AQA

PRACTICE PAPER

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 2A Statistical Techniques

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 and statistical tables
- 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 the 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 paper and graph paper, which must be tagged securely to this answer booklet.
- The paper reference for this paper is 1350/2A.

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

1 Gerry is a teaching assistant.

The four students he supports each completed a short test consisting of four questions.

Their marks in the short test are shown in the table.

Student	Question 1	Question 1	Question 3	Question 4	Total mark	Percentage (%)
Rachel	3	3	4	5	15	60
Shafi	3	3	4	9	19	76
Ash	2	1	2	5	10	40
Karen	3	2	4	5	14	56
Mode	3	3	4	5		

1 (a) A teacher wants to find out the **maximum total mark** available in the short test.

Circle the **maximum total mark**.

[1 mark]

19 25 76 100

1 (b) Identify **one** formatting error in Gerry's table and suggest **three** improvements he could make to the table.

[4 marks]

Error _____

Improvement 1 _____

Improvement 2 _____

Improvement 3 _____

Question 1 continues on the next page

1 (c) Amy gave the same test to the five students she supports.

Their marks are shown in the table.

Student	Question 1	Question 2	Question 3	Question 4	Total mark	Percentage (%)
Ben	3	2	5	6	16	64
Cho	3	1	6	8	18	72
Liz	2	1	2	5	10	40
Nick	3	4	3	7	17	68
Paul	3	3	4	6	16	64

In a meeting, Amy presented her students' marks to her colleagues.

Two of her colleagues made the statements below.

'Most of the students that Amy supports did very well in Question 1.'

(Richard)

'The mean percentage for the five students that Amy supports is 60%.'

(Din)

Critically analyse these two statements.
Show working to justify your comments where necessary.

[4 marks]

Richard's statement

Din's statement

Turn over for the next question

2 Use **Communications Market Report** in the Preliminary Material.

2 (a) A journalist suggested that the format and content of the report were not presented well.

Give **three** examples to support her suggestion.

[3 marks]

Example 1 _____

_____

_____

_____

Example 2 _____

_____

_____

_____

Example 3 _____

_____

_____

_____

2 (b) Christopher wants to find out the average time, in hours, spent per day browsing online on PCs or laptops in 2013 using the data from the CMR.

His calculation is as follows.

> 31.24 × 12 = 374.88 hours
>
> 374.88 ÷ 355 = 1.056 hours
>
> The average time spent per day browsing online is 1.056 hours.

Critically analyse Christopher's calculation.

[3 marks]

Question 2 continues on the next page

2 (c) Three online bloggers made claims about the CMR as follows.

'The number of superfast broadband connections had increased by a factor of three fifths in one year.'

(Rasheed)

'Overall, BT lost over 20 000 landline customers in 2013.'

(Francoise)

'Overall in 2014, the number of national radio stations declined.'

(Eugene)

Does the data support these claims? Justify your answers.

[5 marks]

Rasheed

Francoise

Eugene

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

3 Research in 2015 found that the number of sleeping hours in any given day for adults can be modelled by a normal distribution with mean 6.0 hours and standard deviation 1.5 hours.

3 (a) Michael claims that the probability of a randomly chosen adult sleeping for more than 7 hours in one day is less than $\frac{1}{3}$

Using the model from the 2015 research, show that Michael's claim is justified.

[5 marks]

3 **(b)** George is researching the average number of sleeping hours per day among adults in his village.

The table shows the data for 15 adults from the village.

Adult	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Average sleeping hours	6.5	5.5	6.0	5.0	7.0	6.5	6.0	6.5	5.5	8.0	4.0	7.0	5.5	6.0	8.0

Compare the average number of sleeping hours per day of these 15 adults to those of the general adult population.

[5 marks]

3 **(c)** George decides to identify the adults in his survey whose sleeping hours are more than one standard deviation away from the mean.

Using the mean and standard deviation for the **general adult population**, identify these adults.
You **must** show your working.

[3 marks]

4 Jack works as an analyst for Dopel, a smartphone company.

He chose a random sample of 10 people and recorded how many words from a pre-prepared script each person could type into a text message in one minute.

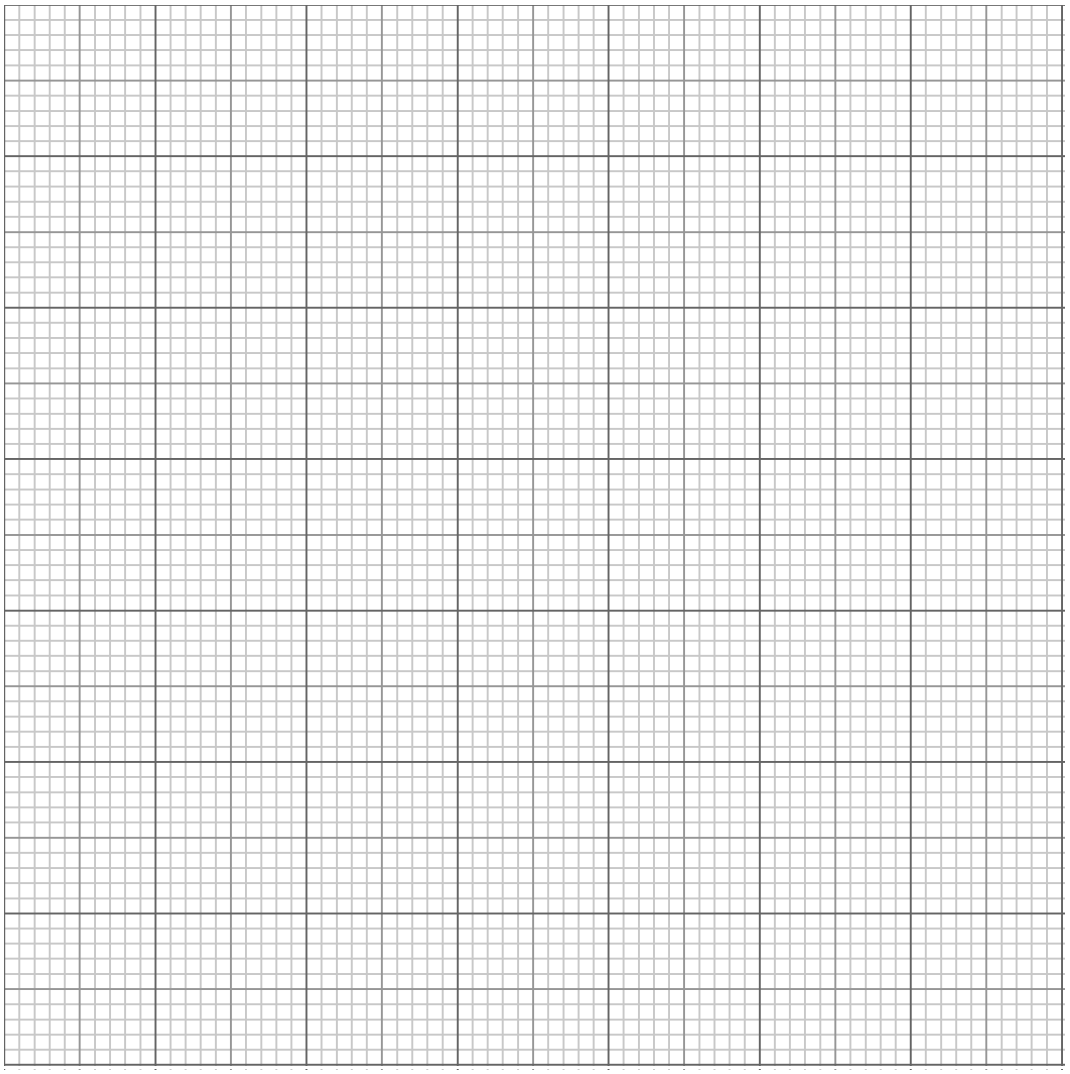
The results are shown in the table.

Name	**Gender**	**Age, a (years)**	**Number of words typed, w**
Hema	Female	39	13
Nathan	Male	27	15
Asha	Female	16	21
Katie	Female	22	19
Anna	Female	19	25
Iqbal	Male	54	10
Laura	Female	17	18
Joel	Male	43	10
Sanja	Female	35	13
Alison	Female	50	8

4 (a) Draw a scatter diagram of w against a on the grid below**.**

[3 marks]

Number of words typed, w



Age, a (years)

4 (b)(i) Calculate the equation of the regression line of w on a, rounding any values to two decimal places.
Draw the regression line on your scatter diagram.

[5 marks]

Question 4 continues on the next page

4 (b) (ii) Interpret the gradient of your regression line in the context of Jack's data.

[2 marks]

4 (c) Suggest **two** improvements which Jack could make to his process of collecting data.

[2 marks]

Improvement 1

Improvement 2 _____

_____

_____

_____

_____

_____

_____

Turn over for the next question

5 Many soft drinks contain a sweetener.

FizzyFuzzy is a company which produces a variety of soft drinks in 500 ml bottles.

Assume that the weight, in milligrams, of the sweetener used in 500 ml bottles of FizzyFuzzy soft drink is normally distributed with mean μ and variance 15

The weight, in milligrams, of the sweetener contained in a randomly selected sample of twelve 500 ml bottles of FizzyFuzzy soft drink is

81 79 83 79 88 96 70 74 90 78 74 83

5 (a) Calculate a 95% confidence interval for μ.

[5 marks]

5 (b) The production manager claims that FizzyFuzzy uses less sweetener than a rival company, Lumusat.

The mean weight of sweetener in 500 ml bottles of Lumusat soft drinks is 82 milligrams.

Comment on the production manager's claim.

[2 marks]

6 Two methods are often used to predict the height a child will reach as an adult.

Method A uses the heights of the child's parents.

Method B uses the child's height at age 18 months.

The tables below show, for 10 women, their predicted adult height and their actual adult height, using both Method A and Method B.

Method A

Predicted adult height, P_A (cm)	157	159	163	163	168	170	176	176	177	178
Actual adult height, a (cm)	154	161	157	162	164	179	167	169	173	172

Method B

Predicted adult height, P_B (cm)	158	163	160	160	164	170	163	165	167	169
Actual adult height, a (cm)	154	161	157	162	164	179	167	169	173	172

6 (a) Calculate the product moment correlation coefficient (pmcc) for both methods.

[2 marks]

pmcc for **Method A** = _____

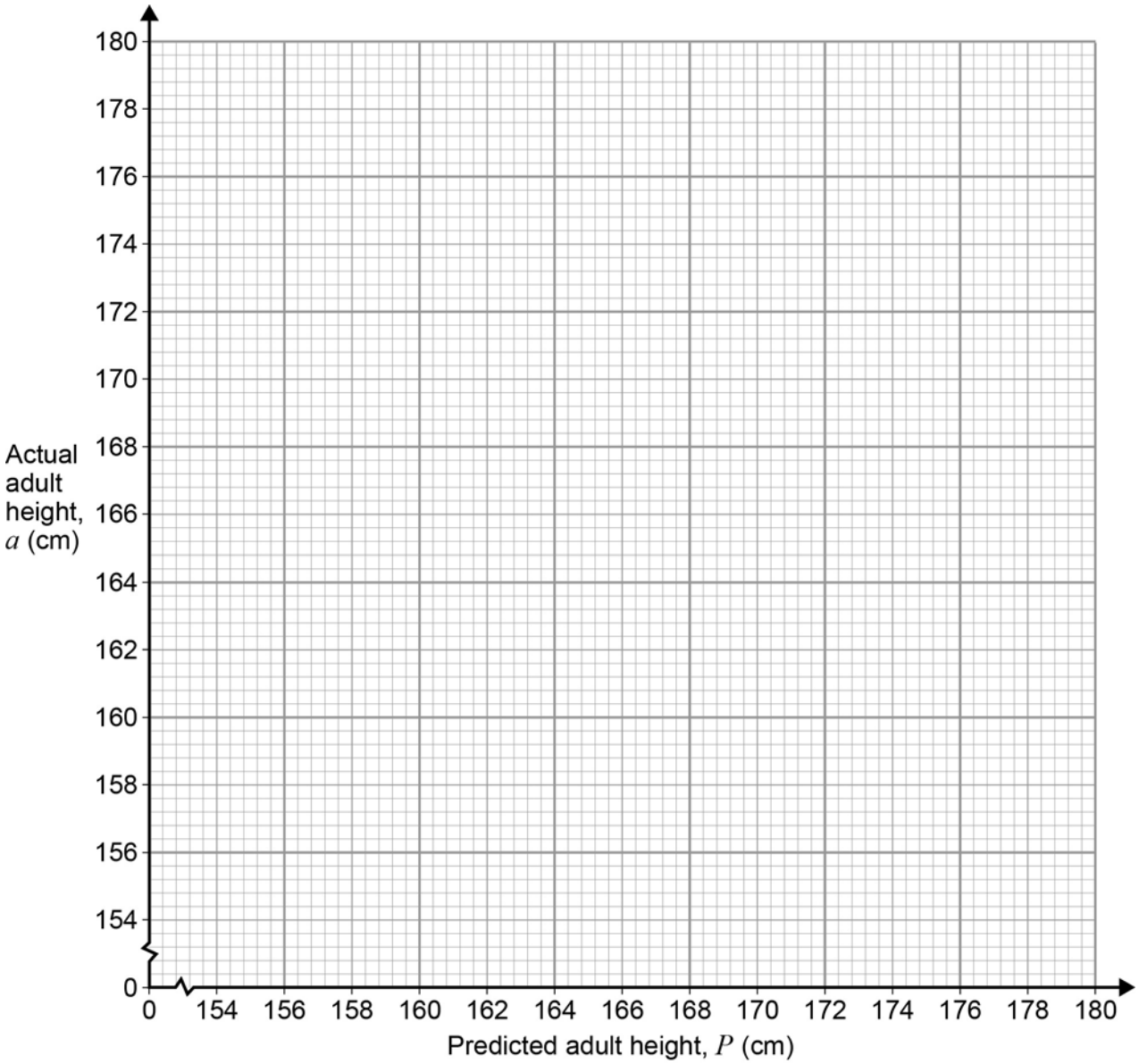
pmcc for **Method B** = _____

Question 6 continues on the next page

6 (b) Using the more accurate method, predict the actual adult height of a person whose predicted adult height is 165 cm.

You **may** use the grid below, but do not have to.

[6 marks]



END OF QUESTIONS

There are no questions printed on this page

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