Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
Pages	Mark
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14 – 15	
TOTAL	

General Certificate of Secondary Education
Higher Tier
March 2013

Mathematics 43601H

Unit 1

Thursday 28 February 2013 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 Questions 1, 2 and 4. 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 booklet.

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

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

1 The points scored by 20 teams in a competition are shown.

25	33	36	23	35
24	50	37	26	46
48	35	51	28	39
30	48	33	44	25

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

Key: 2 | 3 represents 23 points

2	3 4 5 5 6 8
3	0 3 3 5 5 6 7 9
4	4 6 8 8
5	0 1

(3 marks)

Do not write outside the box

1 (b) Teams that score **more than** 25 points stay in the competition.

What percentage of the teams stay in the competition?

$\frac{16}{20} \times 100 = 80\%$

Answer 80 % *(2 marks)*

Turn over for the next question

5

2 (b) Draw a line of best fit on your scatter graph.

(1 mark)

***2 (c)** What type of correlation is shown?

Answer Negative correlation *(1 mark)*

2 (d) Matthew is organising a game at the school fayre.

Each player will be given 10 attempts to throw a ball into a bucket.
He wants the average number in the bucket to be 5.

Use your line of best fit to decide how far the bucket should be from each player.

.....

.....

Answer 4 metres *(2 marks)*

Turn over for the next question

6

3 The table shows the Geography and History grades of 100 students.

Geography \ History	D	C	B	A	A*
D	3	5	1	2	0
C	6	8	4	3	1
B	3	9	5	9	2
A	2	3	8	10	3
A*	0	2	4	5	2

3 (a) How many students have at least one grade A* in these subjects?

.....

.....

Answer 19 *(2 marks)*

3 (b) How many students have a higher grade in Geography than in History?

I have circled the relevant numbers to be added.

.....

Answer 42 students *(2 marks)*

4 Class A had a spelling test of ten words.
The table shows their marks.

Class A

Mark	Frequency	Mark x Freq.
5	4	20
6	2	12
7	8	56
8	10	80
9	6	54
	Total = 30	Total = 222

4 (a) Show that the mean mark is 7.4

$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{222}{30} = 7.4$

(3 marks)

***4 (b)** Class B had the same test.
The mean mark for Class B is 6.5

The teacher says,

"On average, Class A scored 15% higher than Class B."

Is she correct?
You **must** show your working.

Percentage increase is given by:

$\frac{7.4 - 6.5}{6.5} \times 100 = 13.8\%$ (3 s.f.).

∴ She is incorrect.

(3 marks)

10

5 A bag contains only red counters and blue counters.
There are 6 **more** red than blue.

A counter is chosen at random from the bag.

The probability it is blue is $\frac{1}{4}$

How many **red** counters are in the bag?

$R = B + 6 \Rightarrow B = R - 6$

$P(B) = \frac{R-6}{R+R-6} = \frac{R-6}{2R-6} = \frac{1}{4}$

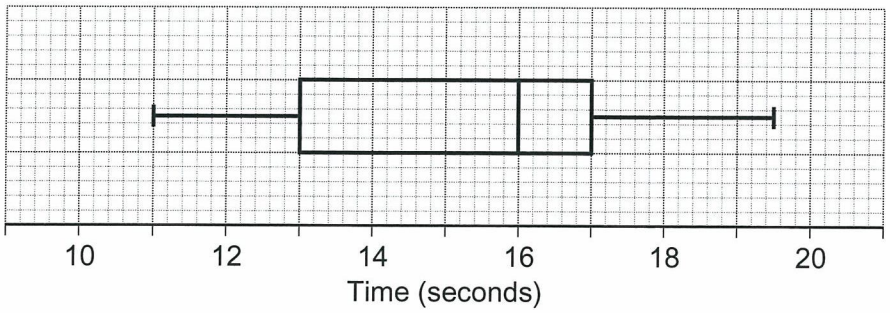
$\Rightarrow 4R - 24 = 2R - 6 \Rightarrow 2R = 18$

$\Rightarrow R = \frac{18}{2} = 9$

Answer 9 *(3 marks)*

6 Girls and boys are timed in a race.
The box plot shows information about the times for the girls.

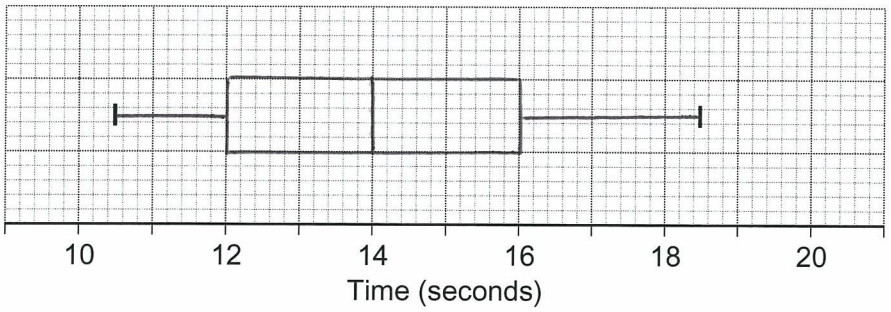
Girls



- 25% of the boys take 12 seconds or less
- The interquartile range for the boys is the same as for the girls
- The ratio of median times is girls : boys = 8 : 7

Complete the box plot for boys on the grid below.
The times for the fastest and slowest boys have been plotted for you.

Boys



(4 marks)

7

Turn over ▶

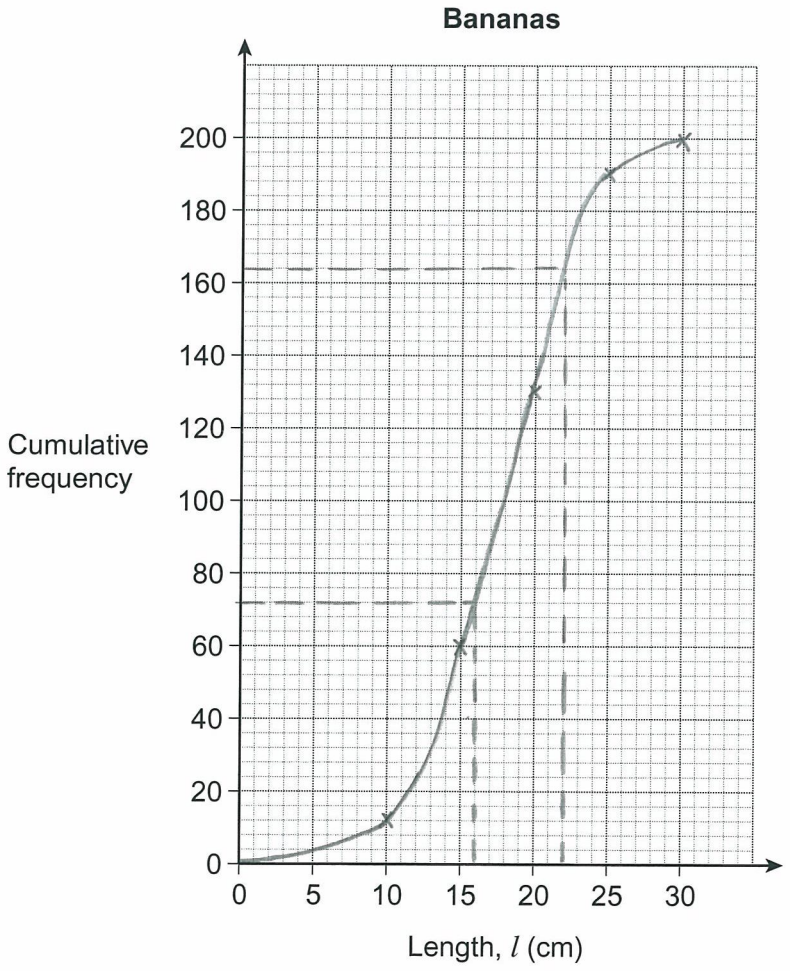
7 The table shows information about the lengths of 200 bananas.

Length, l (cm)	Frequency	Cumulative frequency
$5 < l \leqslant 10$	12	12
$10 < l \leqslant 15$	48	60
$15 < l \leqslant 20$	70	130
$20 < l \leqslant 25$	60	190
$25 < l \leqslant 30$	10	200

7 (a) Complete the cumulative frequency column.

(1 mark)

7 (b) Draw a cumulative frequency diagram for the data.



(3 marks)

7 (c) A shop only buys bananas with lengths between 16 cm and 22 cm.

Estimate the **fraction** of the 200 bananas that the shop buys.

$\frac{164 - 72}{200} = \frac{92}{200} = \frac{46}{100} = \frac{23}{50}$

Answer $\frac{23}{50}$ *(3 marks)*

Turn over for the next question

7

8 A travel company sells holidays.

8 (a) The company sold 1072 UK holidays in 2012.
It expects the number it sells to increase by 12% **each year**.

Work out the number of UK holidays the company expects to sell in 2014.

$1072 + 0.12(1072) = 1200.64$

$1200.64 + 0.12(1200.64) = 1345$ (to nearest integer)

ALTERNATIVELY, $1072 \times 1.12^2 = 1345$ (to nearest integer)

Answer 1,345 *(3 marks)*

8 (b) The company wants to survey 500 customers, stratified by country visited.

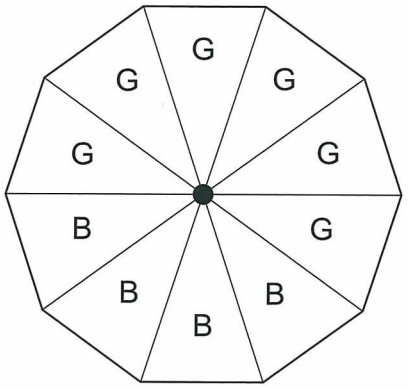
Complete the table.

	UK	Spain	France	Italy	Total
Number of customers	1072	2392	316	220	**4000**
Number in sample	134	299	40	27	**500**

$\frac{1072}{4000} \times 500$

(3 marks)

9 Jack and Lucy each spin this fair 10-sided spinner once.



Key : G = green
B = blue

Jack wins if their colours are the same.
Lucy wins if their colours are different.

Who has the better chance of winning?
You **must** show your working.

$P(\text{Jack wins}) = P(\text{same colour}) = P(GG \text{ OR } BB)$

$= P(G) \times P(G) + P(B) \times P(B) = \left(\frac{6}{10}\right)^2 + \left(\frac{4}{10}\right)^2$

$= \frac{36}{100} + \frac{16}{100} = \frac{52}{100} = \frac{26}{50} = \frac{13}{25}$

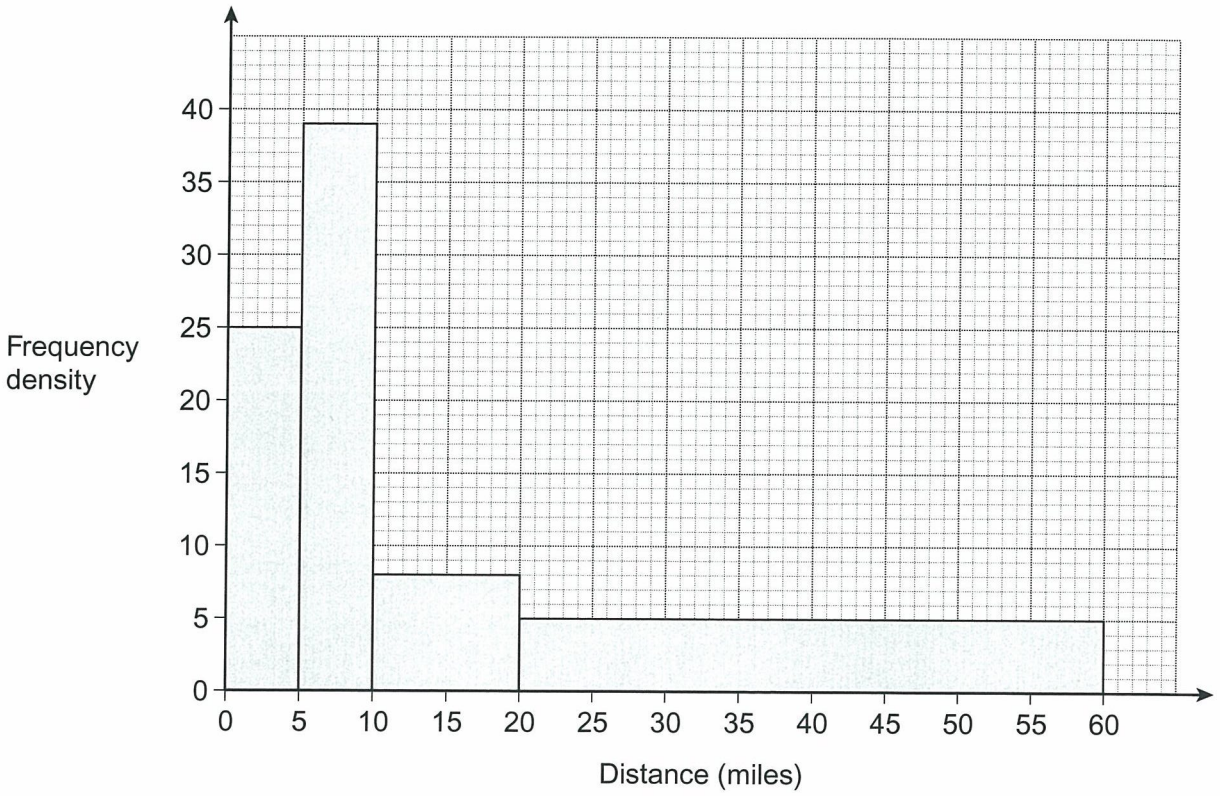
$P(\text{Lucy wins}) = P(\text{different colour}) = 1 - P(\text{same colour})$

$= 1 - \frac{26}{50} = \frac{24}{50} = \frac{12}{25}$. ∴ Jack has greater chance of winning.

Answer Jack *(3 marks)*

9

10 The histogram shows information about the distances 600 people travel to work.



10 (a) How many people travel more than 20 miles to work?

$F.D. = \frac{F}{C.W.} \Rightarrow F = F.D \times C.W.$

$F_{>20} = 5 \times 40 = 200$

Answer 200 *(2 marks)*

10 (b) 224 of these people travel further to work than I do.

Estimate the distance I travel to work.

$F_{10-20} = 8 \times 10 = 80$ and $\frac{80-24}{80} \times (20-10) + 10$

$= 17$

ALTERNATIVELY, we need 24 more people to the left of the 20-mile mark which calls for a class width given by C.W. $= \frac{F}{F.D.}$

$= \frac{24}{8} = 3$ and $20 - 3 = 17$.

Answer 17 miles *(4 marks)*

11 A shelf supports 80 kg, to the nearest kilogram.
Bottles weigh 1.4 kg each, to the nearest tenth of a kilogram.

Work out the greatest number of bottles that can definitely be supported by the shelf.

Let B.S. = No. of bottles supportable by the shelf,

W = Weight that can be supported by the shelf and

B = Weight of each bottle. Then B.S. $= \frac{W}{B}$

$B.S._L = \frac{W_L}{B_U} = \frac{79.5}{1.45} = 54.8$ (3s.f.), which has to be rounded down to 54

Answer 54 *(4 marks)*

END OF QUESTIONS

10

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED