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 13 May 2020 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	
TOTAL	

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

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

1 Javed collects data from the Internet about the number of snow leopards in the world.

What type of data does he collect?

Tick **one** box.

[1 mark]

continuous data ☐

qualitative data ☐

secondary data ☐

1

Turn over for the next question

Do not write outside the box

2 Molly and Jack want to choose a sample of students to answer questions about their school.

2 (a) Molly decides to choose her sample from the whole school register.

She says,

"I will choose the first student on each page of the register."

Is this a random sample?

Tick **one** box.

Yes ☐ No ☐

Give a reason for your answer.

[1 mark]

Do not write outside the box

The table shows the number of students in each year group.

Year 7	Year 8	Year 9	Year 10	Year 11
115	147	96	120	135

2 (b) Jack decides to choose 20 students from each year group.

What is the name of this sampling method?

[1 mark]

Answer _____

2 (c) Name and briefly describe a sampling method that would more fairly represent the year groups.

[2 marks]

Name _____

Description _____

_____

_____

4

Turn over for the next question

Do not write outside the box

3 19 male and 19 female sprinters each recorded their time to run 100 metres.
The stem-and-leaf diagram shows the results.

Key: 7 | 12 | 5 represents 12.7 seconds for females and 12.5 seconds for males

Females		**Males**
9 9 7	12	5 9
8 6 4 1	13	3 5 7 7 9 9 9
9 7 6 5 2 2	14	1 3 7 8 8 8
9 7 6 6 6 5	15	1 1 2 4

3 (a) How many males recorded a time of less than 13.5 seconds?

Circle your answer.

[1 mark]

5 8 3 4

3 (b) Compare the average times of the female sprinters and male sprinters.

[3 marks]

Do not write outside the box

3 (c) Compare the spread of the times of the female sprinters and male sprinters.

[3 marks]

7

Turn over for the next question

Do not write outside the box

4 Use **Foreign exchange rates (September 2019)** from the Preliminary Material.

Lauren visited the USA and Mexico in September 2019.

She changed £1850 into US Dollars.

She only spent 1625 US Dollars in the USA.

She changed the rest into Mexican Pesos at the rate of 1 US Dollar = 19.61 Pesos

She wanted to have £1000 worth of Mexican Pesos for her stay in Mexico.

How many **more** Mexican Pesos did she need?

You **must** show your working.

[5 marks]

Answer _____ Mexican Pesos

5

Do not write outside the box

5 Estimate the number of schools with 15-year-old students in the United Kingdom.

State any assumptions that you make.

You **must** show your working.

[5 marks]

Answer _____

5

Turn over for the next question

Do not write outside the box

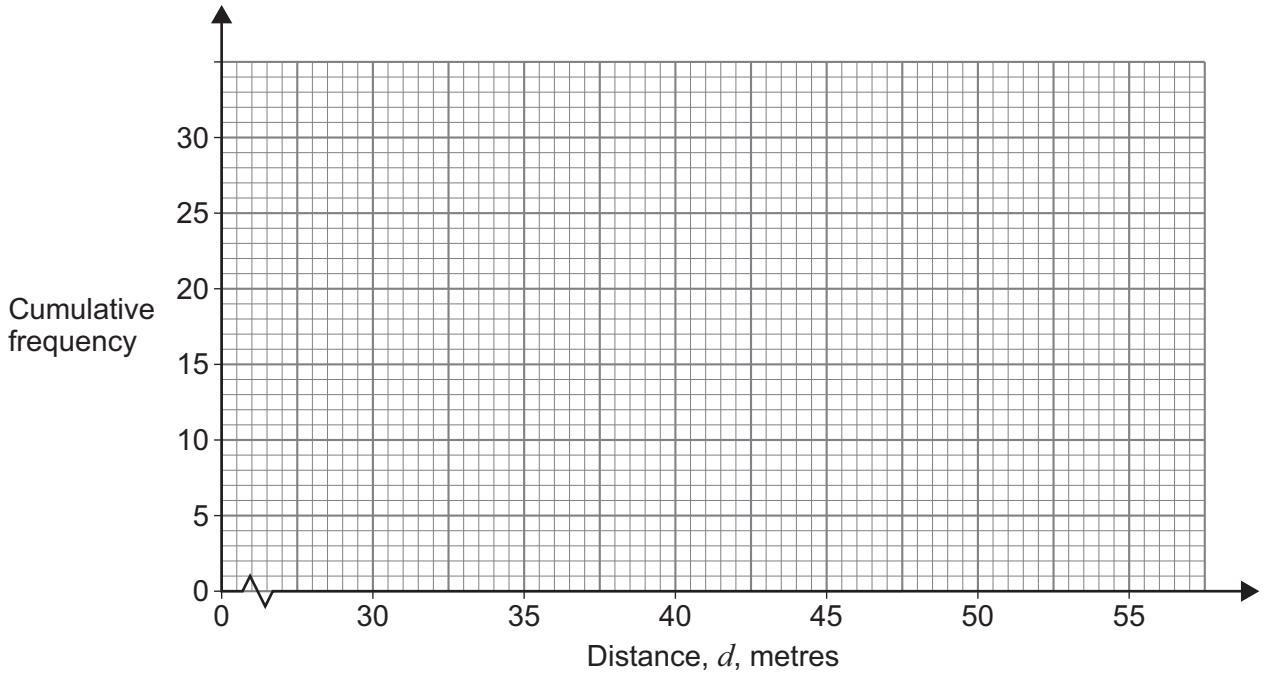
6 Kerry throws the javelin.

The table shows information about the distances for 30 of her throws.

Distance, d, metres	**Frequency**	
$30 < d \leqslant 35$	1	
$35 < d \leqslant 40$	7	
$40 < d \leqslant 45$	13	
$45 < d \leqslant 50$	5	
$50 < d \leqslant 55$	4	

6 (a) Draw a cumulative frequency diagram to represent this data.

[3 marks]



6 (b) The qualifying distance for a competition is 48 metres.

Estimate the number of these throws that reached the qualifying distance.

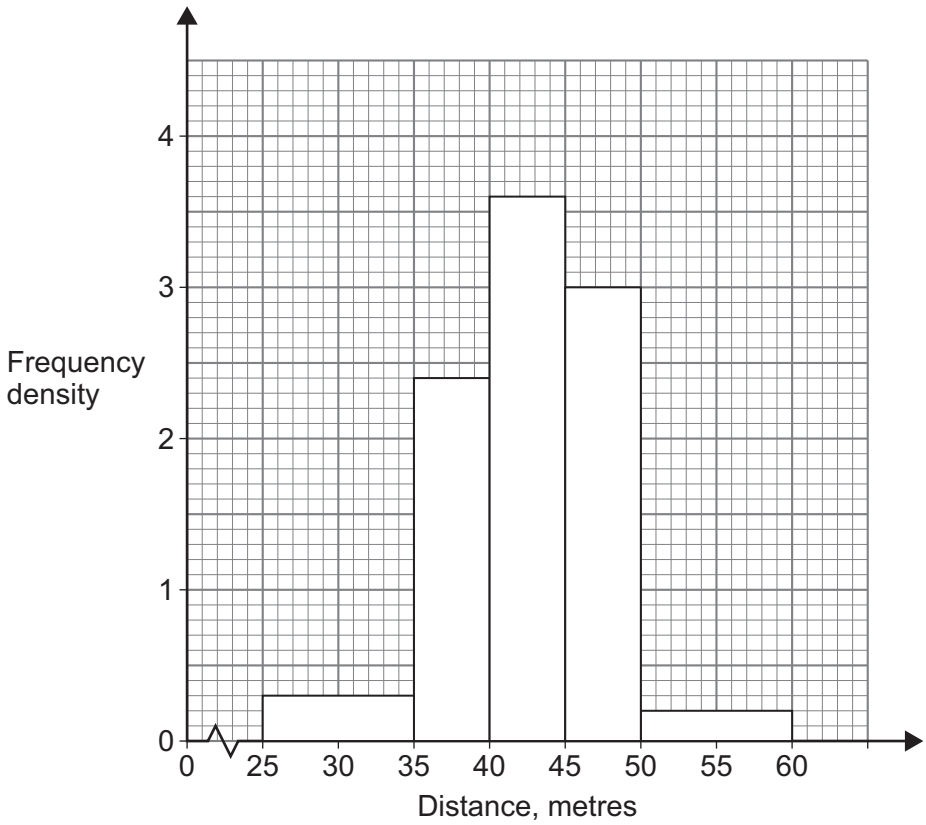
[2 marks]

Answer _____

Do not write outside the box

6 (c) Lola also throws the javelin.

The histogram represents the distances for 50 of her throws.



The girls' coach will choose one of these two girls to take part in the competition.

He will choose the girl with the greater estimated **proportion** of throws reaching the qualifying distance.

Should he choose Kerry or Lola?

You **must** show your working.

[5 marks]

10

Do not write outside the box

7 (a) Use **Wimbledon Tennis Championships** from the Preliminary Material.

The picture shows a portion of strawberries sold at the Wimbledon Tennis Championships.

Each strawberry has a mass of between 12 grams and 16 grams.

Estimate how many **tonnes** of strawberries will be eaten during next year's championships.

State any assumptions you make.

You **must** show your working.

[9 marks]

Do not write outside the box

Answer _____ tonnes

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

[1 mark]

10

Turn over ▶

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

8 Craig and Scott want to take out a mortgage for £190 000

They will repay the mortgage by making equal payments every month for 25 years.

The mortgage interest rate is 4.2% APR.

They use this formula to work out the monthly repayment.

$$\text{Monthly repayment} = \frac{L \times \frac{r}{n}}{1 - \left(1 + \frac{r}{n}\right)^{-n \times t}}$$

where

L = amount of mortgage
r = mortgage interest rate as a decimal
n = the number of payments per year
t = the number of years to repay the mortgage

Craig and Scott have a combined monthly **net** income of £3800

They can afford to use 30% of their monthly **net** income for their monthly mortgage repayments.

Can they afford this mortgage?

You **must** show your working.

[6 marks]

6

Do not write outside the box

9 Use **Income Tax and National Insurance 2019–2020** from the Preliminary Material.

Mel has a gross income of £42 000 per year.

She pays £4004.16 in National Insurance per year.

She also pays income tax.

She has a personal allowance of £12 500

9 (a) Show that Mel's net income is £32 095.84 per year.

[3 marks]

9 (b) Mel and her husband both have the same net income.

Mel's brother Paul has a gross income of £84 000 per year.

He pays income tax and National Insurance but has no other deductions.

He has a personal allowance of £12 500

Mel says,

"In total, my husband and I have a net income which is more than £7000 per year greater than Paul's net income."

Is she correct?

You **must** show your working.

[9 marks]

Do not write outside the box

END OF QUESTIONS

12

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

Do not write outside the box

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

Copyright information

For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from www.aqa.org.uk.

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.

Copyright © 2020 AQA and its licensors. All rights reserved.