Centre Number						Candidate Number				
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Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
2 – 3	
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10 – 11	
12 – 13	
14 – 15	
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TOTAL	

AQA

General Certificate of Secondary Education
Higher Tier
June 2014

Applications of Mathematics (Linked Pair Pilot) 93701H

H

Unit 1 Finance and Statistics

Tuesday 17 June 2014 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 that 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 10, 11, 12 and 15
  These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph 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 A machine records the number of cars in a car park.
The table shows some of the data for every hour one morning.

Time	Number of cars
8 am	74
9 am	116
10 am	152
11 am	202
12 noon	

1 (a) Between 11 am and 12 noon, 14 cars leave the car park and 37 cars enter the car park.

How many cars are in the car park at 12 noon?

[1 mark]

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Answer .....

1 (b) 27 cars leave the car park between 9 am and 10 am

How many cars enter the car park between 9 am and 10 am?

[2 marks]

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Answer .....

2 Lea is giving out a questionnaire about music downloads.

2 (a) One of her questions is

'How many songs did you download last week?'

This is her response section.

☐	☐	☐	☐
1 – 5	5 – 10	11 – 20	21 +

Give **two** criticisms of her **response section**.

[2 marks]

Criticism 1 .....

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Criticism 2 .....

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2 (b) The questionnaire is given to five students in Year 11

Give **one** reason why this is not a suitable sample.

[1 mark]

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6

3 Vikki makes 150 cupcakes.

She pays £20 to hire a stall to sell her cupcakes.

Each cupcake costs 35p to make.

She sells $\frac{4}{5}$ of her cupcakes for £1.40 each.

She sells the rest for £1 each.

Work out the profit she makes.

[7 marks]

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4 (a) Lilly rolls four ordinary six-sided dice.

She records the numbers rolled.

The mode of the numbers is one more than the median.

Work out a possible set of four numbers she could have rolled.

[2 marks]

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Answer .....

4 (b) Meg has one ordinary six-sided dice.
She rolls it 50 times and records each score in this table.

Score	Frequency	
1	10	
2	7	
3	9	
4	5	
5	8	
6	11	

Work out the mean score.

[3 marks]

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Answer .....

12

5 John has 500 ml of apple juice.

He wants to mix apple juice with fizzy water in the ratio 1 : 10

Fizzy water is sold in 1500 ml bottles.

Work out the smallest number of bottles of fizzy water needed to mix all the apple juice.
You **must** show your working.

[4 marks]

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Answer .....

6 Nick went to a football training camp.

6 (a) He weighed 80 kg before the training camp.
He weighed 74 kg after the training camp.

Work out his percentage weight loss.

[3 marks]

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Answer ..... %

6 (b) Nick's backpack weighs 12 kg to the nearest kilogram.

What is the least the backpack could weigh?

[1 mark]

Circle the correct answer.

11.4 kg 11.5 kg 11.6 kg 11.9 kg 12 kg

Turn over for the next question

8

7 Chocolate bars cost £x each.

7 (a) Mary buys 6 chocolate bars.
She pays with a £10 note.

Write down an expression for the change she receives.

[1 mark]

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7 (b) Ben buys 4 chocolate bars.
He also pays with a £10 note.

Ben receives twice as much change as Mary.

Use an algebraic method to work out the value of x.

[4 marks]

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x = ...

8 Dave goes Go-Kart racing with his friends.

These tables show information about his races on both dry and wet tracks.

Dry track

Number of races	Number of wins
64	16

Wet track

Number of races	Number of wins
40	12

On which type of track is he more successful?
You **must** show your working.

[3 marks]

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Turn over for the next question

8

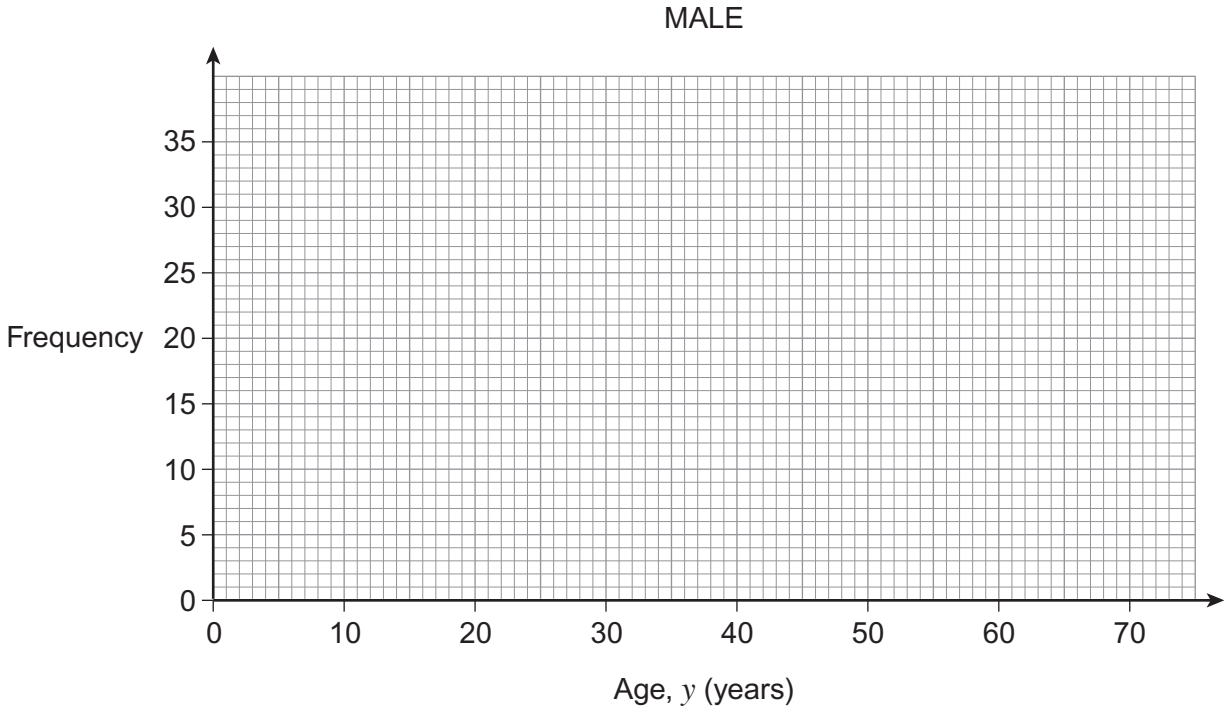
9 A chess club has both male and female members.

9 (a) The table shows the age distribution of the male club members.

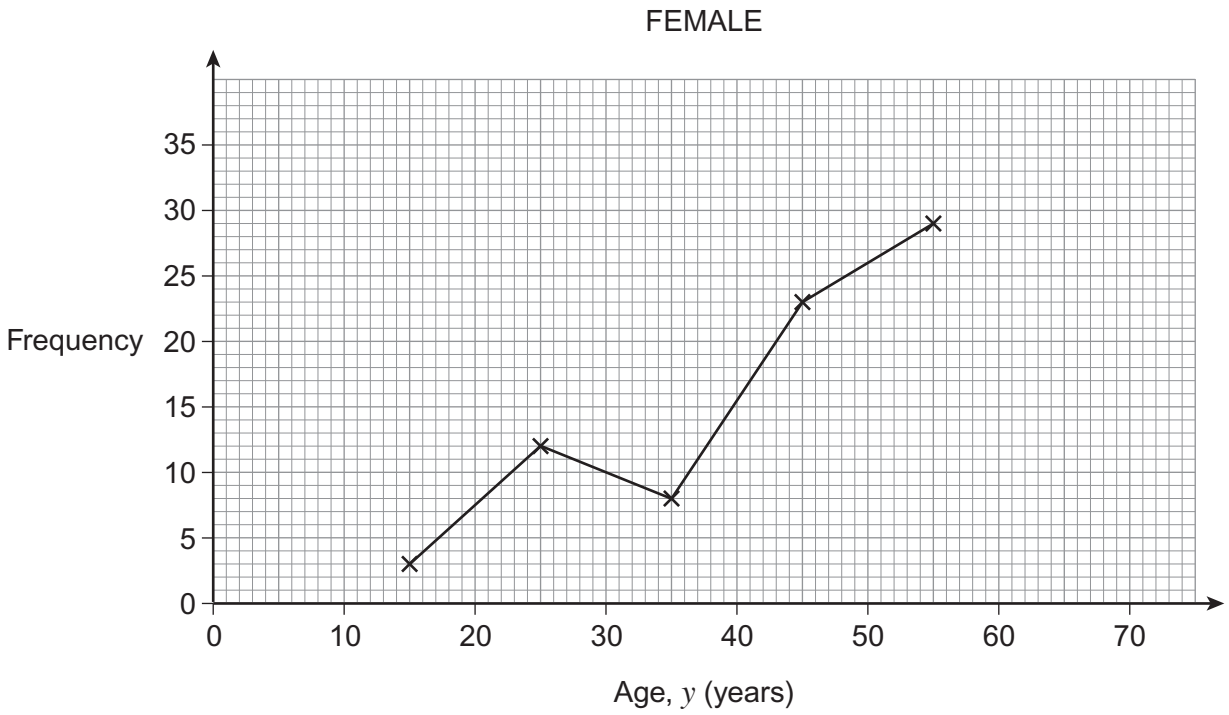
Age, y (years)	Frequency
$10 \leqslant y < 20$	5
$20 \leqslant y < 30$	9
$30 \leqslant y < 40$	16
$40 \leqslant y < 50$	34
$50 \leqslant y < 60$	28
$60 \leqslant y < 70$	19

Draw a frequency polygon for these data.

[2 marks]



9 (b) The frequency polygon below shows the age distribution of the female club members.



Write down **two** comparisons between the age distributions of the male and female club members.

[2 marks]

Comparison 1 .....

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Comparison 2 .....

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4

Turn over ▶

***10** An insurance company provides cover for the cost of repairs for electrical items.

The company knows that

- the probability of a washing machine needing a repair is 0.269
- the average cost of repairing a washing machine is £54

The company also knows that

- the probability of a cooker needing a repair is 0.143
- the average cost of repairing a cooker is £86

Work out which item is the greater risk for the company to cover.
You **must** show your working.

[4 marks]

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***11** Sally has £2000 to invest.

Bank A	**Bank B**
Leave your money in for 3 years and we guarantee 3.2% per annum compound interest.	2.8% per annum compound interest. Leave your money in for 3 years and we will add a bonus of 1% of your **original** investment.

Which bank will give Sally more interest if she is going to leave her money in for 3 years?
You **must** show your working.

[4 marks]

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Answer .....

8

***12** Dave and Helen attend the same school.

Dave lives 5 km from the school.

Helen lives 3 km from the school.

The distance between Dave's house and Helen's house is x km

Write, as an inequality, the minimum and maximum distance that x could be.

[3 marks]

..... $\leqslant x \leqslant$ .....

Justify your answer in the space below.
You may use a diagram if you wish.

School

13 (a) The monthly interest rate on a mortgage is 0.4%

Show that this can be expressed as the decimal 0.004

[1 mark]

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13 (b) The monthly payment, P (£), for a mortgage can be calculated using this formula.

$$P = \frac{i \times A}{1 - (1 + i)^{-N}}$$

where i = the monthly interest rate expressed as a decimal
A = the amount borrowed, (£)
N = the number of **monthly** payments

Ian takes out a mortgage for £125 000
The monthly interest rate is 0.4%
He must make monthly payments for 25 **years**.

Work out his monthly payment.
You **must** show your working.

[4 marks]

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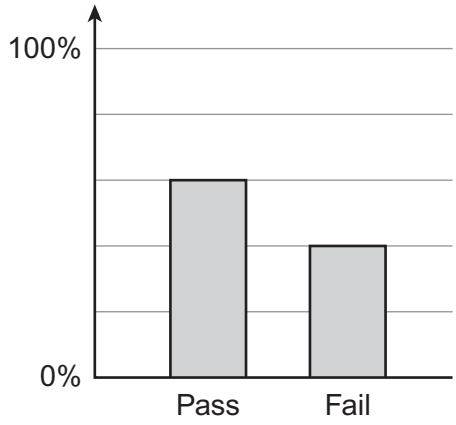
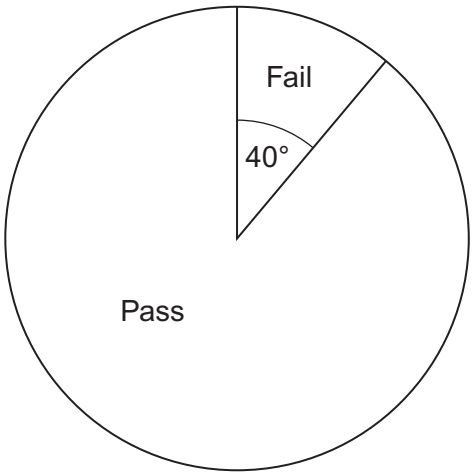
14 Some students take a cycling test.
The percentage bar chart shows the results.



The students who fail the test take it a second time.
The pie chart shows the results.



Two students fail the second test.

How many students pass the test first time?

[5 marks]

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Answer .....

***15** 3 fence panels and 4 posts cost £82.97
5 fence panels and 6 posts cost £131.95

Rav builds fences.

He says,

"£200 should be enough for 8 panels and 9 posts"

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

[6 marks]

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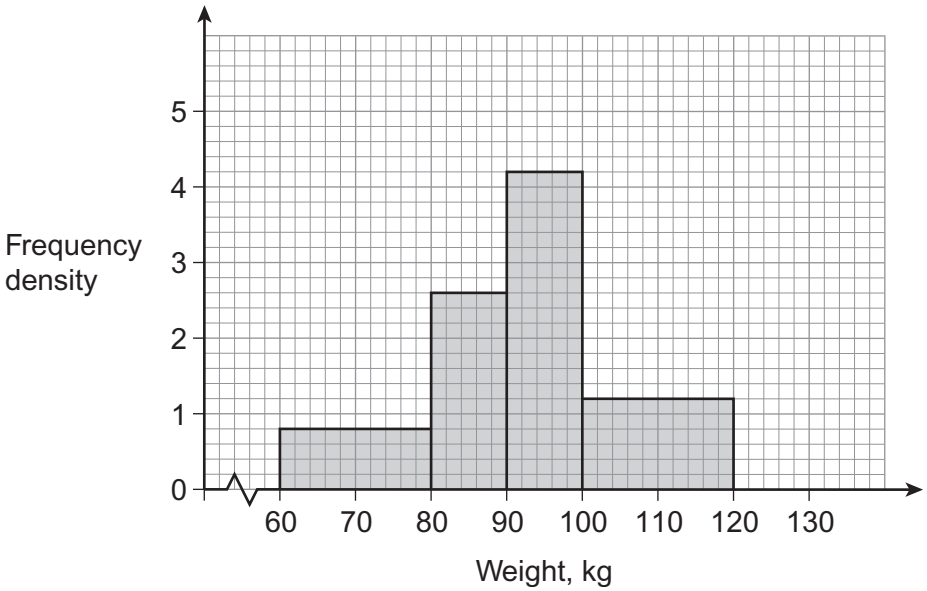
Turn over for the next question

11

16 The histogram represents the weights, in kilograms, of the people on a fitness course.



16 (a) Work out the total number of people on the fitness course.

[3 marks]

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Answer .....

16 (b) Six more people join the course.
They each weigh between 120 kilograms and 130 kilograms.

Complete the histogram.

[1 mark]

17 A swimming club has 400 members.
A stratified sample, by age, is taken.

The table shows some information about the members and the sample.

Age (years)	Under 16	16 – 25	26 – 50	51+
Number of members	56			72
Number in sample	7	13		

Complete the table.

[4 marks]

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Turn over for the next question

8

18 Mel has been given 84 balls of wool.
She decides to knit hats and scarves to raise money for charity.

A hat needs 3 balls of wool.
A scarf needs 6 balls of wool.

She decides to make

- at least 5 hats
- at least 5 scarves
- no more than 20 items altogether.

Let h be the number of hats made.
Let s be the number of scarves made.

18 (a) Use the information above to show that $h + 2s \leqslant 28$

[1 mark]

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18 (b) Write down an inequality for the total number of items made.

[1 mark]

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18 (c) She sells each hat for £4.50
She sells each scarf for £7

The lines $h + 2s = 28$ and $s = 5$ are drawn on the graph below.

Complete the graph to show all the information and work out the maximum amount of money she can make.

[5 marks]

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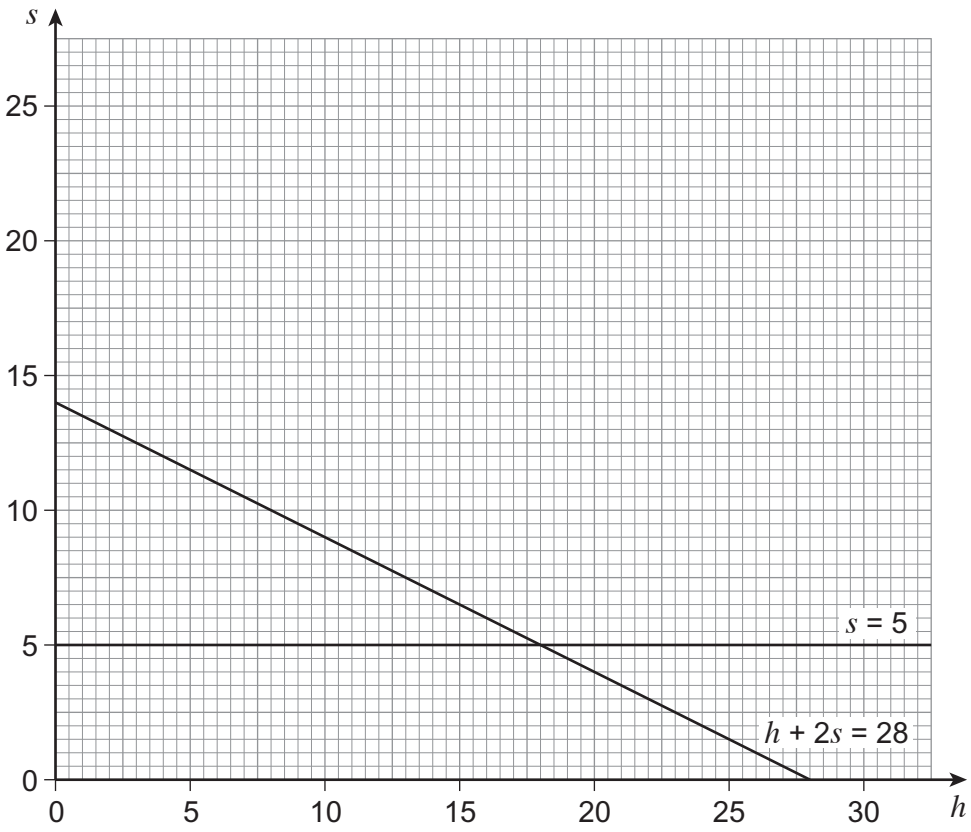

END OF QUESTIONS

7

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