

Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
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TOTAL	



General Certificate of Secondary Education  
Higher Tier  
January 2012

# Applications of Mathematics 93701H (Linked Pair Pilot)

Unit 1 Finance and Statistics

# H

Monday 16 January 2012 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 space 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  $\pi$  button, take the value of  $\pi$  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 5, 10 and 13.  
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 booklet.
- You are expected to use a calculator where appropriate.

### Advice

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



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# 93701H

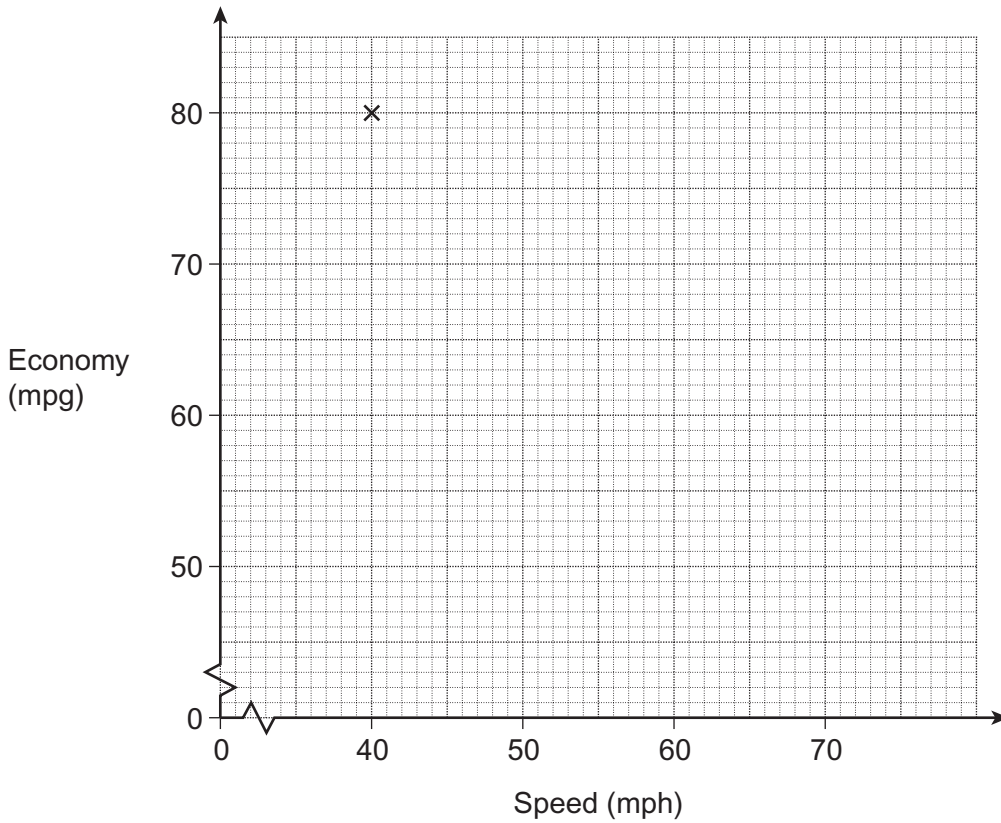
Answer **all** questions in the spaces provided.

**1** A driver records the economy of his car at various speeds.

Economy is measured in miles per gallon (mpg).  
Speed is measured in miles per hour (mph).

<b>Speed (mph)</b>	40	50	55	60	65	70
<b>Economy (mpg)</b>	80	69	64	60	59	52

**1 (a)** Plot these results on the grid.  
The first result has been plotted for you.



(2 marks)

**1 (b)** Use your graph to estimate the economy when the speed is 45 mph.  
You **must** show your working.

Answer ..... mpg

(2 marks)



1 (c) This formula is used to work out the economy of a car.

$$\text{Economy} = \frac{\text{Distance travelled in miles}}{\text{Fuel used in gallons}}$$

Estimate the number of gallons of fuel needed for a journey of 100 miles at a speed of 45 mph.

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Answer ..... gallons (3 marks)

**Turn over for the next question**



2 Here is a rule to work out the dose of medicine for children aged over 2 years old.

$$\text{Child dose} = \frac{\text{Age}}{(\text{Age} + 12)} \times (\text{Adult dose})$$

2 (a) An adult dose of a medicine is 60 ml.

Work out the dose for a 6-year-old child.

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Answer ..... ml (3 marks)

2 (b) James says "If you double the age of a child you double the dose."

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

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(3 marks)



3 (a) Pavel travels  $x$  miles to college.

Ruth travels seven miles further than Pavel.  
Josh travels twice as far as Pavel.  
Pavel, Ruth and Josh travel 29 miles in total.

Work out the distance Pavel travels to college.

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Answer ..... miles (4 marks)

3 (b) Pavel, Ruth and Josh have part-time jobs.  
Their mean pay is three times the mode.

What could the three amounts of pay be?  
You **must** show your working.

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Answer £ ..... , £ ..... and £ ..... (3 marks)



4 It is recommended that children eat  $\frac{1}{4}$  kg of fruit a day.

Jenny buys

2 kg of apples

$1\frac{1}{2}$  kg of cherries

$\frac{3}{4}$  kg of plums

$\frac{1}{2}$  kg of grapes

Jenny has three children.

Has she bought enough fruit for her children for one week?  
You **must** show your working.

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(4 marks)



**\*5** Bethany is raising money for charity.  
She sells 300 raffle tickets numbered from 1 to 300.  
Tickets ending in a 5 or a 0 win a £1 prize.

What price should each ticket be to make £90 profit?

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Answer ..... (4 marks)

**Turn over for the next question**



**6** John drives to work through town each day.  
The table shows information about his journey times for 50 days.

Time, $t$ (minutes)	Frequency
$5 \leq t < 10$	7
$10 \leq t < 15$	23
$15 \leq t < 20$	16
$20 \leq t < 25$	4

**6 (a)** Calculate an estimate of the mean time for driving to work through town.

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Answer ..... minutes (4 marks)





**6 (b)** For the next 50 days John travels to work by an alternative route.  
Here is some information about his journey times.

Quickest time	11 minutes
Slowest time	19 minutes
Mean time	16 minutes

Compare John's journey times through town and by the alternative route.

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(3 marks)

**6 (c)** Which route to work do you think is better for John?  
Give a reason for your answer.

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(1 mark)

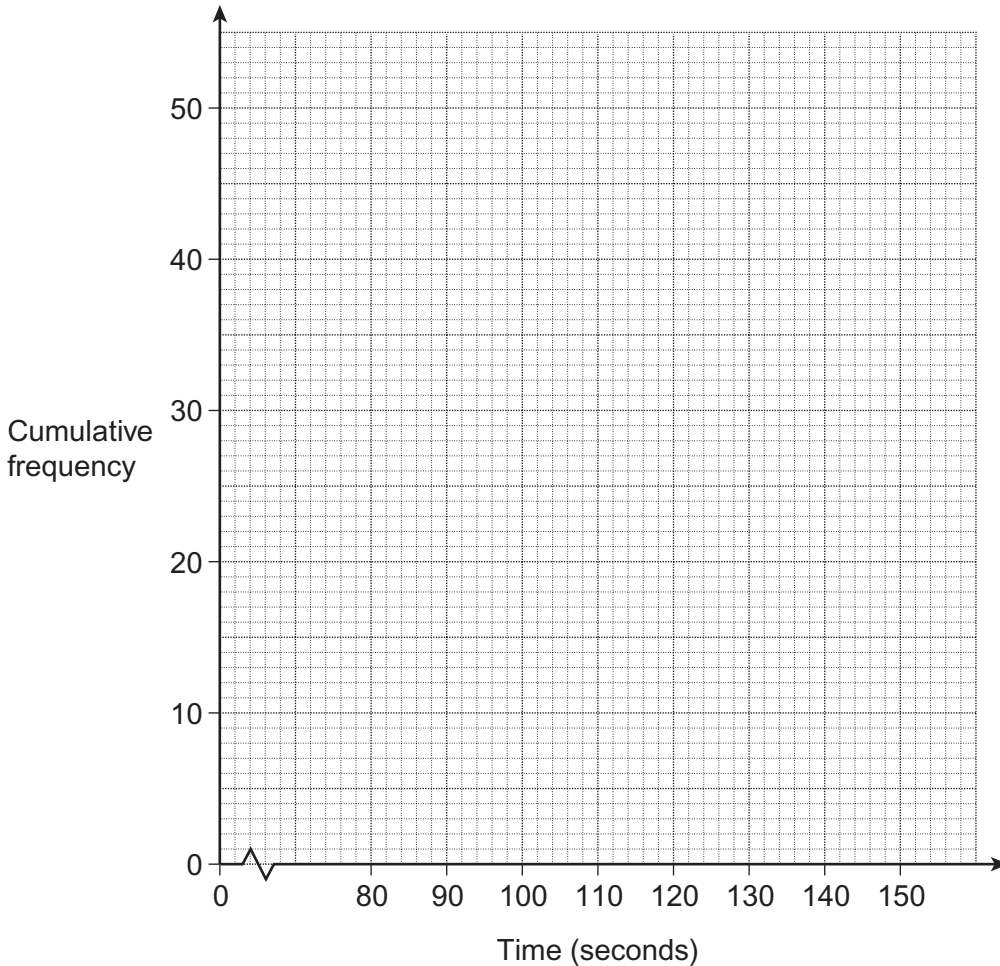
**Turn over for the next question**



7 Two running clubs, A and B, complete a race. The results for the two clubs are worked out separately. Here are some of the results for the 48 members of club A.

Time (seconds)	Position (cumulative frequency)
80	1 <sup>st</sup>
100	10 <sup>th</sup>
110	20 <sup>th</sup>
118	30 <sup>th</sup>
132	40 <sup>th</sup>
150	48 <sup>th</sup>

7 (a) (i) Draw a cumulative frequency graph to show the results.



(2 marks)



7 (a) (ii) Use your graph to estimate the median and the inter-quartile range.

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Median ..... seconds

Inter-quartile range ..... seconds (3 marks)

7 (b) For club B

the median time is 116 seconds.  
the inter-quartile range is 24 seconds.

A member of club B says

“My club has faster and less varied times than club A.”

Comment on this statement.

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(2 marks)

Turn over for the next question



**8** RPI is the Retail Price Index.  
A newspaper headline states

‘RPI for the last 12 months is 104.3’

**8 (a)** What does this value tell you?

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*(2 marks)*

**8 (b)** Mary sees the headline on her way back from the shops.  
She compares the price of her shopping with the price she paid last month.  
She works out the index for her shopping as 102.

Give **two** possible reasons for the difference between this index and the RPI.

Reason 1 .....

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Reason 2 .....

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*(2 marks)*



**9** Jane and Laura each have a meal.  
Jane pays £41.80 which includes a £4 tip.  
Laura also pays £41.80 which includes a 10% tip.

Who pays the greater tip?  
You **must** show your working.

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(4 marks)

**Turn over for the next question**

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**Turn over ►**



**\*10**

Karen buys 4 teas and 3 cakes and pays £7.20

Liam buys 3 teas and 2 cakes and pays £5.20

Jackie buys 2 teas and 3 cakes.

How much does Jackie pay?

You **must** show your working.

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Answer £ ..... (6 marks)



11 John bought a 2-year-old car for £ 12 000.  
Three years later he decides to sell the car.



I think that the value of  
the car is inversely  
proportional to its age.

John estimates the value of the car using this idea.  
The actual value of the car depreciates by 20% each year.

Work out the difference between John's estimate and the actual value.

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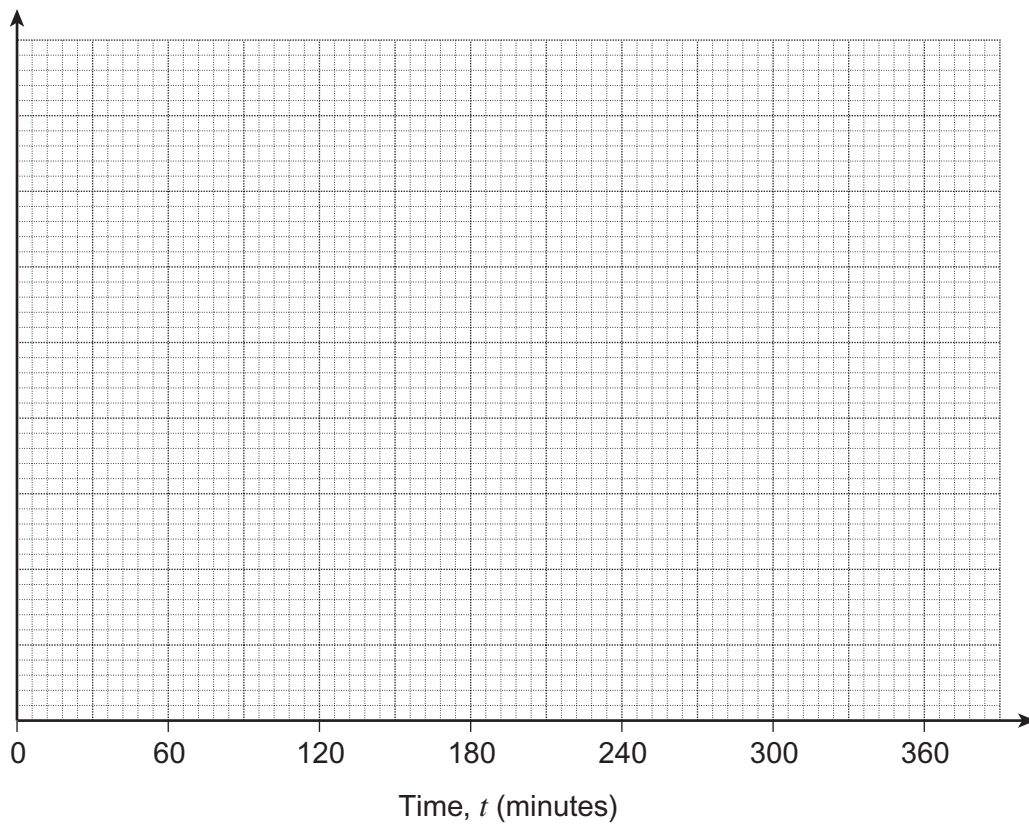
Answer £ ..... (7 marks)



- 12 A survey records the number of minutes of TV watched per day by a sample of 123 people.

Time, $t$ (minutes)	Frequency
$0 \leq t < 90$	27
$90 \leq t < 120$	24
$120 \leq t < 180$	42
$180 \leq t < 330$	30

- 12 (a) Draw a histogram to represent the data.



(3 marks)





**12 (b)** Fay watches  $3\frac{1}{4}$  hours of TV one day.

Calculate an estimate of the number of people in the survey who watch more TV than Fay.

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Answer ..... (3 marks)

**12 (c)** Fay wants to find out how much time people in her school spend watching TV. There are 600 girls and 550 boys in her school. She uses a sample of size 50 stratified by gender.

How many boys are in the sample?

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Answer ..... (2 marks)

**Turn over for the next question**



**\*13(a)** Sam uses his trailer to carry logs.

He has 2800 kilograms of logs.  
His trailer can carry 200 kilograms when full.  
Both weights are correct to 2 significant figures.

What is the least number of times the trailer could be loaded to be sure he can carry all the logs?  
You **must** show your working.

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Answer ..... (5 marks)

**13 (b)** Sam sells the logs.  
He invests the money from the sale of the logs.  
The compound interest is 3.5% each year.

After how many years will the value of his investment have doubled?

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Answer ..... years (3 marks)

**END OF QUESTIONS**

8



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