

AQA

Please write clearly in block capitals.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

I declare this is my own work.

Level 3 Certificate MATHEMATICAL STUDIES

Paper 1

Wednesday 14 May 2025

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of the Preliminary Material and Formulae Sheet (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 each question in the space provided. Do not write outside the box around each page.
- If you need extra space for your answer(s), use the additional pages at the end of this book.
- Show all necessary working; otherwise marks for method may be lost.
- The final answer to questions should be given to an appropriate degree of accuracy.
- You may not refer to any copy of the Preliminary Material seen prior to this examination.

Information

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

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	

Answer all questions in the spaces provided.

Do not write outside the box

1

(a) Circle the one example of qualitative data.

[1 mark]

☐ height of barley plants ☐ colour of grain ☐ mass of harvest ☐ time to maturity

(b) A farmer records the yield of barley from a field each year.

Which word does **not** describe the data collected? Circle your answer.

[1 mark]

☐ discrete ☐ raw ☐ secondary

Do not write outside the box

2

A farm grows barley in two different seasons.

	Spring barley	Winter barley	Total
Irrigated fields	48	72	120
Non-irrigated fields	60	100	160
Total	108	172	280

A stratified sample of 40 fields is taken.

2 (a) Work out the number of winter barley fields in the sample. [2 marks]

Answer _____

2 (b) Work out the number of irrigated fields in the sample. [2 marks]

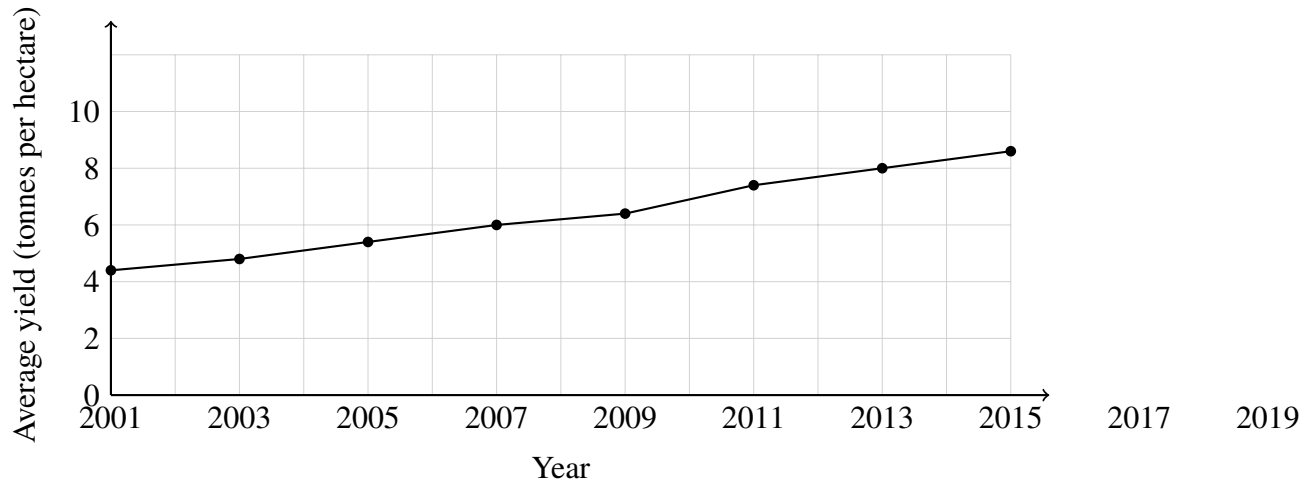
Answer _____

2 (c) Explain why stratified sampling is suitable here. [1 mark]

Do not write outside the box

3

The graph shows the average yield of barley in the UK, in tonnes per hectare, every 2 years from 2001 to 2023.



3 (a) Plot an estimate of the average yield in 2017.

[1 mark]

3 (b) Which year shows an average yield just over double the 2001 value?

[1 mark]

3 (c) In 2023 the average yield was 7.8 tonnes per hectare.

Estimate the percentage change in the average yield from 2001 to 2023.

[3 marks]

Do not write outside the box

4

Estimate the total number of hours an average person spends using a mobile phone in their lifetime.
State any assumptions you make. [4 marks]

Answer _____ hours

Do not write outside the box

5

A farmer buys a grain dryer for £68 000.
Its value decreases by 8% per year.

5 (a) Work out the value of the dryer after 6 years. [3 marks]

Answer £_____

5 (b) State one assumption made in your calculation. [1 mark]

Do not write outside the box

6

Teachers in a Maths department are analysing Core Maths mock results.

The results for the 2025 cohort are shown in Table 1.

Mark (%)	Frequency
0 to 10	3
11 to 20	7
21 to 30	14
31 to 40	26
41 to 50	38
51 to 60	42
61 to 70	35
71 to 80	21
81 to 90	10
91 to 100	4
Total	200

Statistical data for the 2024 cohort are shown in Table 2.

Mean	56.2	Standard deviation	18.9
Median	55.4	Interquartile range	24.6

Compare the performance of the two cohorts using one measure of average and one measure of spread. [5 marks]

[illegible]

Do not write outside the box

7 Use Barley Yield from the Preliminary Material.

A cooperative plans to grow barley to supply a large food producer.

The government wants the cooperative to produce enough barley for **600 000 tonnes per year**.

The cooperative plans to grow barley on fields that all have the same average conditions.

This formula can be used to estimate the annual yield, in tonnes, of the cooperative.

$$Y = A \cdot y \cdot f$$

where

- Y is the total annual yield (tonnes)
- A is the total area grown (hectares)
- y is the expected yield (tonnes per hectare)
- f is the yield factor (percentage $\div 100$)

From the Preliminary Material:

- a typical barley field produces between 5 and 9 tonnes per hectare
- a yield factor between 70% and 95% is common

7 (a) Estimate the minimum total area, in hectares, needed to meet the target.

State any assumptions you make.

[10 marks]

You must show your working.

[illegible]

Answer _____ hectares

7 (b) Explain how your answer may have been affected by an assumption you made. [1 mark]

Do not write outside the box

8 Use Income Tax and National Insurance 2024–2025 from the Preliminary Material.

8 (a) A person has a gross annual salary of £111 000.

Show that their personal allowance is £7 070. [2 marks]

8 (b) The person pays income tax and National Insurance but has no other deductions.
They say,

“My net salary is less than $\frac{2}{3}$ of my gross salary.”

Is the person correct? You must show your working. [9 marks]

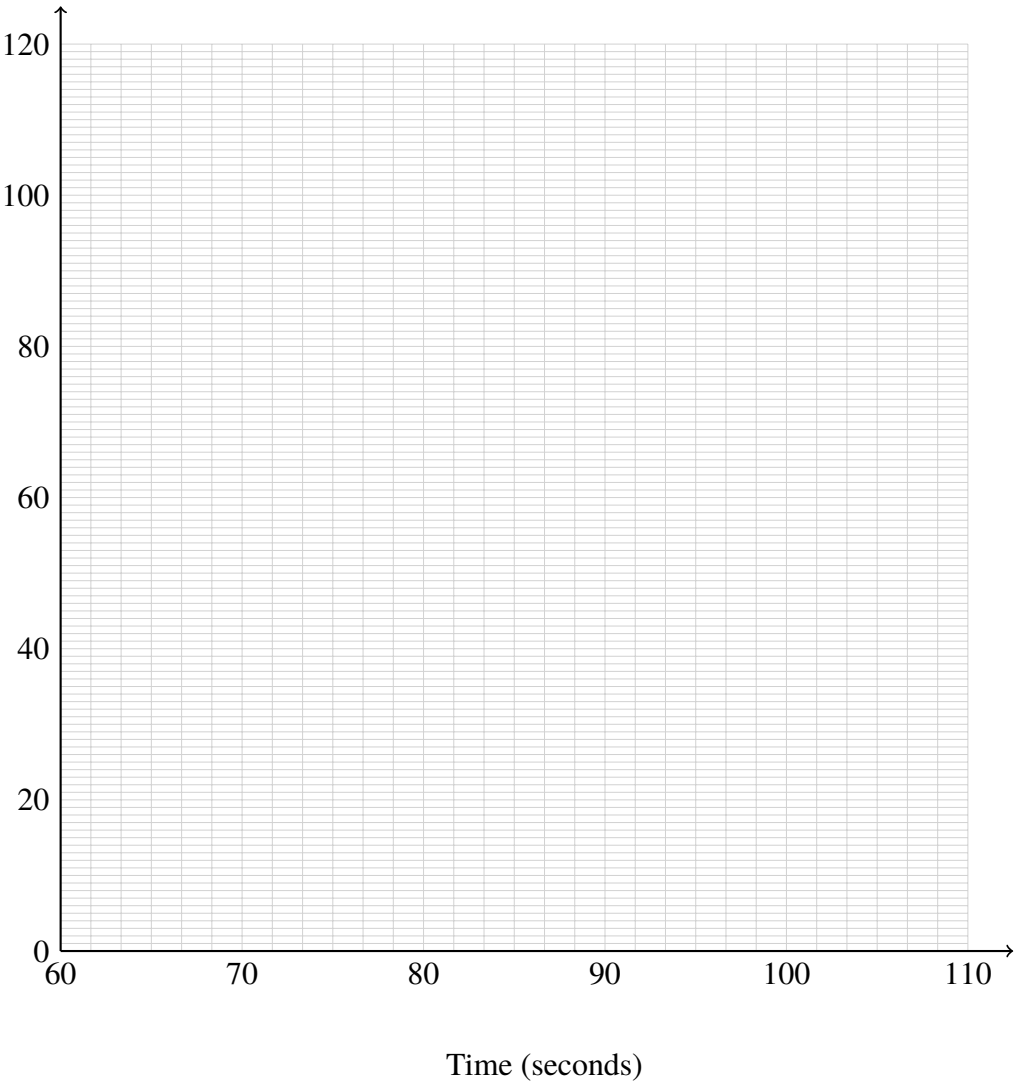
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9

120 students took part in a school **100 m swimming competition**.
The table shows the times for each student's fastest swim.

Time, t (seconds)	Number of students
$60 < t \leq 70$	14
$70 < t \leq 75$	22
$75 < t \leq 80$	31
$80 < t \leq 90$	38
$90 < t \leq 110$	15

9 (a) Draw a suitable graph to represent this information. [4 marks]



9 (b) The qualifying time for the next round is 78 seconds.
Use your graph to estimate the percentage of students who qualify. [6 marks]

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10

Amira invests £4 800 in a savings account at the beginning of January 2025.

Interest is added at the same rate every month for 12 months.

The table shows the activity on the account up to the end of March 2025.

Date	Description	Credit (£)	Debit (£)	Balance (£)
01/01/2025	Account opened	4800.00		4800.00
31/01/2025	Interest	19.20		4819.20
28/02/2025	Interest	19.28		4838.48
31/03/2025	Interest	19.35		4857.83

Calculate the Annual Equivalent Rate (AER) for this savings account.

[4 marks]

Answer %

END OF QUESTIONS