

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel Level 3 Certificate

Friday 23 May 2025

Afternoon (Time: 1 hour 40 minutes)

Paper reference **7MC0/02**

Mathematics in Context

PAPER 2: Applications



You must have: Ruler graduated in centimetres and millimetres, pen, HB pencil, eraser, calculator. Source booklet (enclosed)

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- **Calculators may be used.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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SECTION A

Answer ALL questions. Write your answers in the spaces provided.

EMPLOYMENT

Refer to **data source A** in the source booklet for Question 1.

- 1 (a) Use the information in Table 1 to calculate the mean of the average full time annual earnings in the UK in 2022.

(1)

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- (b) Use the information in Table 1 to calculate the range of the average full time annual earnings in the UK in 2022.

(2)

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Anabel says,

“The average annual full time earnings in Scotland are more than 9% higher than the average annual full time earnings in Wales.”

(c) Is Anabel correct?

Justify your answer.

(3)

(Total for Question 1 is 6 marks)



Refer to **data source B** in the source booklet for Question 2.

- 2 The table gives information about the average annual earnings (US\$) in European countries.

Country	Average annual earnings (US\$)
Greece	26 000
Spain	43 000
Finland	52 000
Ireland	52 000
France	53 000
Norway	54 000
United Kingdom	54 000
Germany	59 000
Netherlands	63 000
Austria	64 000
Denmark	64 000
Belgium	65 000
Switzerland	73 000
Luxembourg	78 000
Iceland	80 000



An outlier is defined as any value that is

greater than the upper quartile + $(1.5 \times \text{interquartile range})$

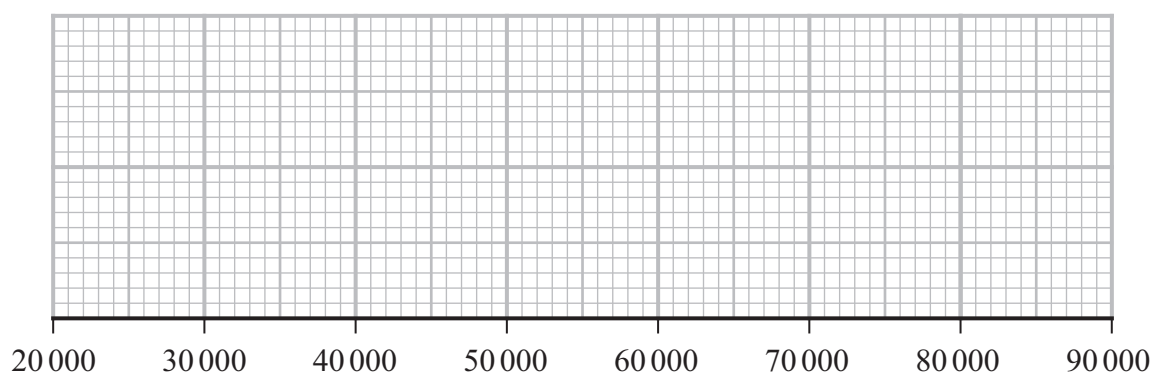
or

less than the lower quartile - $(1.5 \times \text{interquartile range})$

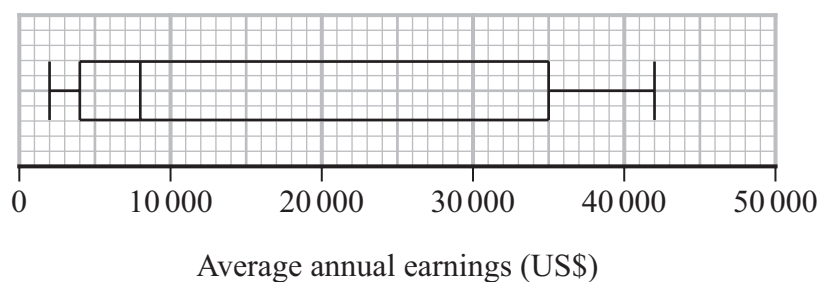
- (a) Using the graph paper below, draw a box plot to show the information from the average annual earnings column in the table.

You must show any outliers on your box plot, and any calculations used to identify these outliers.

(6)



The box plot below shows information about the average annual earnings (US\$) in some countries in South East Asia for 2022.



(b) Use the box plots to compare the two distributions.

(2)

(Total for Question 2 is 8 marks)

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Turn over for Question 3



Refer to **data source C** in the source booklet for Question 3.

- 3 The table below and the graph opposite show information about the unemployment rate in the UK between 2020 and 2022, given to 1 decimal place.

Year	Month	Unemployment rate (%)	4 - point moving average
2020	January	3.9	4.3
	April	4.0	
	July	4.3	
	October	5.0	
2021	January	5.1	4.8
	April	4.8	4.9
	July	4.6	4.7
	October	4.2	4.4
2022	January	3.9	4.1
	April	3.8	3.9
	July	3.6	
	October	3.7	

- (a) Calculate the missing 4 - point moving average.

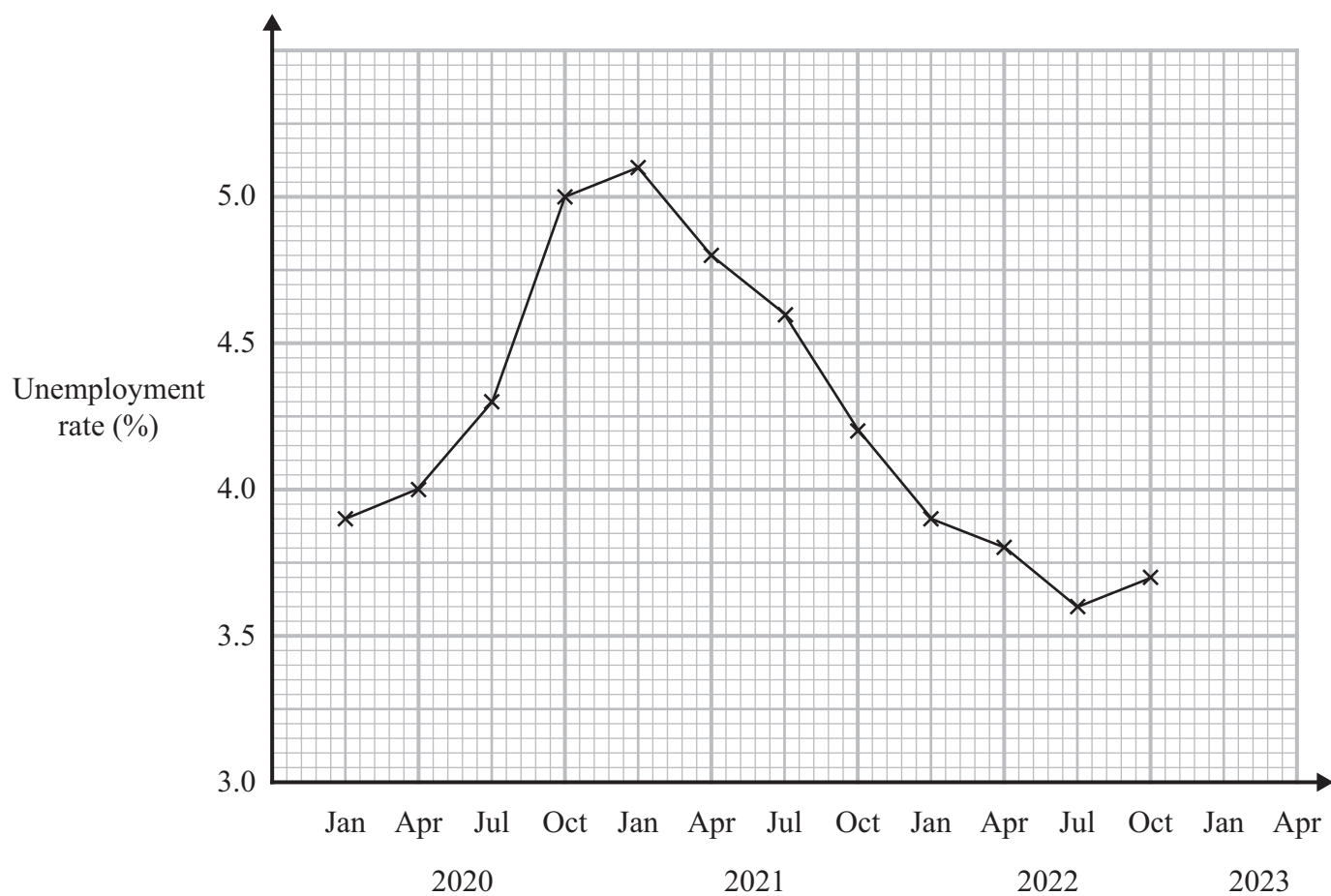
(2)



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(b) On the same grid, plot the moving averages.

(2)

(c) Use the time series graph and your answer to part (b) to estimate the UK unemployment rate for January 2023

(2)

(Total for Question 3 is 6 marks)

TOTAL FOR SECTION A IS 20 MARKS

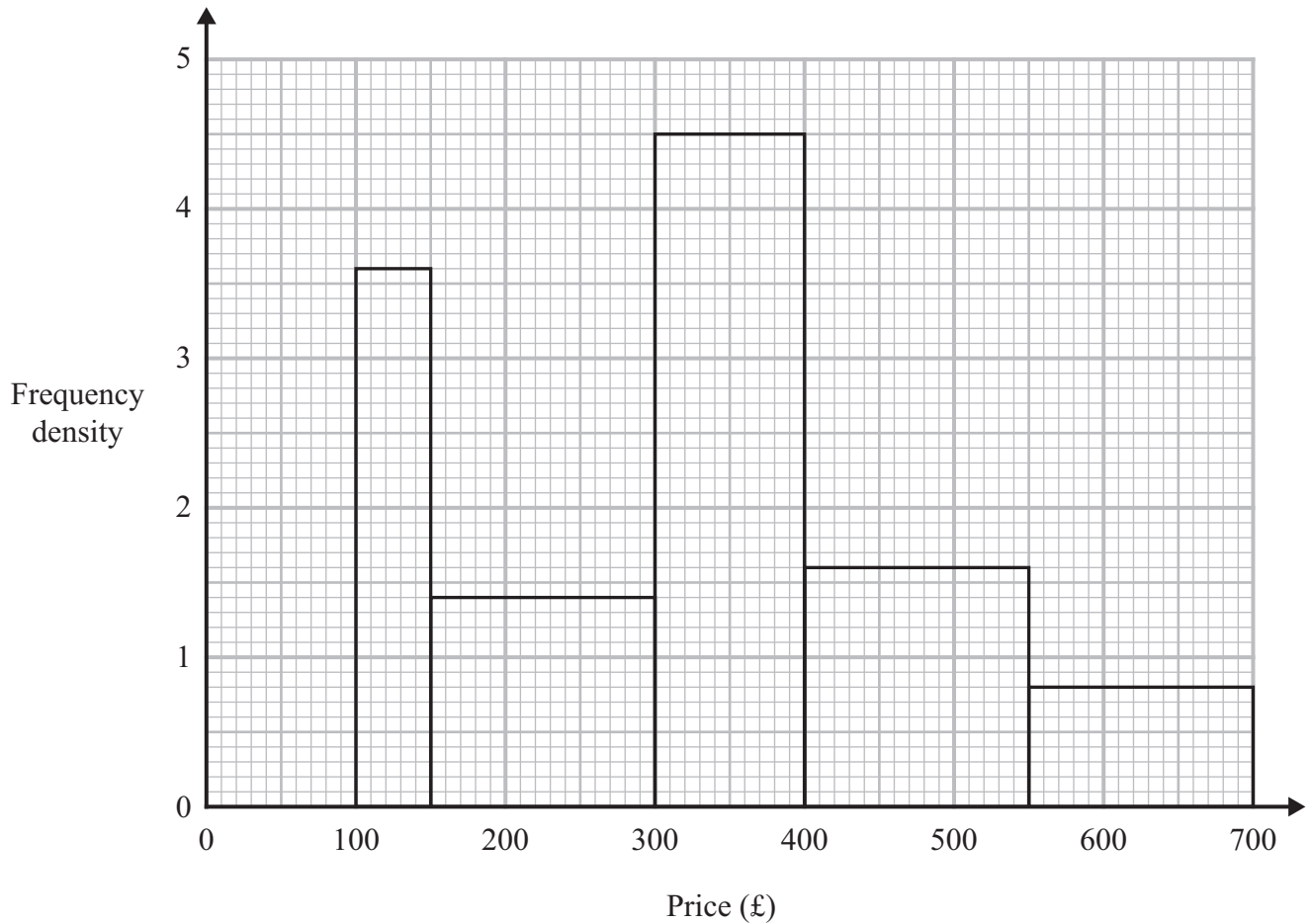


Section B

Answer ALL questions. Write your answers in the spaces provided.

TASK 1: CAR INSURANCE

- 4 The histogram shows information about the price, in £, that a sample of people paid for their car insurance in 2022.



- (a) Show that the number of people in the sample is 1200

(3)

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In 2022, the mean price people paid for car insurance was £510

- (b) (i) Work out an estimate for the percentage of people in the sample who paid more than £510 for car insurance.

(3)

- (ii) Give a reason why your answer to part (b) (i) is only an estimate.

(1)

One person from the sample is chosen at random.

- (c) Estimate the probability that this person paid between £200 and £350 for car insurance.

(3)

(Total for Question 4 is 10 marks)

- 5 In 2022 the price of Suha's car insurance was £478
In 2023 the price of car insurance increased by 7%

Assuming the rate of increase per year does not change, calculate the price of Suha's car insurance in 2030

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(Total for Question 5 is 3 marks)

- 6 Chan is renewing her car insurance for next year.

The percentage increase in the price of her car insurance depends on whether the insurance company thinks she is high risk, medium risk or low risk.

The table shows the probability and percentage increase for each type of risk.

Risk	Probability	Percentage increase
High	0.35	9.5%
Medium	0.40	6.0%
Low	0.25	4.2%

This year the price of Chan's car insurance was £650

- (a) Calculate an estimate for the price of her car insurance next year.

(4)

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If Chan parks her car in her garage the probabilities for the level of risk will change.

The percentage increase for each level of risk will stay the same.

Chan uses the new probabilities to find a new estimate for the price of her car insurance.

Using this year's price of £650 she works out,

the high risk part of the estimate to be £192.17

the medium risk part of the estimate to be £289.32

(b) Calculate the new probabilities for high risk, for medium risk and for low risk.

(3)

(Total for Question 6 is 7 marks)

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8 A new cinema is being built.

There will be two types of seat, standard seats and premier seats.

Let x represent the number of standard seats.

Let y represent the number of premier seats.

One constraint on the number of seats can be represented by the inequality $x + y \leq 300$

(a) (i) Explain, in context, what this inequality represents.

(1)

Another constraint can be represented by the inequality $\frac{x}{x + y} \leq 0.6$

(ii) Write this inequality in the form $ax \leq by$ where a and b are integers.

(2)

The number of standard seats will be at least 125% of the number of premier seats.

(iii) Write down an inequality to represent this information.

Give your answer in its simplest form with integer coefficients.

(2)



The table shows the cost to buy and the cost to install each type of seat.

Type of seat	Cost to buy (£)	Cost to install (£)
Standard	34.50	19.50
Premier	87.50	21.50

The cinema wants to know the maximum total cost, £ C , to buy and install the seats.

- (b) Write down the objective function, C , in terms of x and y .
Give your answer in its simplest form.

(2)

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The plan for the new cinema changes.

The total number of seats increases.

The proportion of standard seats and premier seats changes.

The new constraints are

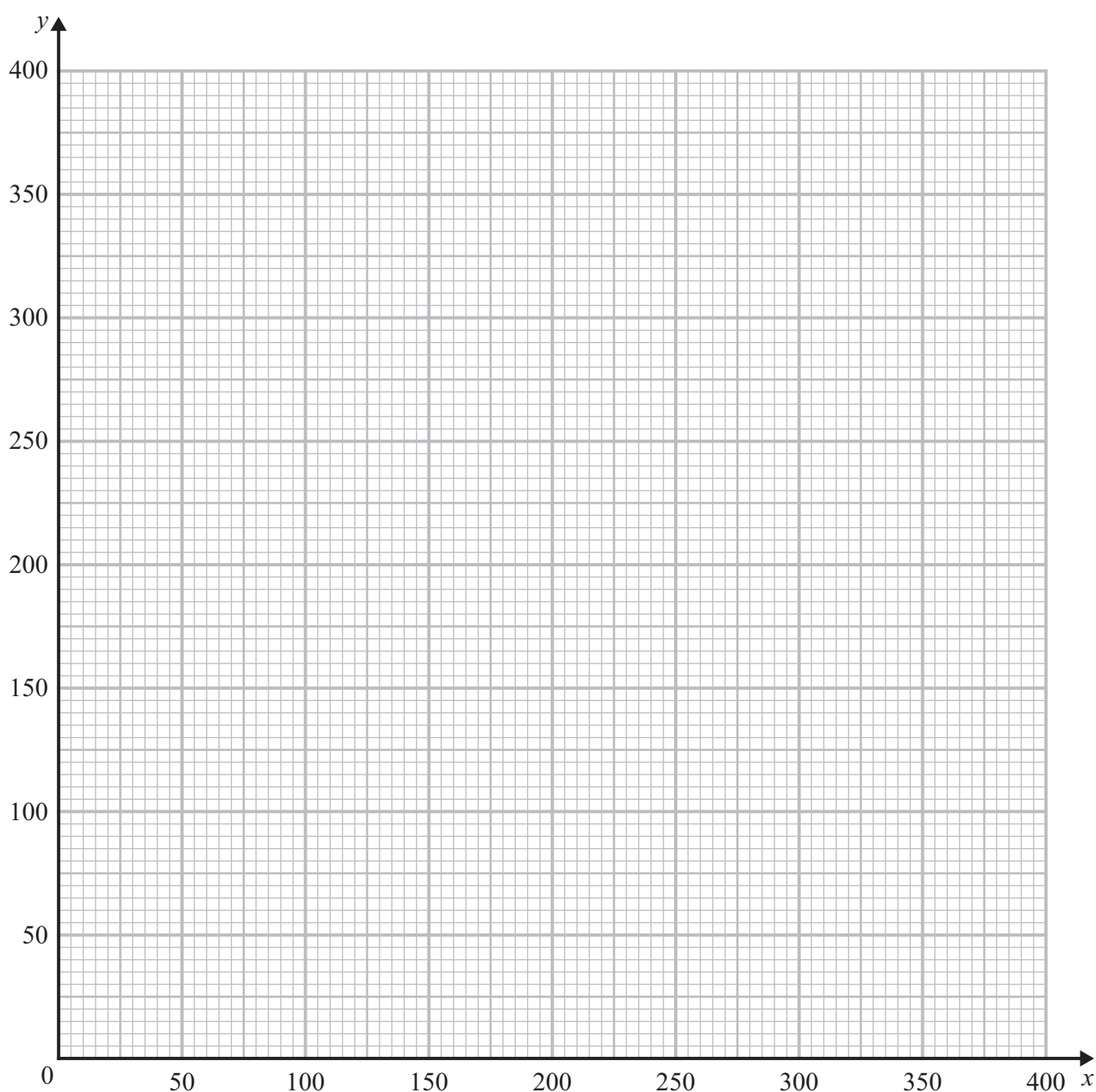
$$x + y \leq 350$$

$$7y \geq 3x$$

$$4y \leq 3x$$

- (c) Represent these inequalities on the grid.
Label the feasible region **R**.

(4)



The costs remain the same and are shown in the table below.

Type of seat	Cost to buy (£)	Cost to install (£)
Standard	34.50	19.50
Premier	87.50	21.50

- (d) Find the maximum total cost to buy and install the seats. State the number of each type of seat.

(5)

(Total for Question 8 is 16 marks)

TASK 3: GAMING DEVICES

- 9 A gaming company surveyed some gamers to find out their ages.

The table shows information about the ages of 150 gamers.

Age (a years)	Frequency		
$14 \leq a < 24$	42		
$24 \leq a < 34$	43		
$34 \leq a < 44$	35		
$44 \leq a < 54$	21		
$54 \leq a < 64$	9		

Calculate an estimate for the mean age of these gamers.

Give your answer correct to the nearest year.

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(Total for Question 9 is 4 marks)



- 10 In January (month 1) of 2025 a company sold 1 500 000 copies of a game.
The company expects the number of sales of this game to go down each month.

The expected number of sales of this game for the company in each month of 2025 can be modelled by

$$1\,500\,000 \times 0.97^{m-1}$$

where m is the month number in 2025.

- (a) Calculate the expected number of sales of this game in September (month 9) of 2025.

(2)

- (b) Calculate the expected total number of sales of this game in the period January 2025 to December 2025.

(3)

(Total for Question 10 is 5 marks)

- 11 The gaming company surveyed 1500 other people to find out which devices they have from device A , device B and device C .

35 people have all 3 devices

437 people have device A and device B

16 people have device A and device C but **not** device B

576 people have device A

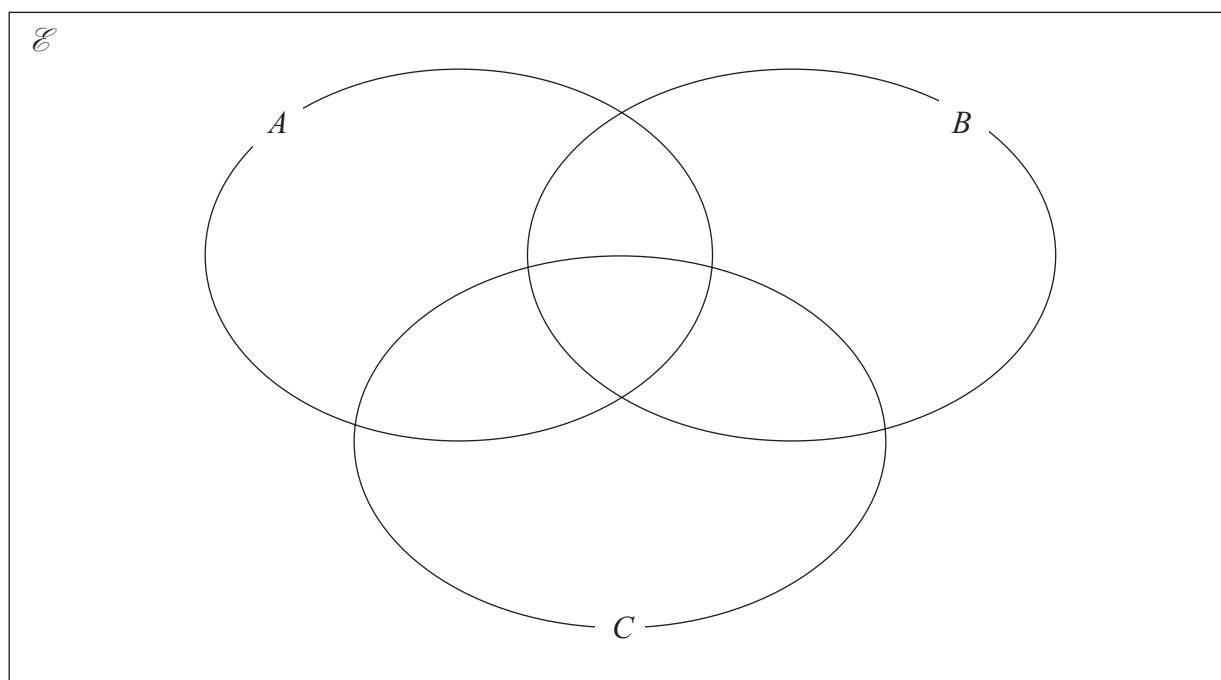
41 people have device B and device C but **not** device A

1051 people have device B

121 people have only device C

- (a) Complete the Venn diagram to show this information.

(4)



- (b) Shade the region $A \cap B \cap C$

(1)



The company chose at random one person from the group.

- (c) (i) Find the probability that this person has device B and device C but **not** device A . (2)

- (ii) Find the probability that this person has device A given that they have device B . (2)

Johan has only device C .

- (d) Write this information using set notation. (1)

- (e) Give an interpretation in context of $A \cap B'$ (1)

(Total for Question 11 is 11 marks)

TOTAL FOR SECTION B IS 60 MARKS
TOTAL FOR PAPER IS 80 MARKS



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Afternoon (Time: 1 hour 40 minutes)

Paper
reference

7MC0/02

Mathematics in Context

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Source Booklet

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Formulae sheet

There will be no credit for anything you write on this formulae sheet.

Mean of a frequency distribution $= \frac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \frac{\sum fx}{\sum f}$, where x is the mid-interval value

Variance $= \frac{\sum (x - \bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2 \right]}$

or $\sqrt{\left[\frac{\sum (x - \bar{x})^2}{n} \right]}$

where $\bar{x}$ is the mean of the set of values

Standard deviation
(discrete frequency distribution) $\sqrt{\left[\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2 \right]}$

or $\sqrt{\left[\frac{\sum f(x - \bar{x})^2}{\sum f} \right]}$

Spearman's rank correlation coefficient $1 - \frac{6\sum d^2}{n(n^2 - 1)}$



The product moment correlation coefficient is

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}} = \frac{\sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}}{\sqrt{\left(\sum x_i^2 - \frac{(\sum x_i)^2}{n}\right)\left(\sum y_i^2 - \frac{(\sum y_i)^2}{n}\right)}}$$

The regression coefficient of y on x is $b = \frac{S_{xy}}{S_{xx}}$

Least squares regression line of y on x is $y = a + bx$ where $a = \bar{y} - b\bar{x}$

Arithmetic series

$$u_n = a + (n - 1)d$$

$$S_n = \frac{1}{2}n(a + l) = \frac{1}{2}n[2a + (n - 1)d]$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1 - r^n)}{1 - r}$$

$$S_\infty = \frac{a}{1 - r} \quad \text{for } |r| < 1$$

There will be no credit for anything you write in this source booklet.

Data source A: EMPLOYMENT

Table 1: Average annual earnings (£) for full time employees in UK by region in 2022

Region	Average annual earnings (£)
Scotland	33 332
North East	29 521
North West	30 716
Northern Ireland	30 000
Yorkshire and Humberside	30 000
West Midlands	31 601
East Midlands	30 326
Wales	30 596
East	32 539
London	41 866
South East	34 431
South West	31 339
Total	386 267

Data source B**Table 2: Average annual earnings in European countries in 2022
in US dollars (US\$) to the nearest \$1000**

Country	Average annual earnings (US\$)
Austria	64 000
Belgium	65 000
Denmark	64 000
Finland	52 000
France	53 000
Germany	59 000
Greece	26 000
Iceland	80 000
Ireland	52 000
Luxembourg	78 000
Netherlands	63 000
Norway	54 000
Spain	43 000
Switzerland	73 000
United Kingdom	54 000

Data source C**Table 3: Quarterly unemployment rate in the UK for 2020 to 2022**

Year	Month	Unemployment rate (%)
2020	January	3.9
	April	4.0
	July	4.3
	October	5.0
2021	January	5.1
	April	4.8
	July	4.6
	October	4.2
2022	January	3.9
	April	3.8
	July	3.6
	October	3.7

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Source information (source available at the time of writing)

Data source A adapted from: <https://www.statista.com/statistics/416139/full-time-annual-salary-in-the-uk-by-region/>

Data source B adapted from: <https://www.statista.com/statistics/557777/average-annual-salaries-in-europe/>

Data source C adapted from: <https://www.statista.com/statistics/279898/unemployment-rate-in-the-united-kingdom-uk/>