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Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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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 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                  |      |
| 5                  |      |
| 6                  |      |
| 7                  |      |
| 8                  |      |
| 9                  |      |
| 10                 |      |
| <b>TOTAL</b>       |      |



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1350/1

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

**1 (a)** Circle the **one** example of qualitative data.

[1 mark]

height of adults      colour of flowers      time asleep      weight of apples

**1 (b)** Caleb records the number of birds in his garden each day.

Which word does **not** describe the data he collects.

Circle your answer.

[1 mark]

discrete      raw      secondary

2



- 2** 283 members of a sports club each play **one** of three sports, football, netball or tennis. The two-way table shows information about the members.

|          | Football   | Netball   | Tennis    | Total      |
|----------|------------|-----------|-----------|------------|
| Adults   | 72         | 22        | 36        | <b>130</b> |
| Children | 42         | 62        | 49        | <b>153</b> |
| Total    | <b>114</b> | <b>84</b> | <b>85</b> | <b>283</b> |

A sports injury specialist wants to take a sample of 50 of these members stratified by the sport played and by age.

- 2 (a)** Work out the number of children in the sample.

**[2 marks]**

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Answer \_\_\_\_\_

- 2 (b)** Work out the **total** number of members in the sample who play tennis or netball.

**[2 marks]**

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Answer \_\_\_\_\_

- 2 (c)** Explain why this is a suitable type of sample to use for this data.

**[1 mark]**

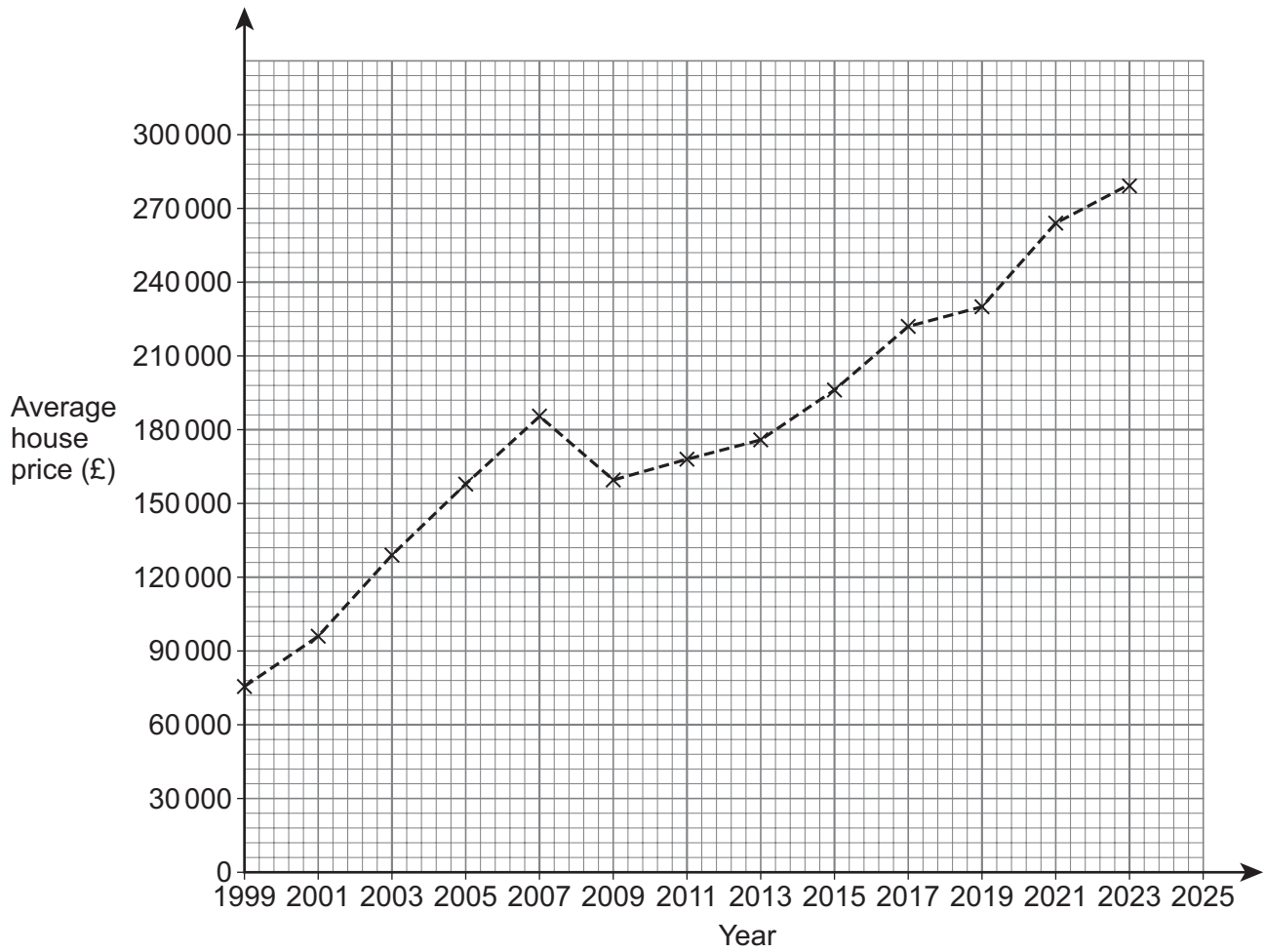
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- 3** The graph shows the average house prices in the UK in June every 2 years, from 1999 to 2023



- 3 (a)** Plot an estimate of the average house price in June 2025

[1 mark]

- 3 (b)** Which year shows an average house price just over double the June 2001 price?

[1 mark]

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Answer \_\_\_\_\_



**3 (c)** In June 2023 the average house price was £281 585

Estimate the percentage change in the average house price from June 1999 to June 2023

**[3 marks]**

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Answer \_\_\_\_\_ %

5

**Turn over for the next question**

**Turn over ►**



- 4 Estimate the total number of **hours** the average person spends brushing their teeth in their lifetime.

State any assumptions you make.

**[4 marks]**

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Answer \_\_\_\_\_ hours

4



**5** Niall sells his car for £16 250 after owning it for 5 years.

He calculates that selling the car for this price means it has decreased in value by 7.5% **per year** since he bought it.

Work out the decrease in value to the nearest pound.

**[3 marks]**

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Answer £ \_\_\_\_\_

3

**Turn over for the next question**

**Turn over ►**



- 6** Teachers in a Maths department are analysing test results for Year 7 intakes. The results for the 2024 intake are shown in **Table 1**

**Table 1**

| Mark (%)     | Frequency  |
|--------------|------------|
| 1 to 10      | 2          |
| 11 to 20     | 9          |
| 21 to 30     | 15         |
| 31 to 40     | 30         |
| 41 to 50     | 41         |
| 51 to 60     | 50         |
| 61 to 70     | 42         |
| 71 to 80     | 20         |
| 81 to 90     | 10         |
| 91 to 100    | 5          |
| <b>Total</b> | <b>224</b> |

The teachers want to compare the results for the 2024 intake to the results for the 2023 intake.

Statistical data for the Year 7 test for the 2023 intake are shown in **Table 2**

**Table 2**

|               |      |                            |      |
|---------------|------|----------------------------|------|
| <b>Mean</b>   | 58.5 | <b>Standard deviation</b>  | 21.3 |
| <b>Median</b> | 57.2 | <b>Interquartile range</b> | 27.2 |



**[5 marks]**

[illegible]

5

**Turn over for the next question**

**7** Use **Wind Turbines** from the Preliminary Material.**7 (a)** A new wind farm is being planned.

The average wind speed, in the area where the wind farm will be built, gives very good efficiency for turbine operation.

Wind farms that have fewer turbines with larger blades are more cost-effective than wind farms that have a greater number of turbines with smaller blades.

The government wants

the wind farm to generate enough electricity for 750 000 homes  
to build 80 wind turbines all with the same blade length.

This formula can be used to calculate the power output, in watts, of a wind turbine.

$$\text{Power output in watts} = \frac{1}{2} \rho A v^3 C$$

where

$\rho$  = air density in kg/m<sup>3</sup> (usually 1.23 kg/m<sup>3</sup>)

$A$  = area swept by the blades in m<sup>2</sup>

$v$  = wind speed in m/s

$C$  = capacity factor (percentage  $\div$  100)

Estimate the minimum blade length, in metres, needed for the wind turbines they plan to build.

State any assumptions you make.

You **must** show your working.

**[10 marks]**

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[illegible]

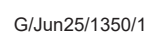
**7 (b)** Explain **how** your answer may have been affected by an assumption you made.

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**Turn over ►**



**[2 marks]**

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**[9 marks]**

[illegible]

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**Turn over ►**

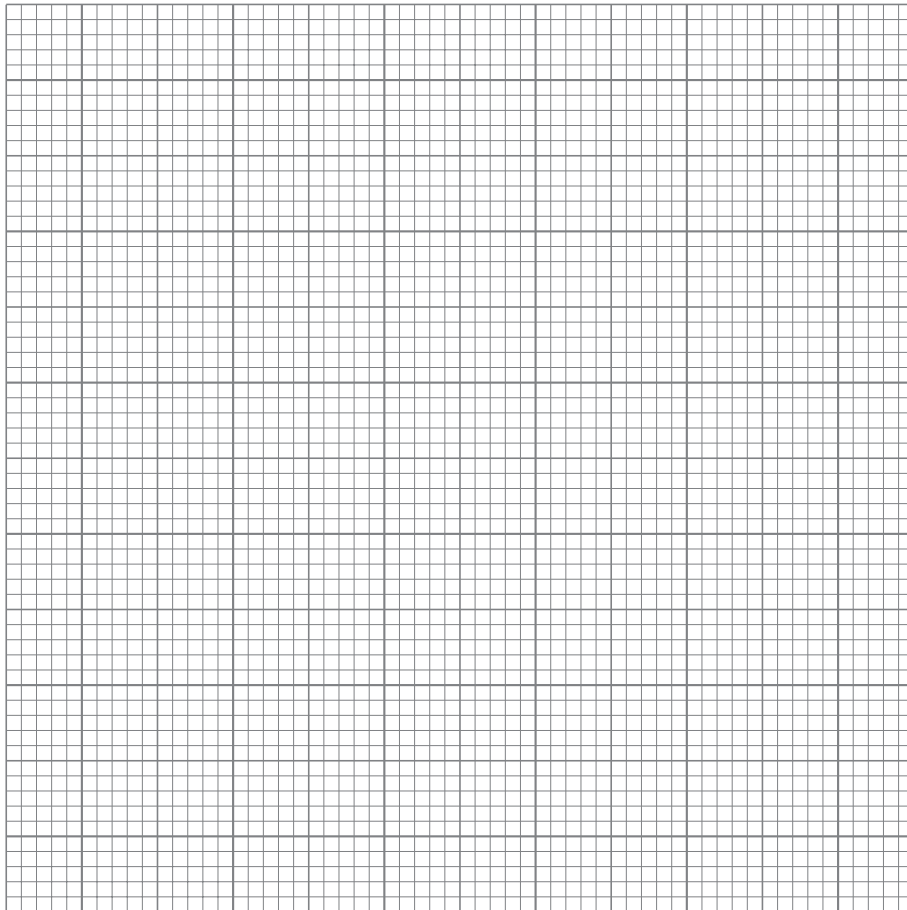


- 9** 80 students took part in a school high jump competition.  
Here are the results for each student's highest jump.

| Height jumped,<br>$h$ cm | Number of<br>students |
|--------------------------|-----------------------|
| $110 < h \leq 120$       | 9                     |
| $120 < h \leq 140$       | 28                    |
| $140 < h \leq 150$       | 22                    |
| $150 < h \leq 160$       | 18                    |
| $160 < h \leq 190$       | 3                     |

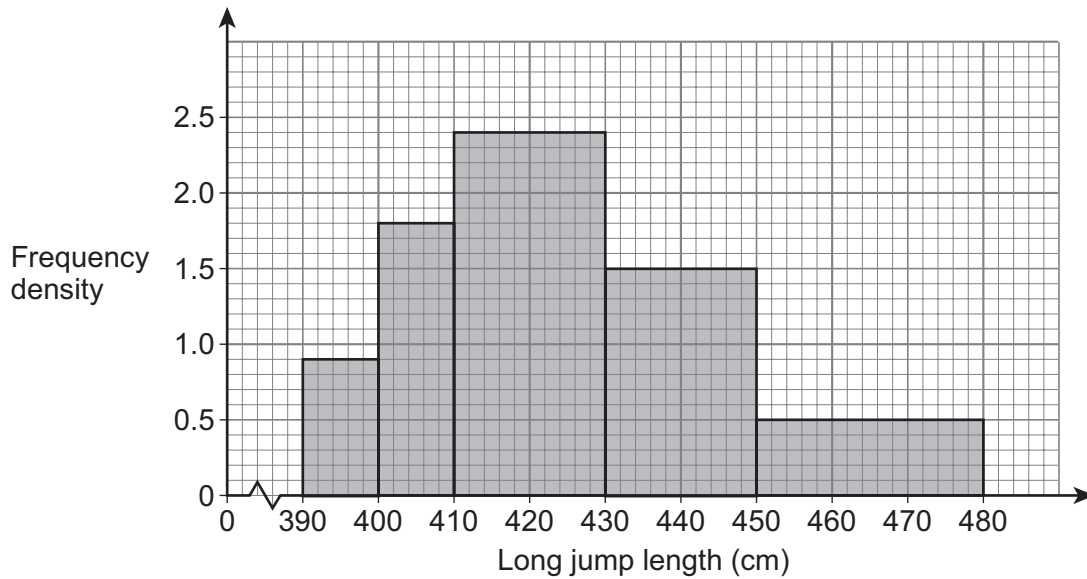
- 9 (a)** Draw a suitable graph to represent this information.

**[4 marks]**



**9 (b)** 120 students took part in a school long jump competition.

The histogram represents the results of each student's longest jump.



To qualify for the next round of each competition these minimum distances must be jumped

high jump 145 cm

long jump 425 cm

Work out which of high jump or long jump had the greater **percentage** of students qualifying for the next round.

You **must** show your working.

**[6 marks]**

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Answer \_\_\_\_\_



**10**

Chris invested £5200 in a new savings account at the beginning of March 2025

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

The table shows the activities on the account up to the end of April 2025

| Date       | Description    | Credit (£) | Debit (£) | Balance (£) |
|------------|----------------|------------|-----------|-------------|
| 01/03/2025 | Account opened | 5200.00    |           | 5200.00     |
| 31/03/2025 | Interest       | 20.80      |           | 5220.80     |
| 30/04/2025 | Interest       | 20.88      |           | 5241.68     |

Calculate the Annual Equivalent Rate the account pays.

**[4 marks]**


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Answer \_\_\_\_\_ %

4

**END OF QUESTIONS**



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ANSWER IN THE SPACES PROVIDED**



[illegible]

[illegible]

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| Question number | Additional page, if required.<br>Write the question numbers in the left-hand margin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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