Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

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

AQA

Free-Standing Mathematics Qualification
Advanced Level
June 2014

Using and Applying Statistics

6990/2

Unit 10

Monday 12 May 2014 1.30 pm to 3.00 pm

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 each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question.
- 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.

Advice
- You do not necessarily need to use all the space provided.

Section A

Answer **all** questions.

Answer each question in the space provided for that question.

Use **New homes** *on page 2 of the Data Sheet.*

1 (a) Use the diagram on the Data Sheet to calculate the percentage increase in the average floor space of a newly built home in Denmark compared to that of one built in the UK.

[2 marks]

(b) On the diagram on the Data Sheet, the area representing the floor space of a newly built home in the UK is $24\,\text{cm}^2$.

(i) What is the area on the diagram which represents the floor space of a newly built home in the USA?

[2 marks]

(ii) The floor space of a newly built home in Ireland is $88\,\text{m}^2$. Calculate the size of the dimensions of the square representing Ireland if Ireland were to be added to the diagram on the Data Sheet.

[3 marks]

(c) The average floor space of a **room** in a newly built home in France is $26.9\,\text{m}^2$. Calculate the average floor space of a **room** in a newly built home in the UK if it is 41.3% smaller than the French equivalent.

[3 marks]

QUESTION PART REFERENCE

Answer space for question 1

QUESTION PART REFERENCE

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Section B

Answer **all** questions.

Answer each question in the space provided for that question.

Use **Earned income** *on page 3 of the Data Sheet.*

2 A modified table showing the range of total income and the number of individuals receiving that total income for all taxpayers in the UK for the period 2009–2010 is shown below.

Range of total income	Number of individuals (thousands)
$6\,475 \leqslant I < 10\,000$	3 700
$10\,000 \leqslant I < 15\,000$	6 540
$15\,000 \leqslant I < 20\,000$	5 450
$20\,000 \leqslant I < 30\,000$	6 800
$30\,000 \leqslant I < 50\,000$	5 490
$50\,000 \leqslant I < 70\,000$	1 340
$70\,000 \leqslant I < 100\,000$	621
$100\,000 \leqslant I < 150\,000$	324
$150\,000 \leqslant I$	305
Total	**30 570**

(a) On the grid opposite, draw a cumulative frequency curve for these data. You only need to plot the cumulative frequency up to an income of £150 000.

[3 marks]

(b) Use your curve to estimate, for incomes up to £150 000:

(i) the median;
(ii) the 90th percentile;
(iii) the 10th percentile.

[3 marks]

(c) Use your answers to part **(b)** to describe the shape of the distribution.

[2 marks]

(d) For taxpayers who lived in London during the period 2009–2010, the mean income was £39 800 and the median income was £23 400.

(i) Give a reason why these two values are so different from each other.

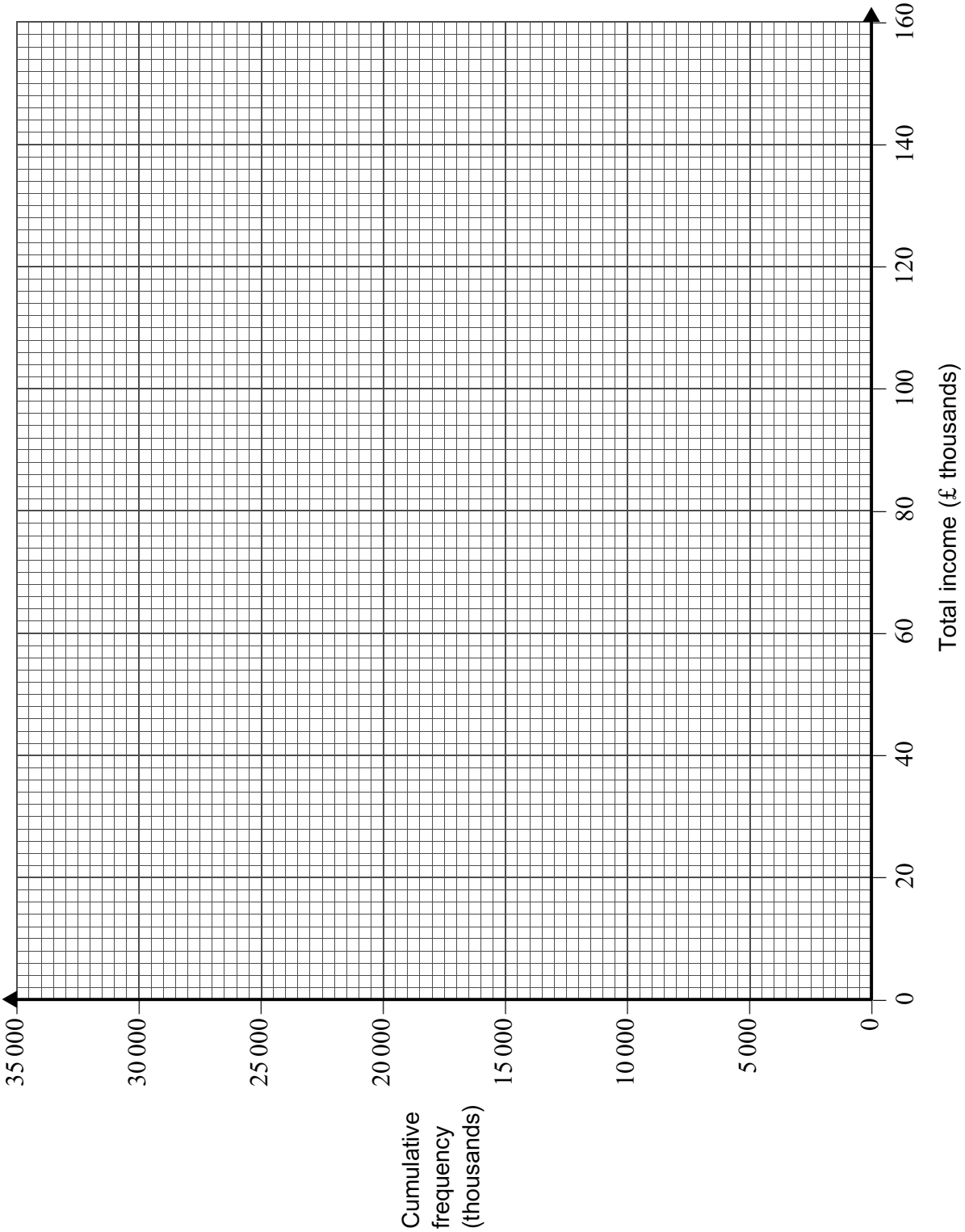
[1 mark]

(ii) Comment on the difference between the median income of taxpayers who lived in London and the median income for all taxpayers in the UK.

[1 mark]

QUESTION PART REFERENCE

Answer space for question 2



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Section C

Answer **all** questions.

Answer each question in the space provided for that question.

Use **Olympic Games** *on pages 4 and 5 of the Data Sheet.*

3 (a) Use the data in **Table 1**, given on the Data Sheet, to calculate:

(i) the mean distance jumped for the **men's** long jump winners from 1948 to 2012;

[1 mark]

(ii) the standard deviation of the distances jumped for the **men's** long jump winners from 1948 to 2012.

[2 marks]

(iii) An outlier is any value more than two standard deviations from the mean. Using the data relating to the **men's** long jump winners from 1948 to 2012, identify any outliers, showing calculations to support your reasoning.

[3 marks]

(b) In the **men's** long jump, the shortest winning jump was by Ellery Clark in 1896. The longest winning jump was in 1968 by Bob Beamon, who jumped 40.2% further than Ellery Clark. How far did Ellery Clark jump?

[3 marks]

(c) The mean distance jumped for the **women's** long jump winners from 1948 to 2012 is 6.80 metres and the standard deviation for this period is 0.411.

Use these values and your answers from part **(a)** to compare the winning distances jumped by **men and women** in the long jump competition since 1948.

[2 marks]

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4 **Table 2** on the Data Sheet shows the number of gold medals won at the London Olympic Games in 2012. A sample of nine countries has been taken from this table. The table below shows this information. The population of each of these countries has also been given.

Country	Population (millions)	Number of gold medals won
Great Britain	62.3	29
Hungary	10	8
New Zealand	4.4	6
Spain	46.2	3
Romania	19	2
Switzerland	7.9	2
Georgia	4.5	1
Tunisia	10.7	1
Bahamas	0.4	1

(a) For the above table of data, use **Population (millions)** (x) and **Number of gold medals won** (y) to plot a scatter graph on the grid opposite.

[2 marks]

(b) Use your calculator to find:

(i) the mean population, $\bar{x}$;

[1 mark]

(ii) the mean number of gold medals won, $\bar{y}$;

[1 mark]

(iii) the product-moment correlation coefficient, r.

[1 mark]

(c) Interpret your value of r found in part **(b)** in the context of this question.

[1 mark]

(d) (i) Calculate the equation of the line of best fit of y on x. Give any numerical values correct to three significant figures.

[3 marks]

(ii) Plot the line of best fit on your scatter graph.

[3 marks]

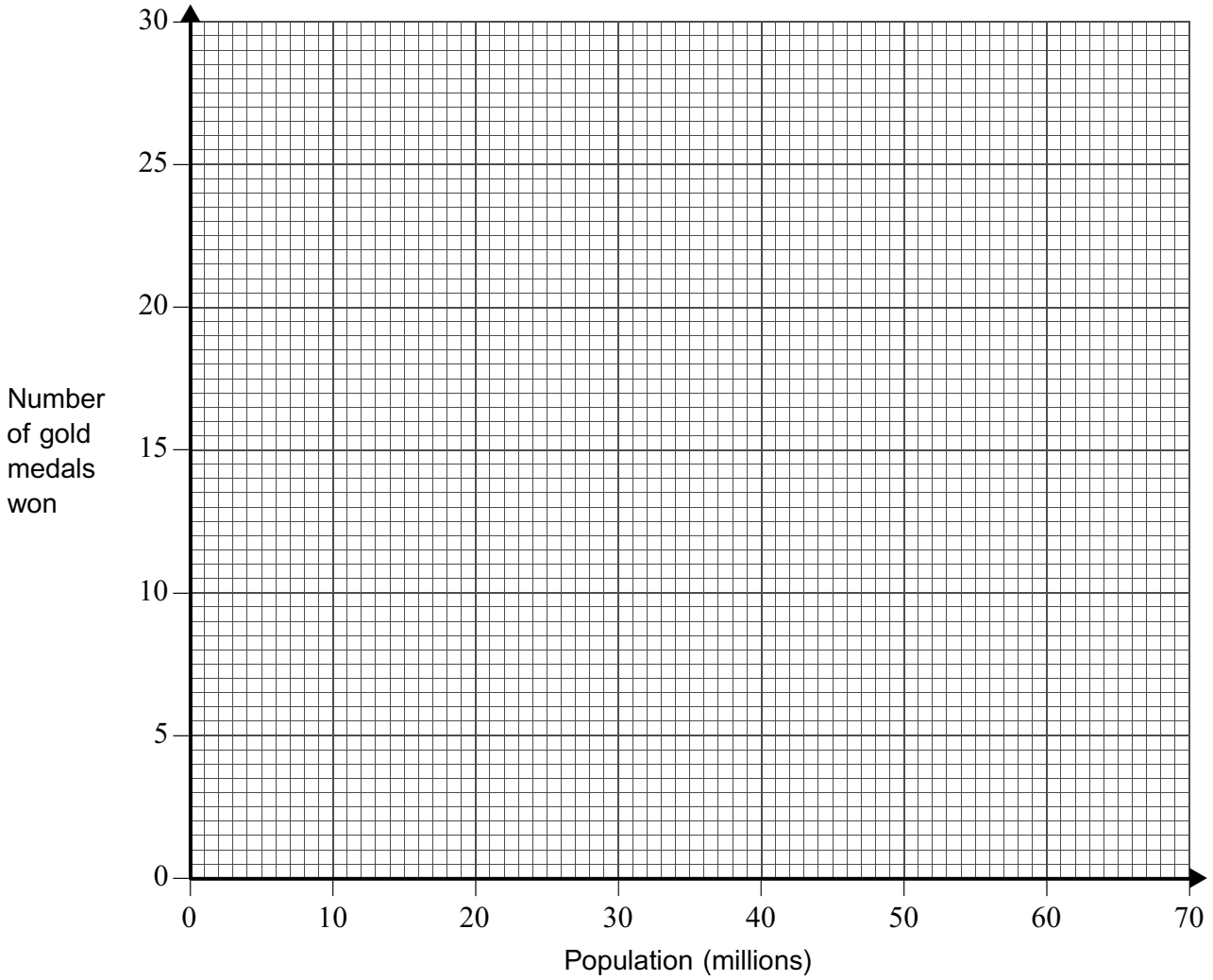
(e) (i) Canada has a population of 34.8 million. Use your equation or your line of best fit to estimate the number of gold medals that Canada should have won.

[2 marks]

(ii) In fact, Canada won one gold medal. Comment on this result.

[1 mark]

Answer space for question 4



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Section D

Answer **all** questions.

Answer each question in the space provided for that question.

Use **The pheasant** *on page 6 of the Data Sheet.*

5 (a) Meredith wants to cook a pheasant for dinner. The butcher asks Meredith to choose an oven-ready pheasant.

Assume that the weight of an oven-ready pheasant follows a normal distribution with a mean of 800 grams and a standard deviation of 80 grams.

(i) Find the probability that Meredith's pheasant weighs less than 920 grams.

[3 marks]

(ii) Find the probability that Meredith's pheasant weighs between 780 grams and 920 grams.

[4 marks]

(b) The butcher wishes to advertise the pheasants as follows: "90% of our pheasants are greater than ..... grams." What should this weight be?

[4 marks]

(c) Meredith looks up a recipe to find the cooking time of a pheasant. The recipe indicates an approximate cooking time of 35 minutes per 500 grams, plus 20 minutes. Meredith's pheasant weighs 850 grams. Calculate the approximate cooking time for her pheasant.

[3 marks]

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END OF QUESTIONS

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