Applications of Mathematics (Linked Pair Pilot)   **93701F**

Unit 1   Foundation Tier

Specimen Paper

F

For this paper you must have:
- mathematical instruments.

You may use a calculator

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 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 3 and 14.
  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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Answer **all** questions in the spaces provided.

1 A supermarket advertises sale offers.

1 (a) Darren wants three tins of baked beans.

> Baked Beans
> Normal Price 57 p
>
> Offer: Buy two get third free

How much should he pay?

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....

Answer £ .... *(2 marks)*

1 (b) Steph wants two loaves.

> Bread
> Normal Price £ 1.08
>
> Offer: Buy two loaves and get 2nd for half price

How much should she pay?

....

....

Answer £ .... *(2 marks)*

1 (c) Pat wants two cartons of milk.

> Milk (4 litre carton)
> Normal Price £ 1.64
>
> Offer: Buy two for £ 2.50

How much will she save using the offer?

....

....

Answer £ .... *(2 marks)*

2 (a) The table shows the cost of a room at a hotel.

	Cost (£)	
Night	Friday to Sunday	Monday to Thursday
Low season	70.00	110.00
High season	88.00	138.00

2 (a) (i) How much does it cost to stay on a Saturday night in low season.

Answer £ .... *(1 mark)*

2 (a) (ii) Nisar stays at the hotel for three nights in the low season.
He arrives on Monday.

How much does he pay for his room?

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Answer £ .... *(2 marks)*

2 (a) (iii) Jacinta stays at the hotel for three nights in the high season.
She arrives on Sunday.

How much does she pay for her room?

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Answer £ .... *(2 marks)*

2 (b) Matt arrives at the hotel on the 20th June.
He leaves on the 7th July.

How many nights is he at the hotel?

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Answer .... *(2 marks)*

13

Turn over ▶

✳ **3**   The timetable shows the train times between Huddersfield and Penistone.

Train Timetable: Huddersfield to Penistone						
Huddersfield:	*depart*	08:20	10:20	12:20	14:20	16:20
Denby Dale:	*depart*	08:45	10:45	12:45	14:45	16:45
Penistone:	*arrive*	08:55	10:55	12:55	14:55	16:55

3 (a)   How long does the journey take between Huddersfield and Penistone?

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

3 (b)   Vidal and Sonia live in Huddersfield.
              It takes them 25 minutes to travel from home to Huddersfield station.
              They want to go to Penistone for a concert that starts at 3:15 pm.

              What is the latest time they can leave home to get to the concert on time?

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                     Answer .... *(3 marks)*

3 (c)   The cost of food and drink from the Trolley service on the train is shown.

> MENU
>
> Tea   £1.50
>
> Coffee   £1.50
>
> Cold drink   95p
>
> Crisps   50p
>
> Chocolate bar   85p

3 (c) (i)   They want two teas and two chocolate bars.
               They only have £5.

               Can they afford them?
               You **must** show your working.

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                     Answer .... *(3 marks)*

3 (c) (ii) During one journey the trolley attendant keeps this tally of what he sells.

	Tally	Totals
Tea	ⅢⅠ ΙΙΙ	
Coffee	ⅢⅠ ⅢⅠ ΙΙΙΙ	
Cold drink	ⅢⅠ ⅢⅠ ⅢⅠ ⅢⅠ Ι	
Crisps	ⅢⅠ ⅢⅠ ⅢⅠ ⅢⅠ ΙΙΙ	
Chocolate bar	ΙΙΙ	

Work out the amount of money he takes during the journey.

Show clearly how you work out your answer.

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Answer £ .... *(4 marks)*

Turn over for the next question

4 The dual bar chart shows the number of visits made to a school nurse over the first four days of one week.
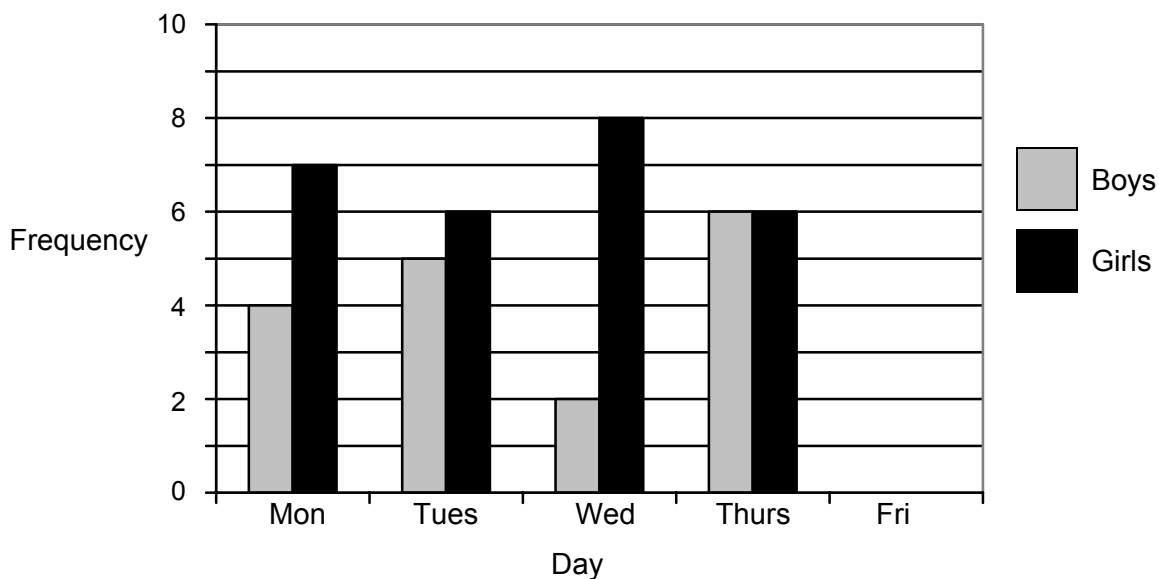
4 (a) On which of the first four days is the biggest difference between the numbers of boys and girls visiting the nurse?

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Answer .... *(1 mark)*

4 (b) By the end of Friday 18 boys in total had visited the nurse.
Twice as many girls as boys had visited her during the whole week.

Complete the chart for Friday.

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(4 marks)

4 (c) One pupil who visited the school nurse on Wednesday is chosen at random.

Write down the probability that this pupil is a girl.

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Answer .... *(2 marks)*

5   Here is a method for converting temperatures from Celsius to Fahrenheit.

| Start with temperature in Celsius | → | Multiply by 9 | → | Divide by 5 | → | Add 32 | → | Answer is temperature in Fahrenheit |
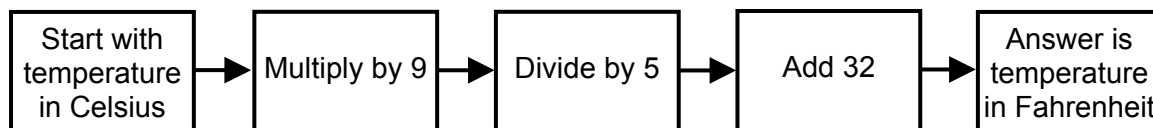
Lauren lives in London.

She telephones her friend Johann who lives in Amsterdam.

Johann says, "The temperature in Amsterdam is 75° Fahrenheit."

Lauren says, "The temperature in London is 2° Fahrenheit hotter."

What is the temperature in London in °C?

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Answer ....°C *(4 marks)*

11

6   Fastbus and Quickline run buses on the same routes.

Paul and Sally are comparing the service of Fastbus and Quickline.

The table shows the advertised journey time for each of nine routes.
It also shows the number of minutes late for the first bus on each route one morning.

	Fastbus		Quickline	
	Advertised journey time (minutes)	Number of minutes late	Advertised journey time (minutes)	Number of minutes late
Route A	120	5	140	0
Route B	60	0	70	0
Route C	145	15	150	45
Route D	180	30	180	60
Route E	95	5	100	0
Route F	140	20	150	5
Route G	95	5	120	0
Route H	110	0	120	25
Route I	70	10	80	0

Example: Route A – Fastbus five minutes late, Quickline on time (0 minutes late)

6 (a)   Write down the advertised journey time for Quickline on route B.

Give your answer in hours and minutes.

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Answer .... hours .... minutes *(1 mark)*

6 (b)   How many more minutes late was Fastbus than Quickline on route F?

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

6 (c)   Show that the median number of minutes late for Fastbus is 5 minutes.

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(2 marks)

6 (d) Complete the table below by working out the mean number of minutes late for Quickline.

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(2 marks)

	Fastbus	**Quickline**
Mean number of minutes late	10	
Median number of minutes late	5	0
Modal number of minutes late	5	0

6 (e) Paul and Sally disagree over who has the better bus service, Fastbus or Quickline.

6 (e) (i) Paul says that Fastbus is better.

Give **one** reason why Paul could be correct.

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(1 mark)

6 (e) (ii) Sally says that Quickline is better.

Give **one** reason why Sally could be correct.

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(1 mark)

9

Turn over ▶

7   Here is a flowchart for working out the interest paid on a one year's savings bond.

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                    ┌──────────┐
                    │  Start   │
                    └────┬─────┘
                         │
                         ▼
                  ╱──────────────╲
                 ╱     Input       ╲
                ╱     amount        ╲
                ╲   Invested (A)    ╱
                 ╲─────────────────╱
                         │
                         ▼
                      ╱─────╲
                     ╱  Is   ╲
                    ╱ amount  ╲        Yes
                   ╱ invested (A)╲───────────────┐
                   ╲ less than   ╱               │
                    ╲  £1000    ╱                │
                     ╲────┬────╱                 ▼
                       No │              ┌──────────────┐
                          ▼              │  A × 2 ÷ 100 │
                   ┌──────────────┐      └──────┬───────┘
                   │ A × 5 ÷ 100  │             │
                   └──────┬───────┘             │
                          │                     │
                          ▼                     │
                  ╱──────────────╲              │
                 ╱  Write down     ╲◄───────────┘
                ╱  the interest     ╲
                ╲─────────┬─────────╱
                          │
                          ▼
                    ┌──────────┐
                    │   Stop   │
                    └──────────┘
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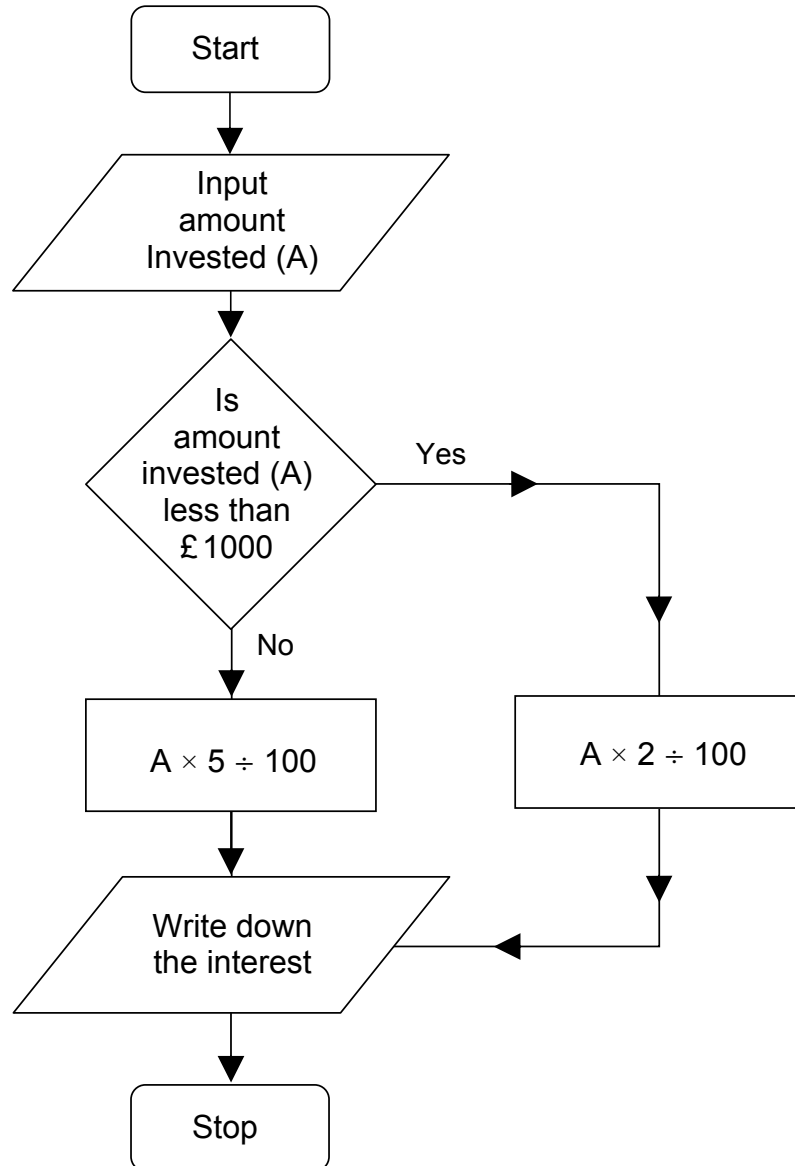
Work out the interest when £1500 is invested.

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Answer £ .... *(2 marks)*

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8 In a science experiment Sita adds weights to a spring.
Each time she adds a weight she measures the length of the spring.

Her results are shown in the table.

Weight (g)	Length of Spring (cm)
20	165
30	180
40	195
50	210

8 (a) What is the length of the spring for a weight of 45 g?

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

8 (b) Work out the length of the spring with no weight on it.

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

Turn over for the next question

6

Turn over ▶

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9   Terri goes on holiday to Germany.
She buys some euros for £500.
On her holiday, Terri spends 484 Euros.
When she arrives back in Britain she sells the remaining euros for pounds.

When she buys euros   £1 = 1.14 Euros
When she sells euros   £1 = 1.18 Euros

How much money, in pounds, does she get back after her holiday?

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Answer £ .... *(4 marks)*

10 Mr Jones buys a new car for £18 245 in June 2004.
He sold it for £8500 in June 2009.

Here is a formula to work out the annual depreciation.

$$\text{Annual depreciation} = \frac{\text{Original price (£)} - \text{Final price (£)}}{\text{Number of years}}$$

10 (a) Use the formula to work out the annual depreciation of the car.
Give your answer to the nearest £10.

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Answer £ .... *(3 marks)*

10 (b) Estimate the value of the car in June 2010.

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Answer £ .... *(2 marks)*

9

Turn over ▶

11 This spreadsheet gives details of the weights of chocolate and packaging in two Easter Eggs.

	A	B	C	D	E
1	**Easter Egg**	**Weight of Chocolate (g)**	**Weight of packaging (g)**	**Total weight of Easter Egg (g)**	**% of chocolate in Easter Egg by weight**
2	Chokky	340	170	510	66.7
3	Dairy Crisp	575	240		

11 (a) Tom writes formulae to complete the spreadsheet.

This is the formula he writes for column D row 2 = B2 + C2

What formula does he write for column D row 3?

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Answer .... *(1 mark)*

11 (b) His formula for column E row 2 is = B2 ÷ D2 × 100

Use this information to complete the spreadsheet.

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(2 marks)

12 A shop manager records the time that customers spend in her shop and the amount of money they spend.

Here are the results

Time	Average spent per customer
5 minutes or less	£10
Greater than 5 minutes	£20

She estimates that if 15 customers visit her shop the takings will be £200.

Use all the information given to work out the greatest number of these 15 customers who spend 5 minutes or less in the shop.

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Answer .... *(4 marks)*

7

Turn over ▶

13   Rio wants to know the number of driving lessons he might need before he passes his driving test.

He also wants to know the number of times he might have to take his driving test before he passes.

He collects some data and shows it on this scatter graph.
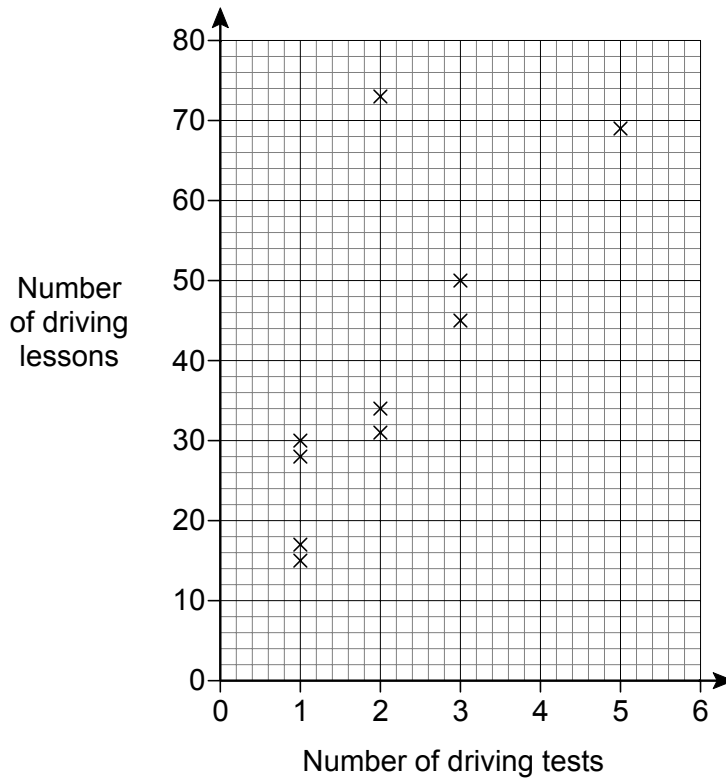
13 (a)   Rio ignores one of the points on the scatter graph.

Circle this point and give a reason why it should be ignored.

Reason ....…………...………....……………………………………………...

...........................……………...………....……………………………………………...

(2 marks)

13 (b)   Draw a line of best fit on the scatter graph.

(1 mark)

13 (c)   Rio has already failed his driving test three times after a total of 40 driving lessons.

13 (c) (i)   Estimate how many **more** driving lessons Rio needs if he is to pass his driving test on the fourth attempt.

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Answer .... *(2 marks)*

13 (c) (ii) Give a reason why this estimate might be unreliable.

.............................……………..………......…………..

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(1 mark)

Turn over for the next question

6

Turn over ▶

✱ **14** Value added tax (VAT) is an extra charge for some goods and services.
The rate of VAT is 15%

T is the total cost including VAT.
A is the amount excluding VAT.

14 (a) Which of the following formulae is correct?
Circle **all** correct answers.

$$T = 1.15A \qquad T = A + 0.15A \qquad T = A\left(1 + \frac{15}{100}\right) \qquad T = A + \frac{A}{10} + \frac{A}{20}$$

(2 marks)

14 (b) A laptop cost £480 excluding VAT.

The laptop can be paid for in instalments using an interest free offer.

To use the offer a 25% deposit has to be paid and the remaining balance is paid by 24 equal monthly instalments.

How much is **one** monthly instalment?
Show clearly how you work out your answer.

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Answer £ .... *(6 marks)*

END OF QUESTIONS

8

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