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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TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2013

Applications of Mathematics (Linked Pair Pilot) 93701H

Unit 1 Finance and Statistics

H

Monday 17 June 2013 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.
- If your calculator does not have a π button, take the value of π to be 3.14 unless another value is given in the question.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- The quality of your written communication is specifically assessed in Questions 2 and 6.
  These questions are indicated with an asterisk(*).
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- You are expected to use a calculator where appropriate.

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

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

1 The table shows the number of desktop computers and laptops in 50 households.

Laptops \ Desktop computers	**0**	**1**	**2**	**3**
0	0	6	1	0
1	5	10	4	4
2	1	8	5	0
3	3	2	1	0

1 (a) How many households have two laptops?

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

1 (b) How many households have more laptops than desktop computers?

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

2 (a) The price of a radio is £ 80.

In a sale the price is reduced by 20 %.

Work out the sale price of the radio.

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£ ..... *(2 marks)*

***2 (b)** In the same sale, an iron is reduced from £ 12 to £ 10.

Is this more, the same, or less than a 20 % reduction?
You **must** show your working.

☐ more ☐ the same ☐ less

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(3 marks)

Turn over for the next question

8

3 Alice wants to collect data to find out how many cars drive past the school gates.

Bev wants to collect data to find out what people think about school uniform.

Craig wants to collect data to test people's memory.

Below are three data collection methods.

1 Questionnaire

2 Controlled experiment

3 Observation

Choose the method each person should use to collect their data.

Alice .....

Bev .....

Craig ..... *(2 marks)*

4 Ravi, Sue and Tom do some jobs.

They are each paid £4 an hour.

They are paid £216 in total.

4 (a) Show that they work for 54 hours in total.

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(1 mark)

4 (b) Ravi works for x hours.

Sue works 5 hours less than Ravi.

Tom works 8 hours more than Ravi.

Work out how much Ravi is **paid**.

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£ ..... *(5 marks)*

8

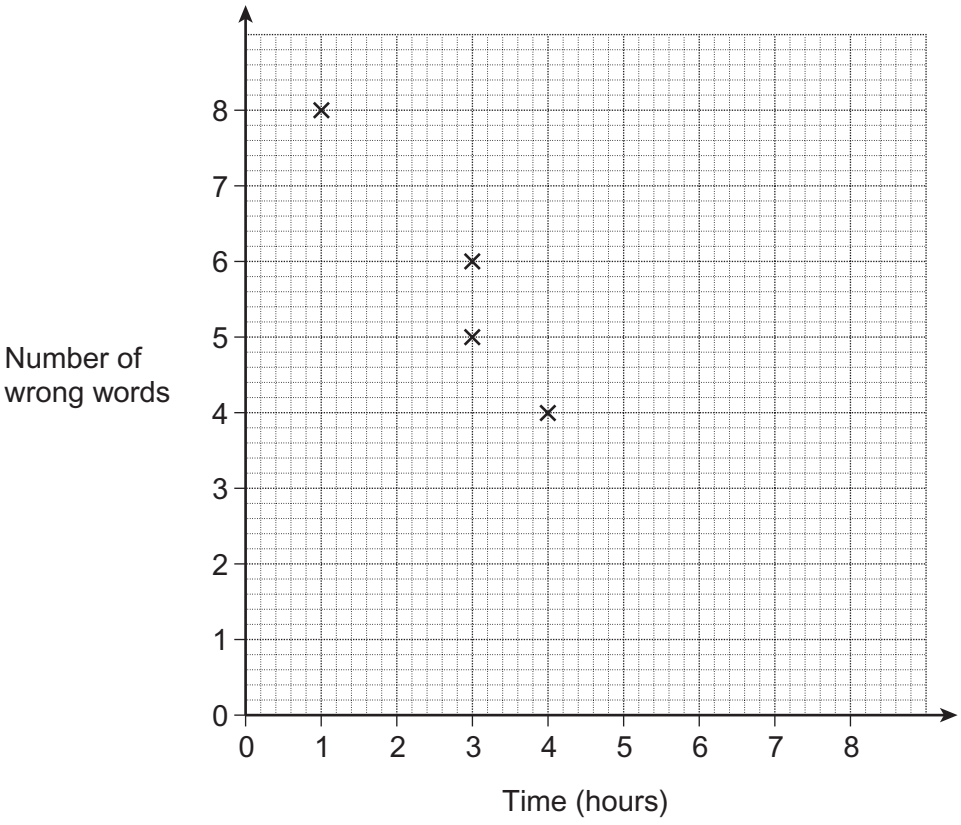
5 Seven students have to learn some French words.

The table shows the time they spent learning the words and the number of words they got wrong in a test.

Time (hours)	1	3	3	4	6	7	8
Number of wrong words	8	6	5	4	3	2	2

5 (a) The first four points have been plotted.

Complete the scatter diagram.



(1 mark)

5 (b) Describe the relationship shown by the scatter diagram.

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(1 mark)

5 (c) Another student spent 5 hours learning the words.

Use a line of best fit to estimate the numbers of words he got wrong.

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

5 (d) Ellie has to take the test.

She says,
"If I learn the words for 12 hours I will definitely not get any wrong."

Is she correct?
Give a reason for your answer.

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(1 mark)

Turn over for the next question

5

***6** Last year Mrs Hart used 5600 units of electricity.
The electricity cost her £784.

This year the cost of electricity has increased by 15%.
She has reduced the electricity used to 4900 units.

Does she pay **less** than she did last year?
You **must** show your working.

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(5 marks)

7 A water tank is $\frac{3}{4}$ full.

56 litres of water are taken from the tank.

The tank is now $\frac{2}{5}$ full.

Show clearly that the tank holds 160 litres when full.

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(4 marks)

Turn over for the next question

9

8 An athlete runs in 10 000 metre races.
The table shows the times for his last 20 races.

Time, t (minutes)	Frequency		
$30 < t \leqslant 32$	3		
$32 < t \leqslant 34$	9		
$34 < t \leqslant 36$	6		
$36 < t \leqslant 38$	2		

Calculate an estimate of his mean time.

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

9 The table shows the populations of some countries.

Country	Population
Denmark	5.59×10^6
France	6.35×10^7
Greece	1.14×10^7
Malta	4.19×10^5
Netherlands	1.68×10^7
Russia	1.43×10^8
Spain	4.68×10^7

9 (a) Which of these countries has the lowest population?

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

9 (b) Which of these countries has a population approximately three times that of Denmark?

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

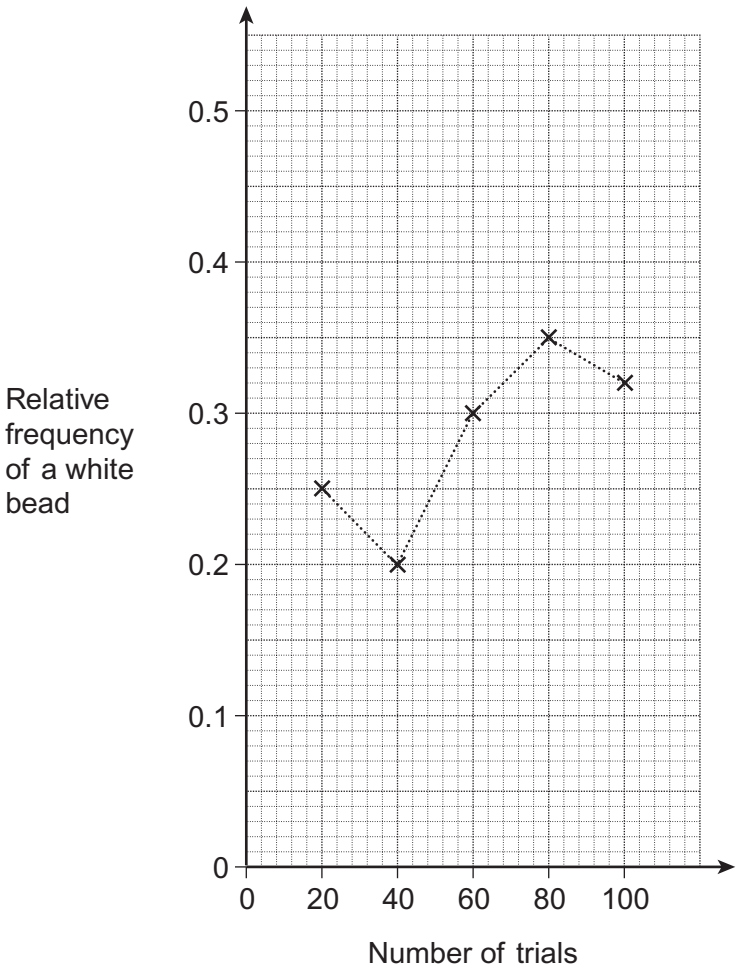
7

10 A bag contains white beads, black beads and red beads.

The following trial is repeated 100 times.

Pick a bead at random.
Record the colour.
Put the bead back in the bag.

The graph shows the relative frequency of a white bead after every 20 trials.



10 (a) Work out the number of times a white bead was picked in the first 20 trials.

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

10 (b) What is the best estimate for the probability of picking a white bead?
Give a reason for your answer.

Answer .....

Reason .....

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(2 marks)

10 (c) There are a total of 1000 beads in the bag.

Estimate the number of beads that are white.

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

Turn over for the next question

6

11 Pete is buying a house.

His salary is £ 36 000.

The bank will lend him 3.5 times his salary for a mortgage.

This is 90% of the house price.

Work out the house price.

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£ ..... *(4 marks)*

12 3 kg of apples and 1.5 kg of blackberries cost £ 9.00
2 kg of apples and 4 kg of blackberries cost £ 13.20

Work out the cost of 1 kg of apples and the cost of 1 kg of blackberries.
You **must** show your working.

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1 kg of apples £ .....

1 kg of blackberries £ ..... *(5 marks)*

9

Turn over ▶

13 Ryan has an income of £ 52 300 a year.

13 (a) He does **not** pay tax on the first £ 9205 of his income.

Work out his taxable income.

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£ ..... *(1 mark)*

13 (b) He pays the following income tax.

- 20% on the first £ 32 245 of his taxable income
- 40% on the rest of his taxable income

Work out his income after income tax has been paid.

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£ ..... *(5 marks)*

14 A golf club has three types of membership: men, women and children.

The ratio of men to women is 5 : 2

The ratio of women to children is 3 : 2

A sample of size 100, stratified by type of membership, is taken.

How many **women** are chosen?

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

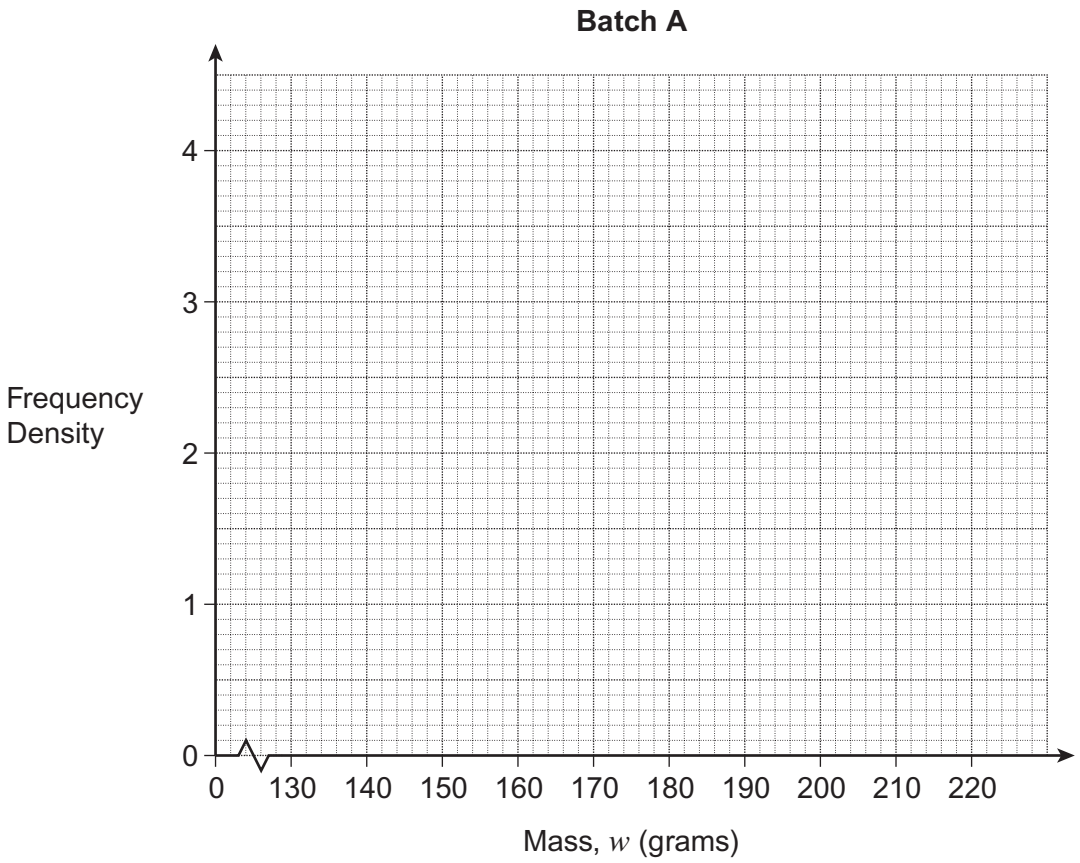
Turn over for the next question

9

15 The table shows information about the masses of 100 oranges in Batch A.

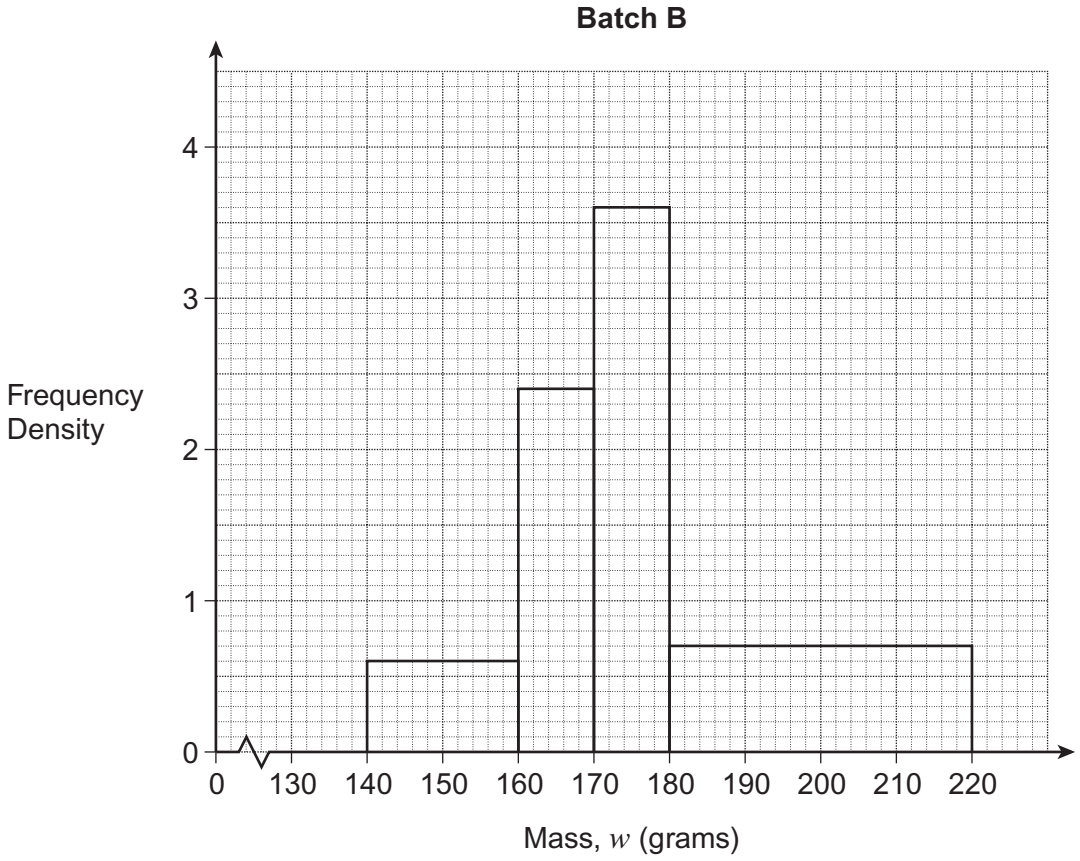
Mass, w (grams)	Frequency
$140 \leqslant w < 160$	16
$160 \leqslant w < 170$	38
$170 \leqslant w < 180$	34
$180 \leqslant w < 220$	12

15 (a) Draw a histogram to represent this data.



(3 marks)

15 (b) The histogram shows the distribution of the masses of 100 oranges in Batch B.



Oranges with a mass of 175 g or more are classified as large.

Estimate how many more oranges in Batch B than in Batch A would be classified as large.

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

7

Turn over ▶

16 A potter makes bowls and jugs.

She has 20 kilograms of clay.
She uses 800 grams of clay for a bowl.
She uses 300 grams of clay for a jug.

She has 10 hours to make the bowls and jugs.
It takes her 8 minutes to make a bowl.
It takes her 12 minutes to make a jug.

Let the number of bowls made be x.
Let the number of jugs made be y.

16 (a) Use the information about the amount of clay to show that $8x + 3y \leqslant 200$

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(1 mark)

16 (b) Use the information about the time available to show that $2x + 3y \leqslant 150$

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(1 mark)

16 (c) The profit on a bowl is £7.
The profit on a jug is £4.

Work out the number of bowls and jugs the potter should make so that she makes the maximum profit.

The line $8x + 3y = 200$ has been drawn on the grid opposite to help you.

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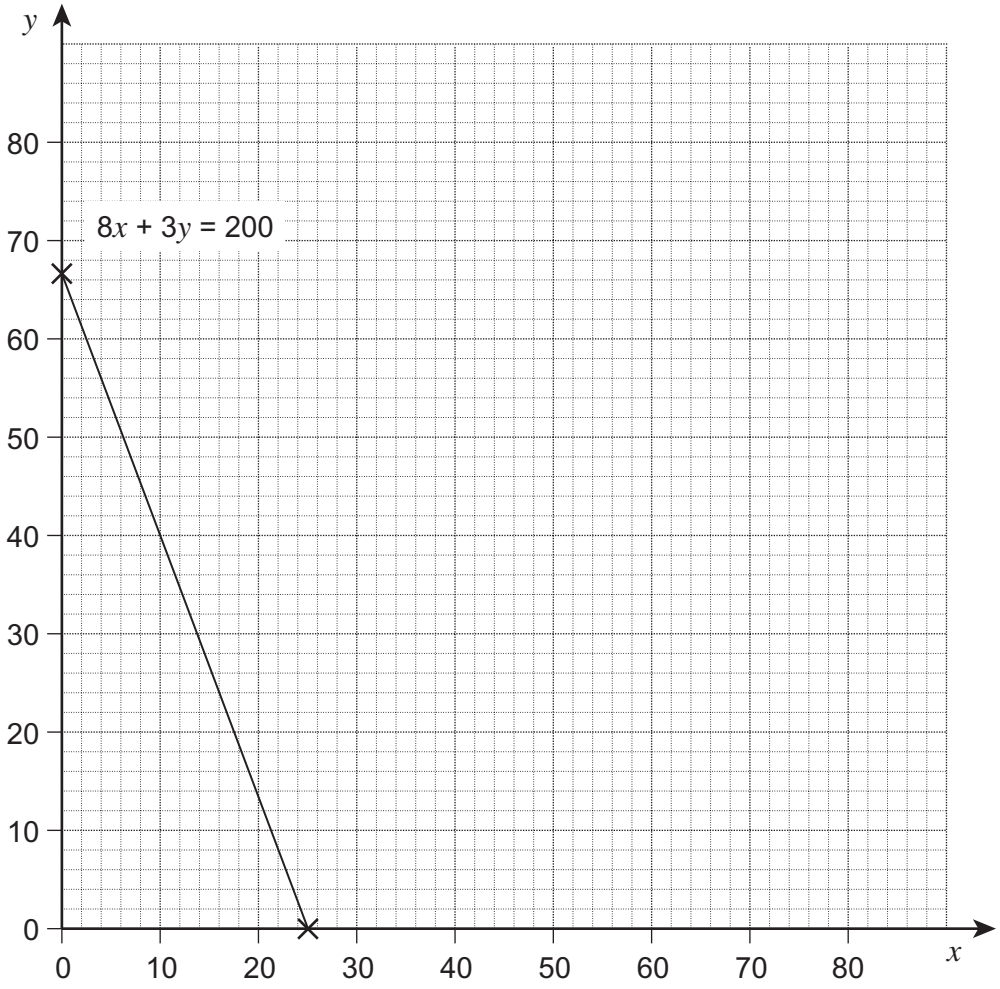
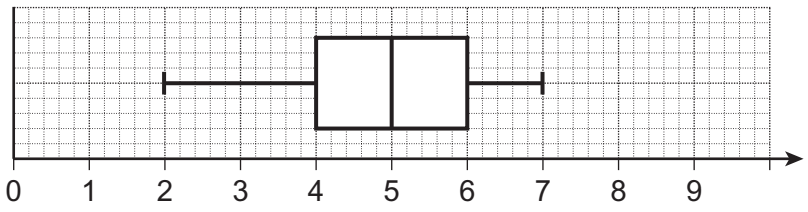
Answer ..... bowls ..... jugs *(4 marks)*



Turn over for the next question

6

17 Sandra goes to 20 meetings.
The box plot shows the distribution of time that she parks her car when at the meetings.



Number of hours

17 (a) Each of her times is different.

How do you know that she parks for between 2 and 4 hours at five of her meetings?

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(1 mark)

17 (b) Car park A charges

- £1 for up to 4 hours.
- £3 for more than 4 hours.

Show that if she parks in car park A for all 20 of her meetings, she pays £50 in total.

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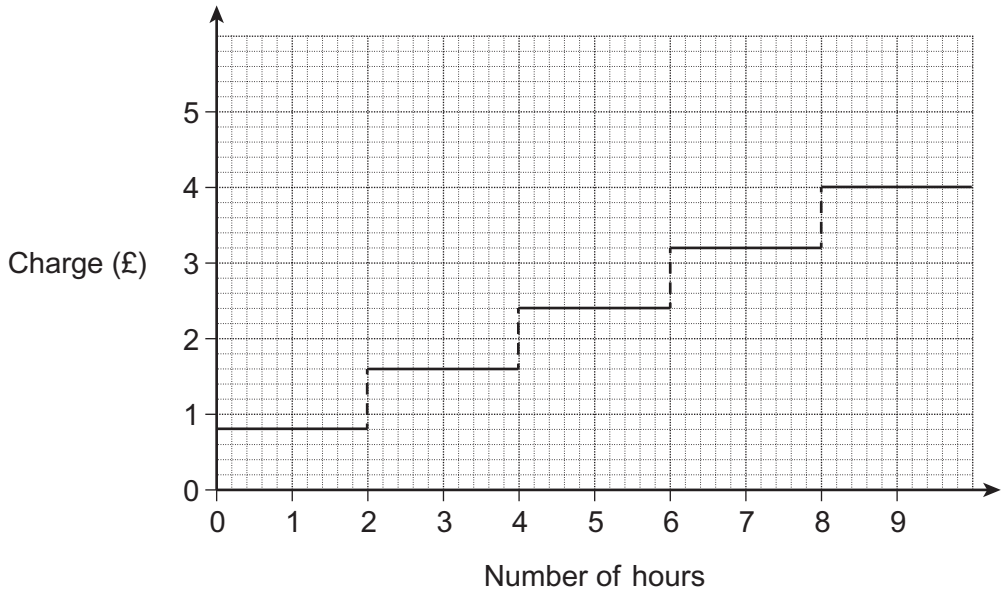
(2 marks)

17 (c) Car park B charges 80 p for every 2 hours or part of 2 hours.

The graph shows the charges for car park B.



Which car park would cost less to use for the 20 meetings?
You **must** show your working.

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

END OF QUESTIONS

6

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED