AQA

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 1

Wednesday 17 May 2017   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 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.
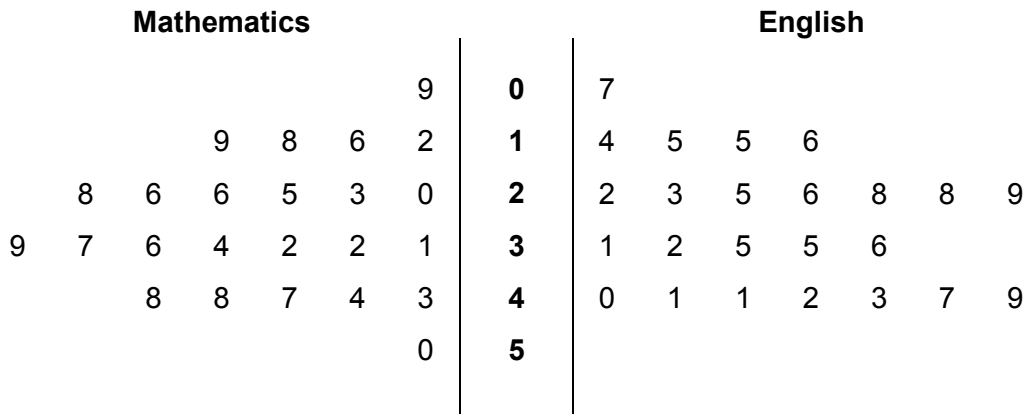- The paper reference for this paper is 1350/1.

For Examiner's Use	
Pages	Mark
2 – 3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
TOTAL	

1350/1

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

1   24 students in Year 9 each sat national tests in Mathematics and English.

The back-to-back stem-and-leaf diagram shows their results.

Key   5 | **1** | 9   represents marks of 15 in Mathematics and 19 in English

Mathematics								**English**						
					9	**0**	7							
		9	8	6	2	**1**	4	5	5	6				
	8	6	6	5	3	0	**2**	2	3	5	6	8	8	9
9	7	6	4	2	2	1	**3**	1	2	5	5	6		
	8	8	7	4	3	**4**	0	1	1	2	3	7	9	
					0	**5**								

1 (a)   The national average mark for the Mathematics test was 33

Work out the percentage of these students who scored more than the national average in Mathematics.

[2 marks]

_____

_____

_____

Answer _____ %

1 (b) The national average mark for the English test was 27

How do the English results of these students compare with the national average?
Show working to support your answer.

[2 marks]

2 Chris is buying a computer.

It costs £498, including VAT at 20%

Chris can claim back the VAT paid.

Work out the amount he can claim back.
Circle your answer.

[1 mark]

£83   £99.60   £398.40   £415

Turn over for the next question

5

3 Ben is booking a holiday to Geneva for himself and two friends.
All three will share a hotel room.

He has found two offers for the same hotel and flights.
He will use a credit card to pay the total cost for himself and his two friends.

Packages for U

7 nights at the Hotel Du Lac
(Including flights to Geneva)

Only
£744 per person

Based on two adults sharing a room

10% discount on the **total** cost if three adults share a room

3% surcharge applies on the discounted total for credit card payments

Booking independently

7 nights at the Hotel Du Lac
Based on 3 adults sharing a room

€480 per person

Flights to Geneva
£312 per person

No charge for using a credit card

The exchange rate is £1 = €1.33

Which offer gives the cheaper **total** cost?
You **must** show your working.

[6 marks]

4 Estimate the number of litres of liquid drunk by the population of a small English town in one month.

State any assumptions that you have made.
You **must** show your working.

[5 marks]

Answer _____ litres

11

5 (a) Carin is investigating house prices in London.

Describe how she could collect data to use as her sample in her investigation.

[2 marks]

_____

_____

_____

_____

_____

5 (b) Carin decides to use the data from her sample to estimate the average house price for the rest of England.

Is this sensible?
Give a reason for your answer.

[1 mark]

_____

_____

_____

_____

5 (c) The chart below was produced by the Office for National Statistics.

It shows the UK house price index values from January 2004 to July 2015

Index values February 2002 = 100

A house had a value of £180 000 at the beginning of 2009

Estimate its value at the beginning of 2014
Give your answer to the nearest £100
You **must** show your working.

[4 marks]

_____

_____

_____

_____

_____

Answer   £ _____

6 Sarah invests £2800 in a tax-free ISA which earns compound interest paid at a rate of 1.14% every 3 months.

The spreadsheet shows some information about her ISA.

	A	B	C	D
1		**Starting amount (£)**	**Interest (£)**	**Final amount (£)**
2	First 3 months	2800.00	31.92	2831.92
3	Second 3 months	2831.92		
4	Third 3 months			
5	Fourth 3 months			

6 (a) Circle the formula that is used in cell C2 to calculate the interest after the first 3-month period.

[1 mark]

=B2*1.14   =B2*0.114   =B2/1.14   =B2*(1.14/100)

6 (b) Complete the spreadsheet.

[2 marks]

6 (c) Calculate the Annual Equivalent Rate (AER) on her investment.

[3 marks]

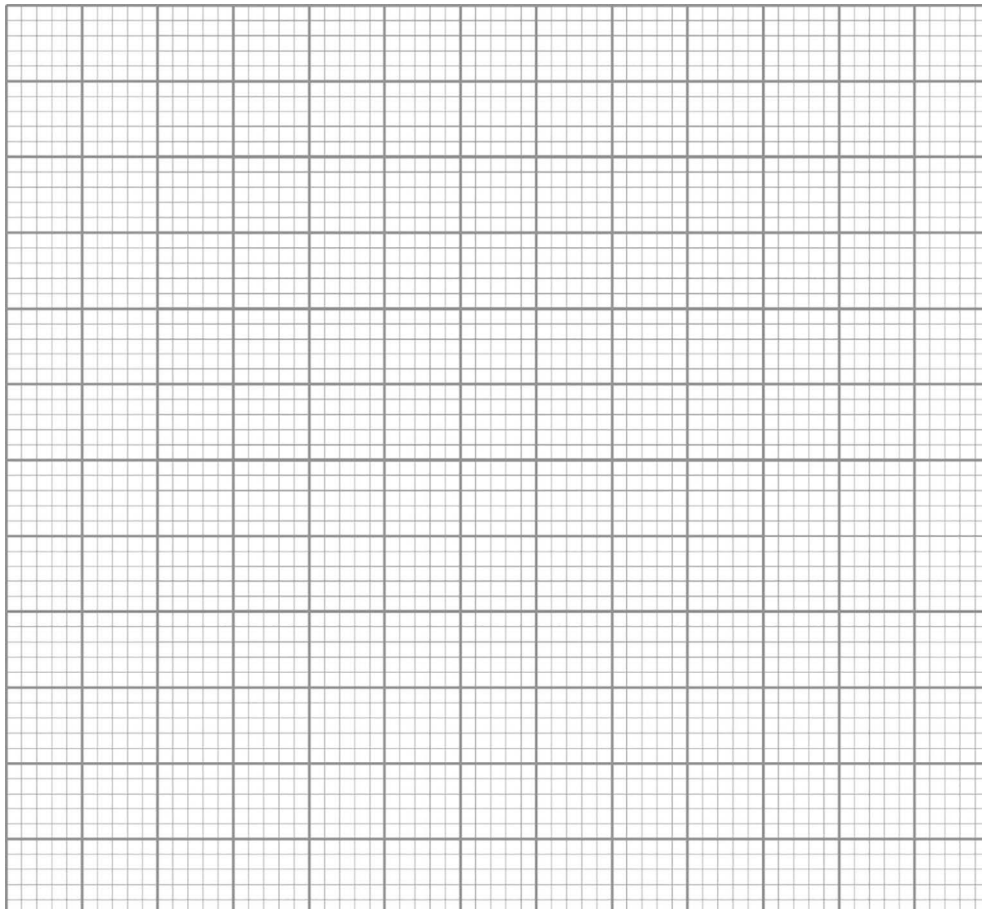Answer _____ %

6

Turn over for the next question

7 100 children aged between 11 and 15 were asked to work out the amount of sugar they consumed on a typical day.

The table shows the results.

Amount of sugar, s (grams)	Frequency
$0 \leqslant s < 40$	12
$40 \leqslant s < 60$	18
$60 \leqslant s < 70$	23
$70 \leqslant s < 80$	27
$80 \leqslant s < 120$	20

7 (a) Draw a suitable frequency diagram to represent this information.

[4 marks]

7 (b) The 100 children and their parents took part in a health project.
They were given information on how to reduce their sugar consumption.

One month later the children recorded their sugar consumption on a typical day.
The histogram shows the results.

Frequency density (y-axis: 0, 0.5, 1, 1.5, 2, 2.5, 3)

Amount of sugar, grams (x-axis: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100)

The recommended daily consumption of sugar for these children is 30g.

Has the health project affected the number of these children having more than the recommended daily consumption of sugar?
Use the histogram to support your conclusion.
You **must** show your working.

[4 marks]

8

8   Use **Income Tax and National Insurance 2016 – 2017** and **National Minimum Wage** from the preliminary material.

At the start of 2016 Samir is 24 years old and works 40 hours each week.

He is paid the National Minimum Wage.

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

His net pay after tax and National Insurance are deducted is £243.15 per week.

The government states,

"New National Living Wage gives you an extra 50p per hour in your pocket."

Samir says,

"When I am 25 the increase in **my** net pay will be less than 35p per hour."

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

[6 marks]

6

9   Ralf is training for a long-distance swim.
He records his times for 50 training swims of 800 metres.

Time, t (minutes)	Frequency
$14.0 \leqslant t < 14.5$	2
$14.5 \leqslant t < 15.0$	5
$15.0 \leqslant t < 15.5$	7
$15.5 \leqslant t < 16.0$	12
$16.0 \leqslant t < 16.5$	16
$16.5 \leqslant t < 17.0$	8

9 (a)   Calculate an estimate of the mean time for the 50 swims.

[2 marks]

Answer _____ minutes

9 (b)   Explain how you can check if your answer is sensible.

[1 mark]

9 (c) Calculate an estimate of the standard deviation of the times for the 50 swims.

[2 marks]

Answer _____ minutes

9 (d) A swimming coach helps with Ralf's training for 6 weeks.

Here is some information about his 800-metre training swims after the coaching.

Mean time	14.2 minutes
Standard deviation	0.53 minutes

Compare his performance before and after the coaching.
Show working to support your answer.

[3 marks]

8

10 Use **Hotel Room Occupancy 2014** from the preliminary material.

James is opening a new hotel in York.

The hotel will have 35 bedrooms.
25 will be rooms with one double bed.
10 will be rooms with two single beds.

He expects the guests to stay for between 1 night and 7 nights.

The bed linen (duvet cover, sheet and pillowcases) is changed when the guest leaves the hotel.

James will send all the bed linen to a laundry to be washed.

Laundry costs	
Single duvet cover	£2.20 each
Double duvet cover	£2.75 each
Single sheet	£1.10 each
Double sheet	£1.65 each
Pillowcase	50p each

10 (a) James will open the hotel in March.

Estimate his laundry costs for **April**.
Use the graph on the preliminary material to help you.
State any assumptions you make.
You **must** show your working.

[8 marks]

Answer   £ _____

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

[1 mark]

END OF QUESTIONS

9

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