

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	



Free-Standing Mathematics Qualification
Advanced Level
June 2010

Using and Applying Statistics

6990/2

Unit 10

Friday 21 May 2010 9.00 am to 10.30 am

For this paper you must have:

- a clean copy of the Data Sheet (enclosed)
- the booklet of formulae and statistical tables (enclosed)
- a calculator
- a protractor
- a ruler.

Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer the questions in the spaces provided. Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The **final** answer to questions requiring the use of tables or calculators should normally be given to three significant figures.
- You may **not** refer to the copy of the Data Sheet that was available prior to this examination. A clean copy is enclosed for your use.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You may use either a scientific calculator or a graphics calculator.



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Section B

Answer **all** questions in the spaces provided.

Use **Couriers** on page 2 of the Data Sheet.

- 2** The table summarises the distances that a local courier travelled each day for 200 days.

Daily distance travelled (d miles)	Number of days
$30 < d \leq 40$	5
$40 < d \leq 50$	22
$50 < d \leq 60$	44
$60 < d \leq 80$	81
$80 < d \leq 100$	40
$100 < d \leq 120$	8

- (a) Draw a cumulative frequency diagram on the grid **opposite**. (3 marks)
- (b) Use your diagram to estimate:
- (i) the median daily distance travelled;
 - (ii) the interquartile range of the daily distance travelled. (3 marks)
- (c) The mean daily distance travelled by a courier's van is 72 miles.

The van's average fuel consumption is 43 miles per gallon and the fuel costs £5.50 per gallon.

Calculate the total cost of fuel used by this van over 200 days. (3 marks)

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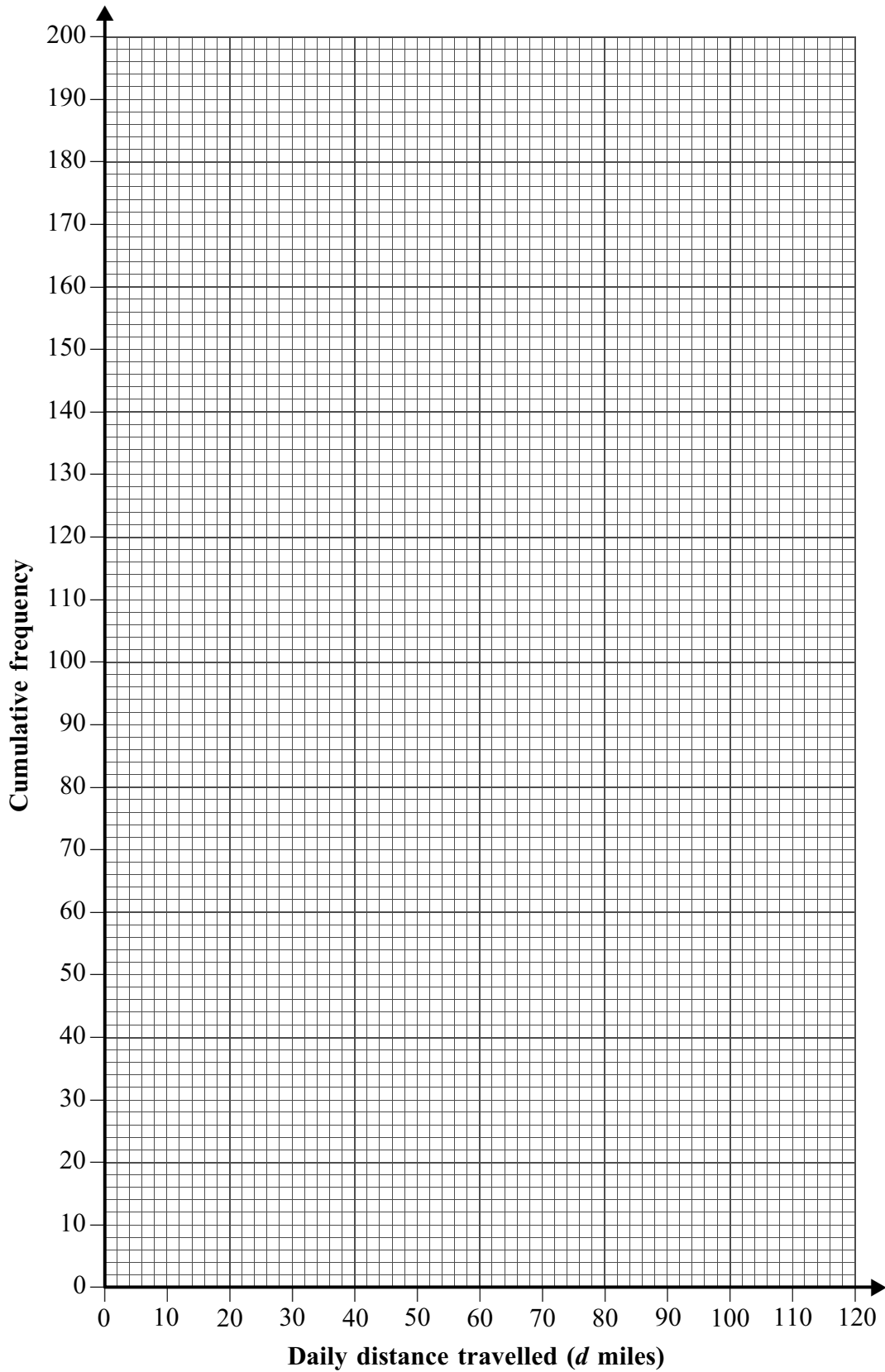
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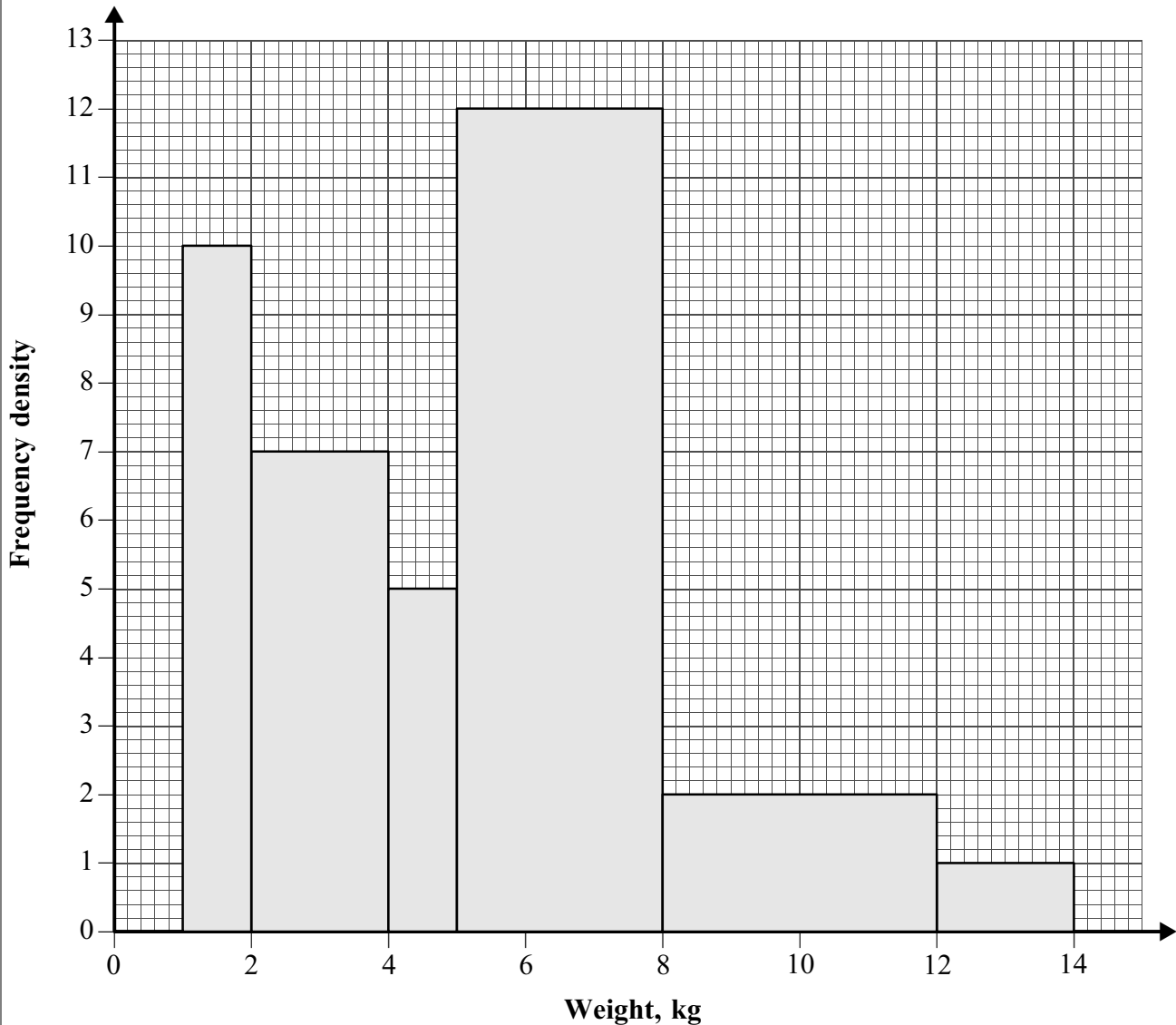


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Clive is a local courier for a large distribution company.

The histogram represents the weights of the parcels that are loaded onto Clive's van.

There are two parcels weighing between 12 kg and 14 kg.



- (a) How many parcels weigh between 5 kg and 8 kg? (2 marks)
- (b) Calculate the total number of parcels in the van. (2 marks)
- (c) Calculate an estimate of the mean weight of these parcels. (3 marks)
- (d) Calculate the **greatest** possible total weight of the parcels in Clive's van. (2 marks)
- (e) Clive's van can carry a maximum load of 600 kg, including Clive himself.

Clive weighs 90 kg. Is Clive's van likely to be overloaded?
Give a reason for your answer.

(1 mark)



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Section C

Answer **all** questions in the spaces provided.

Use **Rainfall** on page 3 of the Data Sheet.

4

Steph believes that the amount of rainfall in August in the UK is increasing. She decides to compare the August rainfall figures for a recent 10-year period with those for an earlier 10-year period.

(a) Use the data from the table **August monthly rainfall (mm) in the UK from 1979 to 2008** on the Data Sheet to calculate the mean and the standard deviation of the 1979 to **1988** August UK rainfall figures. (3 marks)

(b) The mean and standard deviation of the 1999 to 2008 August UK rainfall figures are 93.2 mm and 34.0 mm respectively. Compare and contrast these results with your results from part (a), and hence comment on Steph’s belief. (3 marks)

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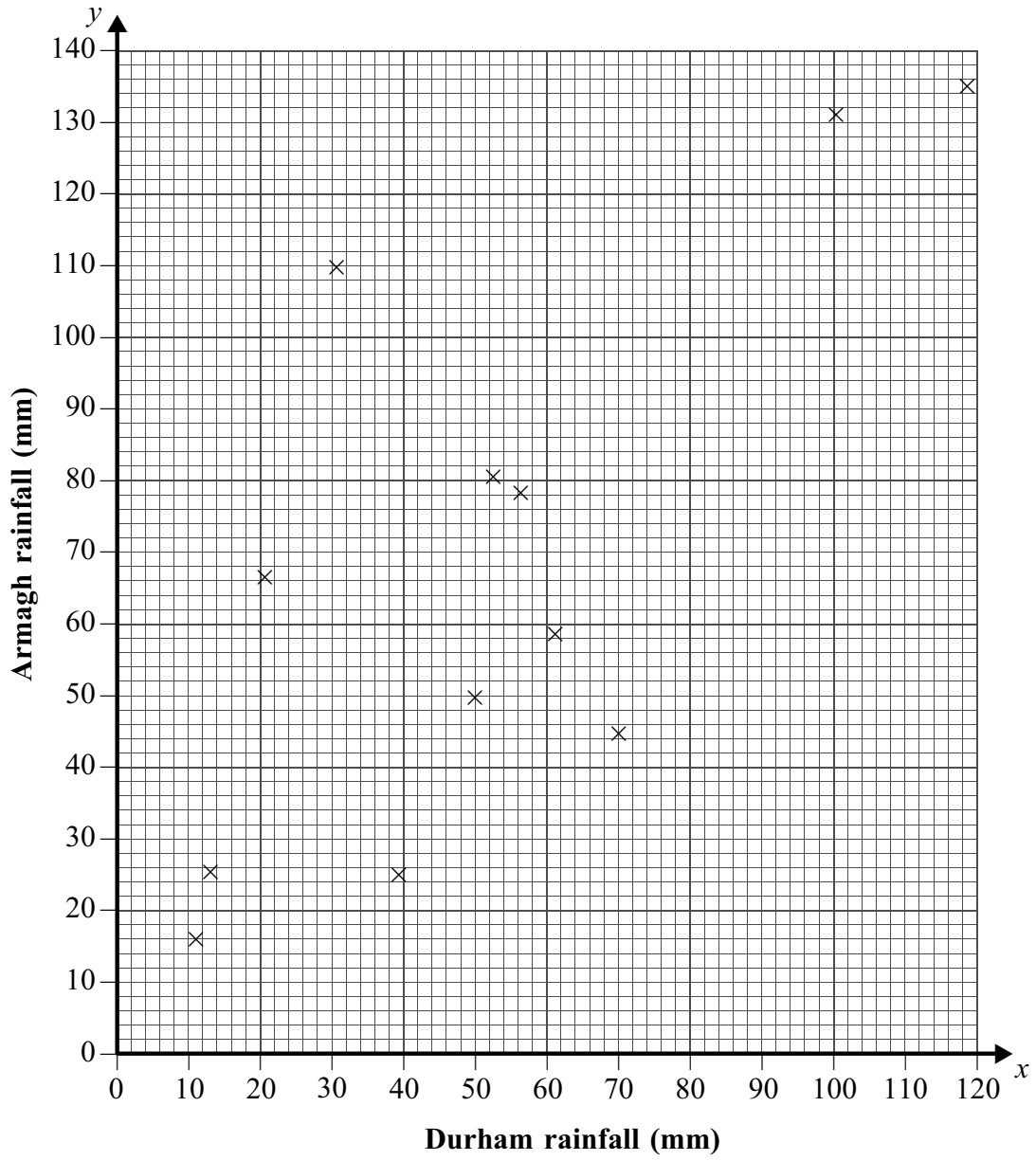


5 The correlation coefficient of the 2007 monthly rainfalls between Durham and Valley is 0.61 and between Durham and Eastbourne is 0.65.

- (a) (i) Use your calculator to find the correlation coefficient of the 2007 monthly rainfalls between Durham (x) and Armagh (y).
(ii) Comment on this correlation coefficient in comparison with those given above. (2 marks)
- (b) (i) Calculate the equation of the regression line of Armagh (y) on Durham (x) in the form $y = ax + b$.
Give the values of a and b correct to two decimal places. (2 marks)
(ii) Write down 2 pairs of coordinates on the regression line. Hence draw the regression line on the scatter graph **opposite**. (4 marks)
(iii) Interpret the value of a in context. (2 marks)
(iv) Interpret the value of b in context. (2 marks)
(v) Explain why it is not sensible to use the regression line to predict Armagh's rainfall when Durham's monthly rainfall is 150 mm. (1 mark)

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Section D

Answer **all** questions in the spaces provided.

Use **Heights** on page 4 of the Data Sheet.

6 (a) Use the stem and leaf diagram on the Data Sheet to find:

(i) the median height of a student;

(ii) the height of the outlier. (3 marks)

(b) Ignoring the outlier, describe **two** features of the distribution of students' heights. (2 marks)

(c) The heights of UK men may be considered to have a normal distribution with mean 178 cm and standard deviation 7 cm.

The height of a standard doorway is 190 cm.

Calculate the percentage of UK men that are too tall to pass through a standard doorway without bending. (4 marks)

(d) The heights of US women may be considered to have a normal distribution with mean 162 cm and standard deviation 6.4 cm.

The United States army requires that women's heights be between 147 cm and 203 cm.

Calculate the percentage of US women that satisfy this requirement. (5 marks)

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