Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2011

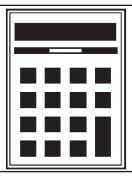
Statistics
Written Paper

43101F

F

Monday 27 June 2011 9.00 am to 10.30 am

For this paper you must have:
- a calculator
- mathematical instruments.



Time allowed
- 1 hour 30 minutes

Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

You may need to use the following formulae:

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

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

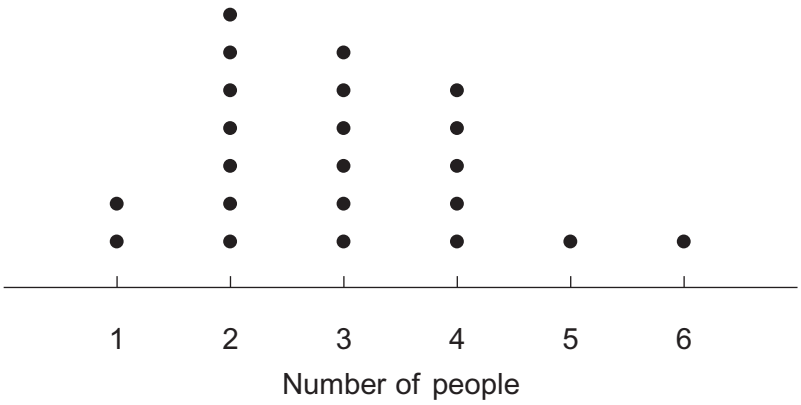
where x is the mid-interval value.

Turn over for the first question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

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

1 This dot plot shows the number of people living in the 22 houses in Trinity Street in 2009.



1 (a) How many people live alone?

Answer ..... *(1 mark)*

1 (b) Write down the modal number of people living in the houses.

Answer ..... *(1 mark)*

1 (c) Work out the range of the number of people living in the houses.

.....

Answer ..... *(1 mark)*

1 (d) In 1959, the modal number of people living in these houses was 4
Also, in 1959, the range of the number of people was 7

1 (d) (i) Give **two** comparisons of the number of people living in these houses in 1959 and 2009.

Comparison 1 .....

.....

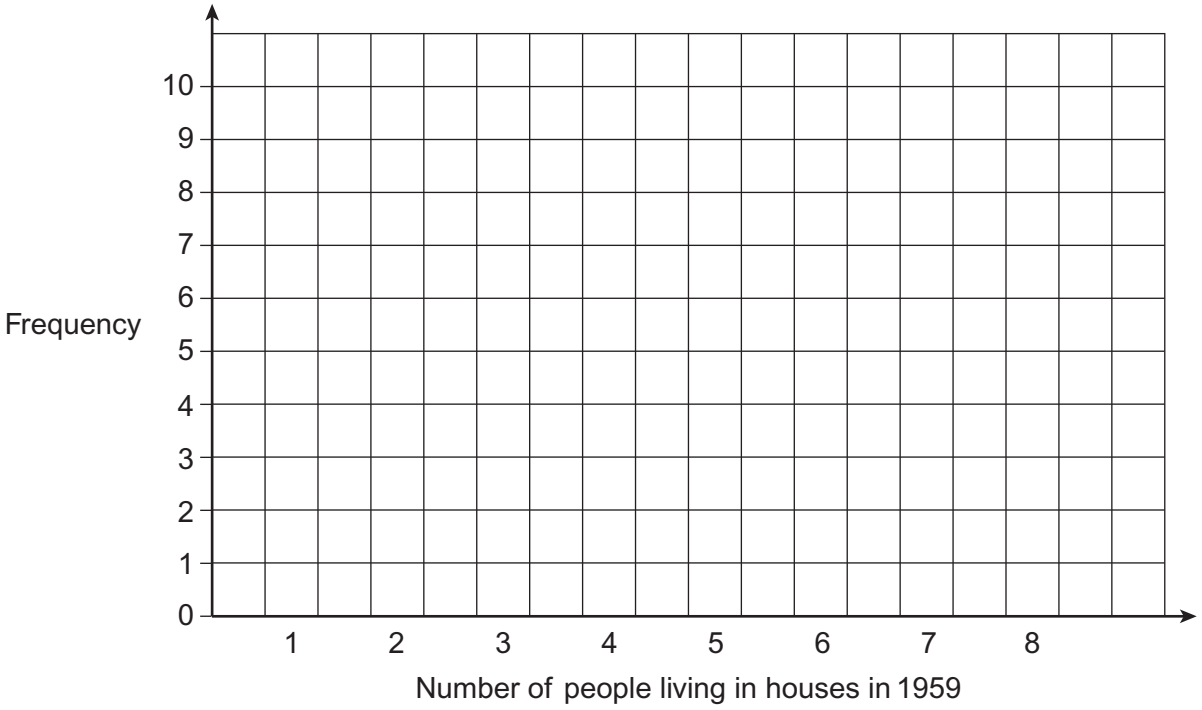
Comparison 2 .....

.....

(2 marks)

1 (d) (ii) Draw a bar chart to show a possible distribution for the number of people living in these 22 houses in **1959**.

Remember, the modal number was 4 and the range was 7



(4 marks)

1 (d) (iii) Name **one** other diagram that could be used to show the data.

Answer ..... *(1 mark)*

Turn over for the next question

10

2 A shop sells chocolate eggs.
One day the shop has 20 of these eggs for sale.
Inside each egg there is **one** toy animal as shown in the table.

Type of animal	Number of eggs with this animal inside
Lion	8
Monkey	5
Giraffe	4
Snake	2
Elephant	1

Quinlan chooses an egg at random.

2 (a) Which of **these** animals is least likely to be inside?

Answer ..... *(1 mark)*

2 (b) What is the probability the egg contains a giraffe?

Answer ..... *(1 mark)*

2 (c) What is the probability the egg contains a zebra?

Answer ..... *(1 mark)*

2 (d) What is the probability the egg contains a lion or a snake?

.....

.....

Answer ..... *(2 marks)*

2 (e) What is the probability the egg does **not** contain an elephant?

.....

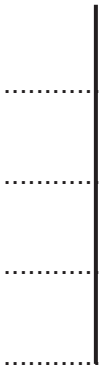
.....

Answer ..... *(2 marks)*

3 The speeds of cars passing a school are recorded to the nearest mile per hour.
For a random sample of 19 cars the speeds are

30	21	28	29	27
18	40	22	19	33
27	30	30	18	23
16	23	31	19	

3 (a) Draw an ordered stem-and-leaf diagram to show the data.



Key 3 | 0 represents 30 miles per hour.

(3 marks)

3 (b) Show that the upper quartile is 30 miles per hour.

.....

.....

(1 mark)

3 (c) The speed limit outside the school is 30 miles per hour.

Comment on the fact that the upper quartile of speeds is the speed limit.

.....

.....

(1 mark)

12

4 The table shows index numbers for the costs of some items in June 2009 using June 2008 as base.

Item	Index number
Bread	120
Milk	110
Petrol	100
Games console	90
Potatoes	105

4 (a) Which item had gone up by 10% from June 2008 to June 2009?

Answer ..... *(1 mark)*

4 (b) Explain the meaning of the index number of 100 for petrol.

.....

.....

(1 mark)

4 (c) A loaf of bread cost 80p in June 2008.

Calculate the cost of an equivalent loaf of bread in June 2009.

.....

.....

Answer ..... p *(2 marks)*

5 James is studying plants in a field.
He divides the field into metre squares.
He counts the number of plants in each square.

This diagram shows his results.

2	6	6	7	9
5	6	8	11	12
8	9	12	14	15
7	11	13	15	15
12	11	12	15	16

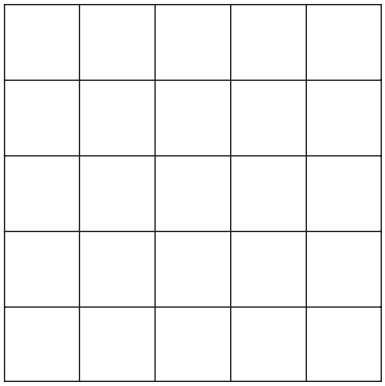
5 (a) How can you tell by looking at the diagram that the median per square is more than 10?

.....

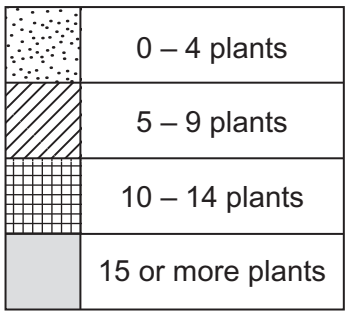
.....

(1 mark)

5 (b) Use the grid **below** to draw a choropleth map for the data.



Key



(3 marks)

5 (c) Part of the field is often shaded by a tree.
This limits the number of plants that grow.

On your choropleth map, put a T in the square most likely to be shaded by this tree.

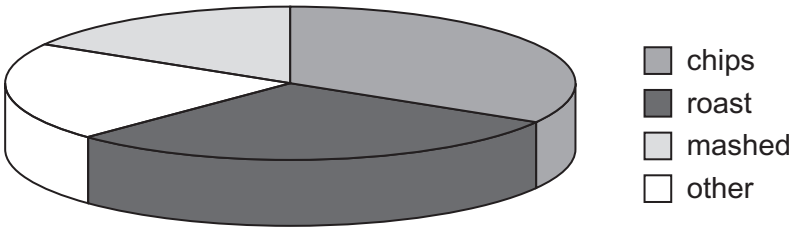
(1 mark)

9

Turn over ▶

6 Look carefully at the pie chart.

3-D pie chart showing favourite type of potato for a sample of children



6 (a) Explain fully why the pie chart is misleading.

.....

.....

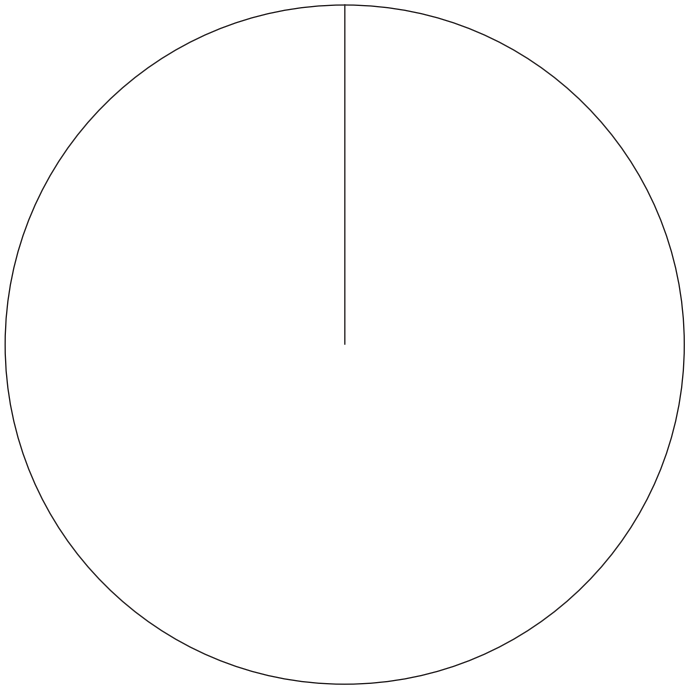
.....

(2 marks)

6 (b) The table gives information about the favourite types of potato for a sample of adults.

Type of potato	Percentage
Chips	25
Roast	50
Mashed	20
Other	5

Draw a suitable pie chart for this information.



(4 marks)

6 (c) Write down one **difference** between the favourite types of potato for children and adults.

.....

.....

(1 mark)

7

7 (a) The time, in seconds, that each of 100 people wait to be connected to a telephone help-line is recorded.
The shortest time was 34.6 seconds and the longest time was 86.3 seconds.

Javed is tabulating the data.
He is considering several possible frequency tables.

7 (a) (i) Describe **one** problem with each of the frequency tables A and B.

Table A

Time, x (seconds)	Frequency
$30 < x \leqslant 60$	
$60 < x \leqslant 90$	

Problem .....

..... *(1 mark)*

Table B

Time, x (seconds)	Frequency
$30 < x \leqslant 40$	
$50 < x \leqslant 60$	
$60 < x \leqslant 70$	
$70 < x \leqslant 80$	
$80 < x \leqslant 90$	

Problem .....

..... *(1 mark)*

7 (a) (ii) Describe **two** problems with frequency table C.

Table C

Time, x (seconds)	Frequency
$40 < x \leqslant 50$	
$50 < x \leqslant 60$	
$60 < x \leqslant 70$	
$70 < x \leqslant 80$	
$80 < x \leqslant 90$	
$90 < x \leqslant 100$	

Problem 1 .....

.....

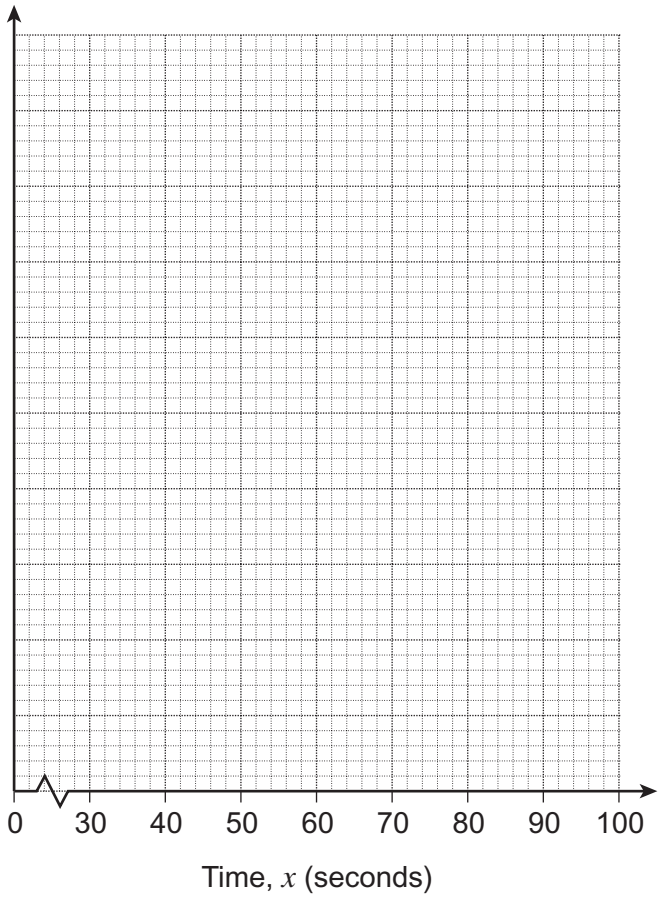
Problem 2 .....

..... *(2 marks)*

7 (b) Javed decides to use this appropriate frequency distribution for the 100 values.

Time, x (seconds)	Frequency	
$30 < x \leqslant 40$	4	
$40 < x \leqslant 50$	7	
$50 < x \leqslant 60$	11	
$60 < x \leqslant 70$	34	
$70 < x \leqslant 80$	32	
$80 < x \leqslant 90$	12	

Use a **graphical** method to estimate the median of the distribution.



Estimate of median = ... seconds *(5 marks)*

9

Turn over ▶

8 You are given that 6.7 days = 9648 minutes

8 (a) I have 2179 songs downloaded on my computer.
The computer indicates that the total time to play all these songs would be 6.7 days.

Work out the mean length of song downloaded on my computer.
Give your answer in minutes to 2 decimal places.

.....

.....

.....

Answer ..... minutes *(3 marks)*

8 (b) The same 2179 songs have the frequency distribution shown below.

Length of song, *t* (minutes)	**Frequency**	**Midpoint**	
$0 < t \leqslant 3$	276		
$3 < t \leqslant 5$	1282		
$5 < t \leqslant 7$	596		
$7 < t \leqslant 11$	23		
$11 < t \leqslant 25$	2		

Total = 2179

Use midpoints to show that an estimate of the mean length of song is 4.30 minutes to 2 decimal places.

.....

.....

.....

.....

(3 marks)

8 (c) Give **one** reason why the answers to parts (a) and (b) are not **exactly** the same.

.....

.....

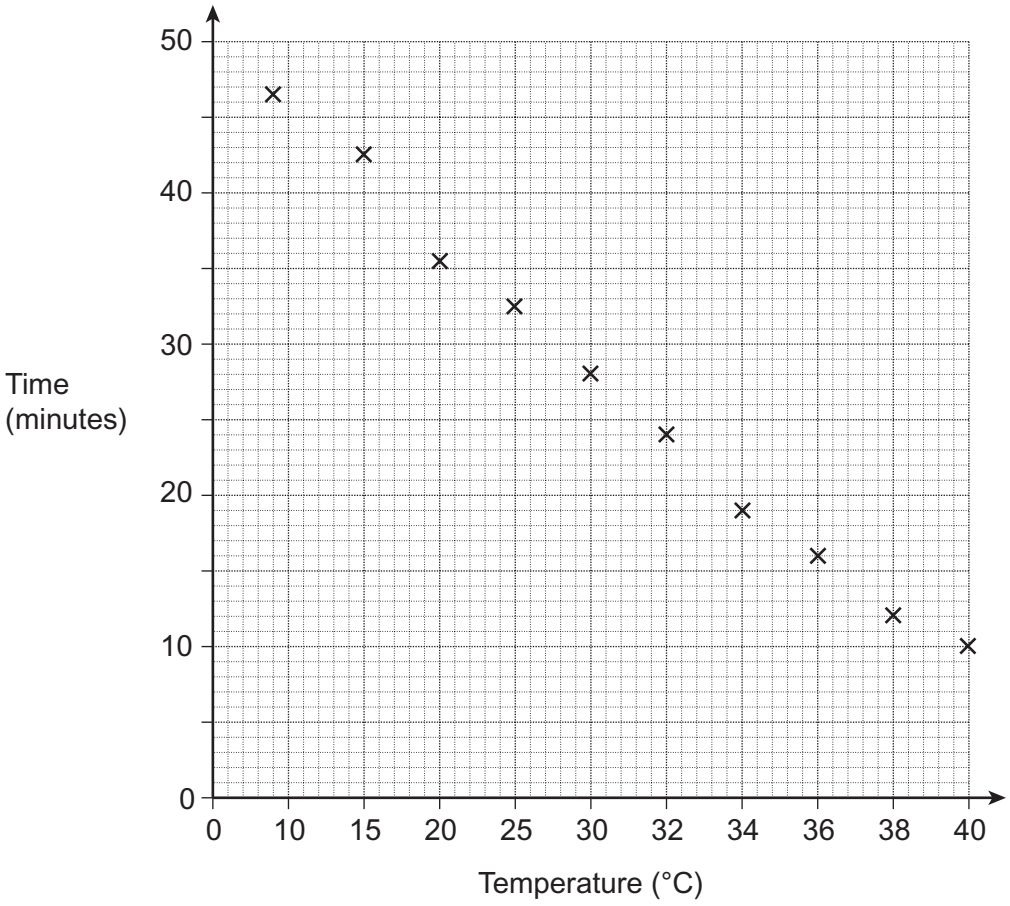
(1 mark)

9 Pam measures the time taken for one kilogram of ice to melt at different temperatures.

9 (a) Name this method of data collection.

Answer ..... *(1 mark)*

9 (b) She draws this graph to show the results.



Pam says

'The graph shows that there is a strong negative correlation between the variables.'

Look carefully at the graph and make comments on Pam's statement.

.....

.....

.....

(2 marks)

10

Turn over ▶

10 Jenny is doing a survey on people (tenants) who rent flats.
She uses two rental companies 'Letsmove' and 'Supaflat'.
Her hypothesis is

"Tenants who rent with 'Letsmove' make fewer complaints than those who use 'Supaflat'."

10 (a) Give **two** different reasons why Jenny should take a sample of tenants and not take a census.

Reason 1 .....

.....

Reason 2 .....

.....

(2 marks)

10 (b) Jenny decides to take a sample using stratification.

10 (b) (i) Name one category which she could use to stratify her sample.

Answer ..... *(1 mark)*

10 (b) (ii) Give a reason why she might choose this category.

.....

.....

(1 mark)

10 (c) Write a question which Jenny could use to find out the number of complaints a tenant had made.

.....

.....

.....

(3 marks)

10 (d) Jenny is considering which data collection method to use from

telephone door-to-door interviews Internet survey.

Which method would you choose from this list?

Data collection method .....

10 (d) (i) Give **one** advantage of your method over the other two methods.

.....

.....

(1 mark)

10 (d) (ii) Describe a problem Jenny may have using your data collection method.

.....

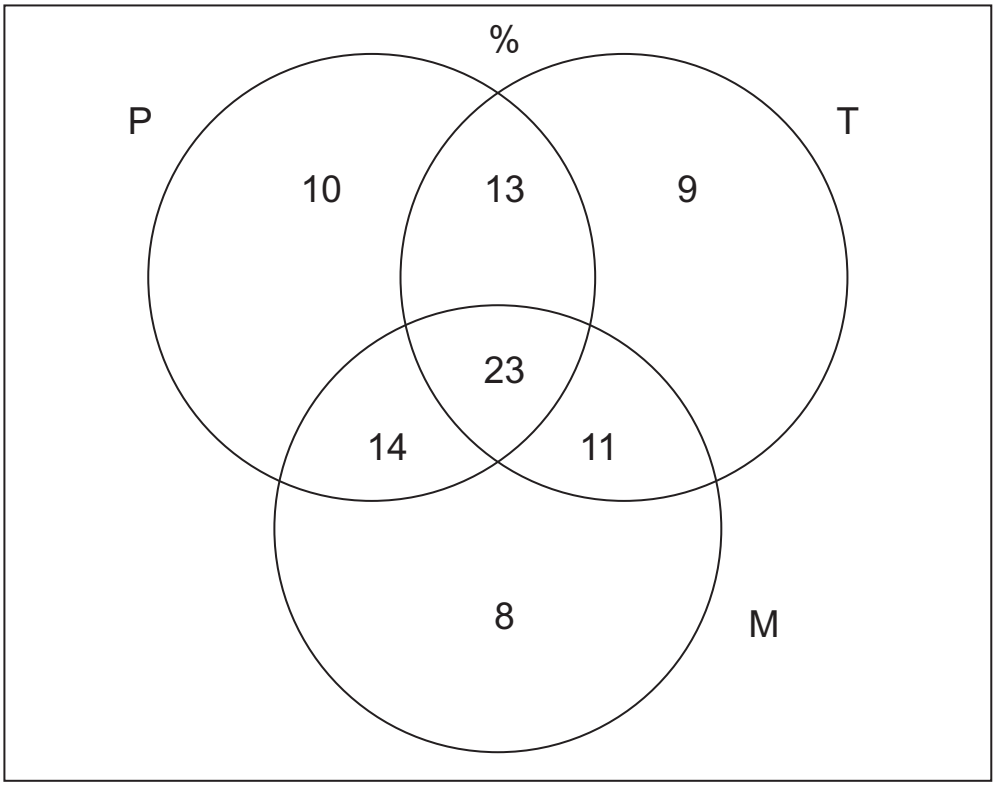
.....

(1 mark)

Turn over for the next question

9

11 Eva works in Spain for a travel company.
Her job is to help tourists on holiday.
The Venn diagram shows the **percentages** of tourists she has helped over the years who have lost passports (P), tickets (T), money (M) or a combination of these.
She also helped people for other reasons.



11 (a) Explain what the 23 in the diagram represents.

.....

.....

(1 mark)

11 (b) Work out the percentage of people Eva helped who had **not** lost their passports, tickets or money.

.....

.....

Answer ..... % *(2 marks)*

11 (c) One person helped by Eva is chosen at random.

11 (c) (i) What is the probability that this person lost their passport but **not** their tickets or money?

Answer ..... *(1 mark)*

11 (c) (ii) What is the probability that this person lost their tickets and money but had **not** lost their passport?

.....

Answer ..... *(1 mark)*

11 (d) In 2010 Eva helped 4100 people.

Estimate the number who had lost their passport and money but had **not** lost their tickets.

.....

.....

Answer ..... *(2 marks)*

12 A hotel is interviewing for a new receptionist.
Two of the interview panel observe and record whether candidates make good eye-contact when speaking.

12 (a) The data collected showed that differences occurred due to inter-observer bias.

Explain what this means in this context.

.....

.....

(1 mark)

12 (b) Give **one** way of reducing or avoiding inter-observer bias in this situation.

.....

.....

(1 mark)

12 (c) Name a possible extraneous variable which may have affected these results.

Answer ..... *(1 mark)*

10

Turn over ▶

13 The tables show information about the populations of two areas.

Eastbourne

Date	Number age 85+	Number all ages
June-01	4000	89 800
June-02	3900	91 000
June-03	3700	92 000
June-04	3700	93 100
June-05	3900	94 200
June-06	4000	94 900
June-07	4100	95 600
June-08	4200	96 100

North Lincolnshire

Date	Number age 85+	Number all ages
June-01	2800	153 000
June-02	2800	154 100
June-03	2800	155 900
June-04	2800	157 400
June-05	3000	158 200
June-06	3300	159 000
June-07	3400	159 400
June-08	3500	160 300

http://www.neighbourhood.statistics.gov.uk

13 (a) Write down **one** similarity between the data for the two areas.

.....

.....

(1 mark)

13 (b) Write down **one** difference between the data for the two areas.

.....

.....

(1 mark)

13 (c) Harry is investigating the hypothesis

'The population of Eastbourne is older on average than the population of North Lincolnshire'.

13 (c) (i) Give a reason why the data could support Harry's hypothesis.

.....

.....

(1 mark)

13 (c) (ii) Give a reason why the data does **not** prove Harry's hypothesis.

.....

.....

(1 mark)

END OF QUESTIONS

4