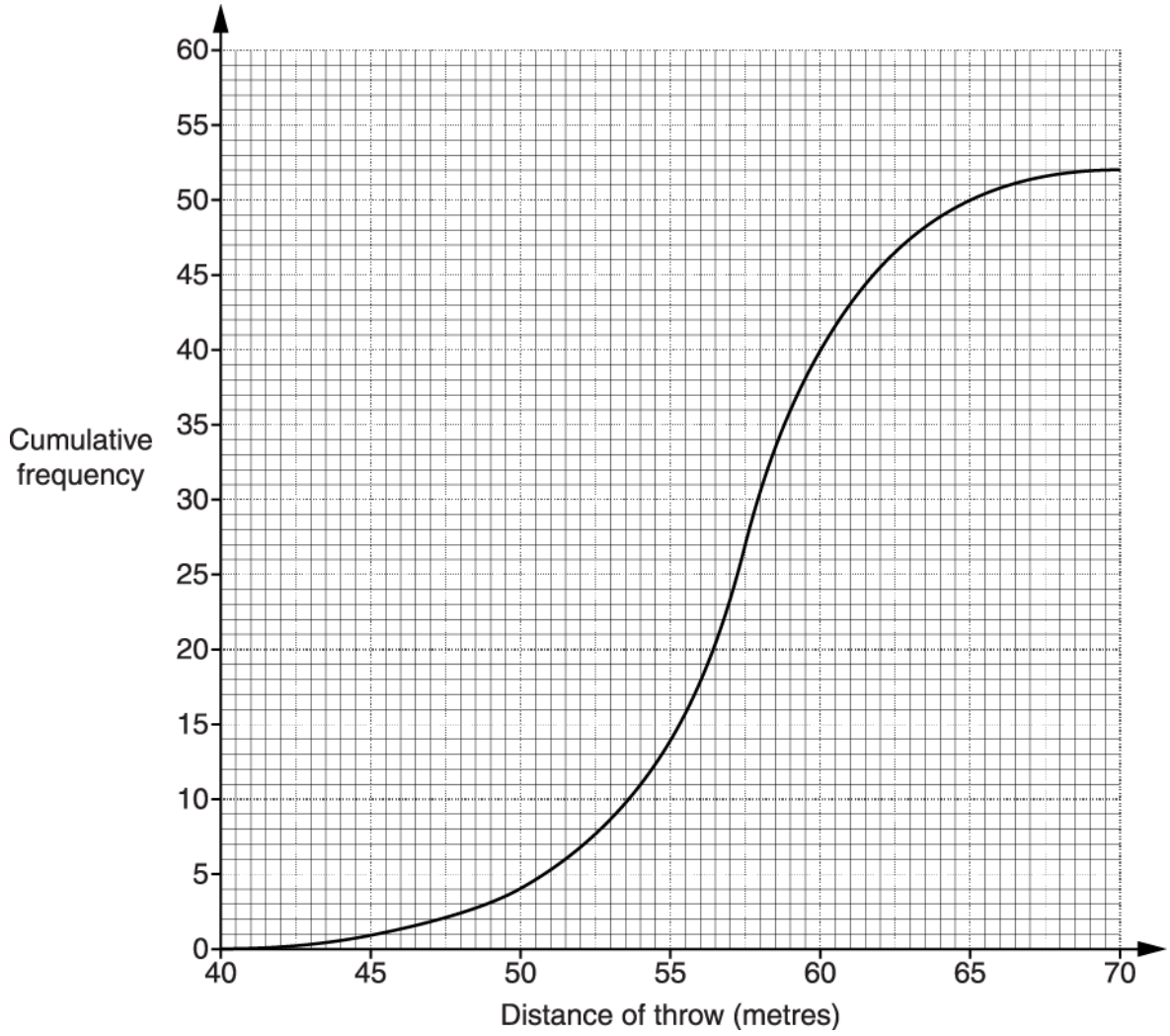
[1]

(ii) the number of boys who are at least 175 cm tall.

_____

[2]

8(a). In the Women's Javelin event at the Beijing Olympics, there was a preliminary round.
The distance, in metres, of each competitor's best throw was recorded.
This cumulative frequency graph represents the results.



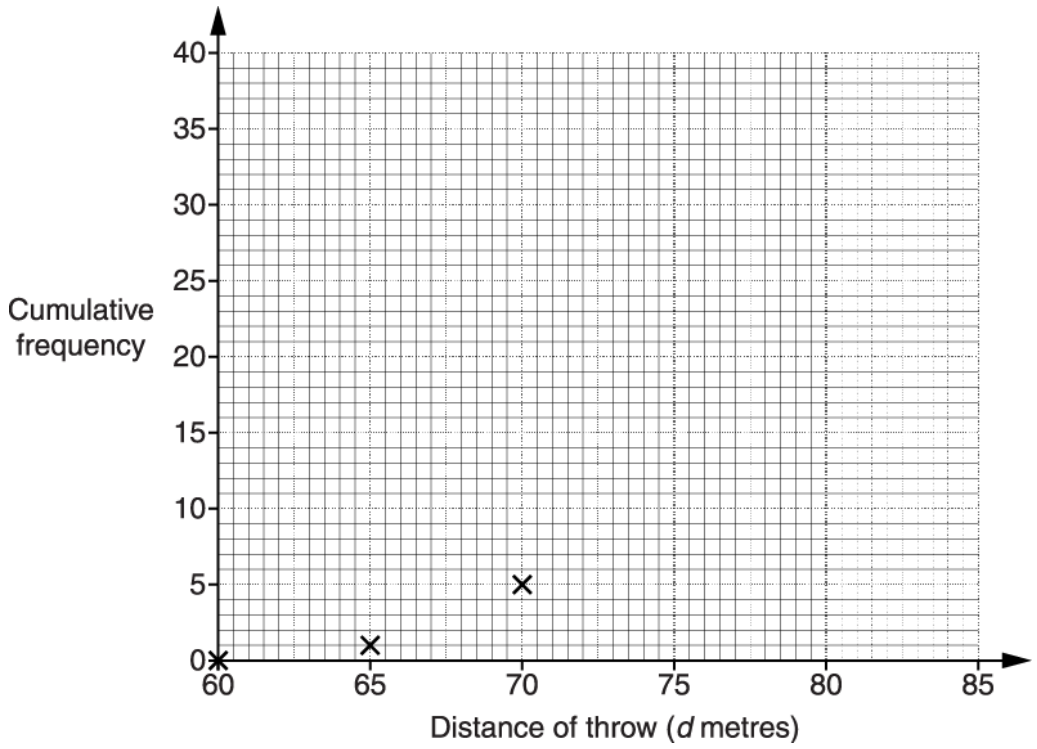
Use the graph to find an estimate of the median distance thrown by the 52 women.

_____ m [2]

(b). This table summarises the results for the Men's Javelin preliminary round.

Distance of throw (d metres)	Frequency
$60 \leq d < 65$	1
$65 \leq d < 70$	4
$70 \leq d < 75$	11
$75 \leq d < 80$	13
$80 \leq d < 85$	8

Complete the **cumulative frequency** graph to represent the Men's Javelin results.



[3]

(c). The interquartile range for the distances thrown by the women was 5.0 m.

Janine says:

The distances thrown by the women were less varied than those thrown by the men.

Use your graph to find an estimate of the interquartile range for the distances thrown by the men and circle the correct response to Janine's statement.

The men's interquartile range is _____ m so Janine's statement is

True False Can't tell

[3]

END OF QUESTION PAPER

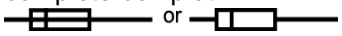
Question			Answer/Indicative content	Marks	Part marks and guidance	
1	a		No, as there is no indication of total numbers who visited each	2	**M1** for 'No' with insufficient reason	
	b		42	2	**M1** for 46 or 4 seen	
	c		World War I in film Smallest range / IQR	2	**M1** **M1**	
	d		Correct similarity Correct difference	2	**B1** for similarity **B1** for difference	Exemplar response: Similarity: They have the same median value Difference: There was less variation in the visitor times for The Philippine Revolution than for Origins of the Steam Engine To be awarded both marks at least one statement must be in context
			Total	**8**		
2			21.81 to 21.82 or 21.8(0)	3	nfww; **M1 for** attempt at multiplying 43 × 417 etc (at least two correct of 17 931, 136 188, 30 450, 6510) or total 191 079 **M1** for their 191 079 ÷ 8760 (may be implied by answer) allow **A1** for 22 if correct working seen	FT attempt at their (sum of fx) ÷ 8760 <u>Examiner's Comments</u> This was quite well answered. Most candidates showed a detailed method with f*x* values in the table and division by 8760 below. A few made arithmetic errors but still managed to gain 2 marks. Less able candidates divided the sum of f*x* values or 8760 by 4.
			Total	**3**		

Question			Answer/Indicative content	Marks	Part marks and guidance	
3		i	48	1		
		ii	27	2	**M1** for 36 or 63 or both; may be on diagram **Examiner's Comments** Estimating the mean was well done with good supporting working. Many were fully correct. A few used class widths or end points instead of the mid points while a small number simply added the frequencies and divided by 5. In part (b), many interpreted the boxplot correctly, although occasionally there were errors in reading off, while some found the range instead of the interquartile range.	
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
4	a		10 15 30 46 50	2	**B1** for 3 correct	
	b		correct curve	2	condone straight lines joining the points **B1** for 3 correct points clearly plotted (½ small square tolerance), **FT** their table if **0** scored **SC1** for an horizontal translation of the correct curve	Ignore ‘curve‘ below x = 0.5 and be generous with judgement, allow curve if 4 points are within ½ small square Condone a little feathering.
	c		[median =] 1.3 – 1.4 and a correct response, eg higher or more or a reading from x = 1.2 [c.f. =] 18 – 21 and a correct response, eg higher or more or if no numbers given accept a clear indication on graph of method and a correct response, eg higher or more	1	**or FT** their c.f.' curve' reading from 25 (or 1.2), and accept any correct conclusion	Must be a ‘curve’ not decreasing tolerance for reading ±0.05 ie one line their response could be lower or less with names

Question			Answer/Indicative content	Marks	Part marks and guidance	
	d		16 – 22 or FT *their c.f. 'curve'*	3	**B1** for a correct reading (±0.5) from their c.f. 'curve' at 1.8 **M1** for 50 – *their reading* or 100 – *their* percentage Examiner's Comments Many candidates could not complete the table correctly and many started with 0 in the first cell instead of 10. Many calculated the frequency density, thinking it was a histogram. In part (b) many drew bars probably continuing the idea of it being a histogram even when the frequencies were correctly worked out. In (c) many read from the frequency of 30 instead of 25 and of those who did read from the correct figure, many did not give the reading or they did not answer the question which asked for a 'higher' or 'lower' response, just 'yes' or 'no' was not sufficient. In (d) many read from 1.9 and not 1.8. The scales were more challenging but at this level it is expected that candidates can select the correct values. Having given a reading they then did not subtract it from 50 to find the number over 1.8. Conversion to a percentage by doubling was achieved by most candidates.	Must be a 'curve' not decreasing eg 50 – 42 or 100 – 42 × 2

Question			Answer/Indicative content	Marks	Part marks and guidance	
	e		two correct comments from different categories	2	**B1** for each, ignore any figures and the categories are 'average', spread, max or min and skewness	**Exemplar Response** A has a higher average(median) (1) B has a higher upper quartile (1) B has a larger spread/range/IQR of results (1) They both have a (slight) negative skew (1) The heaviest/biggest fish was at A (1) Place B box plot is longer meaning weights of fish varied (1) Place B had lightest fish (1) A had greater weights (0) On average B had a wider range (0) A has a higher mean (0) Half of A's are above 1.75 and half of B's are above 1.6 (0) Mean for place A is higher. Therefore the average weight is higher in A (0) The lowest value is lower than A, place B is lower than A (0) More fish caught at place B (0) Place B had lighter fish than Place A (0)

Question			Answer/Indicative content	Marks	Part marks and guidance	
			Total	10		
5			Correct complete box plot	2	**B1** for min 0, max 54 indicated **B1** for LQ at 5, UQ at 22 indicated **B1** for median 8 indicated, dependent on being greater than their LQ **Max 2 marks if box plot incomplete or incorrect** **Examiner's Comments** Many candidates plotted a correct, accurate box plot. The most common error was for candidates to plot all of the given values leading to the median being plotted as the lower quartile and the interquartile range being plotted as the median in their box plot. Candidates should be made aware that they may need to do a calculation in this type of question, in this case calculating the lower quartile using the upper quartile and median. A small number of candidates appeared not to know what a box plot was.	Use overlay, half square accuracy Indication may be a dot / cross for up to 2 marks Minimum acceptable for complete box plot: 
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
6	a	i	90	1	<u>Examiner's Comments</u> In part (a), the median was well understood but there was a lack of familiarity with the interquartile range.	
		ii	22	2	M1 for [UQ =]100 or [LQ =] 77 to 79 | Accept 21 to 23	
	b		No with 18 to 20 and 30 OR No with 8% to 10% [and 15%] OR No with [£] 110 to112 [which is less than 120] OR No with 170 and 180 to 184	2	M1 for 18 to 20 or 8% to 10% or 110 to 112 or for 30 or 170 or 180 to 184 | Could be written on graph for M1 <u>Examiner's Comments</u> Part (b) was well answered with most candidates able to reason with at least one of the required values. The most common method involved reading from the graph the numbers of families spending £120 and then calculating the percentage of families that spent more than this before making the decision.	

Question			Answer/Indicative content	Marks	Part marks and guidance		
	c		Families in the south spent less on average as their median was lower **oe** Families in the south were more spread in their spending as their IQR was larger **oe**	2 2	**Strict FT** their median in (a)(i) **M1** for Families in the South spent less **oe** **nfww** **Strict FT** their IQR in (a)(ii) **M1** for Spending varies more in the South **oe nfww** Examiner's Comments In part (c) candidates were required to use the statistics given to make a general comparison between the spending in the south to the spending in the north. So interpreting the median as average and the interquartile range as spread or variation was required. Many simply gave answers such as the median in the south was less than the median in the north which is insufficient.	Allow either way around but do not allow M1 if wrong reason given e.g. in first reason mentions IQR for spending less Ignore ref to figures For M1 allow spread oe associated with IQR without comparison	
			Total	9			

Question			Answer/Indicative content	Marks	Part marks and guidance	
7		i	163	1		Examiner's Comments Most candidates read the value of the median correctly from the cumulative frequency diagram in (i).
		ii	28 to 30	2	**B1** for 50 to 52 seen	Examiner's Comments Many candidates correctly read the cumulative frequency for a height of 175 cm from the diagram, but a significant number gave this as their answer rather than subtracting from 80 to give the number of boys who were at least 175 cm tall.
			Total	3		

Question			Answer/Indicative content	Marks	Part marks and guidance	
8	a		57 to 57.5	2	**M1** for an attempt to use 26 or 26.5 Examiner's Comments Many candidates knew how to obtain a median, but the error of reading off at 30 instead of 26.5 or 26 was quite common.	Allow **M1** for 26 or 26.5 seen with no other attempts
	b		Cumulative frequencies [1, 5,] 16, 29, 37 soi Points plotted at correct heights and correct endpoints 74.5 to 75, 79.5 to 80 etc, FT one error in cumulative frequencies Points joined with smooth curve or straight line segments	1 1 1	May be implied by plots at correct heights FT for ascending graph only; ignore curve to left of (65, 1) Examiner's Comments Many candidates completed the cumulative frequency graph successfully, but frequency graphs were also common.	
	c		6 to 8.5	2	nfww eg not from reading off at 10 and 30 **M1** for UQ 78.5 to 80 or LQ 71.5 to 72.5 or for reading off lines at both 9 to 10 and 27 to 29 on their increasing graph but **M0** if both 10 **and** 30 used	**0** in this part if their graph is not increasing The marks in this part are all obtainable from an increasing graph in part (b) plotted at midpoints

Question			Answer/Indicative content	Marks	Part marks and guidance	
			True	1Dep	Dependent on IQR of 6 to 8.5, however obtained <u>Examiner's Comments</u> This depended on a cumulative frequency graph, and the usual errors in finding an interquartile range were often made. Very few candidates gained all 3 marks here.	If an error in *their* 37 in part (b), allow FT for this part, unless *their* 37 is 40
			Total	8		