Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						1	3	8	9	/	1	H	Signature	

Paper Reference(s)

1389/1H

Edexcel GCSE

Statistics

Paper 1H

Higher Tier

Thursday 22 June 2006 – Morning

Time: 2 hours 30 minutes

Examiner's use only

Team Leader's use only

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, pen, compass, HB pencil, eraser, electronic calculator.

Items included with question papers
Nil

Question Number	Leave Blank
Section A	
1	
2	
3	
4	
5	
6	
7	
8	
Section B	
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page or any blank pages. Anything you write on these pages will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
This question paper has 8 questions in Section A and 8 questions in Section B. The total mark for this paper is 100.
There are 32 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Work steadily through the paper. Do not spend too long on one question.
Show all stages in any calculations.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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Turn over

edexcel

GCSE Statistics 1389

Higher Tier Formulae

You must not write on this page.
Anything you write on this page will gain NO credit.

Mean of a frequency distribution $= \dfrac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \dfrac{\sum fx}{\sum f}$, where x is the mid-interval value.

Variance $= \dfrac{\sum (x-\bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum (x-\bar{x})^2}{n}\right]}$

where $\bar{x}$ is the mean set of values.

Standard deviation (discrete frequency distribution) $\sqrt{\left[\dfrac{\sum fx^2}{\sum f} - \left(\dfrac{\sum fx}{\sum f}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum f(x-\bar{x})^2}{\sum f}\right]}$

Spearman's Rank Correlation Coefficient $1 - \dfrac{6\sum d^2}{n(n^2-1)}$

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SECTION A

Answer ALL the questions. Write your answers in the spaces provided.

You must write down all stages in your working.

1. Lincoln greenhouses grow Shirley tomatoes. A sample of 26 tomatoes was taken. The weights, to the nearest 5 grams, of the 26 tomatoes were:

60 60 55 65 60 50 60 65 50 65 70 50 65

65 50 55 55 70 65 60 65 70 50 55 65 60

(a) Complete the frequency table.

Weight (x)	Frequency (f)	fx
50	5	250
55	4	220
60	6	360
65		
70		
Totals		

(1)

(b) Use the information in the table to work out an estimate of the mean weight of these tomatoes.

..... g

(2)

Leave blank

Supermarkets want each tomato they sell to be about the same weight.

(c) What other statistical information might the supermarkets need before deciding whether or not Shirley tomatoes will meet their requirements?

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(1) **Q1**

(Total 4 marks)

Leave blank

2. A farmer has two farms.

On one farm he has battery hens, on the other farm he has the same number of free-range hens.

One Saturday the sizes of the eggs collected from the two farms were as follows:

	Large	**Medium**	**Small**	**Total number of eggs**
Free-range hens	125	210	105	
Battery hens	75	210	125	
Totals				

(a) Complete the two-way table.

(2)

An egg from those collected on the Saturday is chosen at random.

(b) Write down the probability that the egg chosen is

(i) large,

.....

(ii) from a free-range hen and medium.

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(2)

(c) Compare and contrast the numbers of the different sizes of eggs laid by the free-range hens and the battery hens on these farms.

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(2)

(Total 6 marks)

Q2

Leave blank

3. John and Matt are playing tennis. The odds against John winning a game are 2 : 1

(a) What is the probability that John wins the next game?

.....

(1)

(b) What are the odds against Matt winning the next game?

.....

(1)

John and Matt play six games of tennis.

(c) Work out how many games John can be expected to win.

.....

(1)

Q3

(Total 3 marks)

Leave blank

4. (a) What is meant by a random sample?

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(1)

Here is an extract from a table of random numbers.

86 13	84 10	07 30	39 05	97 96	88 07	37 26	04 89	13 48	19 20
60 78	48 12	99 47	09 46	91 33	17 21	03 94	79 00	08 50	40 16
78 48	06 37	82 26	01 06	64 65	94 41	17 26	74 66	61 93	14 97

(b) Starting from the first line and the third column of the table with the number 84, and reading across the table select and write down 10 random numbers between 0 and 79 from the table.

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(2)

(c) Explain how you could use these random numbers to select a sample of 10 students from 80 students.

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(2)

Q4

(Total 5 marks)

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5. The table shows the numbers of casualties from road accidents, in thousands, involving illegal alcohol levels in Northern Ireland in the years 1986 to 2000.

	Fatal injuries	Serious injuries	Slight injuries	Total casualties
1986	1.03	6.57	19.60	27.20
1987	0.93	6.01	17.99	24.93
1988	0.81	5.18	17.25	23.24
1989	0.84	4.92	17.05	22.81
1990	0.80	4.23	16.01	21.04
1991	0.69	3.72	14.00	18.41
1992	0.69	3.40	13.28	17.37
1993	0.57	2.82	12.25	15.63
1994	0.54	2.95	12.26	15.75
1995	0.56	3.10	12.89	16.56
1996	0.60	3.13	13.93	17.67
1997	0.57	3.07	13.90	17.55
1998	0.49	2.68	13.25	16.42
1999	0.48	2.60	14.64	17.72
2000	0.56	2.71	15.75	19.02

(Data source: *Department for Transport, Royal Ulster Constabulary*)

(a) Write down the **Total casualties** in 1989.

..... thousand

(1)

The total number of casualties in 1996, found by adding together the **Fatal**, **Serious** and **Slight injuries** columns comes to 17.66 thousand.

The number of casualties in the **Total casualties** column is 17.67 thousand.

(b) Give a reason for this difference.

.....

.....

.....

(1)

Leave blank

(c) Describe the trend in the numbers of **Fatal injuries** in the years

(i) 1986 to 1991,

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(ii) 1993 to 2000.

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(2)

(Total 4 marks)

Q5

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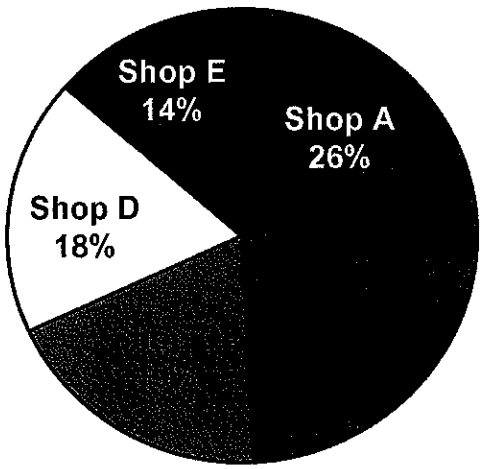
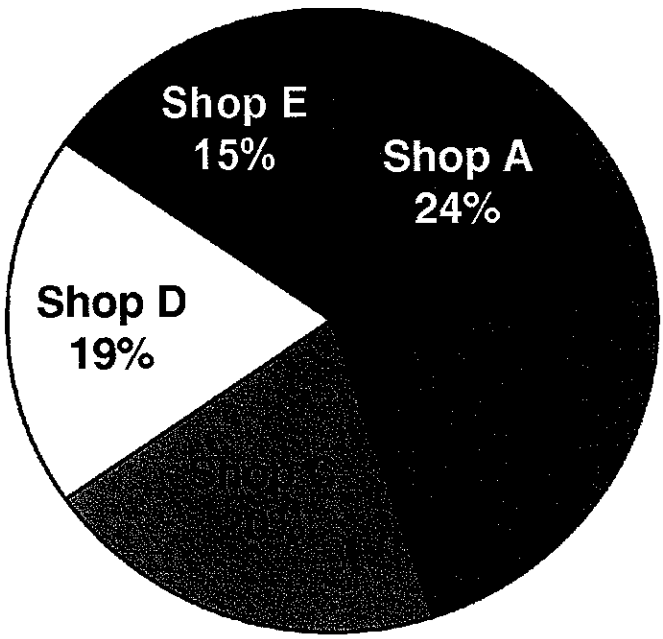
6. Five shops in Whitehaven sell both videos and DVDs.

The comparative pie charts show the percentage of each that were sold by the 5 shops in one week.

Videos sold



DVDs sold



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(a) Comment on the sales of videos compared to DVDs in Whitehaven.
Give reasons for your opinion.

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(2)

(b) Discuss any relationship between the percentages of videos sold and the percentages of DVDs sold in each of the 5 shops.

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(1)

Q6

(Total 3 marks)

Leave blank

7. The table shows how the average price of houses bought by first-time buyers changed over a period of five years. It also shows some of the chain base index numbers for the average prices.
The average prices are given to the nearest £1000.

Year	**2001**	**2002**	**2003**	**2004**	**2005**
Price (£1000's)	68	85	99	121	129
Chain base index number	123	125	116		

(Data source: *Nationwide Database of House Prices*)

(a) Calculate, to the nearest whole number, the chain base index numbers for the years 2004 and 2005, and enter them in the table.

(2)

(b) For the years 2001 to 2005 write down the largest annual percentage increase.

.....%

(1)

(c) Calculate the geometric mean of the chain base index numbers for these five years.

.....

(2)

(d) What can you infer from your answer to (c)?

.....

.....

(1)

(e) Discuss the trend of the chain base index numbers.

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(1)

Q7

(Total 7 marks)

Leave blank

8. A steel manufacturer finds that the total quantity of raw materials used by his company each week is normally distributed with a mean of 1000 tonnes and a standard deviation of 200 tonnes.

(a) Calculate an estimate of the maximum quantity of raw materials the company is likely to use per week.

..... tonnes
(1)

The manager of the steel manufacturing company decides to make a regular order for the same amount of raw materials to be delivered each week on a Monday.

(b) Discuss what would be a suitable figure for the quantity to be ordered.

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(2)

Q8

(Total 3 marks)

TOTAL FOR SECTION A: 35 MARKS

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SECTION B

Answer ALL the questions. Write your answers in the spaces provided.

You must write down all stages in your working.

1. Table 1 shows seven countries, selected at random, their HDI (Human Development Index – a measure of their quality of life) and their GNP (Gross National Product per person – a measure of their wealth).

Table 1

Country	Niger	Rwanda	India	Oman	China	Cuba	UK
HDI	0.116	0.304	0.439	0.535	0.716	0.877	0.970
GNP	20	26	25	93	22	66	113

Table 2 shows the countries ranked in descending order for their HDI.

Table 2

Country	Niger	Rwanda	India	Oman	China	Cuba	UK
HDI rank	7	6	5	4	3	2	1
GNP rank							
Difference in ranks (d)							
d^2							

(a) Complete Table 2.

(2)

(b) Use the information in Table 2 to calculate Spearman's rank correlation coefficient for this data. Give your answer to three decimal places.

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(2)

Leave blank

(c) Interpret your answer to part (b).

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(2) **Q1**

(Total 6 marks)

Leave blank

2. A market research company wants to find out the views of customers about a new supermarket that has just opened.

(a) Give **two** reasons why the company should take a sample rather than a census.

(i) .....

.....

.....

(ii) .....

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(2)

The market research company wants to take a sample of 100 customers.

The sample is to be taken by asking pre-determined numbers of customers of different ages and genders to fill in a questionnaire.

(b) Name a suitable sampling method.

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(1)

(c) Write down an example of a closed question that could be used on this questionnaire.

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(2)

(d) Give **two** reasons why a pilot survey (pre-test) should be carried out.

(i) .....

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(ii) .....

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(2)

Leave blank

One question on the questionnaire is

"Do you agree that the goods are well laid-out and easy to find?"

(e) Discuss whether this is a suitably worded question for the questionnaire.

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(2) Q2

(Total 9 marks)

Leave blank

3. Working days were lost in the Manufacturing Industries and in the Public Administration and Defence Industry between August 2000 and May 2001 as a result of strikes.

The table shows the number of working days, in thousands, lost each month.

Year	**2000**					**2001**				
Month	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Manufacturing	14	4	2	6	8	2	6	9	2	4
Public Administration and Defence	14	13	0	15	5	6	5	7	2	0

(Data source: *Government Statistics*)

The mean value of the number of working days lost each month in the Manufacturing Industries is 5.7 thousand.
The standard deviation of the number of working days lost each month in the Public Administration and Defence Industry is 5.3 thousand, to one decimal place.

(a) (i) Calculate the mean value of the number of working days lost each month in the **Public Administration and Defence Industry**.

Mean for Public Administration and Defence ..... thousands

(ii) Calculate the standard deviation of the number of working days lost each month in the **Manufacturing Industries**. Give your answer to one decimal place.

Standard deviation for Manufacturing ..... thousands
(3)

Leave blank

You may assume that, between August 2000 and May 2001, there were approximately the same number of people employed in the Manufacturing Industries as there were employed in the Public Administration and Defence Industry.

(b) Using the given summary statistics and your answers to part (a), compare the numbers of working days lost each month due to strikes in the two industries between August 2000 and May 2001.

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(2) Q3

(Total 5 marks)

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4. In a screening test a saliva sample is taken and tested for bacteria.
The result of a screening test can be either positive (T+) or negative (T–).
The probability of a person showing a positive (T+) result to the test is 0.1

(a) Work out the probability that a person chosen at random will show a negative (T–) result to the screening test.

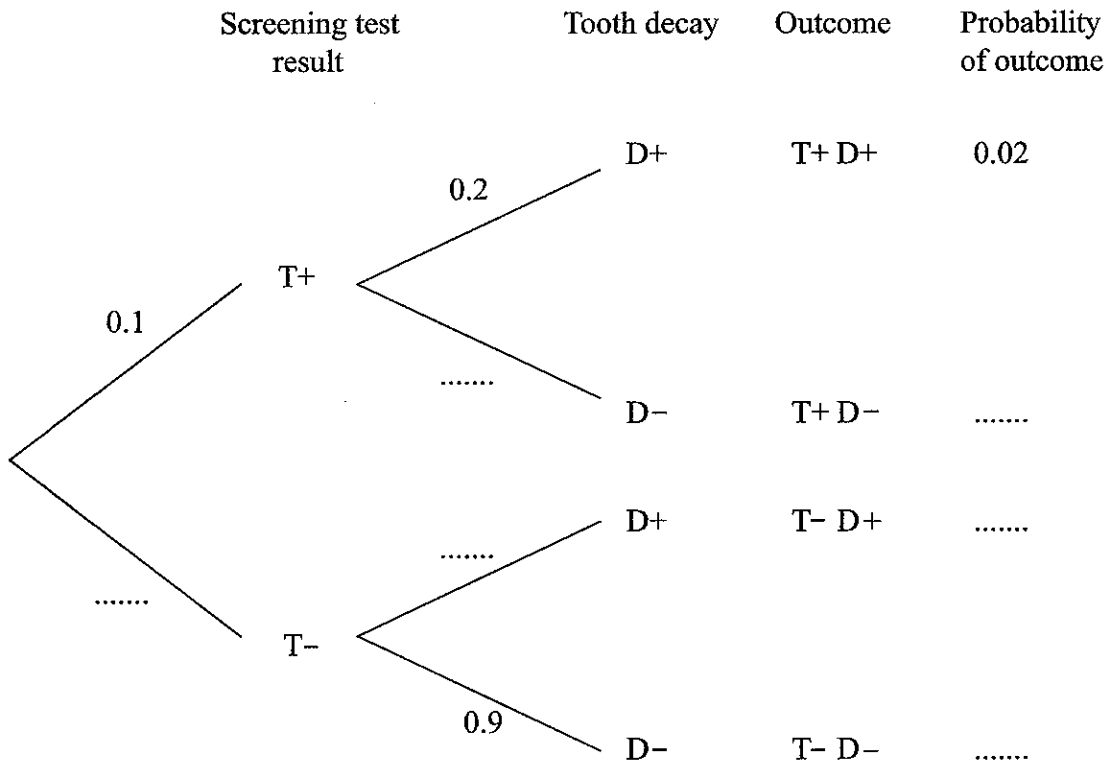
.....

(1)

The probability that a person who gave a positive (T+) result to the screening test goes on to get tooth decay (D+) within 18 months of the screening test was found to be 0.2

The probability that a person who gave a negative (T–) result to the screening test does **not** go on to get tooth decay (D–) was found to be 0.9

(b) Complete the tree diagram below.



(3)

Leave blank

(c) Given that a person has tooth decay (D+), what is the probability that the person gave a positive (T+) result in the screening test within the last 18 months?

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(2)

(d) What can you infer from this result about the usefulness of the screening test?

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(2)

(Data source: *Dental Journal*)

(Total 8 marks)

Q4

Leave blank

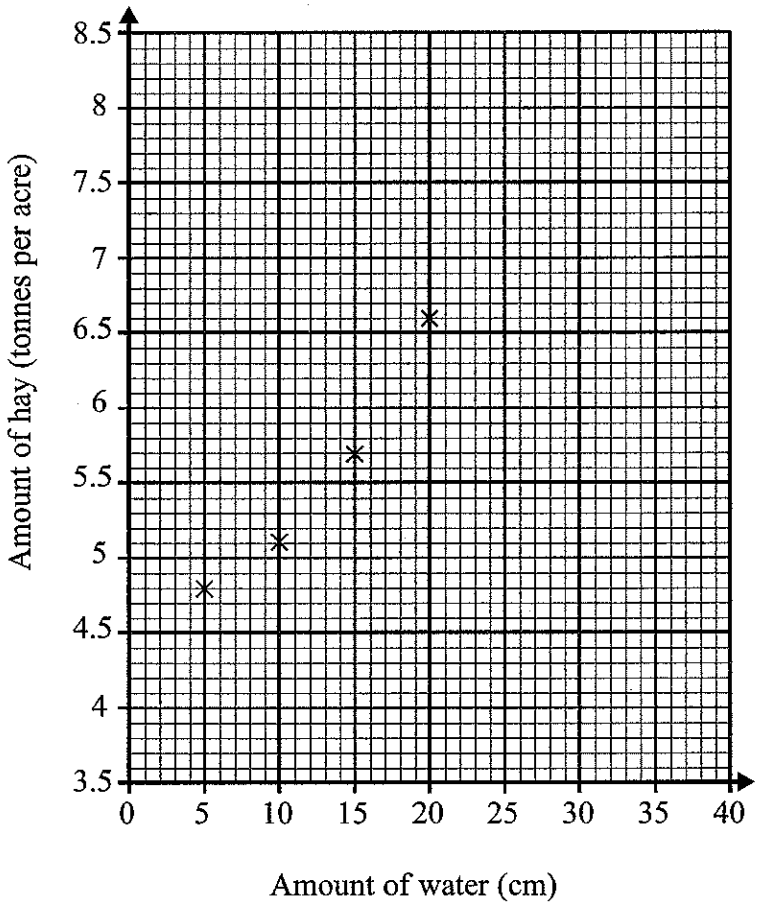
5. Sprinklers are used to water similar plots of land on an experimental farm.

The table shows the amount of water applied, in cm, and the amount of hay grown, in tonnes per acre, on each of seven plots of land.

Amount of water (x cm)	5	10	15	20	25	30	35
Amount of hay (y tonnes per acre)	4.8	5.1	5.7	6.6	7.3	7.9	8.1

(a) Plot the last 3 points from the table to complete the scatter diagram for these data.

Amount of hay with different amounts of water



(1)

(b) Describe the correlation between the amount of water applied and the amount of hay grown per acre.

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(2)

Leave blank

(c) Calculate the coordinates of the mean point $(\bar{x}, \bar{y})$ for the data.

.....

(2)

On the scatter diagram

(d) (i) plot the point $(\bar{x}, \bar{y})$,

(ii) draw the line of best fit.

(2)

(e) Estimate the amount of hay grown when 32 cm of water is applied by the sprinklers to another one of these plots.

..... tonnes per acre

(2)

(f) Extend your line of best fit to find the amount of hay grown when no water is applied by the sprinklers. Discuss this answer.

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(2)

Q5

(Total 11 marks)

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6. In a study on identical twins, the intelligence quotient (IQ) of 10 sets of twins was tested, and whether the twin was the first- or the second-born was recorded.

The results for the second-born twins are shown on the stem and leaf diagram below.

Second-born twins' IQ

8	7	9		
9	3	4	6	7
10	1	3		
11	3			
12	6			

Key
8 | 7 = 87

(a) Find the median IQ of the second-born twins.

.....

(1)

(b) Find the lower and upper quartiles of the IQs of second-born twins.

Lower quartile .....

Upper quartile .....

(2)

(c) Show that 126 is **not** an outlier for the second-born twins' IQs.

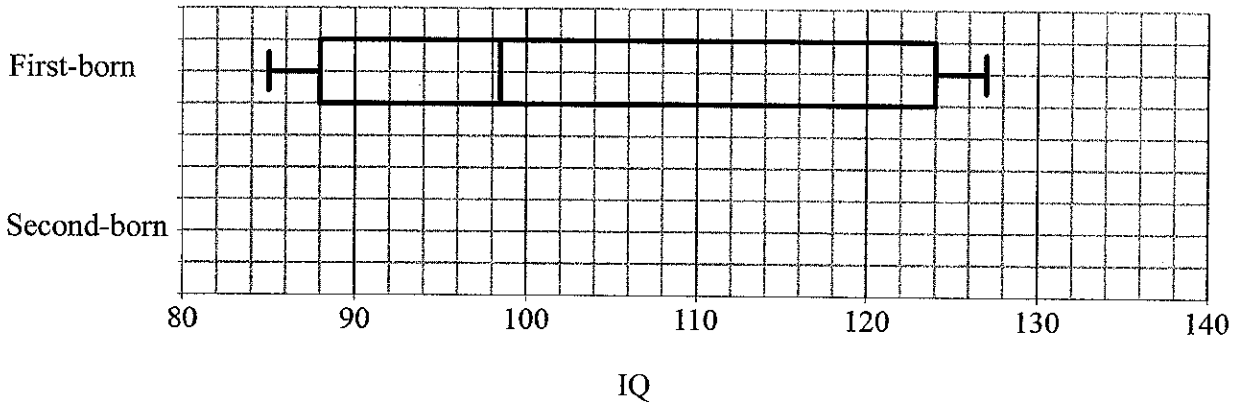
(3)

Leave blank

The IQs of the 10 first-born twins are shown as a box plot on the grid below.

(d) On the same grid draw a box plot for the IQs of the second-born twins.

Comparative box plots



(3)

(e) Compare the two distributions.

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(2)

(f) Suggest one way in which the study could be improved.

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(1)

Q6

(Total 12 marks)

Leave blank

7. A company runs holiday tours.

In 2005, 400 people made provisional bookings.

Of these 320 went on to confirm the booking.

In 2006 one person makes a provisional booking.

(a) Write down an estimate of the probability that this person will go on to confirm the booking.

.....

(1)

(b) Estimate the probability that the person will not go on to confirm the booking.

.....

(1)

(c) The tour company has just had 4 people who made provisional bookings.

(i) Calculate the probability that exactly 3 of these people will go on to confirm their booking.

You may use $(p + q)^4 = p^4 + 4p^3q + 6p^2q^2 + 4pq^3 + q^4$.

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Leave blank

(ii) For these 4 provisional bookings, find which are the **two** most likely numbers of people who go on to confirm their bookings. Show your working.

.....

(5)

Q7

(Total 7 marks)

Leave blank

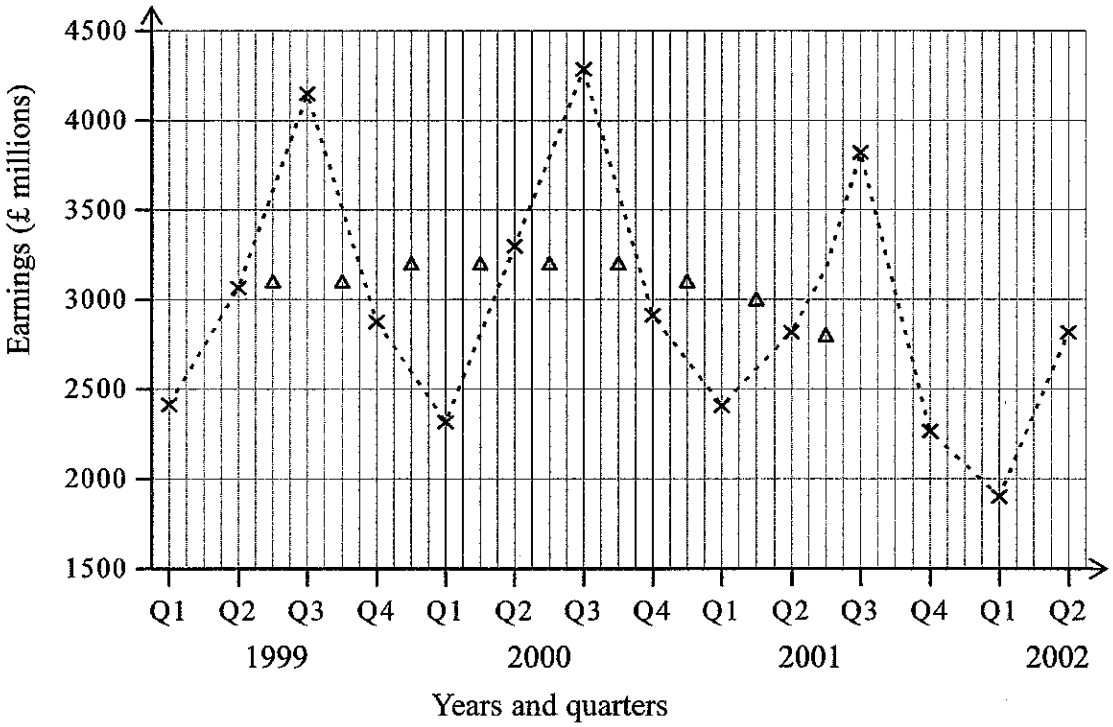
8. The table shows the earnings each quarter from tourism to the UK, from the first quarter of the year 1999 to the second quarter of the year 2002.

	Earnings from tourism to the UK (in £ millions)			
Year	**Q1**	**Q2**	**Q3**	**Q4**
1999	2413	3064	4148	2874
2000	2315	3297	4284	2910
2001	2406	2815	3819	2265
2002	1901	2815		

(Data source: *National Statistics*)

The data is shown on the time series graph below.

Earnings from tourism to the UK



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(a) In which quarter of each year was the greatest amount of money earned?

.....

(1)

(b) Give **one** reason why the earnings from tourism were higher in this quarter of each year.

.....

.....

(1)

The first 9 four-quarterly moving averages, in £ millions, to two significant figures are:

3100 3100 3200 3200 3200 3200 3100 3000 2800

(c) Calculate the last **two** moving averages.

£..... million, £..... million.

(2)

(d) Plot the last **two** moving averages on the time series graph.

(1)

(e) What can be inferred from the moving averages about the way the earnings from tourism changed for the years 1999 to 2002?

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(2)

Q8

(Total 7 marks)

TOTAL FOR SECTION B: 65 MARKS
TOTAL FOR PAPER: 100 MARKS

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