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Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

Level 3 Certificate

MATHEMATICAL STUDIES

Paper 2A Statistical Techniques

Thursday 22 May 2025

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of the Preliminary Material, Formulae Sheet and Statistical Tables (enclosed)
- a scientific calculator or a graphics calculator
- a ruler.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- 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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Show all necessary working; otherwise, marks for method may be lost.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- The **final** answer to questions should be given to an appropriate degree of accuracy.
- You may **not** refer to the copy of the Preliminary Material that was available prior to this examination. A clean copy is enclosed for your use.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You may ask for more answer paper or graph paper, which must be tagged securely to this answer booklet.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
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7	
8	
TOTAL	



J U N 2 5 1 3 5 0 2 A 0 1

G/LM/Jun25/G4002/V6

1350/2A

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

- 1** Total solar eclipses happen when the moon fully blocks the Sun's light on Earth.
They occur approximately every 18 months.

The table below shows where and when total solar eclipses can be seen in the years 2026 to 2035

It also includes the maximum length of time the eclipses can be seen in one place, stated as duration in minutes (m) and seconds (s).

There can only be one total solar eclipse in any year, but it may be visible in more than one continent.

Year	Continents where the total solar eclipses can be seen					Duration
	Europe	North America	Asia	Africa	Australia	
2026	✓	✓				2m18s
2027	✓		✓	✓		6m23s
2028			✓		✓	5m10s
2029						–
2030				✓	✓	3m44s
2031						–
2032						–
2033		✓	✓			2m36s
2034			✓	✓		4m09s
2035			✓			3m53s

- 1 (a)** What fraction of the total solar eclipses that can be seen in **Asia** in these years will last longer than 4.5 minutes?

Circle your answer.

[1 mark]

$$\frac{2}{7}$$

$$\frac{3}{7}$$

$$\frac{2}{5}$$

$$\frac{3}{5}$$



Jaydon is analysing the data in the table.

- 1 (b) He claims that the range of eclipse duration in Europe is **more than double** the range of eclipse duration in Africa.

Does the data support this claim?

Show working to justify your answer.

[2 marks]

- 1 (c) Jaydon incorrectly works out the median duration of total solar eclipses in Europe **and/or** North America in these years as 2 m 27 s

Explain the mistake Jaydon has made in his **method** and state the correct median duration.

[2 marks]

Mistake _____

Correct median _____ m _____ s

5

Turn over for the next question

Turn over ►



2 Use **European Champions Report, 2023**, from the Preliminary Material.

Charlie is writing a report on the finances of football clubs.

She uses information from the European Champions Report, 2023

2 (a) Charlie's report states

The proportion of revenue received from broadcasting is approximately equal for Manchester City FC and AFC Ajax.

Is this correct?

You **must** show your working.

[3 marks]

2 (b) Charlie analyses the ratio of revenue sources

Commercial : Broadcasting : Matchday

Show that for one club this ratio is approximately 3 : 4 : 1 and state the club.

[3 marks]

Club _____



- 2 (c)** Charlie notices that the total revenue stated for Real Madrid CF in **Table 1** and **Extract 1** does not match the figures in **Graph 1**.
She assumes this must be due to rounding of the raw data values used in **Graph 1**.
Give an example calculation that would justify her assumption.

[1 mark]

- 2 (d)** From the 2020/21 season to the 2021/22 season, the total revenue of AC Milan increased by 16% and the total revenue of FC Porto decreased by 6%.
- Work out the difference between AC Milan's total revenue and FC Porto's total revenue for the **2020/21** season.
- Give your answer to the **nearest million** euros (€).
- You **must** show your working.

[3 marks]

Answer € _____ million

Question 2 continues on the next page

Turn over ►



2 (e) Make two criticisms of **Graph 2** from the Preliminary Material.

[2 marks]

Criticism 1 _____

Criticism 2 _____

2 (f) Use **Extract 2** and **Graph 2** from the Preliminary Material.

Charlie analyses the profit/loss of the eight clubs.

Her report states

On average, clubs in Europe that win their league
make a loss of about €50 m every year.

2 (f) (i) Show how one statistical measure supports this statement.

[2 marks]

2 (f) (ii) Give **one** reason why this statement might be misleading.

[1 mark]



- 3** A hospital manager is reviewing the annual salaries of senior nurses in London. The manager makes point estimates of the mean annual salary of senior nurses in a sample of three hospitals in London. Here is their data.

Number of senior nurses	Mean annual salary (£)
17	39 000
8	32 000
15	35 000

- 3 (a)** For this data, show that the point estimate of the population mean is £36 100

[3 marks]

- 3 (b)** State the population in this review.

[1 mark]

- 3 (c)** Explain how the manager could get a better estimate of the population mean.

[1 mark]



[1 mark]

1

 $N(1, 1)$

5 (a) Using a 92% confidence interval for μ , comment on the claim that $\mu = 425$

[6 marks]

[illegible]

5 (b) Work out the probability that the 92% confidence interval is wholly below μ .

[2 marks]

8

Turn over for the next question

Turn over ►



- 6 Two variables have perfect positive correlation.

Circle the product moment correlation coefficient (pmcc) for these two variables.

[1 mark]

−1

0

1

100

1

- 7 Researchers in a small town are investigating the relationship between the age of adult residents and the amount of time they spend browsing the internet.

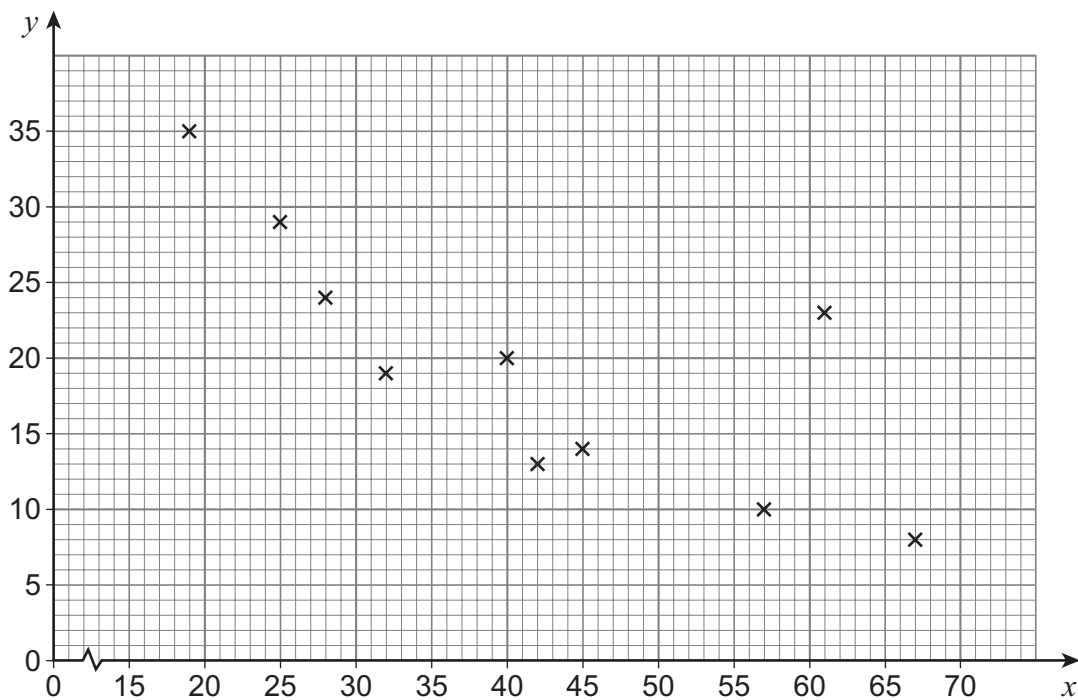
The data they collected for 10 adult residents is shown in the table.

x is the age of the resident in years.

y is the number of hours the resident spends per week browsing the internet.

x	19	25	28	32	40	42	45	57	61	67
y	35	29	24	19	20	13	14	10	23	8

This data is represented on a scatter diagram.



- 7 (a) (i) The data from one resident is an outlier.

How old is that resident?

[1 mark]

Answer _____ years



- 7 (a) (ii)** By calculating the pmcc, state the **type** and **strength** of the correlation between x and y .
Do **not** include the outlier.

[2 marks]

pmcc = _____

Type and strength _____

- 7 (a) (iii)** How would including the outlier affect the pmcc and the type and strength of the correlation?

You do **not** need to calculate the new pmcc.

[2 marks]

pmcc _____

Type and strength _____

- 7 (a) (iv)** The researchers claim that the older the resident, the less time they spend browsing the internet.

Explain why this claim may not be correct.

[1 mark]

Question 7 continues on the next page

Turn over ►



- 7 (b) (i)** Without the outlier, use the equation of the regression line of y on x to estimate the number of hours a 70-year-old resident spends per week browsing the internet.

You **must** show your working.

[4 marks]

Answer _____ hours

- 7 (b) (ii)** Give **one** reason why this estimate may not be reliable.

[1 mark]



8 (a) Write down the probability that the rainfall in a particular year is below the mean.

Answer _____

You **must** show your working.

[illegible]

Answer _____

Turn over ►



You **must** show your working.

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Answer _____ mm



8 (d) Here is a statement.

“The difference between the maximum and minimum annual rainfall is four standard deviations.”

Explain why the statement is **not** valid for the normal distribution model of R .

[2 marks]

14

END OF QUESTIONS



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