AQA

General Certificate of Secondary Education
Foundation Tier
June 2012

Statistics
Written Paper

43101F

F

Monday 18 June 2012   1.30 pm to 3.00 pm

For this paper you must have:
● mathematical instruments.

You may use a calculator

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 that 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, graph paper and tracing 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.

43101F

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.

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

1 (a) Oliver has a bag with 20 counters as shown.

Colour	Number in the bag
Blue	10
Red	6
Green	4

He picks one counter from this bag at random.

1 (a) (i) Here are some probability words.

Impossible   Unlikely   Evens   Likely   Certain

Choose the best word from the list to describe the probability of each outcome in the table below.

Each word should be used **once**.

The first has been done for you.

Outcome	Probability word
The counter is red	Unlikely
The counter is blue	
The counter is yellow	
The counter is blue or red	
The counter is **not** pink	

(3 marks)

1 (a) (ii) Work out the probability that the counter picked is red.
Give your answer as a fraction.

....

Answer .... *(2 marks)*

5

1 (b) Usman has a bag with 40 counters.

The probability of picking a black counter at random from his bag is $\frac{1}{5}$.

How many black counters are there in Usman's bag?

....

....

Answer .... *(2 marks)*

2 Some friends are choosing what they would most like to do on holiday.
The table shows their choices.

Choice	Male	Female
Theme Park	12	3
Water Park	7	8
Sunbathing	5	11
Coach Trip	2	2
Total	**26**	

2 (a) How many friends are there in total?

....

....

Answer .... *(1 mark)*

2 (b) What fraction of the friends choose sunbathing?

....

Answer .... *(2 marks)*

2 (c) The pictogram shows the choices of the 26 **males**.

Complete the key : represents .... friends
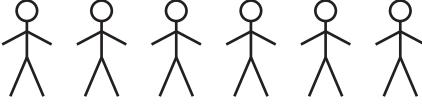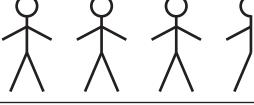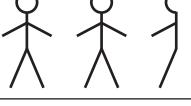
Theme Park	
Water Park	
Sunbathing	
Coach Trip	

(1 mark)

2 (d) Use the same symbol and **same** key to complete a pictogram for the **females**.

Key: represents .... friends

Theme Park	
Water Park	
Sunbathing	
Coach Trip	

(3 marks)

2 (e) (i) Write down **one** difference in the choices of the males and females.

....

....

(1 mark)

2 (e) (ii) Write down **one** similarity in the choices of the males and females.

....

....

(1 mark)

11

Turn over ▶

3   Adults and children choose **one** portion of vegetables to have with a meal.
They choose either carrots or peas or broccoli.

3 (a)   The chart shows what the adults choose.
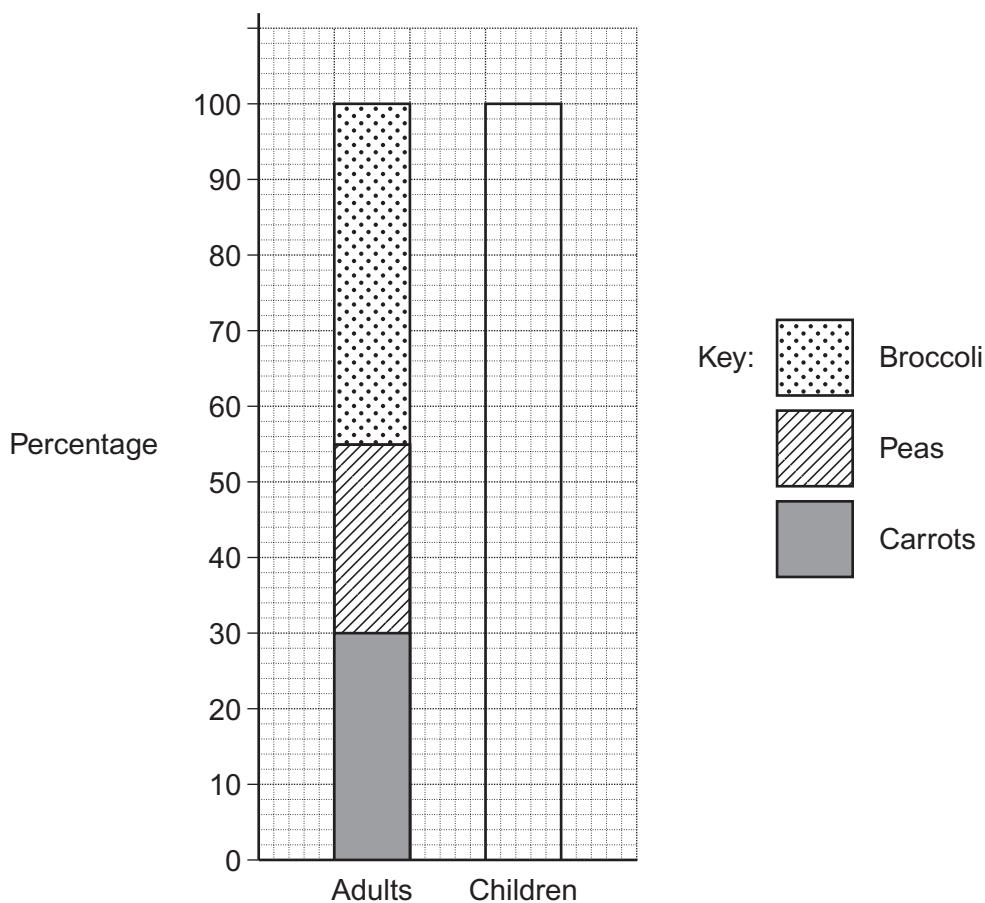
3 (a) (i)   What percentage of adults choose carrots?

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

3 (a) (ii)   What percentage of adults choose peas?

....

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

3 (b)   50% of the children choose carrots.
25% choose peas.
The rest choose broccoli.

Complete the chart for children.

(3 marks)

4   The graph shows the cost (£) of 120 holidays advertised by a travel agent.
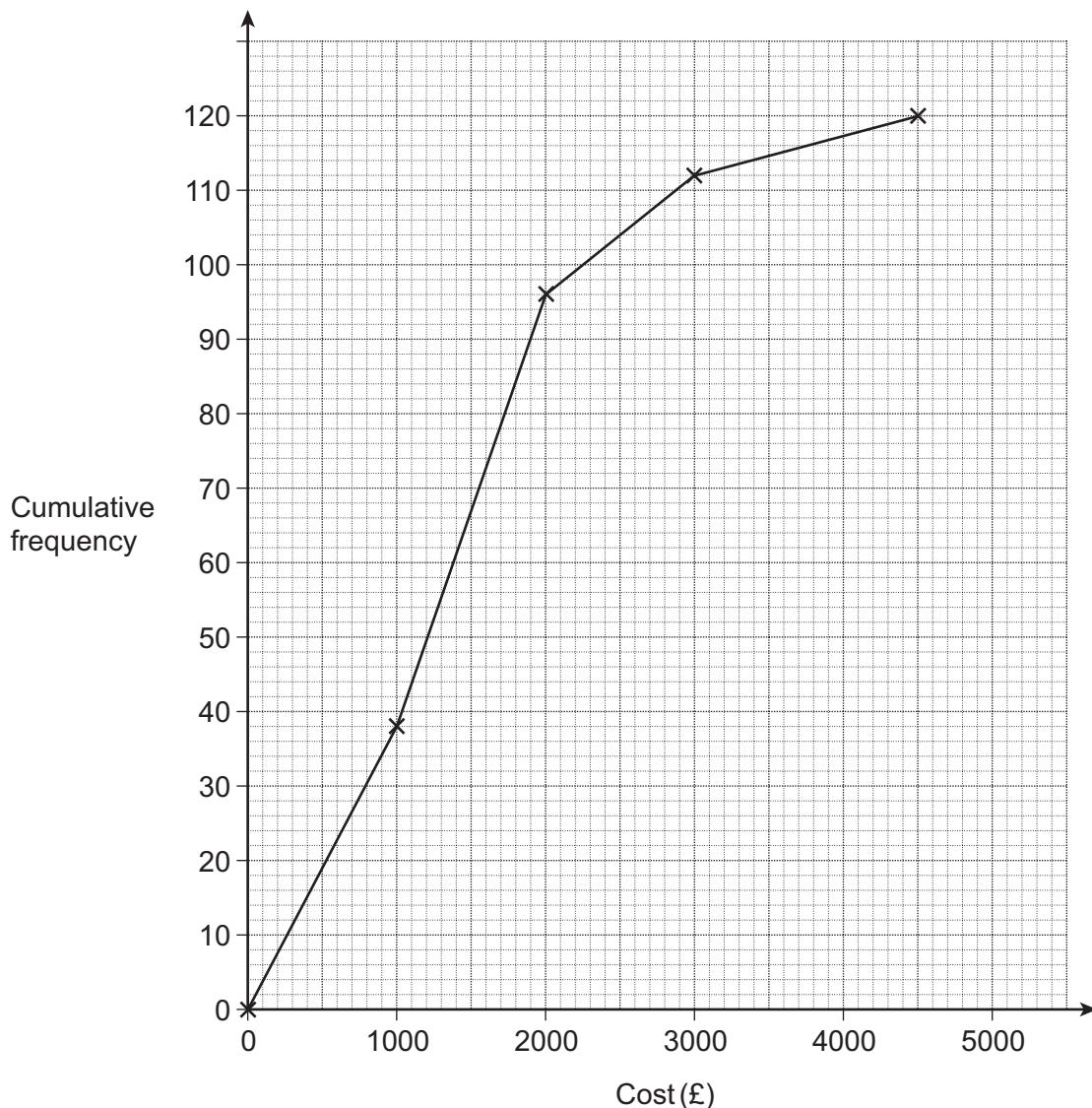
4 (a)   Estimate the median cost of one of these 120 holidays.

....

Answer £ .... *(2 marks)*

4 (b)   Write down the number of holidays costing £2000 or less.

....

Answer .... *(1 mark)*

4 (c)   Write down the probability that a holiday chosen at random costs £2000 or less.

....

Answer .... *(1 mark)*

10

Turn over ▶

5 The manager of a taxi firm wonders if changing the cost of journeys will affect the number of customers.

5 (a) Write a suitable hypothesis for the manager to test.

....

....

(1 mark)

5 (b) The firm has 12 taxis.
The manager asks one taxi driver to survey every customer he meets for a week.

Describe **one** problem with this data selection method.

....

....

(1 mark)

5 (c) In one week, the 12 taxis made 2568 journeys.

Work out the mean number of journeys per taxi.

....

Answer .... *(2 marks)*

5 (d) The cost of journeys is reduced.

A month later, the manager again records the number of journeys made in one week by the 12 taxis.

Here are the totals for each taxi.

219	198	247	230	254	199
265	272	308	213	222	253

Compare the mean number of journeys before and after the cost of journeys is reduced.

....

....

....

....

(3 marks)

5 (e) Do the taxis take more money after the cost of journeys is reduced? Tick a box.

☐ Yes

☐ No

☐ Cannot tell

Give a reason for your answer.

....

....

(2 marks)

Turn over for the next question

6 Ten historians estimate the age of an ancient plate.

The results, in years, are

2200   2600   2300   2350   2450   2400   2200   2200   2450   2300

6 (a) Bev says the mode of these values is 2200.

Is Bev correct? Tick a box.

☐ Yes   ☐ No

Give a reason for your answer.

....

....

(1 mark)

6 (b) Do you think the mode is a good measure of average in this case? Tick a box.

☐ Yes   ☐ No

Give a reason for your answer.

....

....

(1 mark)

6 (c) The historian who gave the age of the plate as 2600 years changes his mind.
He now states that his estimate is 2500 years.

Circle the **two** measures whose value will have changed.
You do **not** need to do any further calculations.

Mode   Median   Mean   Range

(2 marks)

7 The table shows petrol prices in ten European countries in summer 2010.
All values are given in pence per litre.

2010	Price (before tax is added)			Pump price (after tax is added)		
	Jun	Jul	Aug	Jun	Jul	Aug
Austria	43.5	42.2	41.9	100.5	99.4	98.0
Denmark	50.6	48.5	47.4	124.8	123.4	120.9
Finland	49.6	47.0	46.4	122.4	119.7	118.8
France	43.5	42.5	42.0	112.2	111.5	109.7
Germany	45.5	42.7	40.4	118.9	115.9	112.0
Ireland	45.2	45.0	44.3	111.3	111.5	109.5
Luxembourg	45.9	45.1	44.3	97.0	96.3	94.6
Netherlands	45.5	44.4	43.4	124.4	122.5	121.9
Sweden	42.9	41.2	39.0	113.5	112.5	108.4
UK	43.0	42.6	41.7	117.7	117.2	116.2

Source: Adapted from the Office for National Statistics

7 (a) (i) Which country had the lowest **pump price** per litre in July?

Answer .... *(1 mark)*

7 (a) (ii) Which country had the highest **pump price** per litre in August?

Answer .... *(1 mark)*

7 (b) Calculate the amount of tax paid per litre in the UK in June.

....

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

7 (c) Briefly describe the pattern in petrol prices during this 3 month period.

....

....

(1 mark)

9

Turn over ▶

**8** Liz keeps three different breeds of duck on her farm.
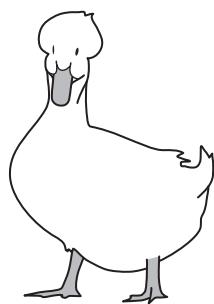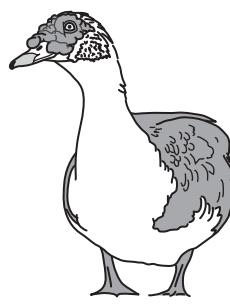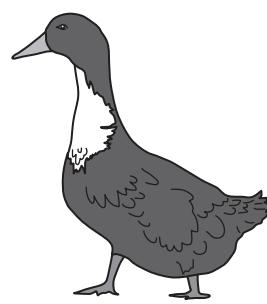
Bali duck   Muscovy duck   Swedish duck

8 (a) Liz has 40 Bali ducks.

Explain how she can select a random sample of three of them.

....

....

....
(2 marks)

8 (b) The box plots show information about the weights of Liz's ducks.

Weight of duck (kilograms)
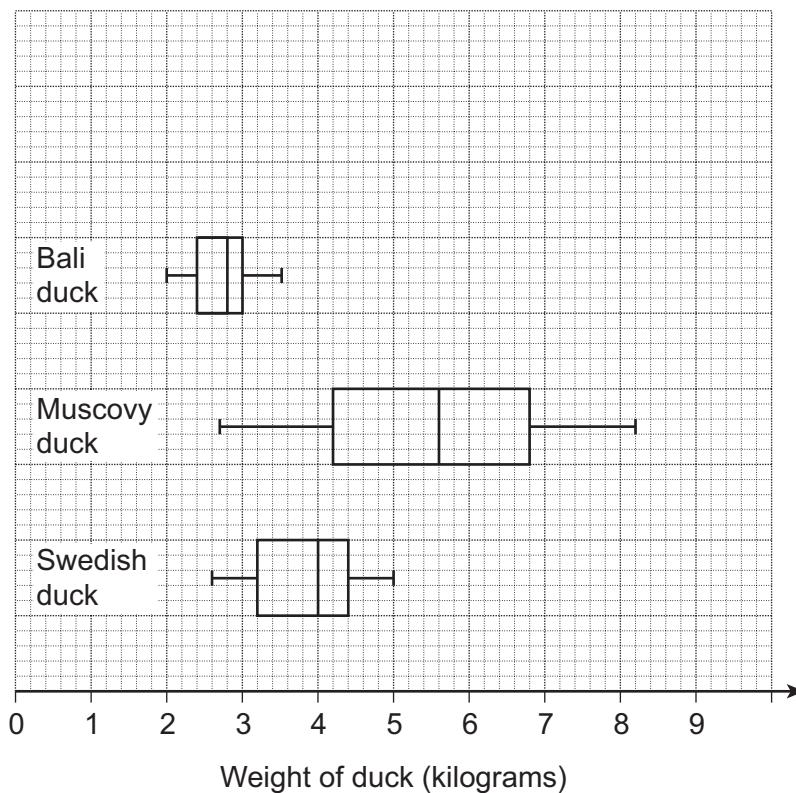
8 (b) (i) One of Liz's ducks weighs 5.2 kg.

Which breed of duck is it? Tick a box.

☐ Bali duck

☐ Muscovy duck

☐ Swedish duck

Give a reason for your answer.

....

....

(2 marks)

8 (b) (ii) Liz has 60 Swedish ducks.

Estimate the number of Swedish ducks with a weight greater than 4.4 kilograms.

....

Answer .... *(2 marks)*

Turn over for the next question

9   A film director makes a film with two different endings.

She shows the two different endings to a group of 20 people.
She wants to find out which is more popular, ending A or ending B, **and** if males and females have different opinions.

9 (a)   Design an observation sheet to record this information for the director.

(2 marks)

9 (b)   The director now wants to ask more detailed questions.
She will either give out a written questionnaire or conduct an interview.

9 (b) (i)   Give **one** advantage of using a written questionnaire.

....

....

(1 mark)

9 (b) (ii)   Give **one** advantage of using an interview.

....

....

(1 mark)

Turn over for the next question

**DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED**

Turn over ▶

4

10 Barbara is a nurse at a local hospital.

One of her duties is to record the number of patients admitted to the hospital unit and whether their injuries are Critical, Serious or Minor.

This table shows her results for the first 80 patients seen last Friday.

Type of injury	Number of patients
Critical (C)	40
Serious (S)	28
Minor (M)	12

To help future planning she decides to simulate the likely type of injuries for the next 20 patients.

She allocates 2-digit numbers to the three types of injury as follows.

Type of injury	Number
Critical (C)	00 – 49
Serious (S)	50 – 84
Minor (M)	85 – 99

10 (a) Explain why she allocated the numbers 00 – 49 to the Critical injury group.

....

....

....

(2 marks)

10 (b) (i) The type of injury is simulated using the following 2-digit random numbers.

Use one of the three letters C, S, or M to complete the table.

82	05	72	56	14	90	81	62	50	87	54	96	21	32	78	07	61	53	82	57
S	C	S	S	C															

(2 marks)

10 (b) (ii) Fill in the table below to show the total results for each type of injury after the simulation has been carried out.

Type of injury	Tally	Number of patients
Critical (C)		
Serious (S)		
Minor (M)		

(3 marks)

10 (b) (iii) Make **two** comments comparing the simulated results with the expected results based on the first 80 patients seen last Friday.

Comment 1 ....

....

Comment 2 ....

....

(2 marks)

Turn over for the next question

**11** A population pyramid is drawn to show the percentages of the UK population by gender and age in 2001.

The data for females and for some of the male ages has already been drawn.

11 (a) Use the table to complete the drawing of the population pyramid for males.

Age (years)	Percentage of population (males)
0 – 9	6.2
10 – 19	6.6
20 – 29	6.2
30 – 39	7.6
40 – 49	6.8
50 – 59	6.0
60 – 69	4.5
70 – 79	3.2
80+	1.4

(Source: Adapted from Social Trends 2003, Number 33)

(You should assume that the age group 80+ covers the ages 80 – 89 years)

FEMALES   Age (years)   MALES

Percentage of population   Percentage of population
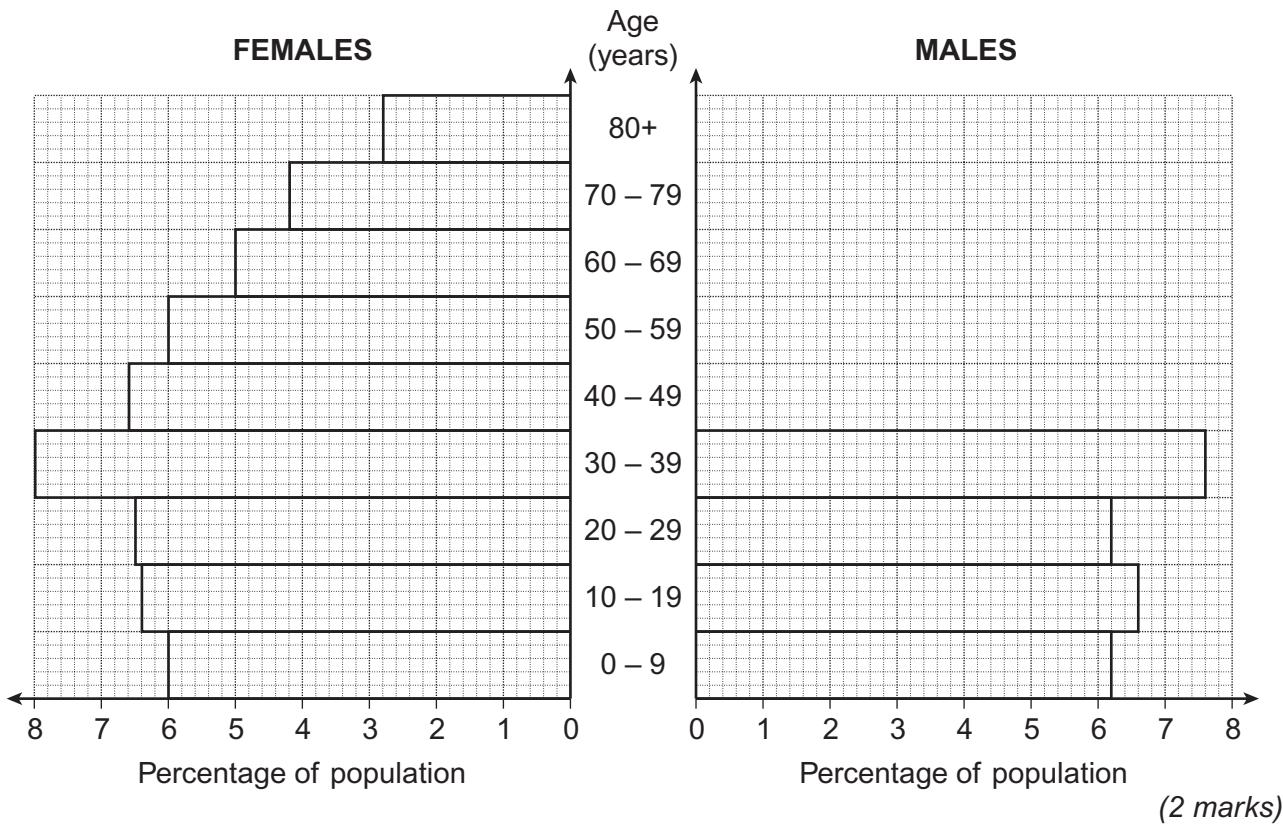
(2 marks)

11 (b) What percentage of the UK population are females between the ages of 30 and 49?

....

....

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

11 (c) Which age group has the same percentage of population for both males and females?

Answer ....   *(1 mark)*

Turn over for the next question

5

12 It is claimed that cleaning teeth with a new type of toothpaste, 'Wondershine', will reduce the number of fillings children need.

An experiment is to be set up to test this claim.

Here is a list of variables that may be connected to the experiment.

A - How often the child cleans his/her teeth.

B - The number of fillings the child needs during the experiment.

C - How many sweets the child eats.

D - The number of TVs in the child's house.

E - Use of the toothpaste 'Wondershine'.

For this experiment write down which of these variables is

12 (a) the explanatory variable

Answer .... *(1 mark)*

12 (b) the response variable

Answer .... *(1 mark)*

12 (c) a possible extraneous variable.

Answer .... *(1 mark)*

13 The table shows the index numbers for five different items of household expenditure in 2003, 2007 and 2009.

	Index Number		
Item	**2003**	**2007**	**2009**
Food	100	104	106
Heat and Light	100	105	108
Clothing	100	100	97
Mortgage	100	106	106
Other	100	105	109

13 (a) The base year is 2003.

How do you know this from the figures in the table?

....

(1 mark)

13 (b) What happened to household expenditure on mortgages from 2007 to 2009?

....

(1 mark)

13 (c) Which is the only item to show a reduction in expenditure from 2003 to 2009?

Answer .... *(1 mark)*

Turn over for the next question

6

Turn over ▶

14 (a)   Eight students study French and German.
The students take an oral test and a written test in each subject.
The marks are then ranked for each test.

14 (a) (i)   The value of Spearman's rank correlation coefficient between the two oral tests is
+0.76

Explain what this value shows.

....

....

(1 mark)

14 (a) (ii)   The value of Spearman's rank correlation coefficient between the two written tests
is –0.06

Explain what this value shows.

....

....

(1 mark)

14 (b)   20 students take a Spanish written test.
The scatter diagram shows their marks and the number of Spanish lessons they had
missed during the year.
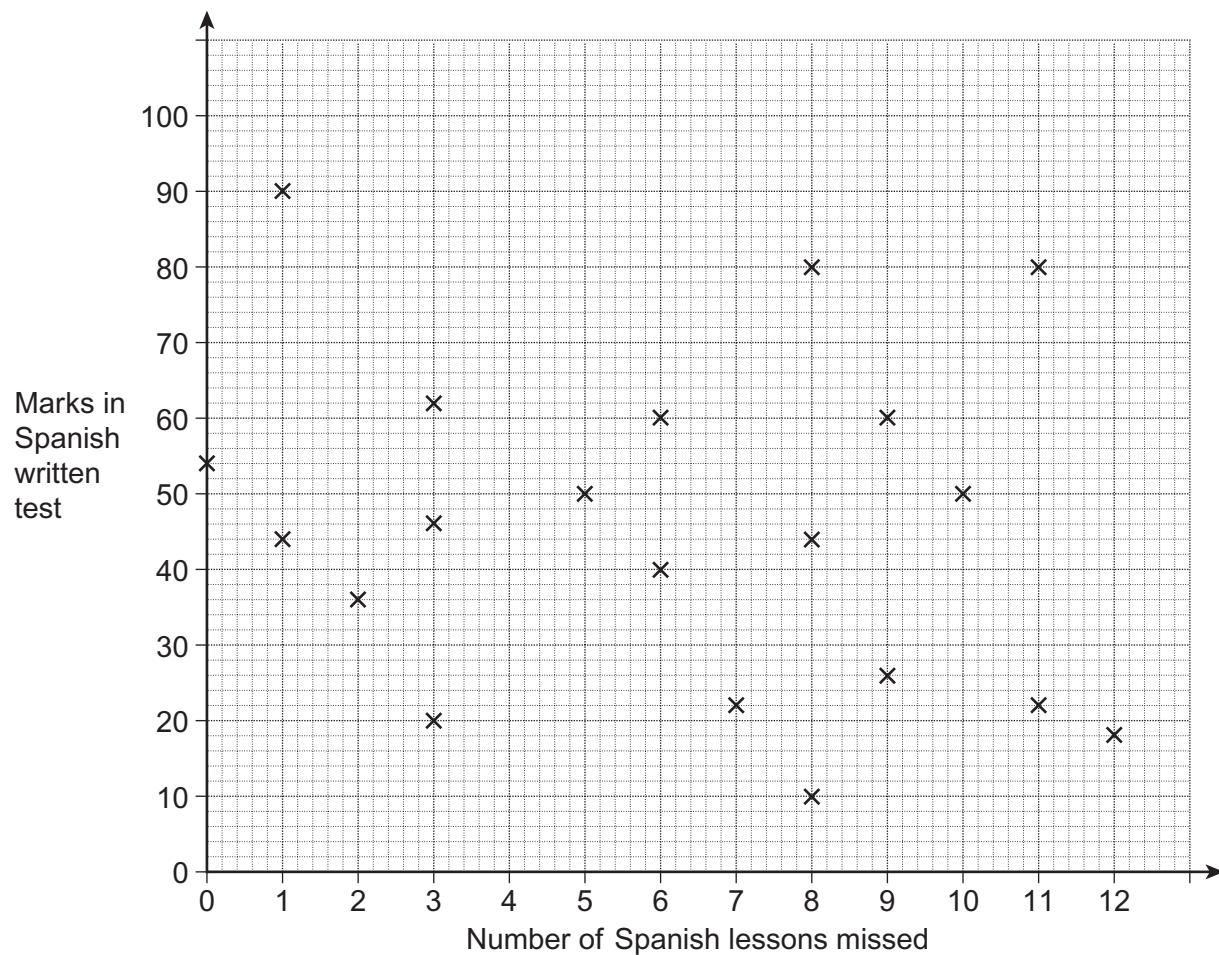
14 (b) (i)   Write down the mark of the student who missed most lessons.

Answer ....   *(1 mark)*

14 (b) (ii)   Write down the number of lessons missed by the student having a mark of 36.

Answer ....   *(1 mark)*

14 (b) (iii)   One student missed many lessons but still had a high mark in the test.

Write down the mark and number of lessons missed by this student.

Mark .... lessons missed ....   *(2 marks)*

END OF QUESTIONS

There are no questions printed on this page

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