AQA

Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

STATISTICS

H

Higher Tier Paper 1

8382/1H

Wednesday 5 June 2024 Afternoon

Time allowed: 1 hour 45 minutes

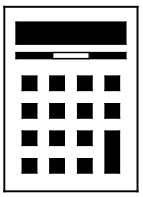
[Turn over]

J U N 2 4 8 3 8 2 1 H 0 1

On the front of this book, write your surname and forename(s), your centre number, your candidate number and add your signature.

MATERIALS

For this paper you must have:



- **a calculator**
- **mathematical instruments**
- **a Diagram Booklet.**

INSTRUCTIONS

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**

- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **Do all rough work in this book. Cross out any work you do not want to be marked.**

INFORMATION

- **The marks for the questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **You may ask for more answer paper and graph paper. These must be tagged securely to this answer booklet.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

1 **A biased six-sided dice is rolled 50 times.**

The results are shown below.

SCORE	FREQUENCY
1	8
2	11
3	7
4	10
5	9
6	5

Use these results to estimate the probability that the dice rolls a 6

Circle your answer. [1 mark]

$\frac{1}{6}$ $\frac{5}{6}$ $\frac{5}{50}$ $\frac{45}{50}$

[Turn over]

2 A school uses this table to give students a score that represents their behaviour.

SCORE	BEHAVIOUR DESCRIPTION
1	Excellent
2	Good
3	Satisfactory
4	Unacceptable

What type of data is the score?

Circle your answer. [1 mark]

Bivariate Ordinal

Continuous Grouped

3 A data set is shown below.

5 5 6 7 21

The value of 21 is identified as an outlier and removed.

Which of the following measures will NOT decrease?

Circle your answer. [1 mark]

Mean Mode Median Range

4 Each value in a data set is different.

Which of the following measures of spread has the largest value?

Tick (✓) a box. [1 mark]

☐ The interquartile range.

☐ The interdecile range between the 1st and 9th deciles.

☐ The interpercentile range between the 20th and 80th percentiles.

☐ The range.

4

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[Turn over]

5 All Year 7 students in two schools take the same French test.

Sanjit wants to know if students in school A or school B score better.

5(a) Write down a suitable hypothesis that Sanjit could use. [1 mark]

5 (b) Describe fully the population for Sanjit's investigation. [1 mark]

_____

_____

_____

[Turn over]

5 (c) **Sanjit considers the following two methods for collecting scores from a sample of 19 students in school A.**

METHOD A

Ask the first 19 Year 7 students who arrive in the playground.

METHOD B

Give each student in Year 7 a unique number.

Generate 19 different random numbers.

Use the 19 students whose numbers match the ones generated.

State the name of each method and give one advantage of that method. [4 marks]

METHOD A

Name _____

_____

Advantage _____

_____

_____

_____

METHOD B

Name _____

_____

Advantage _____

_____

_____

_____

[Turn over]

5(d) **Sanjit collects the test scores from a sample of 19 Year 7 students in SCHOOL A.**

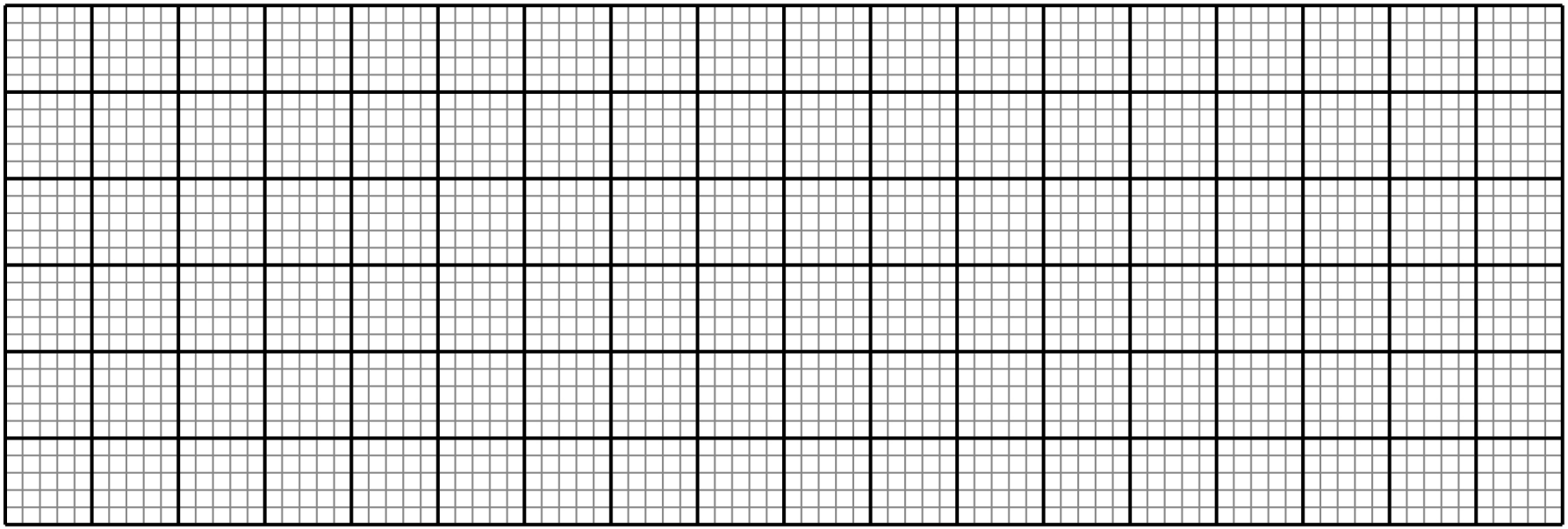
Here are his data.

5	**8**	**9**	**9**	**10**	**11**	**13**	**14**	**14**	**15**
18	**19**	**23**	**24**	**26**	**31**	**35**	**37**	**42**	

On the opposite page, draw a box plot to represent these data.

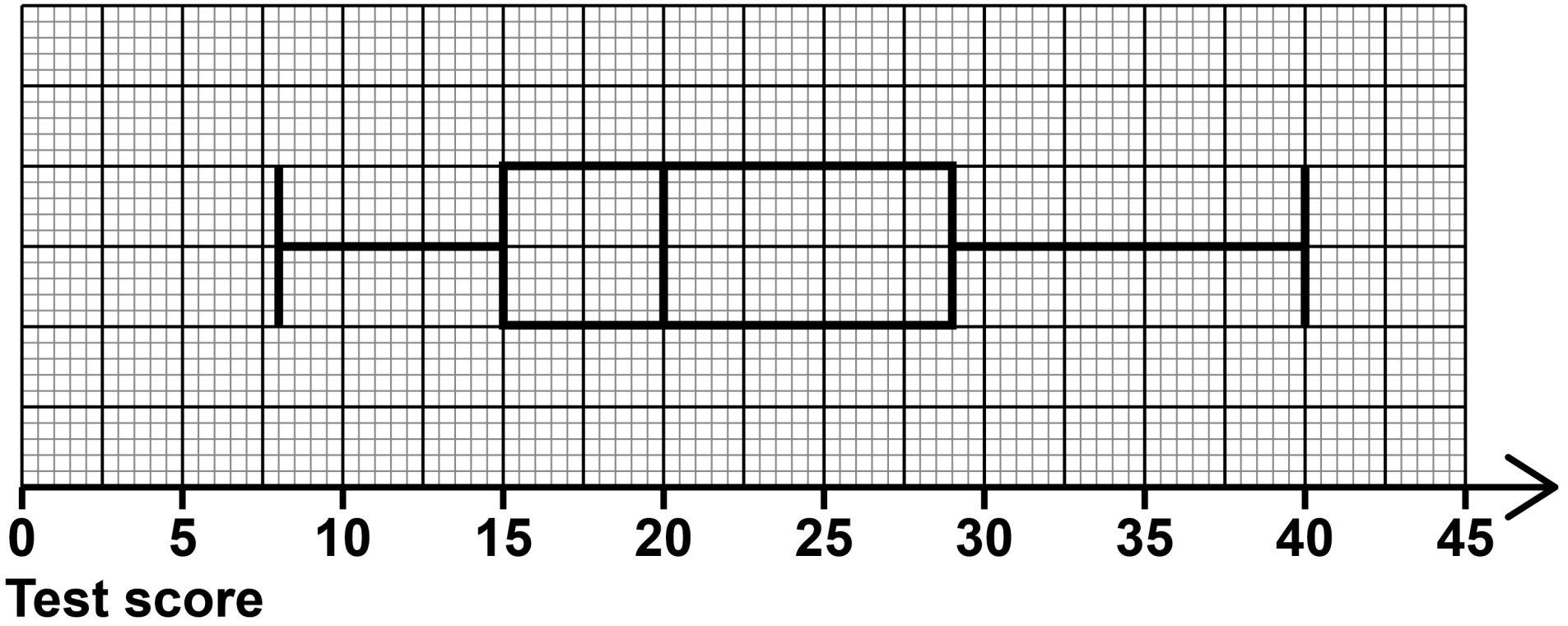
You may use the table to help. [6 marks]

LOWER QUARTILE	
MEDIAN	
UPPER QUARTILE	



15

Sanjit draws this box plot to show the test scores for his sample of 19 students from SCHOOL B.



5 (e)(i) **Use the box plot to write down the median test score for SCHOOL B. [1 mark]**

Answer _____

5 (e)(ii) **Compare statistically the median scores for SCHOOL A and SCHOOL B. [1 mark]**

_____

_____

_____

[Turn over]

5 (f) (i) **Use the box plot to calculate the interquartile range for SCHOOL B. [1 mark]**

Answer _____

5 (f) (ii) **Compare statistically the interquartile ranges for SCHOOL A and SCHOOL B. [1 mark]**

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[Turn over]

6 Alex asks a group of friends how many times they exercised last month.

Here are the data.

1 1 1 2 3 3

5 7 14 30

Alex correctly calculates these three averages.

Mode	1
Median	3
Mean	6.7

Alex wants to know the average that BEST represents these data.

Comment on the suitability of each average. [3 marks]

Mode _____

_____

_____

_____

Median _____

_____

_____

_____

Mean _____

_____

_____

_____

3

7 A random number generator is programmed to only generate values of 1, 2, 3, 4 and 5

Numbers are generated in groups and recorded to see if the random number generator is fair.

The table, provided on page 2 of the Diagram Booklet, shows information about the number of 1s generated.

7 (a) Which group contained zero 1s? [1 mark]

Answer _____

7 (b)(i) Aalim says

"We only need the first set of results because they show the random number generator is fair."

Chloe says

"It is better to use all the results to see if the random number generator is fair."

Give ONE reason why Chloe is correct. [1 mark]

_____

_____

_____

[Turn over]

7 (b)(ii) **Use the table, on page 2 of the Diagram Booklet, to decide if the random number generator is fair.**

Tick (✓) a box.

☐ **Yes**

☐ **No**

☐ **Cannot tell**

Give a reason for your answer.
[1 mark]

_____

_____

_____

3

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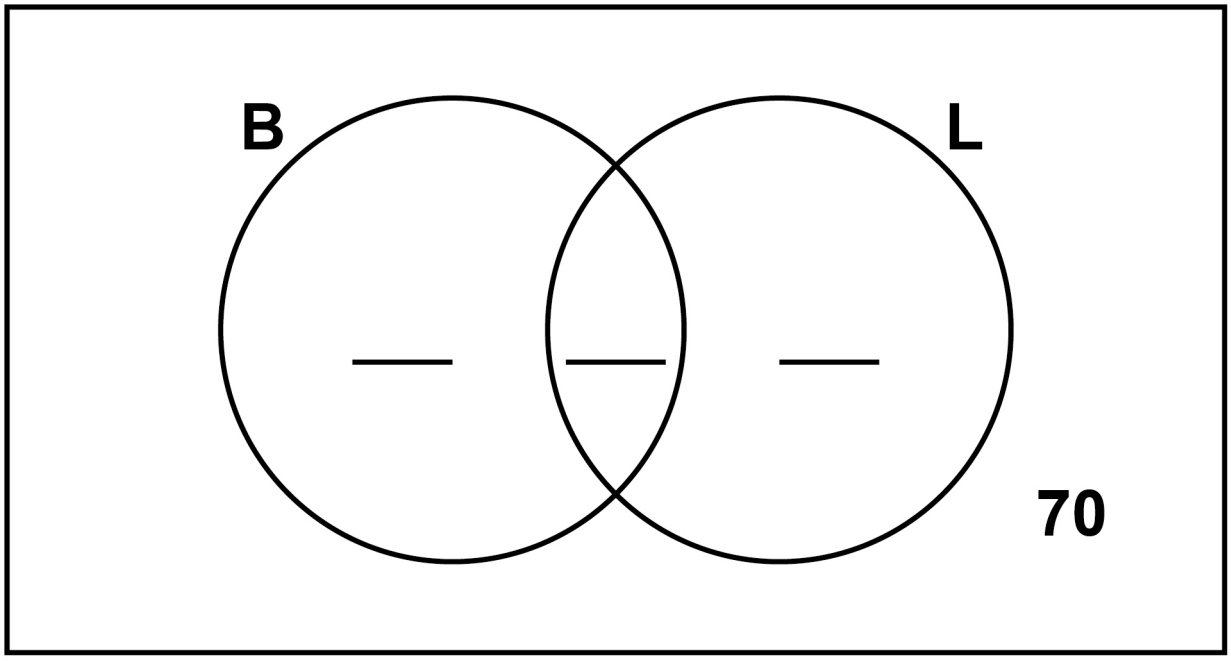
[Turn over]

8 The Venn diagram shows some information about the 350 photographs in an exhibition.



In the diagram,

B represents the black-and-white photographs

L represents the landscape photographs.

8 (a) Complete the diagram to show that,

- there are 166 black-and-white photographs
- there are 154 landscape photographs.

[3 marks]

8(b) A photograph is chosen at random.

8(b)(i) What is the probability that the photograph is not black-and-white and not landscape? [1 mark]

Answer _____

8(b)(ii) Given that the photograph is black-and-white, what is the probability that it is NOT landscape? [2 marks]

_____

_____

_____

Answer _____

6

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[Turn over]

9 A researcher is investigating the heights of children in their area.

They have access to the medical records of 1200 children.

In the records, each child is categorised into one of four age groups,

- babies
- infants
- juniors
- seniors.

9 (a) Kim suggests they take a sample of 120 children by choosing 30 from each age group.

Give ONE reason why choosing 30 from each group may not be appropriate. [1 mark]

_____

_____

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[Turn over]

9 (b) **The researcher uses a different method to take a sample of 120 children.**

Some information about the heights of the children in the sample is shown in the table and histogram, on pages 34–35 .

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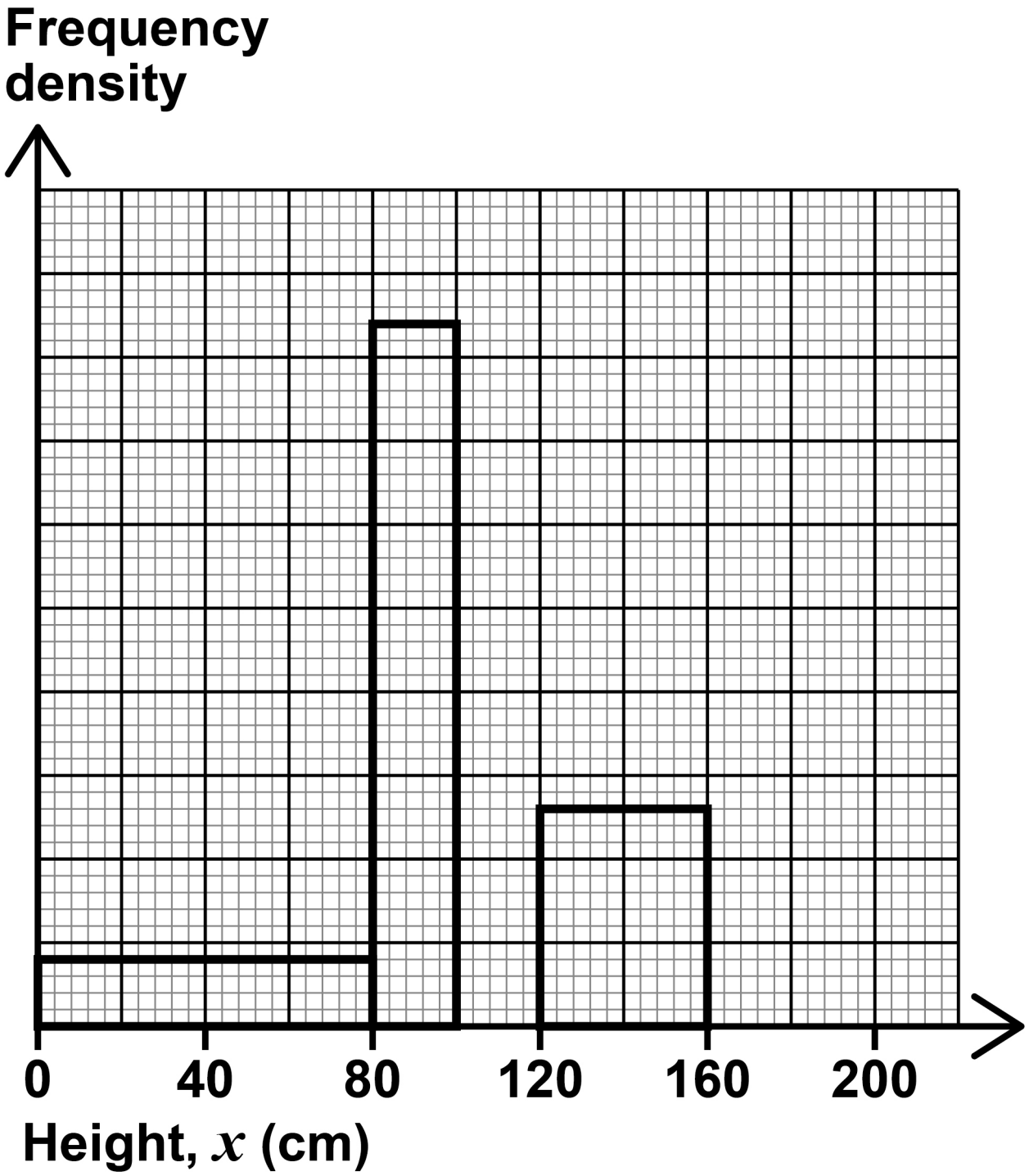
[Turn over]

HEIGHT, x (cm)	FREQUENCY
$0 < x \leqslant 80$	
$80 < x \leqslant 100$	42
$100 < x \leqslant 120$	26
$120 < x \leqslant 160$	
$160 < x \leqslant 180$	10

Complete the table and histogram.
[5 marks]



[Turn over]

6

10 The dual bar chart, provided on pages 4–5 of the Diagram Booklet, shows information about the number of cattle on farms in England and Scotland.

10 (a) Is the 90th percentile for SCOTLAND between 201 and 350 cattle?

Tick (✓) a box.

☐ Yes

☐ No

Justify your answer. [2 marks]

[Turn over]

10 (b) **The following statement is made,**

"Scotland has a greater proportion of large farms, so there are more cattle in Scotland than in England."

Give two reasons why this may NOT be correct. [2 marks]

1 _____

_____

_____

_____

2 _____

_____

_____

_____

10 (c) Describe the skew for the data about farms in England. [1 mark]

_____

_____

_____

[Turn over]

5

11 Aiyla has this diagram, provided on page 6 of the Diagram Booklet, comparing the ages of the populations in Spain and Turkey in 2019.

11 (a) (i) Use the diagram, on page 6 of the Diagram Booklet, to work out the percentages of the populations aged below 40 in Spain and in Turkey. [3 marks]

_____

_____

_____

_____

Spain _____ %

Turkey _____ %

11 (a)(ii) **Hence compare the percentages of the populations aged below 40 in Spain and in Turkey. [1 mark]**

11 (b) Aiyla finds this information.

COUNTRY	AVERAGE LIFE EXPECTANCY (YEARS)
Spain	83.5
Turkey	77.7

Write down one feature of the graph, on page 6 of the Diagram Booklet, that supports this information. [1 mark]

_____

_____

_____

_____

5

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[Turn over]

12 The table shows the population of England and Wales in 2017 and 2020.

It also shows the birth rate in 2017.

YEAR	POPULATION FOR ENGLAND AND WALES	BIRTH RATE (PER 1000 POPULATION)
2017	58 744 600	11.6
2020	59 719 700	

Source: ONS

The number of births in 2020 was 9.6% lower than the number of births in 2017.

Complete the table using the formula

$$\text{Birth rate (per 1000 population)} = \frac{\text{number of births}}{\text{population}} \times 1000$$

[4 marks]

[Turn over]

4

13 A race has a running section and a cycling section.

Seb takes part in the race.

The table, provided on page 7 of the Diagram Booklet, shows

- Seb's time for each section
- the mean time and standard deviation of the times for all of the racers for each section.

Seb's coach says he did better in the running section than in the cycling section.

Is Seb's coach correct?

Tick (✓) a box.

☐ Yes

☐ No

You MUST show your working.

Use the formula

$$\text{standardised score} = \frac{\text{value} - \text{mean}}{\text{standard deviation}}$$

[3 marks]

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14 Charlie is investigating the lengths of words used in crosswords.

The cumulative frequency step polygon, provided on pages 8–9 of the Diagram Booklet, shows the lengths of 120 words used in crosswords in his local newspaper.

14 (a) Work out the percentage of words which had more than 8 letters. [2 marks]

Answer _____ %

14 (b)(i) **Use the graph, on page 9 of the Diagram Booklet, to complete the table. [2 marks]**

LOWER QUARTILE	UPPER QUARTILE	INTERQUARTILE RANGE

14 (b)(ii) **Using the values in your table, determine if there are any outliers.**

You MUST show your working.

Tick (✓) a box.

☐ There ARE outliers

☐ There are NO outliers

[3 marks]

_____

_____

_____

_____

7

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15 **The comparative pie charts, provided on pages 10–11 of the Diagram Booklet, show information about the ages (in years) of students in two countries who finished university in 2021.**

15 (a) **More students finished university in 2021 in country A than in country B.**

How do the pie charts, on pages 10–11 of the Diagram Booklet, show this? [1 mark]

15 (b) **618 000 students finished university in 2021 in country B.**

Calculate the number of students who finished university in 2021 from country A that were older than 24

You MUST show your working.
[5 marks]

Answer _____

6

[Turn over]

16 (a) **Emily wants to estimate the population of honey badgers in a large area.**

She uses the following method,

- **capture 5 honey badgers**
- **mark them using coloured chalk dust and release them**
- **three hours later capture 50 honey badgers.**

Write down THREE problems with this method. [3 marks]

1 _____

_____

_____

_____

2 _____

_____

_____

_____

3 _____

_____

_____

_____

[Turn over]

16 (b) Roberta wants to estimate the number of honey badgers in a different area.

She uses this method.

1ST SAMPLE

40 captured and then marked

2ND SAMPLE

35 captured

8 were marked

Use this information to estimate the number of honey badgers in Roberta's area. [2 marks]

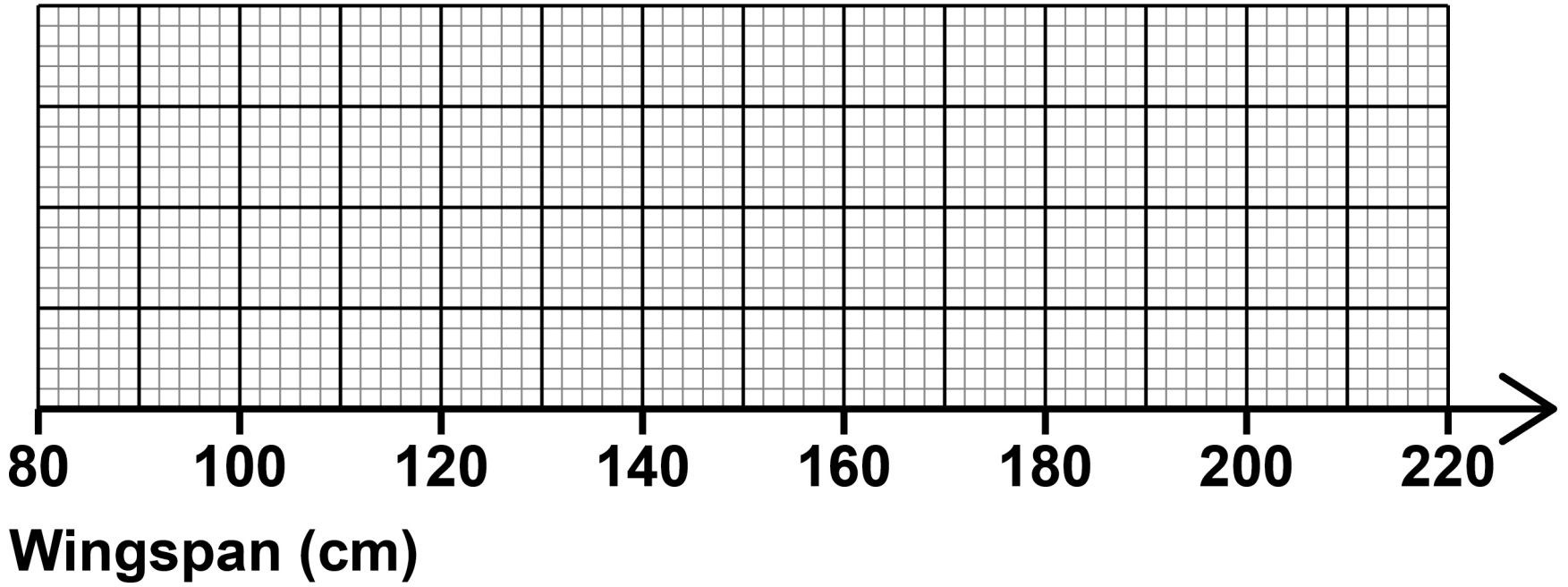
Answer _____

[Turn over]

5

17 **The wingspan of the Canada goose is normally distributed with a mean of 156 cm and a standard deviation of 10 cm.**

17 (a) **Draw a sketch of this distribution on the grid.**
[3 marks]



17 (b) The wingspan of the snow goose is normally distributed with a mean of 148 cm and a standard deviation of 6 cm.

A snow goose is selected at random.

Work out the probability that it has a wingspan between 136 cm and 154 cm. [3 marks]

61

[Turn over]

Answer _____

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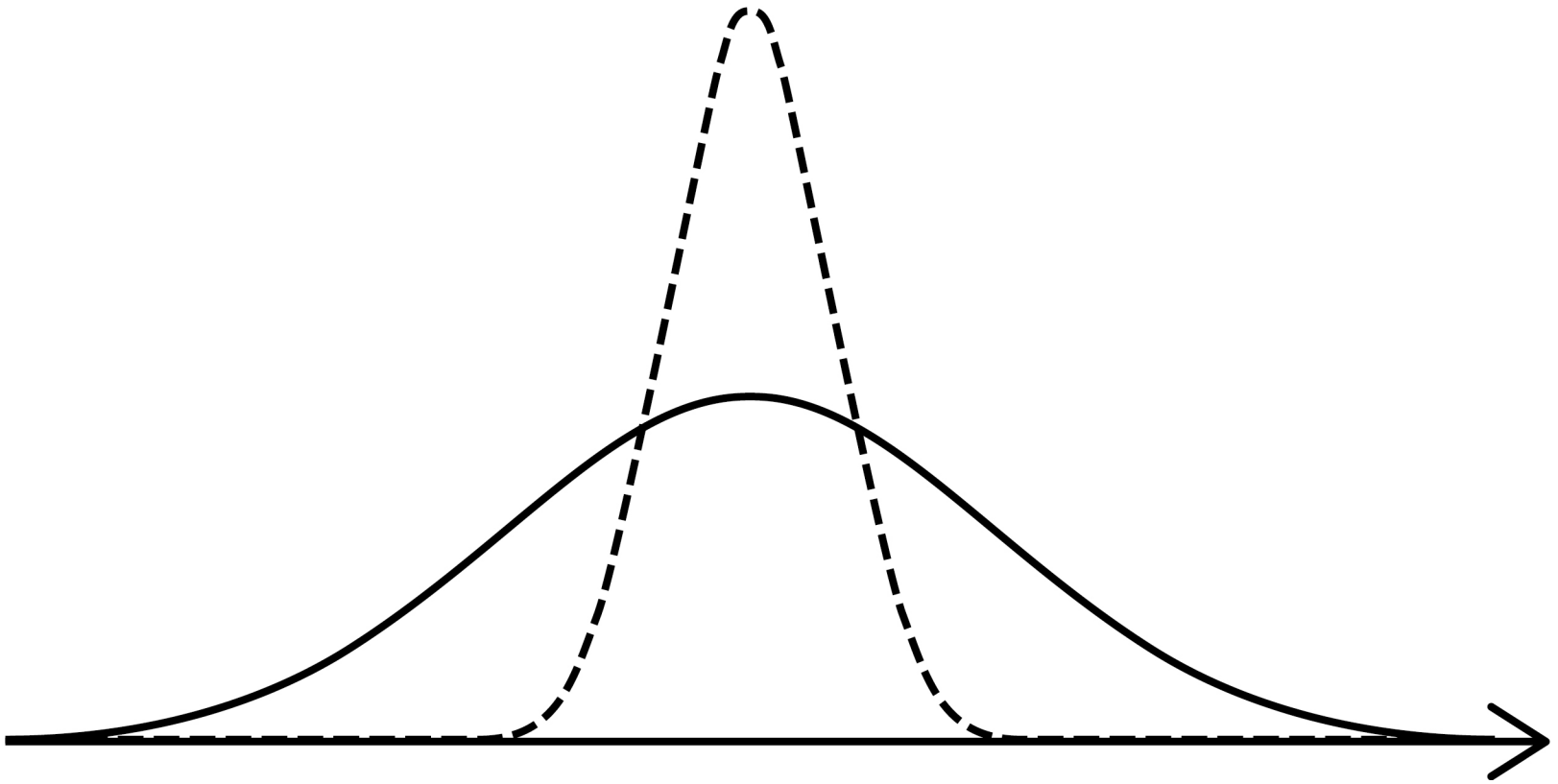
[Turn over]

17 (c) **This diagram shows some information about the wingspan of the greylag goose.**

The diagram has no key or scale.



The solid line shows the distribution of the wingspan of the greylag goose.

Give ONE reason why the dashed line could show the distribution of the sample means of the wingspan of the greylag goose. [1 mark]

_____

_____

_____

65

END OF QUESTIONS

7

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Question	Mark
1–4	
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