

Paper Reference 1ST0/1F
Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Total Marks

Statistics
PAPER 1
Foundation Tier

Monday 12 June 2023 – Afternoon
Time: 1 hour 30 minutes

In the boxes below, write your name, centre number and candidate number.

Surname					
Other names					
Centre Number					
Candidate Number					

YOU MUST HAVE

Ruler, writing and drawing equipment, protractor, compass, scientific calculator.

YOU WILL BE GIVEN

Data Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or on the separate data sheets – there may be more space than you need.

Scientific calculators may be used.

You must show all your working out with your answer clearly identified at the end of your solution.

INFORMATION

The total mark for this paper is 80.

The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.

There may be spare copies of some data sheets in case you need them.

ADVICE

Read each question carefully before you start to answer it.

Try to answer every question.

Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Look at the table for Question 1 in the Data Booklet. It shows the average heights, to the nearest **cm**, of **Adult Males** and **Adult Females** who were born in the year **1996** in some countries of the world.

(a) Write down the average height of **Adult Males** in **Italy**.

(1 mark)

_____ **cm**

(b) Write down the country in the table in which the **Adult Females** have the greatest average height.

(1 mark)

(continued on the next page)

Turn over

1. continued.

Afzal thinks that the country in the table with the greatest difference in average heights between Adult Males and Adult Females is Italy.

(c) Is Afzal correct?

Give a reason for your answer.

(2 marks)

(continued on the next page)

1. continued.

- (d) Using the table in the Data Booklet, compare the average height of Adult Males in Australia, with the average height of Adult Males in Zimbabwe.**
(1 mark)

Afzal suggests drawing a time series graph to represent the data in the table.

- (e) Explain whether or not this is an appropriate graph to use.**
(1 mark)

(Total for Question 1 is 6 marks)

Turn over

2. Look at the diagram for Question 2 in the Data Booklet.

It shows a probability scale.

Jonathan has a fair 6-faced dice which has the numbers 1, 2, 3, 4, 5 and 6 on its faces.

Jonathan rolls his dice once.

- (a) On the probability scale in the Data Booklet, mark the probability that the dice will land on an odd number.

(1 mark)

(continued on the next page)

2. continued.

Kasia has a fair 8–faced dice which has the numbers 1, 2, 3, 4, 5, 6, 7 and 8 on its faces.

**(b) Circle the word from the list below that best describes the likelihood that the dice lands on a 9
(1 mark)**

impossible

unlikely

evens

likely

certain

(continued on the next page)

Turn over

2. continued.

Kasia rolls her dice 80 times.

**(c) Work out the number of times you would expect
her dice to land on a 5
(2 marks)**

(continued on the next page)

2. continued.

Jonathan is going to roll his dice once.

Kasia is going to roll her dice once.

(d) Is Jonathan more likely to roll a 6 than Kasia?

You should justify your answer.

(2 marks)

(Total for Question 2 is 6 marks)

3. Look at the diagram for Question 3 in the Data Booklet.

A newspaper reporter completed some research into the percentage of household waste that was recycled in the London Borough of Hackney in 2018 and 2019

The newspaper reporter drew the bar chart in the Data Booklet to show this information.

Give TWO reasons why the bar chart could be misleading or wrong.

(2 marks)

Answer lines continue on the next page.

3. continued.

(Total for Question 3 is 2 marks)

4. A town council is proposing to build a new leisure centre.

Michelle is going to carry out a survey to find out what all the people in the town think of the proposal.

Michelle thinks that she should take a sample rather than a census.

- (a) Give TWO reasons why Michelle might think this.

(2 marks)

(continued on the next page)

4. continued.

Michelle plans to use the electoral register as the sampling frame.

(b) (i) Explain what you understand by the term sampling frame.

(1 mark)

(ii) Give one problem Michelle may have using the electoral register as the sampling frame.

(1 mark)

(continued on the next page)

Turn over

4. continued.

Michelle intends to conduct a pilot study.

**(c) Give TWO reasons why it is a good idea to
conduct a pilot study.**

(2 marks)

(continued on the next page)

4. continued.

Michelle is writing a plan for her investigation into people's views on the leisure centre proposal.

(d) Write down what Michelle should include in her plan.

You should include each of the following

- a sampling method**
- a question she could ask in her questionnaire**
- a statistical diagram she could use to show the results of the survey.**

Explain why each of the things you have written down is appropriate.

(6 marks)

Answer lines continue on the next two pages.

4. (d) continued.

[illegible]

Turn over

4. (d) continued.

(Total for Question 4 is 12 marks)

5. Look at the diagram for Question 5 in the Data Booklet.

Jim is investigating the relationship between air temperature and altitude.

He has found data on the internet showing the average air temperature at different altitudes on one particular day.

The table on the next page shows the results he collected.

5. continued.

Altitude (metres)	Average air temperature (°C)
0	15·0
1 000	8·5
2 000	2·0
3 000	−4·5
4 000	−11·0
5 000	−17·5
6 000	−24·0
8 000	−36·9
10 000	−49·9

(continued on the next page)

Turn over

5. continued.

He uses this information to draw the scatter diagram in the Data Booklet.

(a) Describe and interpret the correlation shown in the scatter diagram.

(2 marks)

(b) Draw a line of best fit on the scatter diagram.

(1 mark)

(continued on the next page)

Turn over

5. continued.

(c) Use the scatter diagram and your line of best fit to predict the average air temperature at an altitude of **7000** metres.

(1 mark)

_____ °C

(continued on the next page)

5. continued.

Jim wants to predict the average air temperature at an altitude of 11 000 metres.

(d) Discuss whether or not it is appropriate to use the line of best fit to make his prediction.

(2 marks)

(Total for Question 5 is 6 marks)

6. Look at the information for Questions 6(a), 6(b), 6(c), 6(d) and 6(e) in the Data Booklet.

It shows some data.

David asked **15** of his friends about the number of pets they each have.

The data he collected is shown in the Data Booklet.

- (a) Circle the word in the list below that describes this type of data.

(1 mark)

continuous

qualitative

discrete

grouped

(continued on the next page)

6. continued.

(b) Write down the modal number of pets.

(1 mark)

(c) Find the median number of pets.

(1 mark)

(continued on the next page)

Turn over

6. continued.

(d) State which average, the mode or the median, best represents these data.

Give a reason for your answer.

(1 mark)

(e) Find the interquartile range of the number of pets.

(2 marks)

(continued on the next page)

Turn over

6. continued.

Look at the table for Questions 6(f) and 6(g) in the Data Booklet.

It shows some data.

Wanda asked some of her friends about the number of pets they each have.

The table in the Data Booklet is a summary of the data she collected.

(f) Compare the distribution of the numbers of pets for David with the distribution of the numbers of pets for Wanda.

Give TWO comparisons and interpret each of your comparisons.

(4 marks)

Answer lines continue on the next page.

6. (f) continued.

(continued on the next page)

Turn over

6. continued.

Wanda recorded the highest number of pets as **15**
She says that this must be an outlier and concludes
that it should be removed from her data.

(g) (i) Give one reason why Wanda's conclusion
may be appropriate.

(1 mark)

(ii) Give one reason why Wanda's conclusion
may NOT be appropriate.

(1 mark)

(Total for Question 6 is 12 marks)

Turn over

- 7. Look at the table for Question 7 in the Data Booklet.
It gives information about the ages of people on
the electoral register in the West Midlands in
December 2018**

**A researcher wanted to find out information about
voting intentions in the West Midlands.**

**He sent a questionnaire to a sample of
10 000 people on the electoral register in the
West Midlands stratified by age of voter.**

**Describe how the researcher would have carried out
this stratified sampling.**

You should show any calculations that you use.

**Discuss the appropriateness of this stratified
sample.**

(5 marks)

Answer lines are on the next two pages.

7. continued.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Turn over

7. continued.

(Total for Question 7 is 5 marks)

8. Look at the table for Question 8(a) in the Data Booklet.

The following is an extract from part of a row of a random number list.

68236

35335

71329

- (a) Use the random number list to complete the table in the Data Booklet for the first 5 random 2-digit numbers.

There are four spaces to fill.

(2 marks)

(continued on the next page)

8. continued.

The most common blood type in the United Kingdom is **O+**

The percentage of people in the United Kingdom with **O+** blood type is **38%**

Asha uses a simulation method to estimate how many donors would be needed to find exactly 3 donors with **O+** blood type.

Asha is going to use the following **2**-digit numbers for her simulation.

Blood type	O+	Not O+
Random numbers	00–37	38–99

(continued on the next page)

Turn over

8. continued.

(b) Explain why this is an appropriate way to allocate the random numbers.

(1 mark)

(continued on the next page)

8. continued.

Look at the information for Questions 8(c) and 8(d) in the Data Booklet.

It shows a table of results and a set of random numbers.

Asha runs trials using her simulation method.

The result of each trial is the number of random numbers used until Asha gets exactly 3 donors with O+ blood type.

The table in the Data Booklet shows the results of her first 4 trials.

The set of random numbers used by Asha to complete the fifth trial are shown in the Data Booklet.

(continued on the next page)

8. continued.

(c) Using this set of random numbers, find the result for the fifth trial.

You must make it clear how you obtain your answer.

(2 marks)

(continued on the next page)

8. continued.

Asha finds the mean of her 5 results and decides that the results of her simulation are sufficient to predict the number of donors needed to find at least 3 with O+ blood type in the next blood donation session.

(d) Explain whether the method that Asha uses to predict the number of donors required is appropriate.

(2 marks)

(Total for Question 8 is 7 marks)

Turn over

9. Kyle is investigating the heights and the weights of professional basketball players.

He found the weight, in kilograms, of some professional basketball players from 1950 to 1959

- (a) Circle the word in the list below that describes weight, in kilograms, as a type of data.

(1 mark)

discrete

continuous

ordinal

categorical

(continued on the next page)

9. continued.

Look at the diagram for Questions 9(b) and 9(c) in the Data Booklet.

It shows an incomplete histogram.

The incomplete histogram in the Data Booklet and incomplete grouped frequency table on the following page give information about the weights, in kilograms, of the professional basketball players from 1950 to 1959

(continued on the next page)

9. continued.

Weight (w kilograms)	Frequency
$65 < w \leq 70$	5
$70 < w \leq 75$	15
$75 < w \leq 80$	61
$80 < w \leq 85$	81
$85 < w \leq 90$	
$90 < w \leq 95$	
$95 < w \leq 100$	35
$100 < w \leq 105$	14
$105 < w \leq 110$	9
$110 < w \leq 115$	1

(continued on the next page)

Turn over

9. continued.

(b) Use the information in the histogram in the Data Booklet to complete the table on the previous page.

There are two spaces to fill.

(2 marks)

(c) Use the information in the table on the previous page to complete the histogram in the Data Booklet.

(2 marks)

(continued on the next page)

9. continued.

Kyle also drew a histogram for the weights of professional basketball players from 2000 to 2009. This histogram was negatively skewed.

(d) Interpret the negative skew of the weights of professional basketball players from 2000 to 2009

(1 mark)

(continued on the next page)

9. continued.

Look at the table for Question 9(e) in the Data Booklet.

Kyle also collected data about the heights of professional basketball players from 1950 to 1959 and the heights of professional basketball players from 2000 to 2009

The grouped frequency table in the Data Booklet gives information about the heights of professional basketball players from 2000 to 2009

(continued on the next page)

9. continued.

The estimate of the mean height for professional basketball players from **1950 to 1959** is calculated to be **190.9 cm** to one decimal place.

- (e) (i) Calculate an estimate of the mean height of basketball players from **2000 to 2009**
(3 marks)

_____ cm

- (ii) Comment on how the mean height of professional basketball players has changed between the two sets of data.
(1 mark)

(Total for Question 9 is 10 marks)

Turn over

10. Claire is investigating sales of different types of vehicle over time.

She plans to collect data on the numbers of motorcycles first registered in the UK over time.

(a) Write down a suitable hypothesis for this investigation.

(1 mark)

(continued on the next page)

10. continued.

**Look at Diagram 1 for Question 10 in the
Data Booklet.**

**It shows a time series graph with some information
about the numbers of motorcycles first registered in
the UK from 2017 to 2019**

**(b) Identify and interpret one example of
seasonal trend shown by the time series graph
in Diagram 1
(2 marks)**

(continued on the next page)

Turn over

10. continued.

Claire calculated 4–point moving averages for the information shown in the time series graph.

(c) Explain why this is appropriate.

(1 mark)

(continued on the next page)

10. continued.

Look at Diagram 2 for Question 10 in the Data Booklet.

Claire also collected data on the numbers of cars first registered in the UK from 2017 to 2019

The time series graph in the Data Booklet shows some information about the numbers of cars first registered in the UK from 2017 to 2019 together with the first seven 4–point moving averages.

(d) Compare the seasonal trend shown for the numbers of motorcycles first registered in the UK with the seasonal trend for the numbers of cars first registered in the UK.

(1 mark)

(continued on the next page)

Turn over

10. continued.

**The last three 4–point moving averages
(thousands) for the number of cars registered in the
UK from 2017 to 2019 are**

576·0

575·3

573·9

**(e) Plot these three moving averages on the
time series graph in Diagram 2 and draw a
trend line.**

(3 marks)

(continued on the next page)

10. continued.

- (f) Describe and interpret the trend in the numbers of cars first registered in the UK from 2017 to 2019**
(2 marks)

(Total for Question 10 is 10 marks)

11. Look at the diagram for Question 11 in the Data Booklet.

It is a sample space diagram.

A fair 3-sided spinner numbered 1, 2 and 3 and a fair 4-faced dice numbered 1, 2, 3 and 4 are used in a game.

To play the game, a player spins the spinner once and rolls the dice once.

The total score is found by adding the number the spinner lands on and the number the dice lands on.

(a) Complete the sample space diagram in the Data Booklet to show all the possible total scores.

There are nine spaces to fill.

(2 marks)

(continued on the next page)

11. continued.

To win the game a player needs to get a total score of at least 6

Chloe plays the game once.

(b) Find the probability that Chloe does NOT win the game.

(2 marks)

(Total for Question 11 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER

Sources

Question 5

(Source: adapted from www.engineeringtoolbox.com)