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| Centre Number | | | | | | Candidate Number | | | | |
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| Other Names | | | | | | | | | | |
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|---------------------|------|
| For Examiner's Use | |
| Examiner's Initials | |
| Pages | Mark |
| 2 – 3 | |
| 4 – 5 | |
| 6 – 7 | |
| 8 – 9 | |
| 10 – 11 | |
| 12 – 13 | |
| 14 – 15 | |
| 16 – 17 | |
| 18 – 19 | |
| 20 – 21 | |
| TOTAL | |



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

| | |
|---|--|
| <p>For this paper you must have:</p> <ul style="list-style-type: none"> • 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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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

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| 12 |
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Turn over ►



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



7 Chocolate bars cost $\pounds x$ each.

7 (a) Mary buys 6 chocolate bars.
She pays with a $\pounds 10$ note.

Write down an expression for the change she receives.

[1 mark]

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\pounds

7 (b) Ben buys 4 chocolate bars.
He also pays with a $\pounds 10$ 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

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| 8 |
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Turn over ►



9 A chess club has both male and female members.

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

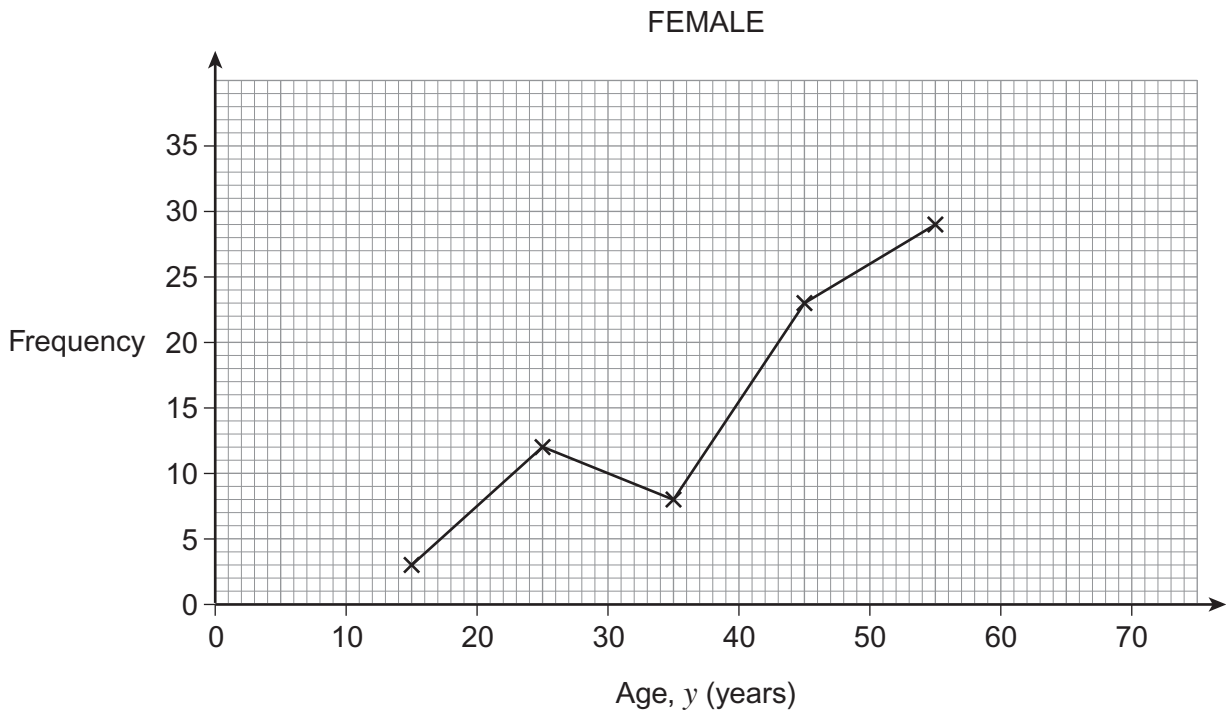
| Age, y (years) | Frequency |
|------------------|-----------|
| $10 \leq y < 20$ | 5 |
| $20 \leq y < 30$ | 9 |
| $30 \leq y < 40$ | 16 |
| $40 \leq y < 50$ | 34 |
| $50 \leq y < 60$ | 28 |
| $60 \leq y < 70$ | 19 |

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 |
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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

Leave your money in for
3 years and we guarantee
3.2% per annum
compound interest.

Bank B

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

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Turn over ▶



***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]

..... $\leq x \leq$

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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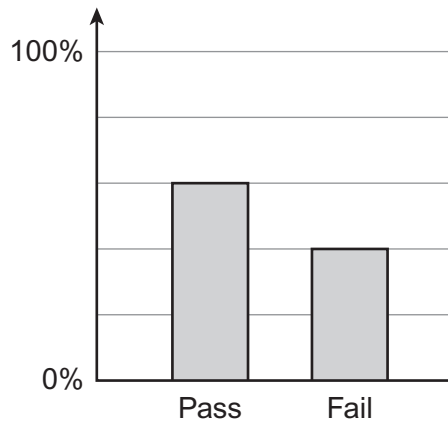
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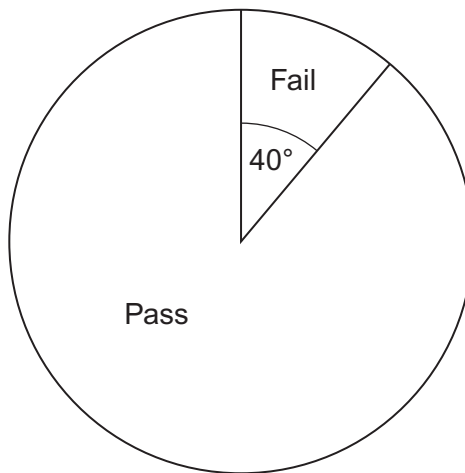
Turn over ►



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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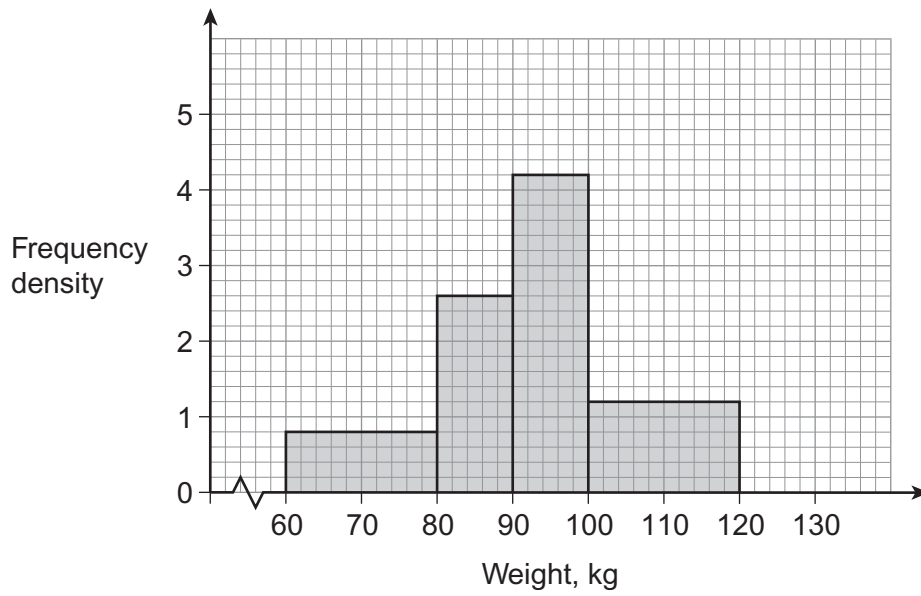
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Turn over for the next question



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

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Turn over ►



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 $h + 2s \leq 28$

[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]

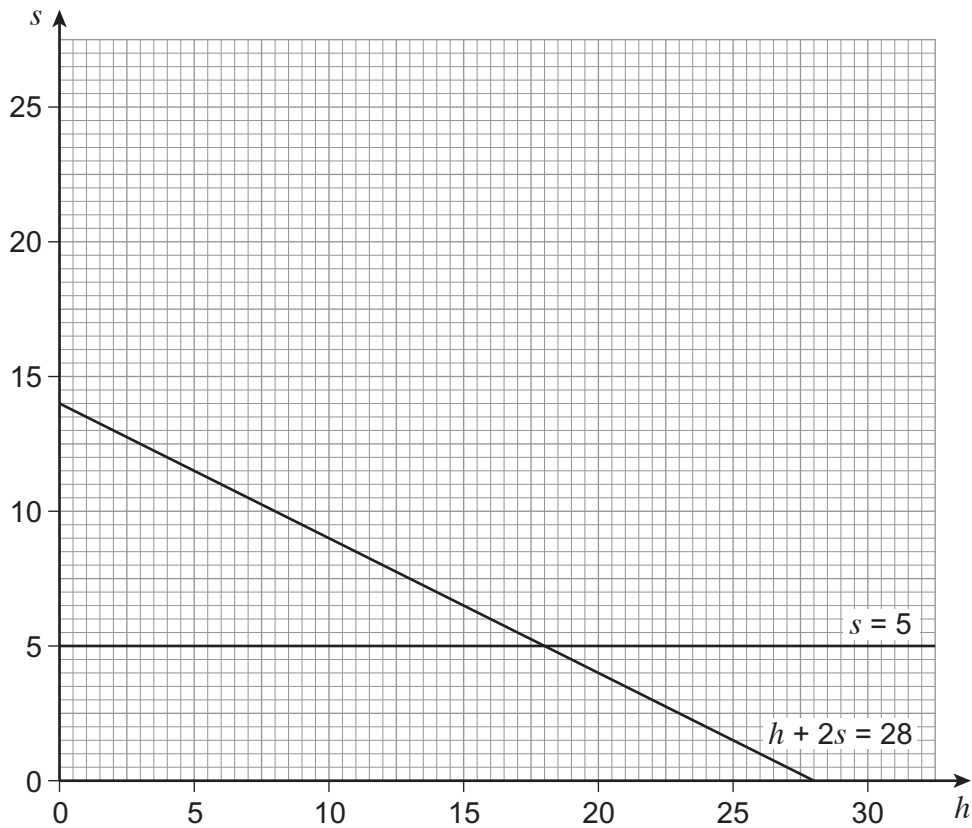
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END OF QUESTIONS

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