AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 1

Wednesday 16 May 2018 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.
- 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 or graph paper, which must be tagged securely to this answer booklet.
- The paper reference for this paper is 1350/1.

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

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

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1 Javed and Sophie are each paid an hourly rate.

They both receive a pay rise.

Javed's hourly rate rises from £7.20 to £7.65

Sophie's hourly rate rises from £8.10 to £8.60

Who has received the greater **percentage** pay rise?
You **must** show your working.

[3 marks]

3

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2 A company runs 5 gyms in a city.

Each gym has 140 members.

2 (a) The owner of the company wants to conduct a face-to-face survey among the members.

She decides to use a cluster sample.

Is this a suitable sampling method to use?
Give reasons for your answer.

[2 marks]

For a different survey, the owner needs to consider the different genders of the 700 members.

There are 580 males and 120 females.

2 (b) What type of sampling method should she use?

[1 mark]

2 (c) She requires a sample of 175 members.

How many more males than females should be in her sample?

[3 marks]

Answer _____

6

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3 Chris takes out a mortgage for £160 000
The mortgage has an interest rate of 0.2% per month.
Chris repays £710 per month.

The amount of mortgage outstanding at the end of the nth month, £A_n, is given by the iteration formula

$$A_n = 1.002A_{n-1} - 710$$

where $A_0 = 160\,000$

3 (a) Complete the table to show the amount of mortgage outstanding at the end of each of the first 4 months.

[3 marks]

Month	Amount outstanding
0	£160 000.00
1	£159 610.00
2	
3	
4	

3 (b) Chris says,

"In these 4 months the total interest is more than £1200".

Is he correct?
You **must** show your working.

[3 marks]

6

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4 Estimate how many hours of sleep the average person in the UK has in their lifetime.
State any assumptions you make.
You **must** show your working.

[5 marks]

Answer _____

5

Turn over for the next question

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5 The boys from class 10A did a cross-country run.

Here are their times in minutes.

24.6	22.3	29.2	36.4	31.3	35.0
25.4	34.5	42.0	39.6	19.5	

5 (a) What was the median time in minutes?
Circle your answer.

[1 mark]

22.5 30.9 31.3 35.0

5 (b) Work out the interquartile range of the times for the boys from class 10A.

[2 marks]

Answer _____

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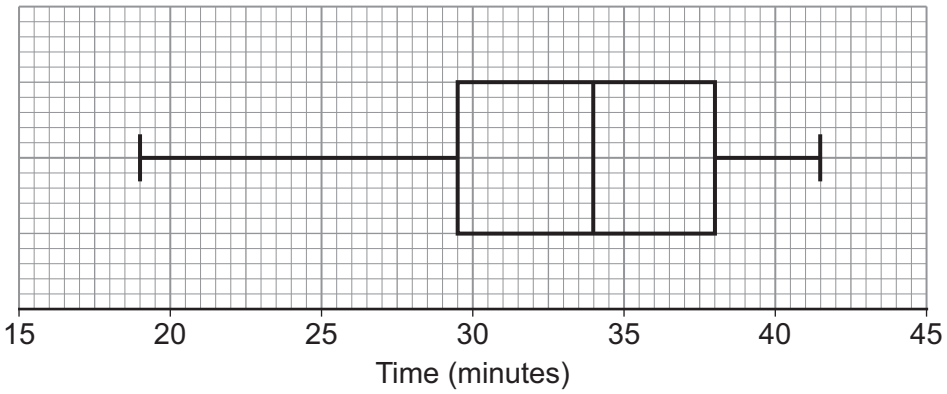
5 (c) The rest of the year 10 boys in the school also did the cross-country run.

The box and whisker diagram shows the distribution of their times.



Compare the performance of the boys in class 10A with the rest of the year 10 boys.

[4 marks]

7

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6 Sarah needs a payday loan.

She wants to borrow £235 for a period of 6 days and then pay the loan and interest back in one payment.

She finds these two options.

Payday Help **Loan Company** **Borrow up to** £500 Compound interest rate of only 0.8% per day	**See You Through** **Loan Company** **Borrow up to** £1000 Interest 1150% APR

Sarah uses the formulae sheet to work out the amount she would have to pay back to See You Through.

Which loan company would be the cheaper option for her?
You **must** show your working.

[5 marks]

Answer _____

5

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7 Ravi is a gardener who grows and sells sunflowers.

This year he bought two different types of sunflower seeds, Type **A** and Type **B**.

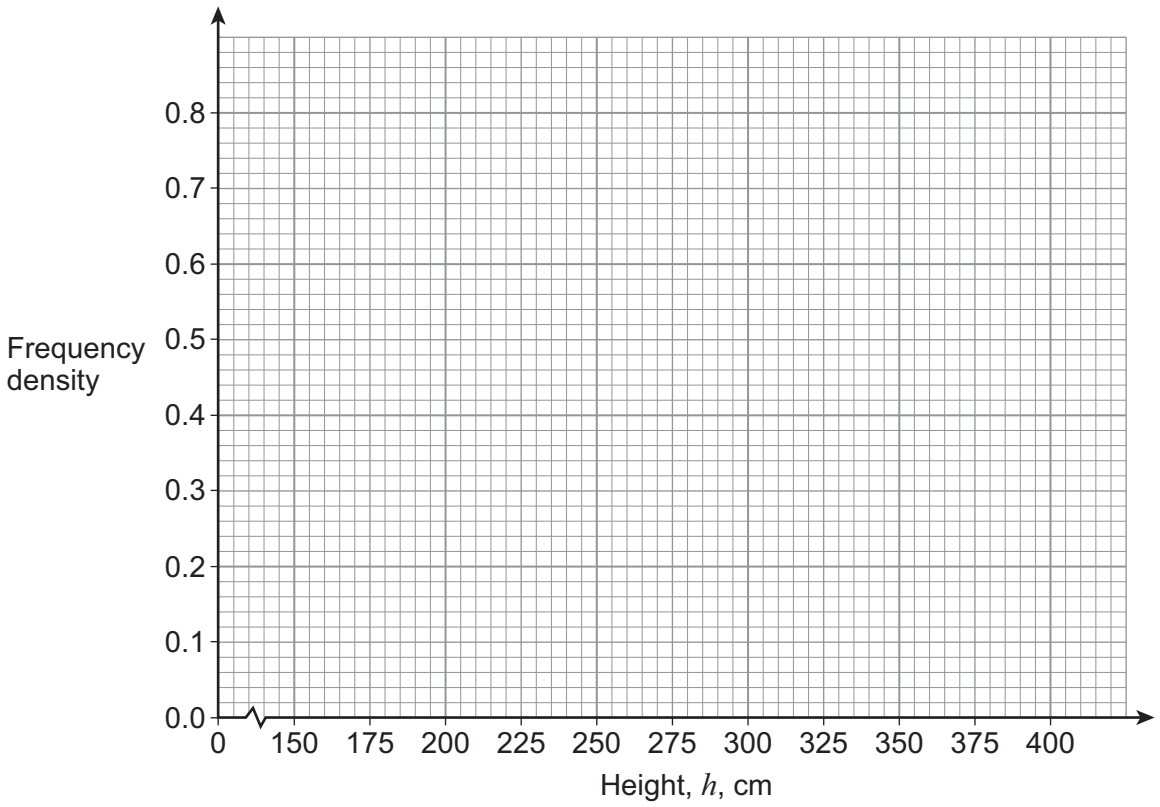
He planted 60 seeds of Type **A**.

The table shows the maximum height each of these 60 sunflowers grew to.

Maximum height of Type A sunflowers	
Height, h, cm	**Frequency**
$150 \leqslant h < 250$	10
$250 \leqslant h < 300$	15
$300 \leqslant h < 325$	18
$325 \leqslant h < 350$	15
$350 \leqslant h < 400$	2

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

[3 marks]



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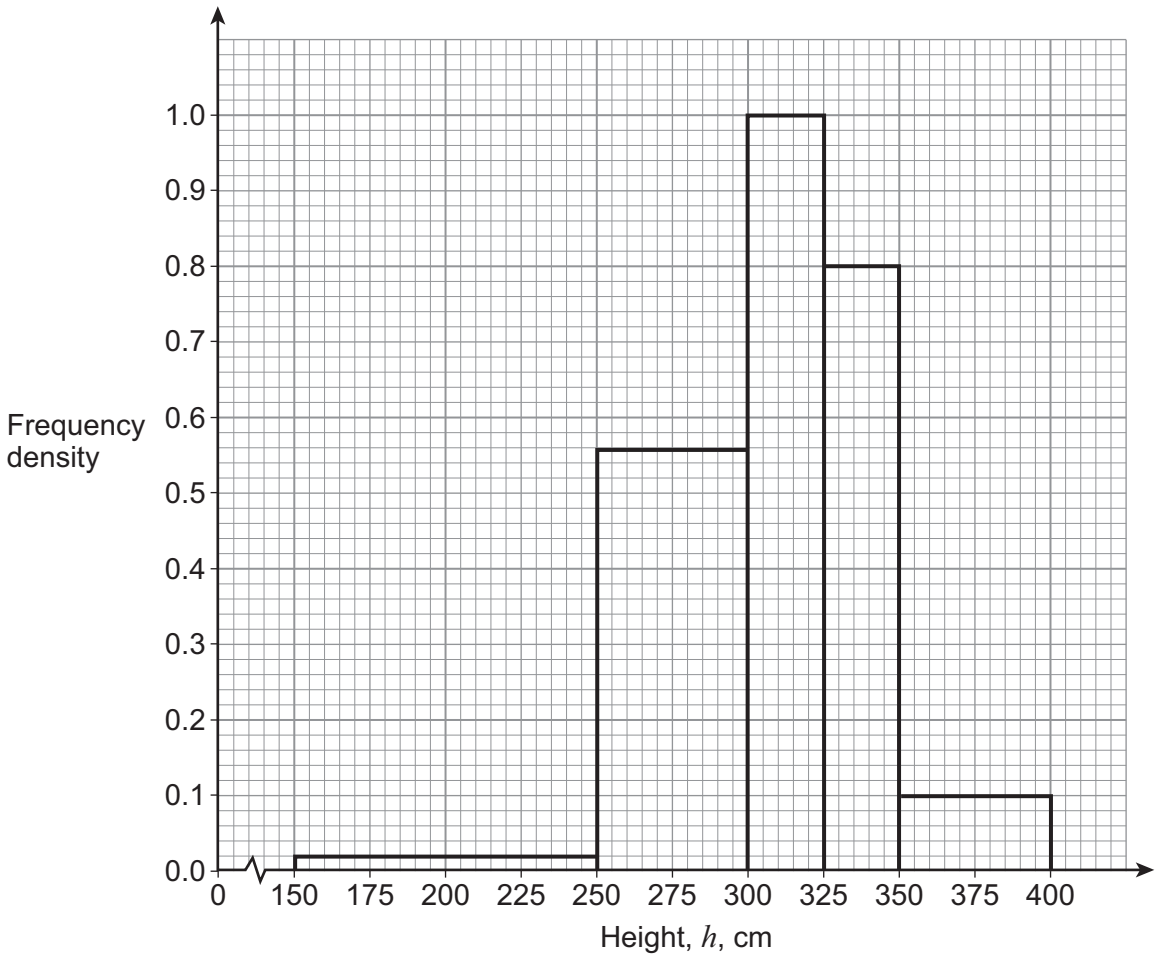
7 (b) Ravi also planted 80 seeds of Type **B** sunflowers.

This histogram shows the distribution of the maximum heights these 80 sunflowers grew to.



A florist pays Ravi more money for sunflowers that are at least 340 cm tall.

Which type of sunflower, **A** or **B**, had the greater proportion of sunflowers that were at least 340 cm tall?

You **must** show your working.

[5 marks]

8

Turn over ▶

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8 Use **Income Tax and National Insurance 2017–2018** in the Preliminary Material.

Vikki is thinking about returning to work after having a baby.

Her employer offers her a contract for three days a week with a gross salary of £15 800 per year.
She will have to pay for nursery and travelling costs for each of the three days.

Nursery	£32 per day
Travel	£7 per day

Vikki will have **four** weeks' holiday each year.
She will have no nursery or travel costs in these weeks.

She pays income tax and National Insurance but has no other deductions.
She has a personal tax allowance of £11 500

Vikki works out her average monthly net pay after paying the nursery and travel costs.

She says,

"I will still have more than £700 per month left of my net pay."

Is she correct?

You **must** show your working.

[9 marks]

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9

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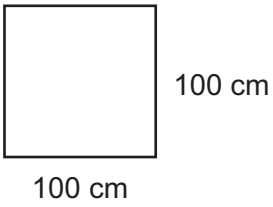
9 (a) Use **Making food and drink cans** in the Preliminary Material.

A food company is making a new soup product.
The soup will be put into a new size of can.

In a trial run, the food company produced between 1900 and 2150 litres of soup per hour.

The company manager asks a can manufacturer to supply three-piece cans with diameter 7 cm and height 9 cm

The can manufacturer must buy 1 m by 1 m sheets of steel to make the cans.



Estimate how many sheets of steel the can manufacturer will need to make enough cans for **one week** of soup production.

Give your answer to the nearest 10 sheets.

State any assumptions you make.

You **must** show your working.

[10 marks]

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Answer _____

9 (b) Explain how your answer may have been affected by one assumption you made.

[1 mark]

END OF QUESTIONS

11

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