Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
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12 – 13	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2011

Mathematics 43601H

Unit 1

Monday 13 June 2011 1.30 pm to 2.30 pm

H

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.

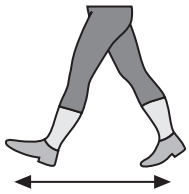
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 54.
- The quality of your written communication is specifically assessed in Question 1. This question is indicated with an asterisk (*).
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer book.

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

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

***1** The stride lengths of 18 boys in Class A are shown to the nearest centimetre.

76	78	81	69	86	90	78	72	83
77	78	88	90	77	83	89	79	91



stride length

1 (a) Show the data in an ordered stem-and-leaf diagram.
Remember to complete the key.

Key ..... | ..... represents ..... cm

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(4 marks)

1 (b) The stride lengths of the boys in Class B are summarised in the table.

Median	86 cm
Range	18 cm

1 (b) (i) Compare the stride lengths of the two classes of boys.

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(4 marks)

1 (b) (ii) Do you think the boys in Class B are older than the boys in Class A?
Give a reason for your answer.

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(1 mark)

2 A train ticket costs £23.50
The price increases by 6%.
Felix has £100.

Can Felix buy four tickets at the new price?

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(4 marks)

13

3 A newspaper headline states:

> Only 80% of teenagers think
> Winston Churchill was a real person.

3 (a) Show that the ratio of the number of teenagers who think Winston Churchill was a real person to those who do not is 4 : 1

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(1 mark)

3 (b) Hana claims:

> GCSE History students are more likely than other teenagers to know that Winston Churchill was a real person

Design a data collection sheet for Hana to investigate her claim.

(2 marks)

3 (c) The ratio of GCSE History students who think Winston Churchill was a real person to those who do not is 17 : 3

Is Hana's claim true?
Show how you decide.

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(2 marks)

3 (d) There are 56 more History students who think Winston Churchill was a real person than those who do not.

How many History students are there altogether?

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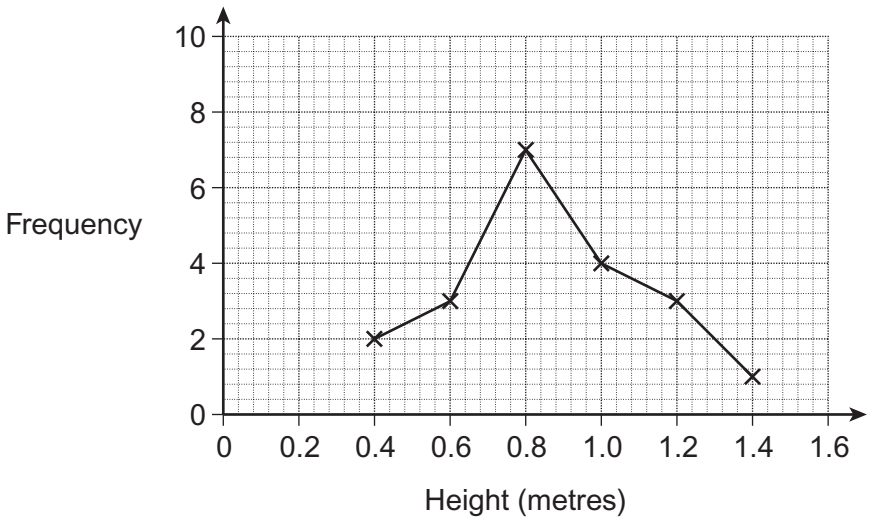
Answer ..... *(3 marks)*

Turn over for the next question

8

4 (a) Amir drops different balls from the same height onto a wood floor.
He measures the height, to the nearest 0.2 metres, of their first bounce.
The frequency polygon shows his results.



Calculate an estimate of the mean bounce height.

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Answer ..... m *(3 marks)*

4 (b) Amir wants to test this hypothesis.

Balls bounce higher on concrete than on wood.

Use the Data Handling Cycle to write a plan for Amir.

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(3 marks)

4 (c) One of the balls is dropped from a height of 2 metres.

Each time the ball bounces it reaches $\frac{3}{5}$ of its previous height.

How high will the ball reach after two bounces?

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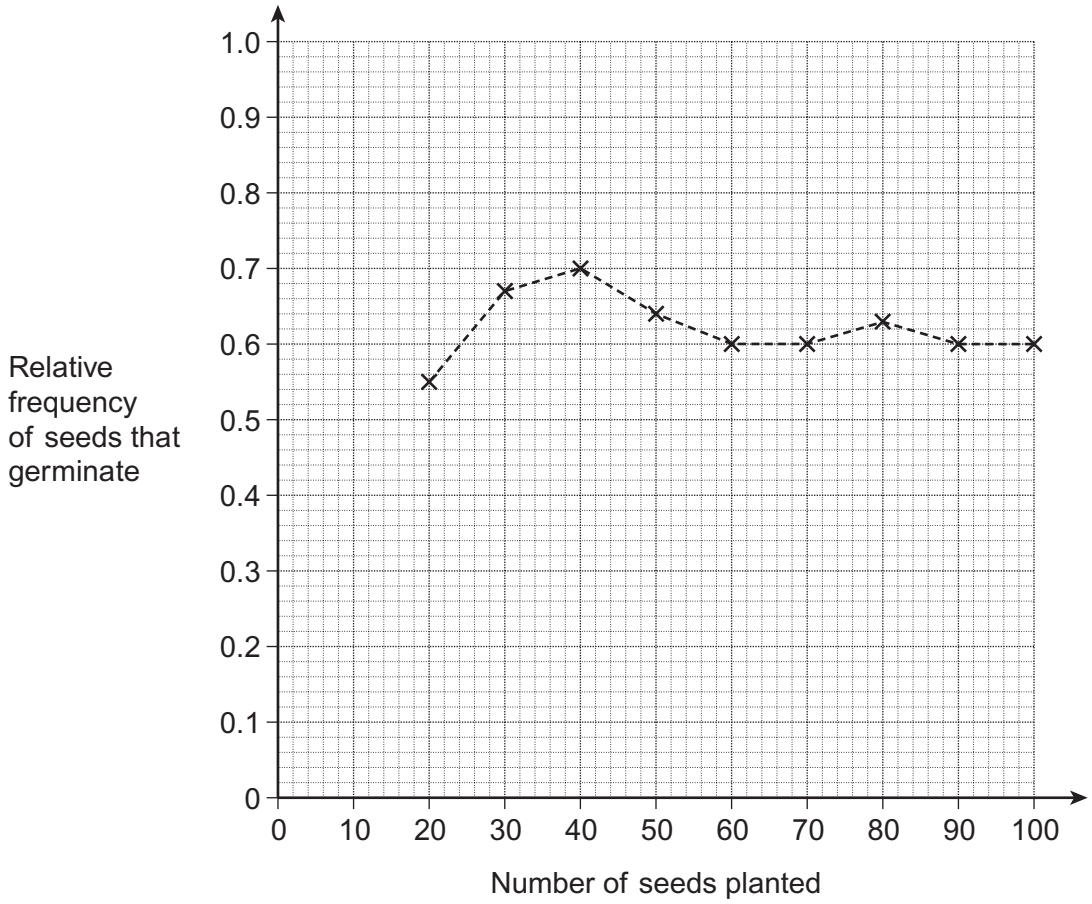
Answer ..... m *(2 marks)*

8

5 A gardener plants ten seeds each week from the same seed packet.
The graph shows the relative frequency of seeds that germinate.



5 (a) Nine seeds out of the ten planted in the first week germinate.

5 (a) (i) Write down the relative frequency of seeds planted in the first week that germinate.

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

5 (a) (ii) Plot your relative frequency on the graph. *(1 mark)*

5 (b) How many of the seeds planted in week 2 germinate?

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

5 (c) There are 130 seeds in the seed packet.
The label on the packet states:

> On average 80 of the seeds will germinate.

Is this statement fair?
Show how you decide.

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(2 marks)

Turn over for the next question

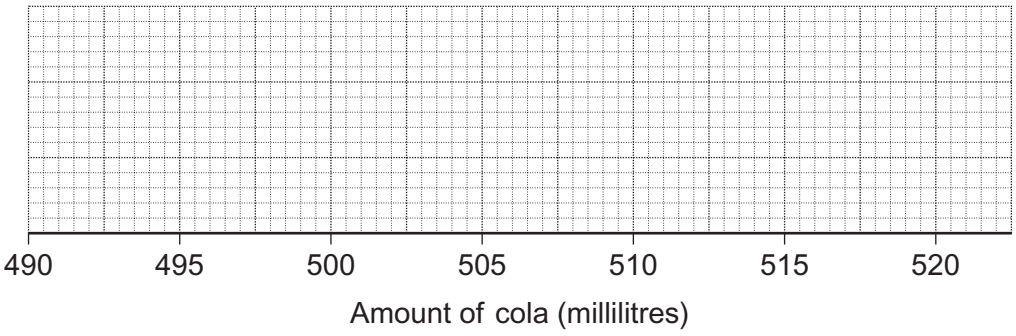
6

6 In a factory two machines, A and B, fill bottles with cola.
Each bottle should contain 500 millilitres of cola.

6 (a) Here is some information about the amount of cola contained in a sample of bottles from machine A.

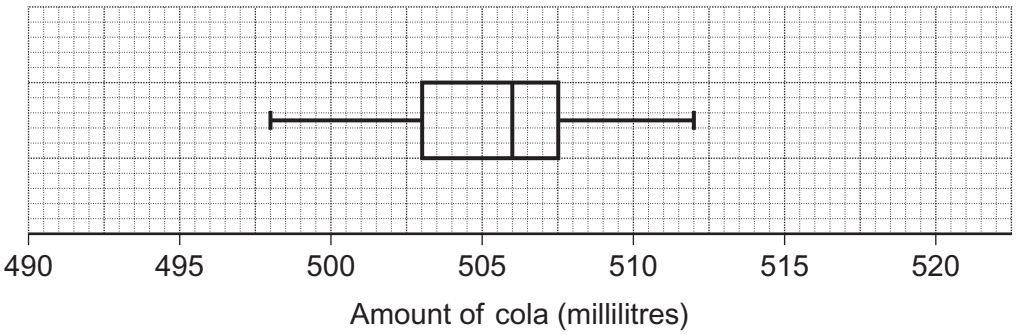
Minimum	Lower quartile	Median	Upper quartile	Maximum
496 ml	502 ml	508 ml	510 ml	514 ml

6 (a) (i) Draw a box plot to represent this information.



(2 marks)

6 (a) (ii) The box plot shows information about a sample of bottles from machine B.



The factory manager wants to replace one of the machines.

Which machine should he replace?
Tick a box ☐ machine A ☐ machine B

Give **two** reasons for your answer.

Reason 1 .....

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Reason 2 .....

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(2 marks)

6 (b) The contents of the sample bottles are given to the nearest millilitre.

Work out the greatest possible difference between the contents of two of the sample bottles from machine A.

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

6 (c) The factory buys two more machines, C and D.
The four machines fill a total of 6000 bottles each day.

A sample, stratified by the number of bottles filled per day, is taken.
Some information about the sample is given in the table.

Machine	**A**	**B**	**C**	**D**
Number of bottles per day	1550			1800
Number in sample	31	24		

Complete the table.

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(4 marks)

10

7 A bag only contains black counters and white counters.
A counter is chosen from the bag at random and replaced.
Another counter is then chosen from the bag at random.
The probability of choosing two black counters is 0.36

7 (a) Show that the probability of choosing a black counter each time is 0.6

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(1 mark)

7 (b) Work out the probability of choosing two white counters.

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

7 (c) Work out the probability of choosing at least one white counter.

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

8 Ella has these coins.

Jayden has these coins.

Ella takes one of her coins at random and gives it to Jayden.
Jayden adds it to his coins.

Then Jayden takes one of his coins at random and gives it to Ella.

What is the probability that Ella and Jayden now have the same amount of money as each other?
You **must** show your working.

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Answer ..... *(4 marks)*

END OF QUESTIONS

9

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