AQA – Test of Hypothesis – GCSE Statistics – 2019

1. June/2019/Paper_1F/No.15(a-b)

Charlie wants to investigate how people do most of their travelling.

She begins by asking 30 of her friends how they travel to school.

(a) Write down a question that Charlie could ask.

[1 mark]

_____

_____

(b) The frequency table shows Charlie's results.

Method of Travel	Frequency
Car	3
Bus	6
Walk	18
Cycle	2
Train	1

Charlie says,

> "10% of these friends come to school by car, so 10% of all students come to school by car."

Comment on **both parts** of Charlie's statement.

[2 marks]

"10% of these friends come to school by car" _____

_____

_____

_____

"10% of all students come to school by car" _____

_____

_____

_____

2. June/2019/Paper_1F/No.9

A hotel chain has 800 hotels.

Of these hotels 200 have a car park.

Rogan wants to choose a sample of the hotel managers, stratified by whether they run a hotel with a car park or not.

Rogan wants a total sample size of 60

(a) How many managers who run a hotel with a car park should be in the sample?

[2 marks]

Answer _____

(b) Rogan will email a questionnaire to the managers.

Why will Rogan probably have to send out more than 60 emails **in total**?

[1 mark]

3. June/2019/Paper_1H/No.8(a-b)

Charlie wants to investigate how people do most of their travelling.

She begins by asking 30 of her friends how they travel to school.

(a) Write down a question that Charlie could ask.

[1 mark]

(b) The frequency table shows Charlie's results.

Method of Travel	Frequency
Car	3
Bus	6
Walk	18
Cycle	2
Train	1

Charlie says,

"10% of these friends come to school by car, so 10% of all students come to school by car."

Comment on **both parts** of Charlie's statement.

[2 marks]

"10% of these friends come to school by car"

"10% of all students come to school by car"

4. June/2019/Paper_1H/No.5

A college has a rule that no student should work more than 6 hours per week in a part-time job.

The college principal wants to find out how many students work for more than this.

He decides to carry out a census of all 3600 students in the college.

All students were asked to complete a questionnaire in one of their classes.

One of the questions on the questionnaire was

> Do you usually work for more than 6 hours per week in a part-time job?

Only 75% of the students answered the question.

Of these students, 216 said that they did usually work for more than 6 hours per week in a part-time job.

(a) What percentage of the students answering the question usually worked for more than 6 hours per week in a part-time job?

[2 marks]

Answer _____ %

(b) Give **two** reasons why the percentage of students in the college who usually work more than 6 hours per week in a part-time job is likely to be greater than your answer to **part (a)**.

[2 marks]

Reason 1 _____

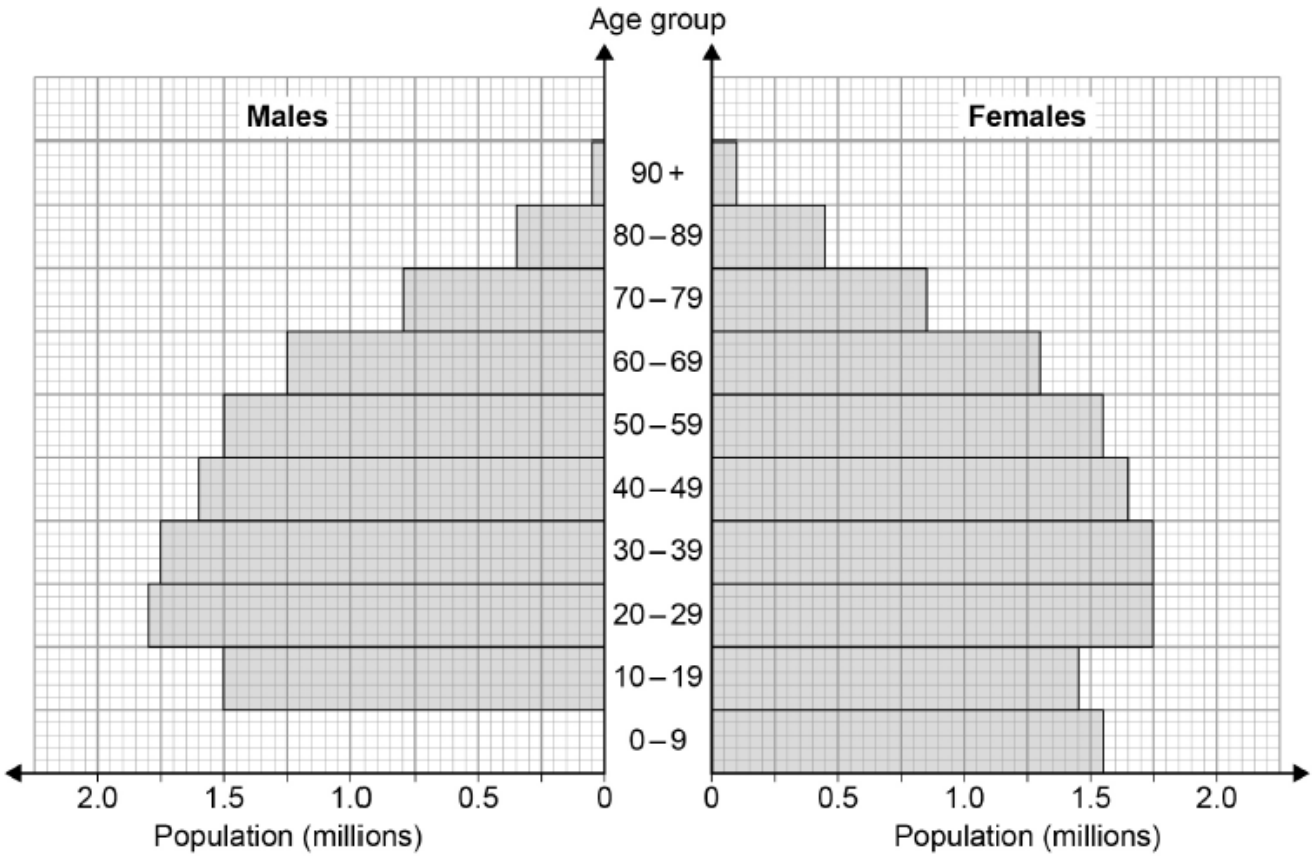
Reason 2 _____

_____

_____

5. June/2019/Paper_1H/No.7

Information about the population of Australia in 2017 is shown in the population pyramid.



Source: Australian Bureau of Statistics

(a) In 2017, there were 1.6 million males aged 0 – 9 years.

Complete the population pyramid.

[1 mark]

(b) Carla is investigating the hypothesis,

> The percentage of those aged 80 and over who are male is greater in 2017 than in 1997.

In 1997 there were,

- 330 000 females aged 80 and over
- 170 000 males aged 80 and over.

Investigate Carla's hypothesis.

You **must** show your working.

[4 marks]

6. June/2019/Paper_2F/No.9

Some Year 11 girls investigate how much time different age groups spend on the internet.

(a) Write down a possible hypothesis they could use.

[1 mark]

_____

_____

(b) Keiva designs a data collection sheet.

The first few rows are shown.

Person	Age Group (0 – 10, 10 – 20 or over 20)	How long on internet?
1		
2		
3		
4		

Suggest **two** improvements to the data collection sheet.

Do **not** draw a new data collection sheet.

[2 marks]

Improvement 1 _____

_____

Improvement 2 _____

_____

(c) Holly decides to collect her data by recording the exact age, in years, of everyone she asks.

(c) (i) Give **one** advantage of collecting exact ages over having age groups.

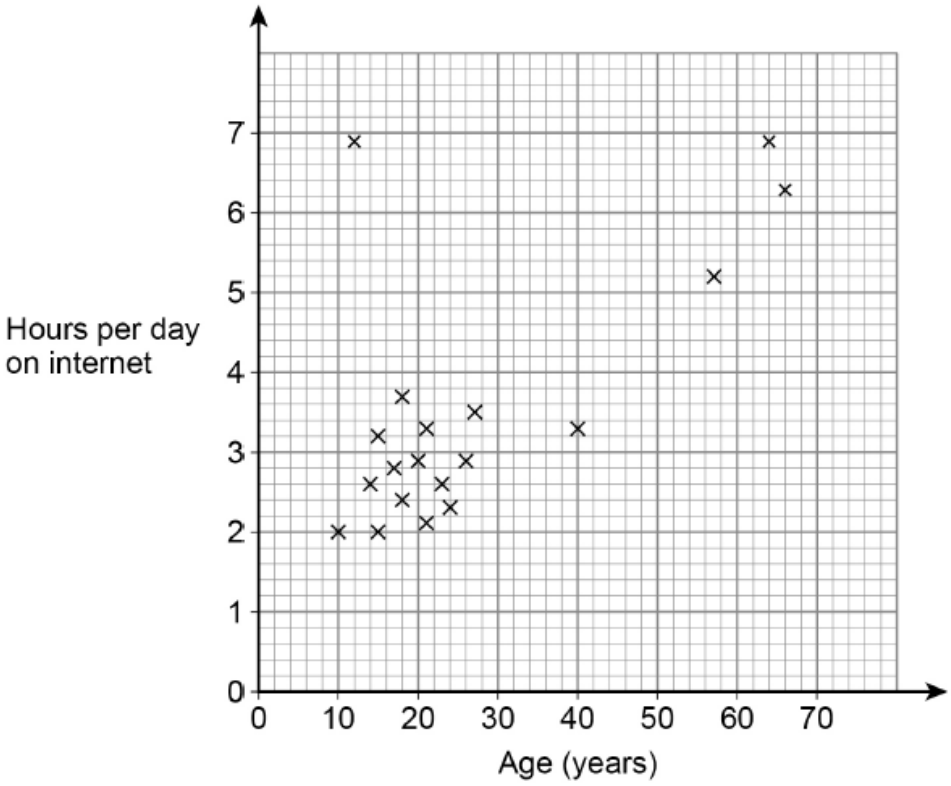
[1 mark]

(c) (ii) Give **one** disadvantage of collecting exact ages over having age groups.

[1 mark]

(d) The scatter diagram shows the results from Holly's data collection.

All points were correctly plotted.



(d) (i) Give **one** criticism about the age of people Holly collected data from.

[1 mark]

(d) (ii) Holly says,

"Apart from one outlier, my graph seems to show negative correlation."

Circle the outlier on the graph and comment on what Holly says about the correlation.

[2 marks]

(d) (iii) What does the correlation show in this context?

[1 mark]

(e) Courtney decides to use grouped data for her sample of people.

The table shows information about the time spent per day on the internet for a sample of people who are **over 50 years old**.

Time, h (hours)	Frequency
$0 \leqslant h \leqslant 1$	44
$1 < h \leqslant 2$	18
$2 < h \leqslant 3$	10
$3 < h \leqslant 4$	6
$4 < h \leqslant 5$	2

(e) (i) Work out how many people are in this sample.

[1 mark]

Answer _____

(e) (ii) Write down the largest value that the range of these data could be.

[1 mark]

Answer _____ hours

(e) (iii) Show that an estimate of the mean time this sample spent on the internet in a day is 1.3 hours.

You may use the blank columns in the table opposite to help you.

[3 marks]

(f) Courtney also collected data for a group of people who are all **15 years old**.

The data has,

- an estimated mean of 1.6 hours on the internet per day
- a range of 6 hours.

Use this information, and your answers in **part (e)**, to make **two** comparisons of Courtney's data for people who are 15 years old and for people who are over 50 years old.

[2 marks]

Comparison 1 _____

_____

_____

_____

Comparison 2 _____

_____

_____

_____

7. June/2019/Paper_2H/No.9

(a) Laboratory experiments can be quicker and cheaper to perform than field experiments.

Give **one** other advantage of performing a laboratory experiment over a field experiment.

[1 mark]

(b) Steve wants to investigate this hypothesis,

'Drinking a cup of coffee helps students to perform better in tests.'

He plans this laboratory experiment.

He chooses 80 Year 11 students.
He gives every student a computer-based intelligence test.
He then divides all the students into two groups.

- 40 of the students are randomly chosen to drink a cup of coffee.
- The rest are the control group and drink nothing.

Each student then takes a similar intelligence test.

(b) (i) Give a reason why Steve has used a control group.

[1 mark]

(b) (ii) Here are Steve's results.

Coffee drinkers	Control group
Test results increase by an average of 6 marks	Test results increase by an average of 7 marks

Do these results support Steve's hypothesis?

Give a reason for your answer.

[1 mark]

8. June/2019/Paper_2H/No.15

A hotel has a choice of coffee or tea as the hot drink for breakfast.

The hotel finds that 18% of its customers have tea with their breakfast.

(a) Theo says,

"82% of customers at the hotel **must** have coffee with their breakfast."

Comment on Theo's statement.

[1 mark]

(b) The hotel selects a random sample of 5 customers.

Use the Binomial distribution to find the probability that **exactly one** of these customers has tea with their breakfast.

[3 marks]

Answer _____

(b) The hotel selects a random sample of 5 customers.

Use the Binomial distribution to find the probability that **exactly one** of these customers has tea with their breakfast.

[3 marks]

Answer _____

(c) A family of 3 people have breakfast at the hotel.

Explain why the number of people in the family having tea with their breakfast may **not** follow a Binomial distribution.

[1 mark]