AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE STATISTICS

F

Foundation Tier Paper 2

Tuesday 16 June 2020 Morning Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments.



Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or 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 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.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
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8	
9	
10	
11	
12	
13	
14	
TOTAL	

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

1 In a sample of 30 hockey matches, Natalie scored in 6 of them.

Estimate the proportion of all hockey matches in which Natalie scores.

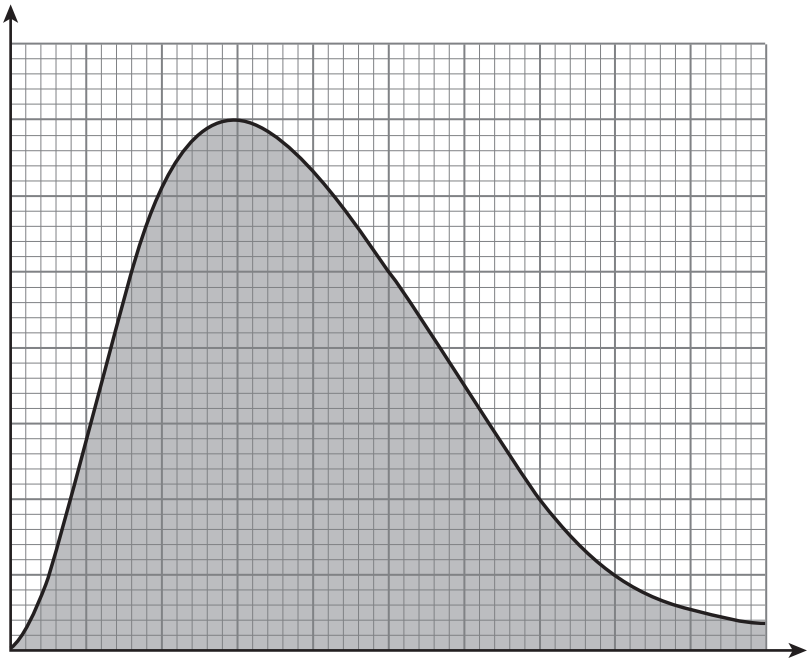
Circle your answer.

[1 mark]

0.18 0.2 0.3 0.6

1

2 The diagram shows the distribution of some data.



What word describes the skewness of the data shown?

Circle your answer.

[1 mark]

positive zero stretched negative

1

Do not write outside the box

3 In this question use the formula

$$\text{birth rate} = \frac{\text{number of births} \times 1000}{\text{total population}}$$

In 2017, there were 1197 births in Retford, which has a population of 23 000

Circle the birth rate to the nearest whole number.

[1 mark]

19 52 1197 19 215

1

4 Which word describes the extent to which something measures what it is supposed to measure?

Circle your answer.

[1 mark]

bias reliability validity accuracy

1

Turn over for the next question

Do not write outside the box

5 Asha is learning to throw the javelin.

During training one day, she threw the javelin these distances (in metres).

21.4	18.8	23.7	3.9	17.9	26.1
32.4	26.8	18.6	22.2	30.5	

Asha wants to be able to see if her performance improves in the future.

She decides to calculate the median and range of the data.

5 (a) Work out the median of the data.

[2 marks]

Answer _____ metres

5 (b) Work out the range of the data.

[2 marks]

Answer _____ metres

5 (c) Give **one** reason why the range might **not** be a good measure of spread to use here.

[1 mark]

Do not write outside the box

5 (d) Six months later Asha calculates her median throw length again after training one day.

Her median is 31.7 metres.

She says,

> "On average, my throws are getting longer, so if I keep training my distances will continue to increase."

Comment on **both** parts of Asha's statement, giving a reason for whether you think she is correct.

[2 marks]

"On average, my throws are getting longer…"

_____

_____

_____

"… if I keep training my distances will continue to increase."

_____

_____

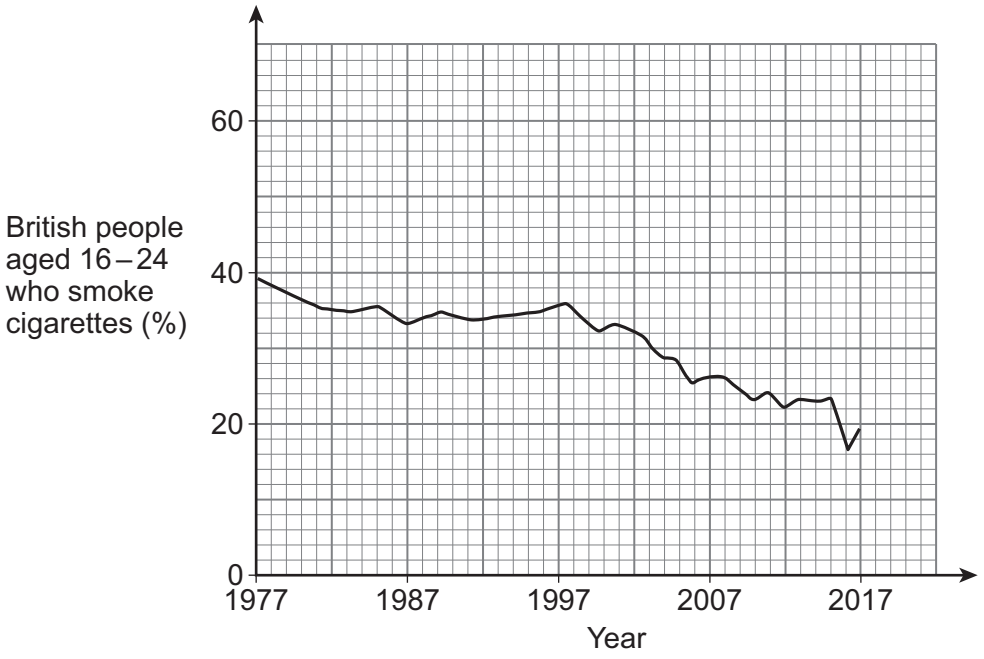
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7

Turn over for the next question

Do not write outside the box

6 This graph was seen on a news app.



Source: adapted from ONS

6 (a) Approximately what percentage of British people aged 16 to 24 smoked cigarettes in **1997**?

[1 mark]

Answer _____ %

6 (b) Write down a possible headline for the story which was based on this graph.

[1 mark]

_____

_____

_____

2

Do not write outside the box

7 Research into the effect of gaming on concentration levels in young people shows mixed results.

Jem decides to get opinions about this amongst her friends and teachers.

7 (a) Jem decides to use convenience sampling to obtain people to ask.

What is convenience sampling?

[1 mark]

_____

_____

7 (b) Give **one** advantage of using convenience sampling.

[1 mark]

_____

_____

7 (c) Give **one** disadvantage of using convenience sampling.

[1 mark]

_____

_____

7 (d) One of Jem's questions was,

"Do you agree that gaming has more positive benefits than negative?"

Tick (✓) a box Yes ☐ No ☐

Suggest **two** improvements to this question.

[2 marks]

1 _____

_____

2 _____

_____

5

Turn over ▶

Do not write outside the box

8 When customers have enjoyed a meal at a restaurant, they might

- tweet positively about it
- leave a star rating on a review website.

Dylan suggests that there is a positive correlation between the number of positive tweets and the average star rating.

8 (a) Dylan collects secondary data for these variables for 10 restaurants in his town.

Where may he have been able to source the data?

[1 mark]

Answer _____

8 (b) Here are the data he collected for tweets and star ratings last month.

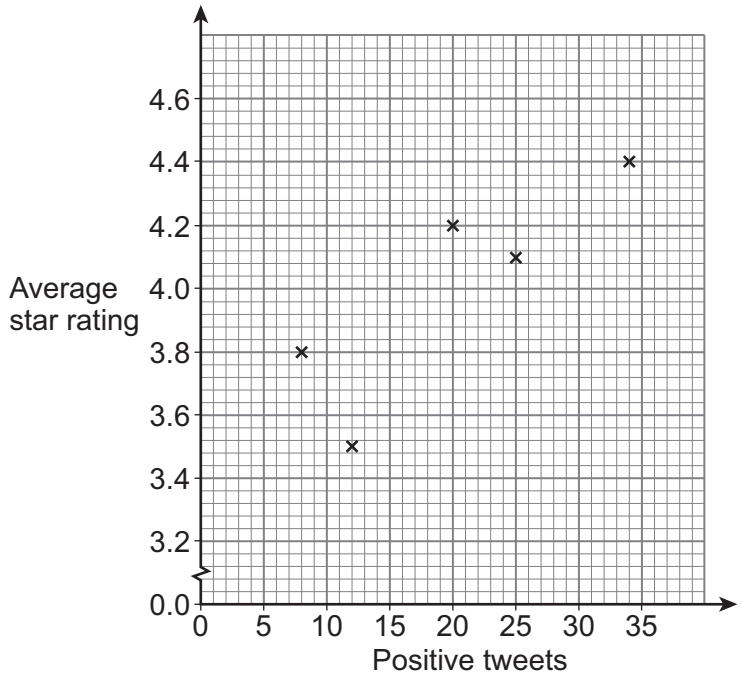
Positive tweets	Average star rating
25	4.1
8	3.8
20	4.2
12	3.5
34	4.4

Positive tweets	Average star rating
10	3.8
30	4.3
0	4.2
24	4.6
8	3.3

8 (b) (i) The data for the left-hand table is plotted on the scatter diagram below.

Complete the diagram by plotting the points for the right-hand table.

[2 marks]



Do not write outside the box

8 (b) (ii) Circle the outlier on your scatter diagram.

[1 mark]

8 (b) (iii) Ignoring the outlier, the mean number of positive tweets for these restaurants is 19

Show that the mean star rating, ignoring the outlier, is exactly 4

[2 marks]

8 (b) (iv) Use these means to help you draw a line of best fit on the diagram.

[2 marks]

8 (b) (v) Estimate the average star rating for a restaurant with 15 positive tweets last month.

[1 mark]

Answer _____

8 (c) Dylan says,

"The data show a correlation of about 0.99 so my suggestion is correct."

Make **two** comments on what Dylan has said.

[2 marks]

Comment 1 _____

Comment 2 _____

11

Turn over ▶

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9 In a national survey, held regularly, people are asked,

"Overall, how happy did you feel yesterday?
Score 0 for 'not at all happy' to 10 for 'completely happy'."

Some results are given in the table.

Date range	Mean Score	Category of 'happiness' (%)			
		Low	Medium	High	Very High
		0–4	5–6	7–8	9–10
April 2014–March 2015	7.46	8.87	16.59	40.44	34.10
July 2014–June 2015	7.48	8.69	16.51	40.59	34.22
October 2014–September 2015	7.48	8.72	16.57	40.49	34.21
January 2015–December 2015	7.48	8.69	16.49	40.59	34.23
April 2015–March 2016	7.48	8.81	16.46	40.49	34.24
July 2015–June 2016	7.46	8.90	16.63	40.41	34.06
October 2015–September 2016	7.48	8.79	16.47	40.39	34.35
January 2016–December 2016	7.49	8.69	16.31	40.43	34.58
April 2016–March 2017	7.51	8.58	16.30	40.26	34.85
July 2016–June 2017	7.52	8.48	16.13	40.31	35.08
October 2016–September 2017	7.52	8.44	16.19	40.45	34.92
January 2017–December 2017	7.53	8.26	16.26	40.36	35.12
April 2017–March 2018	7.52	8.25	16.34	40.53	34.88
July 2017–June 2018	7.54	8.08	16.28	40.44	35.20

Source: ONS

9 (a) For the period January 2016–December 2016, what percentage of people were categorised with a **high** happiness score?

[1 mark]

Answer _____ %

9 (b) Identify the trend in mean score over the period shown.

[1 mark]

_____

_____

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9 (c) Look at the percentages in the first and last rows of Category of 'happiness'.

9 (c) (i) Which happiness score category has seen the biggest **numerical** change in the percentages over the period shown?

Circle your answer.

[1 mark]

Low Medium High Very High

9 (c) (ii) Which happiness score category has seen the biggest **percentage** change in the percentages over the period shown?

Circle your answer.

[1 mark]

Low Medium High Very High

4

Turn over for the next question

Do not write outside the box

10 Matilda sells drinks from her beach café.

She sells,

- tea (T)
- coffee (C)
- orange (O)
- blackcurrant (B)

Matilda believes that, over time, she sells equal numbers of each drink.

Assume she is correct and that every customer's choice is independent.

10 (a) Write down the probability that she sells the next customer a tea.

[1 mark]

Answer _____

10 (b) Work out the probability that she sells each of the next **two** customers a tea.

[2 marks]

_____

_____

_____

Answer _____

10 (c) By listing all the possible pairs of drinks, or otherwise, work out the probability she sells the next two customers **different** drinks.

[2 marks]

Answer _____

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10 (d) One hot summer's day Matilda sells,

3 teas
1 coffee
35 orange drinks
41 blackcurrant drinks.

Matilda says,

"It looks like my assumption about selling equal numbers of drinks is wrong."

10 (d) (i) Compare the data with her assumption.

[1 mark]

10 (d) (ii) Give a reason why Matilda should perhaps not come to that conclusion yet.

[1 mark]

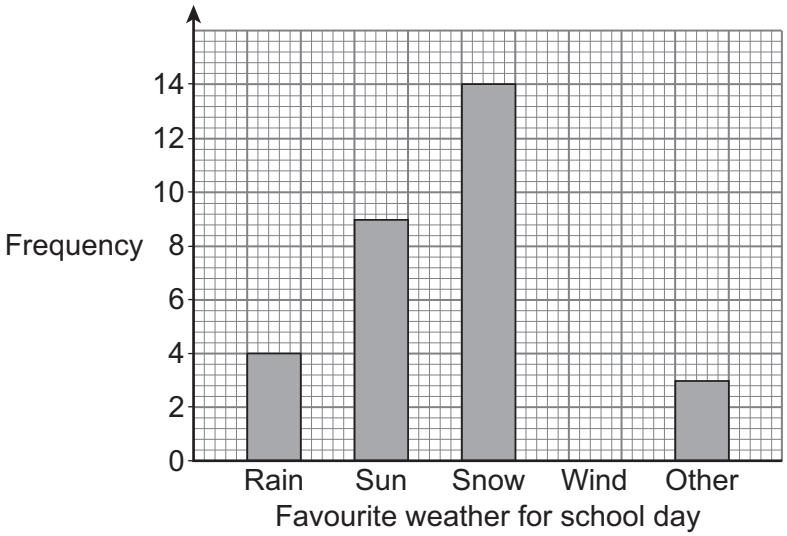
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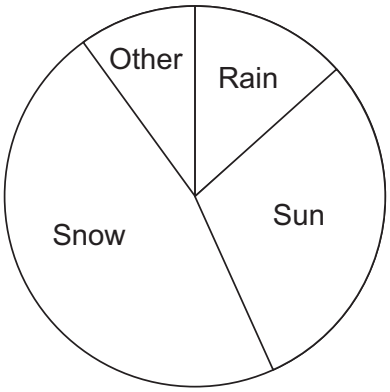
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11 Thirty students were asked about their favourite type of weather for a school day.

The bar chart and the pie chart show the results.



Favourite weather for school day



11 (a) Give **two** reasons why the bar chart gives more information.

[2 marks]

Reason 1 _____

_____

_____

Reason 2 _____

_____

_____

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11 (b) The pie chart angle for "other" is 36°

Show **how** this value is calculated.

[2 marks]

11 (c) The same 30 students were later asked about their favourite weather for a **non-school day**.

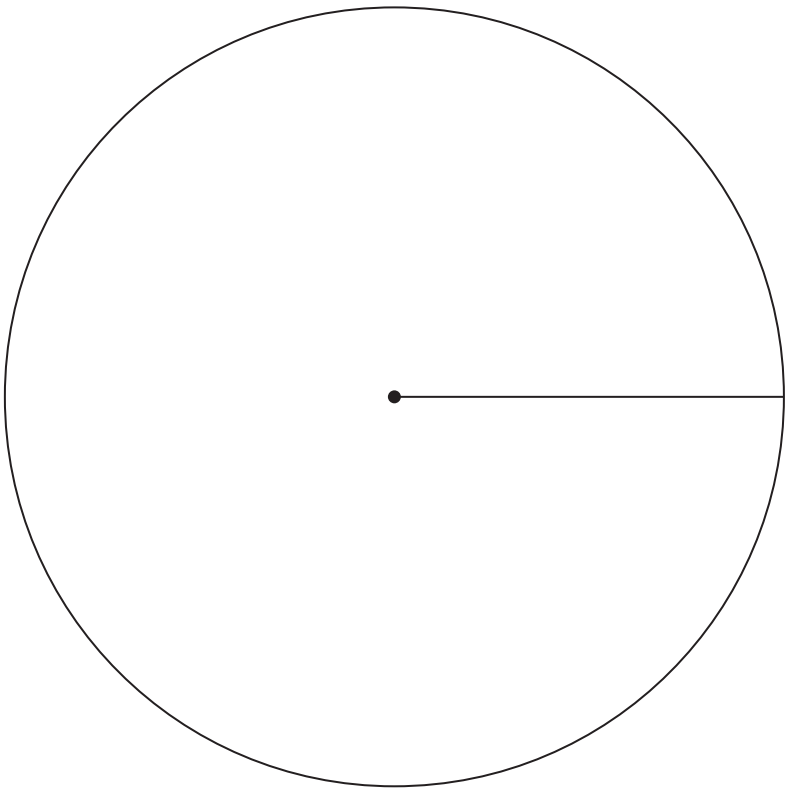
Compared to their choices for a school day

- no one wanted rain
- double the number wanted sun
- five fewer wanted snow
- one person wanted it windy.

Draw a labelled pie chart for the favourite weather on a non-school day.

Remember to include any who now wanted 'other'.

[5 marks]



9

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12 There are many ways to judge how hard it is to read a piece of text in a book.

12 (a) Ravi decides to record the number of letters in the longest word on each of the first 11 pages of a book.

His results are

7 13 8 9 6 10 16 9 10 8 8

He calculates the interquartile range (IQR).

12 (a) (i) Show that he should get a value of 2

[3 marks]

12 (a) (ii) For a second book, Ravi again counts the number of letters in the longest word on each of the first 11 pages.

He works out that the IQR is 3

Ravi says,

"The second book will be harder to read than the first as its IQR is bigger."

Is he correct?

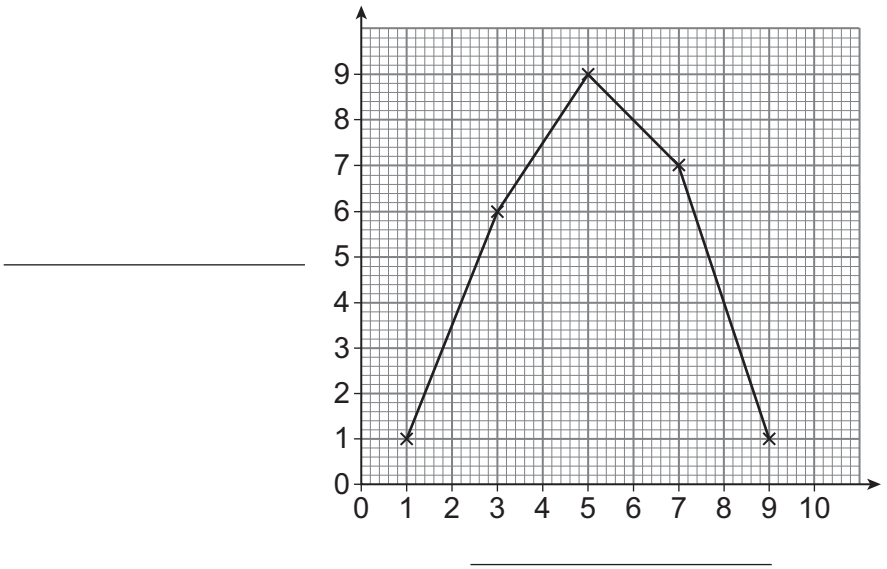
Give a reason for your answer.

[1 mark]

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Ben measures the length of time (in seconds) it takes his Mum to read the first sentence on every page in the **same two books as in part (a).**

12 (b) The results for the first book are shown in this frequency polygon.



12 (b) (i) Is the diagram appropriate for the **type** of data it is representing?

Tick (✓) a box.

Yes ☐ No ☐

Give a reason for your answer.

[1 mark]

12 (b) (ii) Write the two missing labels on the axes.

[2 marks]

12 (b) (iii) Write down the modal group.

[1 mark]

Answer _____

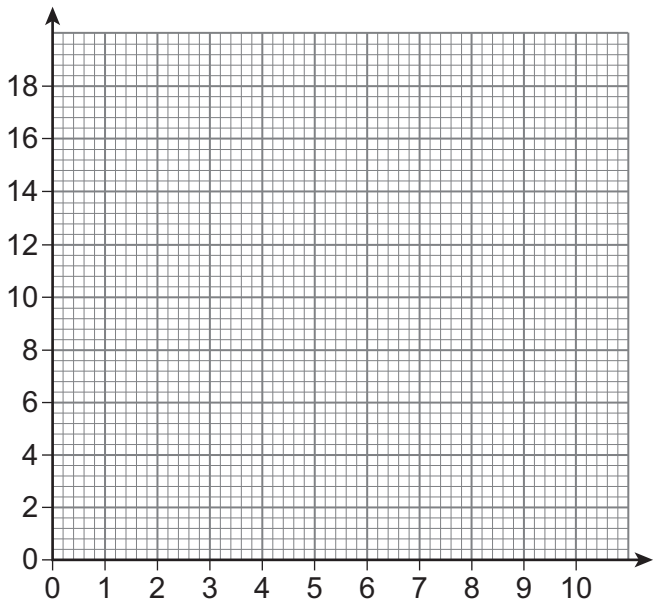
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12 (c) The table shows the data Ben collected for the second book.

Length of time, t (seconds)	Frequency
$0 < t \leqslant 2$	6
$2 < t \leqslant 4$	18
$4 < t \leqslant 6$	16
$6 < t \leqslant 8$	8
$8 < t \leqslant 10$	0

12 (c) (i) Complete the frequency polygon for the second book's data on the grid below.

[2 marks]



12 (c) (ii) Compare the lengths of time taken for the two books.

[2 marks]

12

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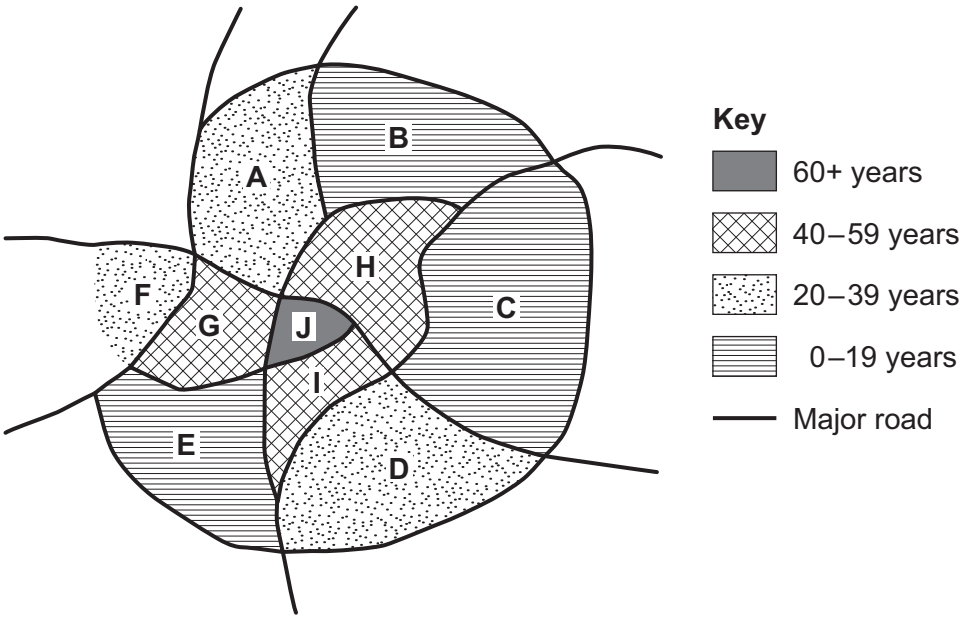
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13 The diagram shows the map of a town.

The **modal** age of buildings in each region of the town is shown.



13 (a) Circle the modal age of the buildings in **region F** of this town.

[1 mark]

0–19 years 20–39 years 40–59 years 60+ years

13 (b) The oldest building in the town was built in 1847.

Ahmed says that this building is in region J.

Is Ahmed correct?

Tick (✓) a box.

Yes ☐ No ☐ Cannot tell ☐

Give a reason for your answer.

[1 mark]

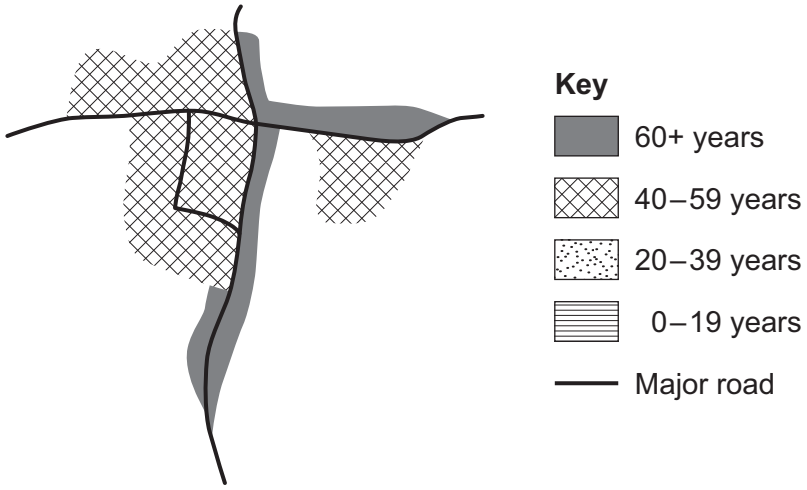
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13 (c) The diagram below shows the **modal** age of buildings in a neighbouring village.



Compare the age of buildings in the village with the age of buildings in the town.

[1 mark]

_____

_____

_____

3

Turn over for the next question

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14 The tables show the **mean** number of portions of fruit and vegetables eaten per day by children and adults of different ages and gender in England.

Children

	Age (years)				
	5–7	**8–10**	**11–13**	**14–15**	**All ages**
Females	3.3	3.2	3.5	3.2	**3.3**
Males	3.3	3.5	3.1	2.9	**3.2**
All children	3.3	3.4	3.3	3.0	**3.2**

Adults

	Age (years)							
	16–24	**25–34**	**35–44**	**45–54**	**55–64**	**65–74**	**75+**	**All ages**
Females	3.2	3.8	3.7	3.7	3.8	3.9	3.4	**3.7**
Males	2.6	3.4	3.6	3.4	3.5	3.9	3.6	**3.4**
All adults	2.9	3.6	3.7	3.6	3.7	3.9	3.5	**3.5**

Source: Adapted from *Health Survey for England*, 2015

14 (a) (i) Compare the amount of fruit and vegetables eaten by males **aged 14–15** with the amount eaten by females of the same age.

[1 mark]

_____

_____

14 (a) (ii) Write **two** comparisons of the amount of fruit and vegetables eaten by different ages of **adults**.

[2 marks]

Comparison 1 _____

_____

Comparison 2 _____

_____

Do not write outside the box

Natalie wants to investigate how many portions of fruit and vegetables students in her year group at school eat.

The table shows the number of students of each gender in her year group.

Gender	Number
Males	99
Females	121

Natalie decides to interview a sample of 40 students.

She decides to **stratify** by gender.

14 (b) Explain why it is sensible for Natalie to stratify by gender.

[1 mark]

14 (c) Show that Natalie should select 18 male students from her year group.

[2 marks]

14 (d) Natalie's friend suggests she should interview students in her year group eating school dinners.

Explain why this could give biased results.

[1 mark]

Question 14 continues on the next page

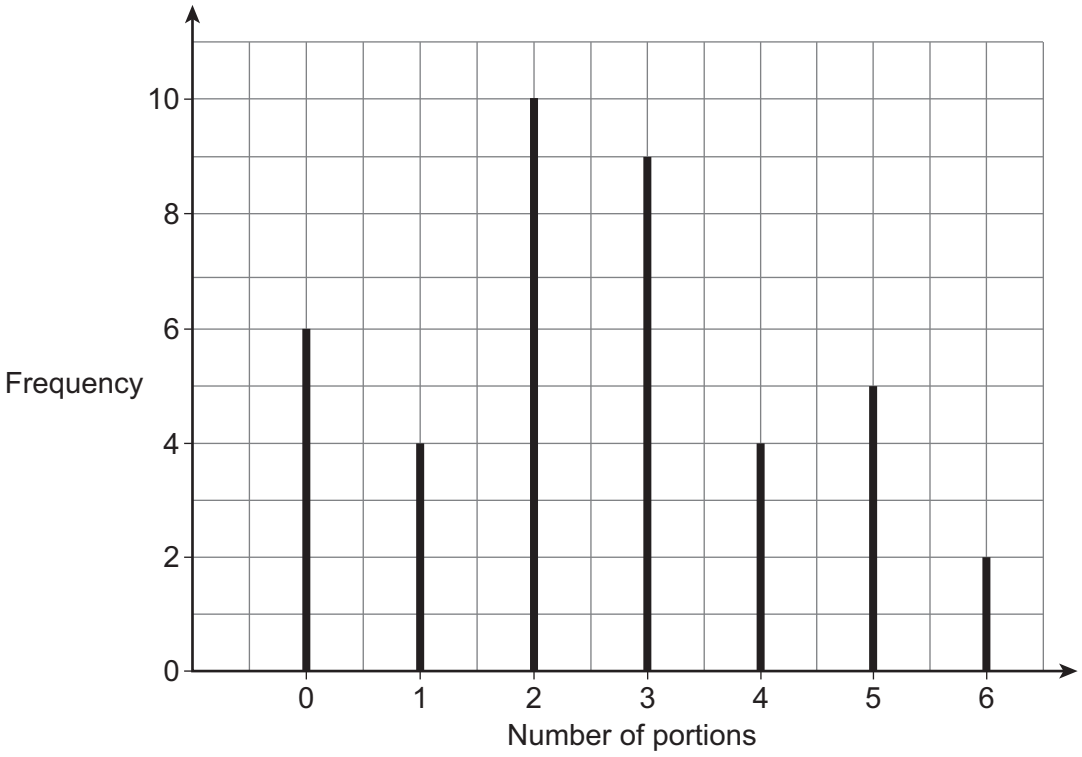
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Natalie decides to select 18 male students and 22 female students at random from her year group.

She asks each student,

"How many portions of fruit and vegetables did you eat yesterday?"

The bar line graph shows the number of portions of fruit and vegetables eaten by the 40 students in her sample.



It is recommended that everyone should eat at least 5 portions of fruit and vegetables every day.

14 (e) Calculate an estimate of the percentage of students in Natalie's year group that ate at least 5 portions.

[2 marks]

Answer _____ %

Do not write outside the box

Students in Natalie's year are aged **14–15 years**.

14 (f) Compare the number of portions of fruit and vegetables eaten by students in Natalie's year with the corresponding figure for England.

You should,

- use the information from the bar line graph on page 24 and the information from the table on page 22
- calculate an appropriate average.

[5 marks]

14 (g) Suggest **two** things that Natalie could have done to make her comparison more reliable.

[2 marks]

Suggestion 1 _____

Suggestion 2 _____

16

END OF QUESTIONS

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