Mathematics 43601H

Unit 1

Thursday 11 June 2015    1.30 pm to 2.30 pm

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

Time allowed
- 1 hour

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.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 54.
- The quality of your written communication is specifically assessed in Questions 2 and 12. These questions are indicated with an asterisk (*).
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

Advice
- In all calculations, show clearly how you work out your answer.
The scatter graph shows information about the marks of 10 students in two tests.

1 (a) Describe the correlation.

Answer ......................................................................

[1 mark]
1 (b) A student scored 40 in the first test. Estimate her total for both tests. [2 marks]

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Answer ...........................................................................

2 A professor wants to know whether boys or girls are more likely to study Economics.

2 (a) Write a suitable hypothesis. [1 mark]

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2 (b) He asks some boys and girls if they plan to study Economics. Design a data collection sheet for his results. [2 marks]

Turn over for the next question
3 The chart shows information about sales of loaves of bread at a bakery.

3 (a) Circle the simplest form of the ratio white : brown : granary

9 : 14 : 20  4.5 : 2.5 : 3  9 : 5 : 6  45 : 70 : 100

3 (b) The table shows the sales for May.

<table>
<thead>
<tr>
<th>White</th>
<th>Brown</th>
<th>Granary</th>
<th>Total = 6000</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000</td>
<td>1800</td>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

Show this information on the chart. [3 marks]
A pet shop had 40 rabbits. 
22 were male. 
The others were female. 

The shop sold 10 of the rabbits. 

The probability that a rabbit picked at random is male is now \( \frac{1}{2} \)

How many **female** rabbits were sold? 

**Answer** 

Turn over for the next question
5 A machine makes buttons.
The graph shows the relative frequency of buttons that are faulty.

5 (a) 18 of the first 100 buttons are faulty.

Plot the relative frequency on the graph.

[1 mark]

5 (b) One week the machine makes 5000 buttons.

Work out the best estimate of the number of faulty buttons.
Use the graph to help you.

Answer .........................................................
In a survey people were asked if they support a new tram system. Here are the results.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>80%</td>
<td>20%</td>
</tr>
</tbody>
</table>

People who said No were asked for a reason.

900 people said they prefer the car.

How many people in the survey said Yes?

Answer: ________________________________
Five singers took part in a competition. Viewers voted for their favourite. The table shows the proportion of the votes for four of the singers.

<table>
<thead>
<tr>
<th>Singer</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ali</td>
<td>0.56</td>
</tr>
<tr>
<td>Beth</td>
<td>0.19</td>
</tr>
<tr>
<td>Carl</td>
<td>0.14</td>
</tr>
<tr>
<td>Dan</td>
<td>0.08</td>
</tr>
<tr>
<td>Emma</td>
<td></td>
</tr>
</tbody>
</table>

7 (a) Complete the table. [2 marks]

7 (b) This year there were 9 400 000 votes. This is an increase of 28% from last year. Work out the number of votes last year. [3 marks]

Answer .................................................................
8 (a) Work out \(0.15^2 \times (1 - 0.15)^3\)

Give your answer in standard form to 2 significant figures. [2 marks]

Answer ..........................................................................................................................

8 (b) In an experiment
the probability of A is \(3.9 \times 10^{-7}\)
the probability of B is \(1.2 \times 10^{-8}\)

How many times more likely is A than B? [2 marks]

Answer ..........................................................................................................................
9 Zoe and Ben record their times in 40 races. The graph shows information about Zoe’s times.

\[ \text{Cumulative frequency} \]

\[ \text{Time (minutes)} \]

The box plot shows information about Ben’s times.

9 (a) Zoe’s fastest time was 40 minutes. Her slowest time was 46.5 minutes.

On the same grid, draw a box plot for Zoe’s times. [3 marks]

9 (b) Who was more consistent? Give a reason for your answer. [1 mark]

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10 Here are two fair spinners.

Both arrows are spun.

10 (a) Complete the tree diagram.

10 (b) Work out the probability that both arrows land on the same colour.

Answer ......................................................................
The table shows information about the 1200 students in a school.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Main school</th>
<th>Sixth form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>440</td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1040</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td><strong>Total = 1200</strong></td>
<td></td>
</tr>
</tbody>
</table>

A teacher sent a questionnaire to a sample of 150 of the 1200 students. The sample was stratified by gender and school group.

11 (a) How many **boys** in the **main school** were sent the questionnaire?  

Answer .............................................................................
11 (b) The questionnaire was sent to 2 more girls in the sixth form than boys in the sixth form. How many boys are there in the sixth form? Assume that the teacher did not need to round any values in the sample. [3 marks]............................................................................................................................................
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Answer ........................................................................

Turn over for the next question
The table and histogram give some information about the lengths of 600 ribbons.

<table>
<thead>
<tr>
<th>Length, $l$ (cm)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>$60 &lt; l \leq 90$</td>
<td>120</td>
</tr>
<tr>
<td>$90 &lt; l \leq 110$</td>
<td></td>
</tr>
<tr>
<td>$110 &lt; l \leq 120$</td>
<td></td>
</tr>
<tr>
<td>$120 &lt; l \leq 140$</td>
<td>180</td>
</tr>
<tr>
<td>$140 &lt; l \leq 180$</td>
<td>80</td>
</tr>
</tbody>
</table>

Total = 600

Complete the table and the histogram. [4 marks]
These cards are in a hat.

Two of the cards are taken out at random.

Work out the probability that the total of the two cards is 10 or more.

[4 marks]

Answer

Turn over for the next question
A pan contains 9 litres of jam, to the nearest litre. Jars hold 0.15 litres each, to 2 decimal places.

Work out the greatest number of jars that could possibly be filled with the jam. You must show your working.

Answer ..................................................................................................................