

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname _____

Forename(s) _____

Candidate signature _____

Level 3 Certificate MATHEMATICAL STUDIES

Paper 1

Date

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of the Preliminary Material (enclosed)
- a scientific calculator or a graphics calculator
- a copy of the formulae sheet
- 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 questions in the space provided. Do not write outside the box around each page or on blank pages.
- Show all necessary working; otherwise, marks for method may be lost.
- Do all rough work in this book. Cross through any work that 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 or graph paper, which must be tagged securely to this answer booklet.
- The paper reference for this paper is 1350/1.

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

- 1** Rajesh is following a course in sports studies.
He wants to study the performance of the students in his college athletics club who take part in track (running) events.
There are 24 sprinters, 15 hurdlers and 11 distance runners in the club.
Firstly, he carries out an experiment to compare the reaction times of the hurdlers and the distance runners.
He measures the reaction time of each hurdler and each distance runner.

- 1 (a)** Is the data he collects primary or secondary data?
Tick a box.

primary

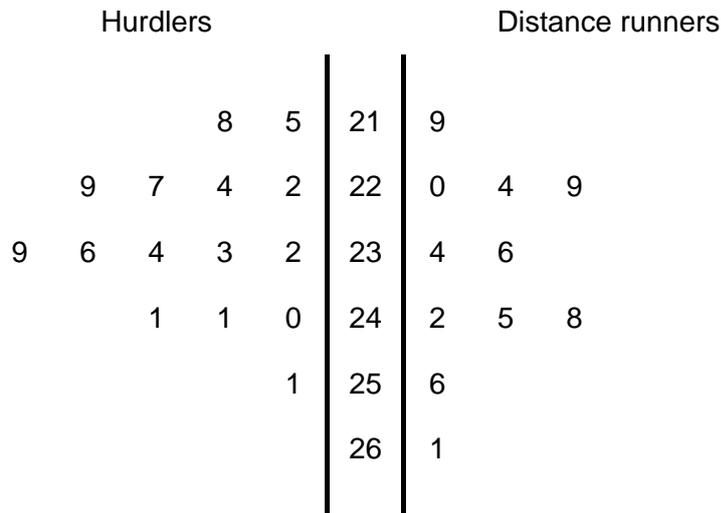
secondary

Give a reason for your answer.

[1 mark]

- 1 (b) Rajesh thinks that hurdlers have quicker reaction times than distance runners. The back-to-back stem-and-leaf diagram shows the reaction times, in milliseconds, of the 15 hurdlers and the 11 distance runners.

Key 5 | 21 | 9 Represents 215 and 219



Is Rajesh correct? Tick a box.

Yes

No

Give **two** reasons to support your answer.

[3 marks]

Reason 1

Reason 2

- 1 (c)** Rajesh then carries out an experiment to compare the stamina of the 24 sprinters, 15 hurdlers and 11 distance runners.

He wants a sample of 30 students stratified by event.

Work out how many students he should choose from each event.

[2 marks]

Answer _____ sprinters

_____ hurdlers

_____ distance runners

- 3 Charlotte is organising a trip for herself and ten friends.
The full price of the trip is £635 per person, but Charlotte sees an early-booking offer.

Book early
12% discount
and
for every 8 people
paying, the 9th goes
free

Charlotte uses the offer to book the trip for herself and her ten friends.
They divide the total cost equally between them.

How much does each person pay?

[3 marks]

- 5 Leon needs to drive from Land's End to John O'Groats.
He knows that the distance from Leeds to Manchester is 45 miles.
He knows that his car will travel between 35 and 50 miles for each gallon of petrol, depending on his speed.



6 Use **Student Loans** in the Preliminary Material.

Camilla started a three-year course at university in September 2012

At the start of each year she received a loan from the Student Loans Company (SLC) to cover her tuition fees of £9000 per year and living costs of £4800 per year.

At the end of each year of her course the SLC added 5.5% interest to the amount she owed.

6 (a) Circle the multiplier that represents an **increase** of 5.5%

[1 mark]

0.945

1.055

1.505

1.55

6 (b) Calculate the amount Camilla owed the SLC at the end of her course.

[4 marks]

Answer _____

- 6 (c)** Camilla's first job has an annual salary of £43 000, paid monthly.
She begins repaying her student loan at the end of the first month after she starts her job.
Work out her first repayment.

[3 marks]

Answer _____

Turn over for the next question

7

James is a chef.

He wants to buy tomatoes for his restaurant.

He wants the tomatoes all to be of a similar size.

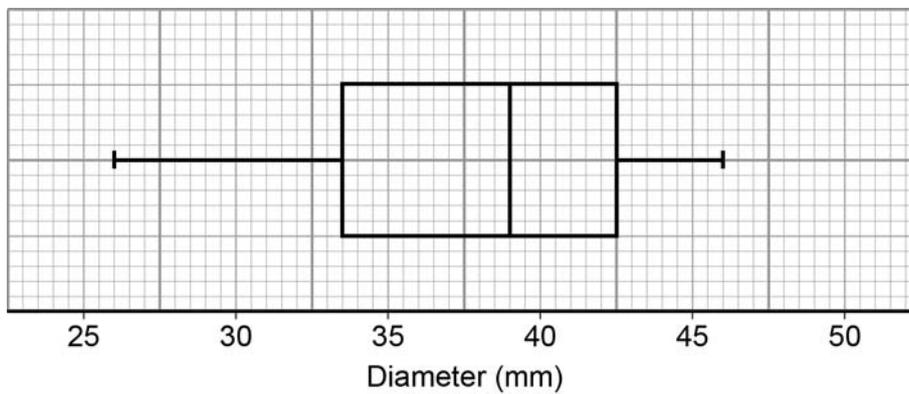
He can buy from supplier A or supplier B.

He finds this list of the diameters (mm) of a sample of tomatoes from **supplier A**.

The tomatoes are listed in order of size.

28.5	29	30	31	32.5	33	34	34.5	35	35.5
36	37	38	38	38.5	41	43	44	48.5	

The box plot shows information about the diameters of a sample of tomatoes from **supplier B**.



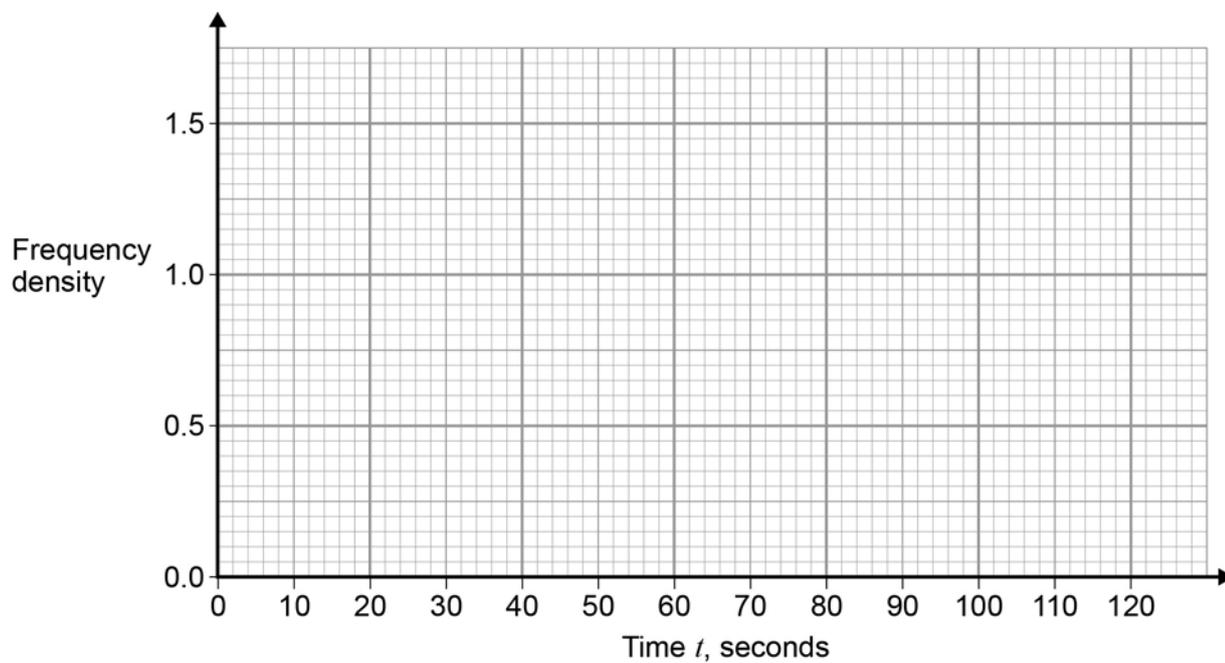
8 A money advice call centre has a target of answering all calls in under 1.5 minutes.

The table shows the waiting time, in seconds, for calls to be answered for a sample of 100 calls.

Time t , seconds	Frequency
$10 \leq t < 50$	12
$50 \leq t < 80$	39
$80 \leq t < 100$	28
$100 \leq t < 120$	21

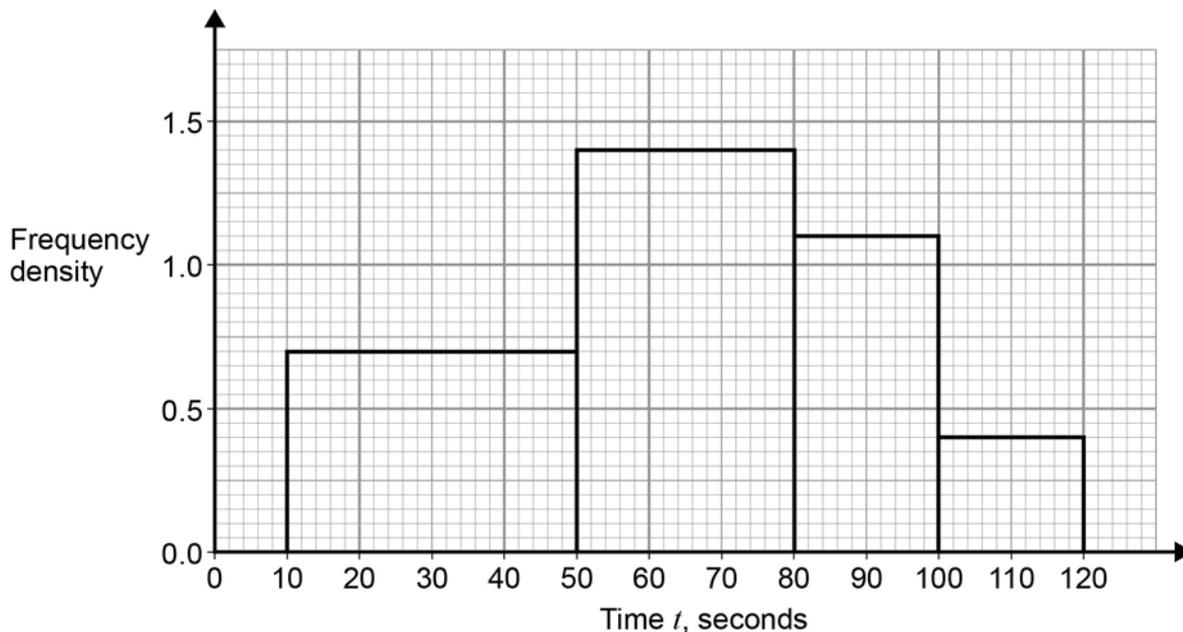
8 (a) Draw a histogram to represent this information.

[2 marks]



8 (b) Extra staff are employed to answer calls.

This histogram shows the distribution of waiting times for the first 100 calls to be answered after the extra staff are employed.



Has the number of calls above the target of 1.5 minutes been affected by the extra staff?

You **must** show working to justify your answer.

[4 marks]

9 The monthly payment, $\pounds P$, for a mortgage can be calculated using this formula.

$$P = \frac{i \times A(1+i)^N}{(1+i)^N - 1}$$

where i = the monthly interest rate expressed as a decimal

A = the amount borrowed (\pounds)

and N = the number of **monthly** payments.

Sara takes out a mortgage for $\pounds 172\,000$

The monthly interest rate is 0.3%

She must pay each month for 25 years.

Work out her monthly payment.

You **must** show your working.

[4 marks]

Answer \pounds _____

There are no questions printed on this page

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