Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

AQA

Free-Standing Mathematics Qualification
Advanced Level
June 2011

Using and Applying Statistics

6990/2

Unit 10

Monday 16 May 2011 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 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.

Section A

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

Use **Internet access** *on page 2 of the Data Sheet.*

1 (a) In 2006, there were 14.3 million households with Internet access and in 2009 there were 18.3 million.

Show calculations to confirm that this is a 28 % rise. *(2 marks)*

(b) In 2009, 70 % of households had Internet access.

Calculate the number of households that did not have Internet access. *(3 marks)*

QUESTION PART REFERENCE

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Section B

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

Use **Claimant count** *on page 3 of the Data Sheet.*

2 (a) (i) Between which quarters did the claimant count increase the most? *(1 mark)*

(ii) By how many did it increase? *(2 marks)*

(b) (i) Describe the trend of the claimant count from 2008 quarter 2 to 2009 quarter 3. *(1 mark)*

(ii) Give a possible reason for this trend. *(1 mark)*

(c) The claimant count is expected to reach 1750 (thousands) by 2011 quarter 1. It is then expected to drop gradually. Assuming that the quarterly drop in the claimant count from 2011 quarter 1 is 10 % per quarter, give workings to show in which quarter the claimant count will first drop below 1000 (thousands). *(4 marks)*

QUESTION PART REFERENCE

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Section C

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

Use **Distance travelled to work** *on page 4 of the Data Sheet.*

3 (a) Complete the percentage cumulative frequency column in the table below. Explain why the percentage frequencies sum to 100.1 . *(2 marks)*

(b) Draw a percentage cumulative frequency diagram on the grid opposite. Treat the '60 km and over' class as '60 km to less than 80 km'. *(3 marks)*

(c) Use your percentage cumulative frequency diagram to estimate:

(i) the median distance travelled to work;

(ii) the inter-quartile range of the distance travelled to work. *(3 marks)*

(d) (i) Draw a box plot for the distances travelled to work in England on the grid at the bottom of the page opposite. *(2 marks)*

(ii) Describe the distribution. *(1 mark)*

(iii) The median and inter-quartile range of the distances travelled to work in the Newcastle upon Tyne area are 4 km and 6 km respectively.

Compare the distances travelled to work in England (as a whole) with those of Newcastle upon Tyne. *(3 marks)*

QUESTION PART REFERENCE

Distance travelled to work	England (thousands)	Percentage frequency (correct to 1 decimal place)	Percentage cumulative frequency (correct to 1 decimal place)
Works mainly at or from home	2055	9.6	9.6
Less than 2 km	4484	21.0	
2 km to less than 5 km	4510	21.1	
5 km to less than 10 km	4095	19.2	
10 km to less than 20 km	3412	16.0	
20 km to less than 30 km	1198	5.6	
30 km to less than 40 km	528	2.5	
40 km to less than 60 km	488	2.3	
60 km and over	608	2.8	100.1
Total	**21 378**		

Explanation .....

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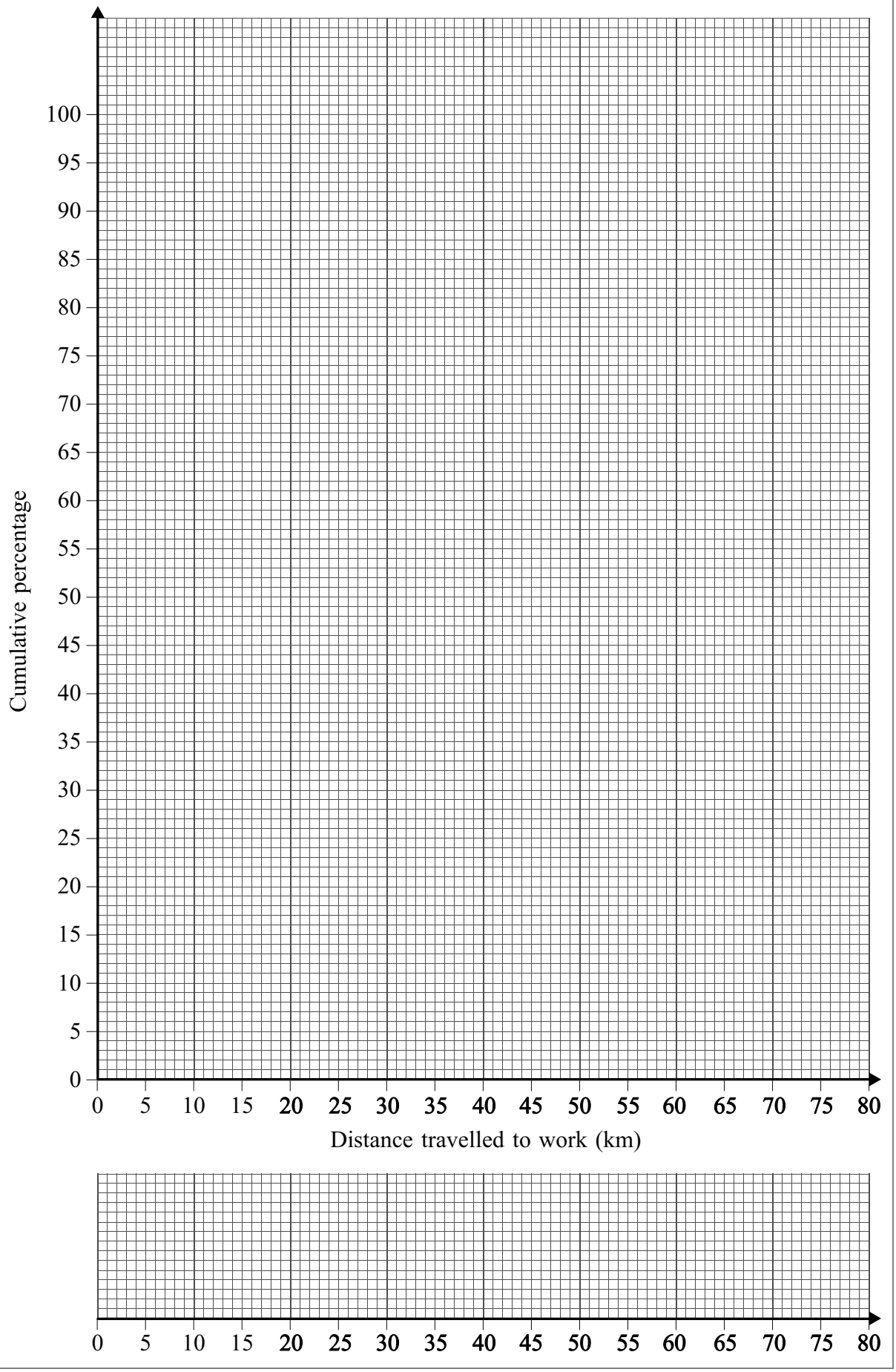

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Section D

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

Use **Climate** *on page 5 of the Data Sheet.*

4 The table shows, over two different ten-year periods, the number of days after 20 April (+) and before 20 April (−) that the oak was observed first leafing.

Year	Number of days
1951	+17
1952	+16
1953	+1
1954	+6
1955	+19
1956	+10
1957	+17
1958	−11
1959	+11
1960	+4

Year	Number of days
1998	−20
1999	−19
2000	−17
2001	−6
2002	−15
2003	−8
2004	−6
2005	−15
2006	0
2007	−17

(a) The mean and the standard deviation of the number of days for the period 1951 to 1960 are 9 and 8.83 respectively.

Comment upon the mean value, in context. *(2 marks)*

(b) Calculate the mean and the standard deviation of the number of days for the period from 1998 to 2007. *(4 marks)*

(c) Compare the means and standard deviations of the number of days for the two ten-year periods. *(3 marks)*

(d) Comment upon the claim that the climate is affecting the dates when the oak first produces leaves. *(1 mark)*

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Section E

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

Use **Height and foot length** *on pages 6 and 7 of the Data Sheet.*

5 (a) (i) Find the mean foot length $(\bar{x})$ of the sample of boys. *(1 mark)*

(ii) Find the mean height $(\bar{y})$ of the sample of boys. *(1 mark)*

(b) (i) Find the correlation coefficient for the data. *(1 mark)*

(ii) Interpret the value of the correlation coefficient in context. *(1 mark)*

(c) (i) Calculate the equation of the regression line of height (y) on foot length (x). Write down your equation in the form $y = ax + b$, where the values of a and b are correct to 2 decimal places. *(2 marks)*

(ii) Interpret the value of a in context. *(2 marks)*

(iii) Plot your regression line on the given grid. *(3 marks)*

(d) Use the equation of the regression line to predict the height of a 5-year-old boy whose footprint was measured as 13.8 cm. *(2 marks)*

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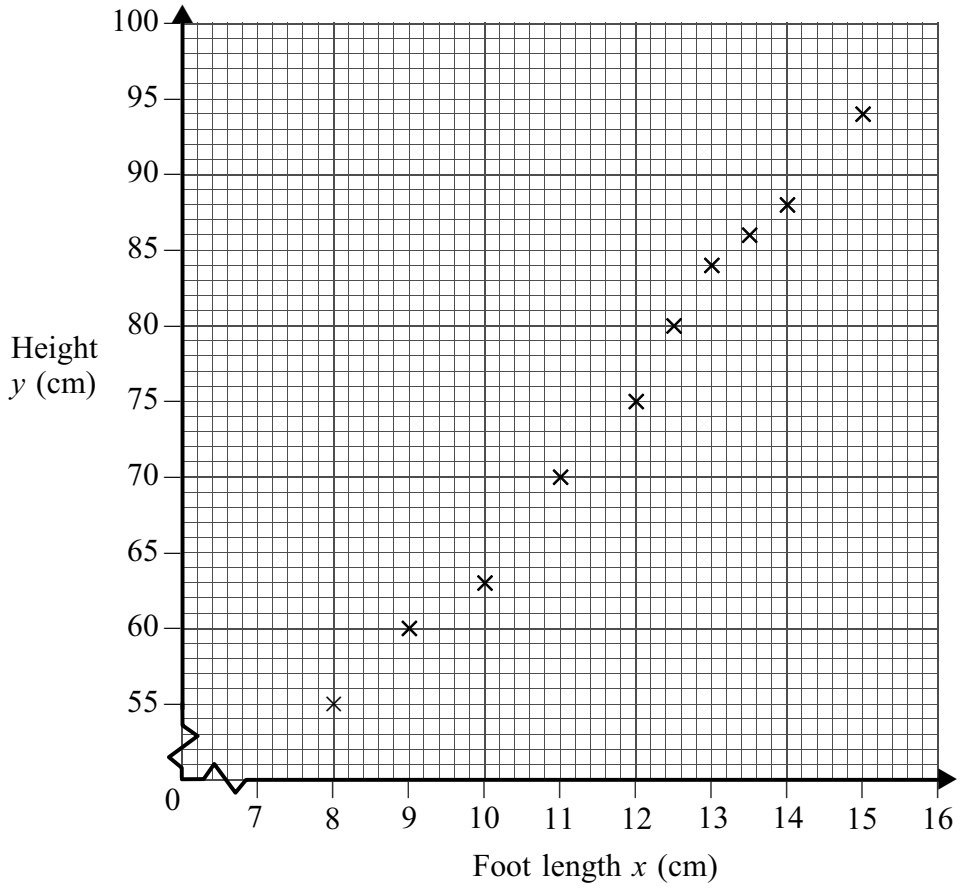

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6 (a) Assume that Japanese adult males have foot lengths which are normally distributed with mean 24.9 cm and standard deviation 1.05 cm.

Calculate the probability that a Japanese adult male has a foot length greater than 27 cm. *(4 marks)*

(b) Assume that Japanese adult females have foot lengths which are normally distributed with mean 22.8 cm and standard deviation 0.89 cm.

Calculate the percentage of the Japanese adult female population that has foot lengths between 22 cm and 25 cm. *(5 marks)*

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END OF QUESTIONS

There are no questions printed on this page

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