A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

For Examiner's Use

Candidate Signature _____

I declare this is my own work.

GCSE STATISTICS

H

8382/1H

Higher Tier Paper 1

Thursday 11 June 2020 Afternoon

Time allowed: 1 hour 45 minutes

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

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

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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.**
- **Do all rough work in this book. Cross through 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.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

1 **The table shows the index numbers for the cost of an item in different years.**

YEAR	2016	2017	2018	2019
INDEX NUMBER	95	100	90	115

Circle the base year. [1 mark]

2016 **2017** **2018** **2019**

1

2 **Here are some summary measures for a distribution.**

SMALLEST VALUE	2ND DECILE	LARGEST VALUE
11	35	161

The difference between the 2nd and 8th deciles is 30% less than the range.

Circle the value of the 8th decile. [1 mark]

80 **105** **140** **155**

1

3 The geometric mean of 3 and x is 6

Circle the value of x. [1 mark]

2 4 9 12

1

4 **Here are four scatter diagrams.**

DIAGRAM A

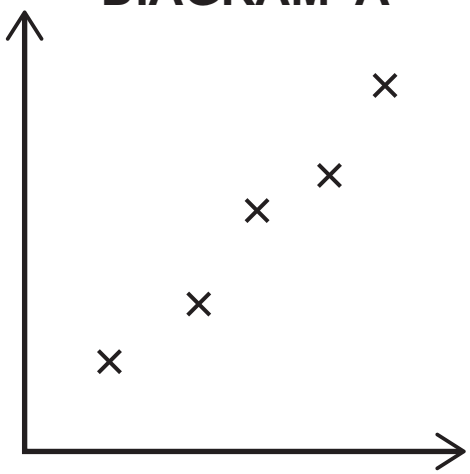


DIAGRAM B

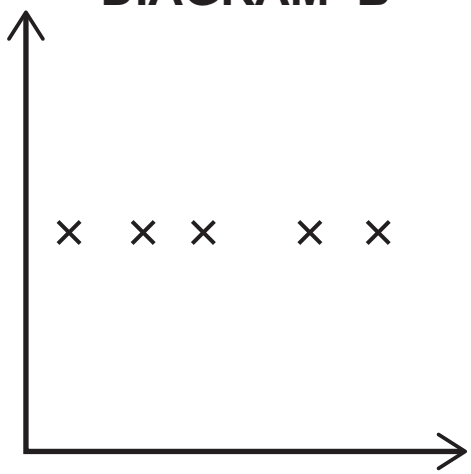


DIAGRAM C

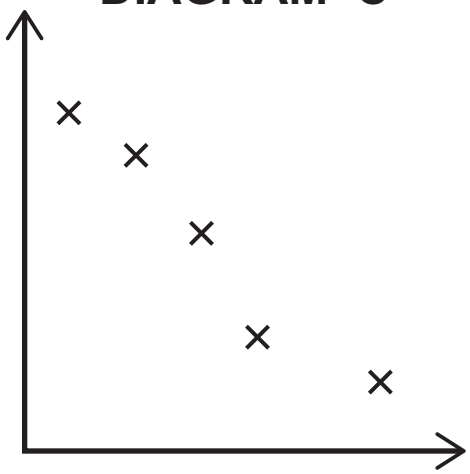
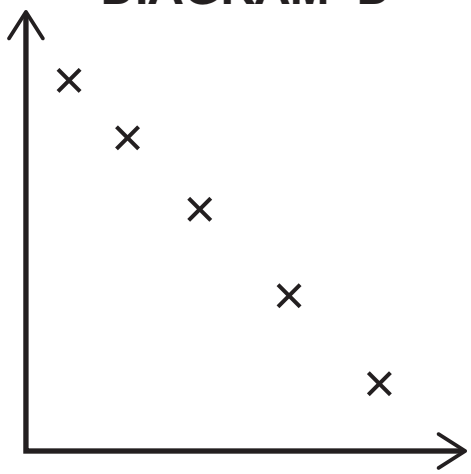


DIAGRAM D



Circle the letter of the scatter diagram for which the Pearson's product moment correlation coefficient is −1 [1 mark]

A **B** **C** **D**

1

5 Marcus is planning a Driver Safety course.

He wants to give the people attending the course a questionnaire to complete.

5 (a) Marcus wants to know how far each person usually drives in a week.

Write a closed question that Marcus could ask to find out this information.

Include a response section. [3 marks]

5 (b) **Marcus also wants to know whether people regularly drive faster than the speed limit.**

He plans to collect the information using this method.

> **He asks each person to secretly throw a dice.**
>
> **The person then answers as follows:**
>
> - **if the person gets an odd number, they answer 'Yes'**
> - **if the person gets an even number, they truthfully answer the question,**
>
> **'Do you regularly drive faster than the speed limit?'**

5 (b) (i) **Why does Marcus use this method?**
[1 mark]

_____

_____

_____

5 (b) (ii) Marcus collects data from 100 people using this method.

60 people give the answer 'Yes'.

Marcus says,

"60% of these people regularly drive faster than the speed limit."

Explain why Marcus is wrong. [1 mark]

_____

_____

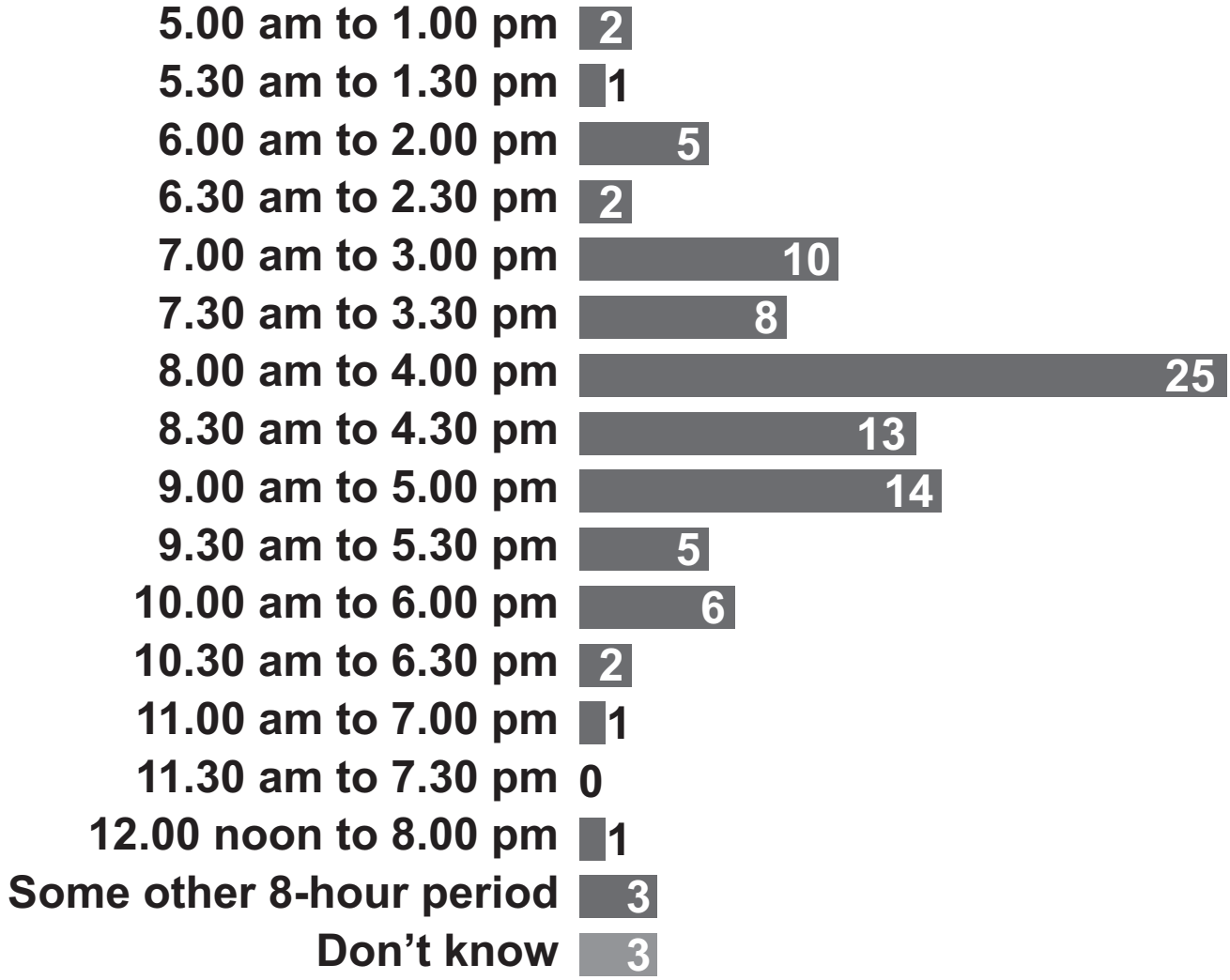
_____

5

6 **A YouGov survey was carried out with nearly 2000 British working adults who have an 8-hour working day.**

They were asked which period of 8 hours they would prefer to work.

YouGov produced this summary graph showing the PERCENTAGE of each response, rounded to the nearest whole number.



Source: yougov.com

6 (a) **Show that about two-thirds of adults questioned wanted to work EARLIER than the traditional 9 am to 5 pm working hours. [2 marks]**

_____

_____

_____

_____

_____

6 (b) **Amber says,**

"NONE of the adults questioned wanted to start work at 11.30 am."

Is Amber correct?

Tick (✓) a box.

Yes ☐ **No** ☐ **Cannot tell** ☐

Give a reason for your answer. [1 mark]

_____

_____

_____

6 (c) **Give ONE reason why these results will NOT apply to all British working adults. [1 mark]**

_____

_____

_____

4

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[Turn over]

7 200 students, 200 parents with young children and 200 retired people were asked what was the first thing they did on their mobile phones that day.

The results are shown in the table.

	Social media	Gaming	News	Other
Students	124	52	13	11
Parents	120	8	37	35
Retired	88	11	67	34

7 (a) One of the people is chosen at random.

7 (a) (i) Work out the probability that this person goes on social media first that day.
[2 marks]

_____

_____

_____

Answer _____

7 (a) (ii) **Work out the probability that this person does NOT go on gaming first that day. [2 marks]**

_____

_____

_____

Answer _____

7 (b) **One of the people who went on gaming first that day is chosen at random.**

What is the probability that this person is retired? [2 marks]

_____

_____

_____

Answer _____

[Turn over]

7 (c) **Work out the probability that TWO of the 200 retired people, chosen at random, both went on news first that day.**

Give your answer to three decimal places.
[3 marks]

Answer _____

7 (d) **Joe looks at the data in the table and makes the two statements below.**

Is each statement correct?

Give a reason for each decision.
[2 marks]

STATEMENT 1
Most of these 600 people went on social media first THAT day.

Tick (✓) a box.

Yes ☐ **No** ☐ **Cannot tell** ☐

Reason

_____

_____

_____

_____

_____

STATEMENT 2
Most of these 200 retired people go on social media first EVERY day.

Tick (✓) a box.

Yes ☐ **No** ☐ **Cannot tell** ☐

Reason

_____

_____

_____

_____

_____

11

8 A deadly disease currently has no treatment.

A researcher develops a drug which she believes will treat the disease.

She suggests a statistical experiment to test her drug.

Infect six people chosen at random with the disease. Give the drug to all six people. Record whether each person recovers or not.

8 (a) Write down TWO problems with the researcher's experiment. [2 marks]

Problem 1 _____

_____

_____

_____

_____

Problem 2 _____

_____

_____

_____

_____

8 (b) The researcher carries out a more suitable experiment.

She writes an article for a magazine to highlight her results.

She gives the name of each patient in the experiment and records how they responded to the drug.

The magazine editor asks the researcher to rewrite her article.

Explain why. [1 mark]

_____

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3

[Turn over]

9 In an experiment, Paulo throws three fair coins.

He repeats the experiment 120 times.

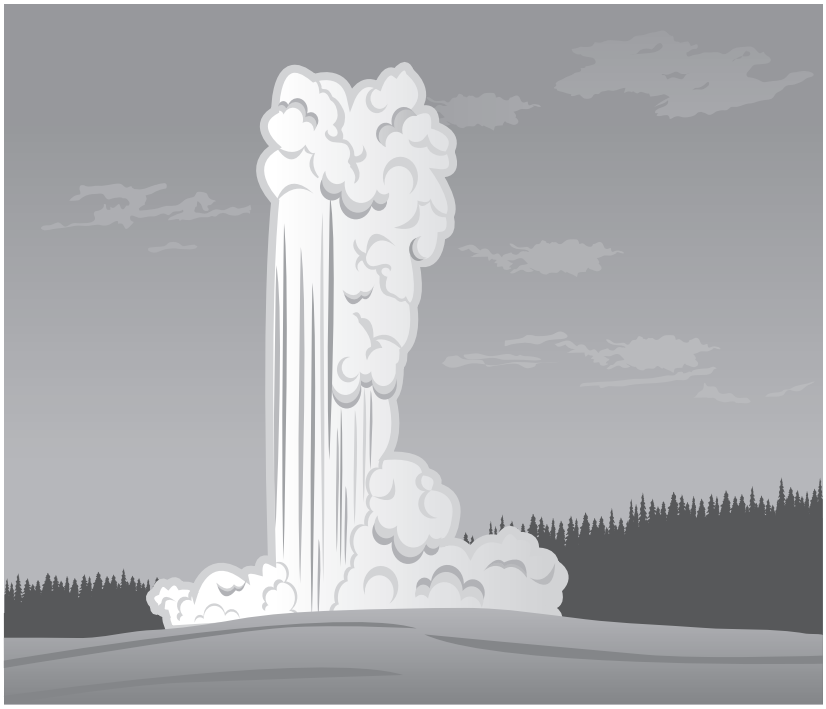
How many times should he expect to throw three heads? [2 marks]

Answer _____ 2

BLANK PAGE

[Turn over]

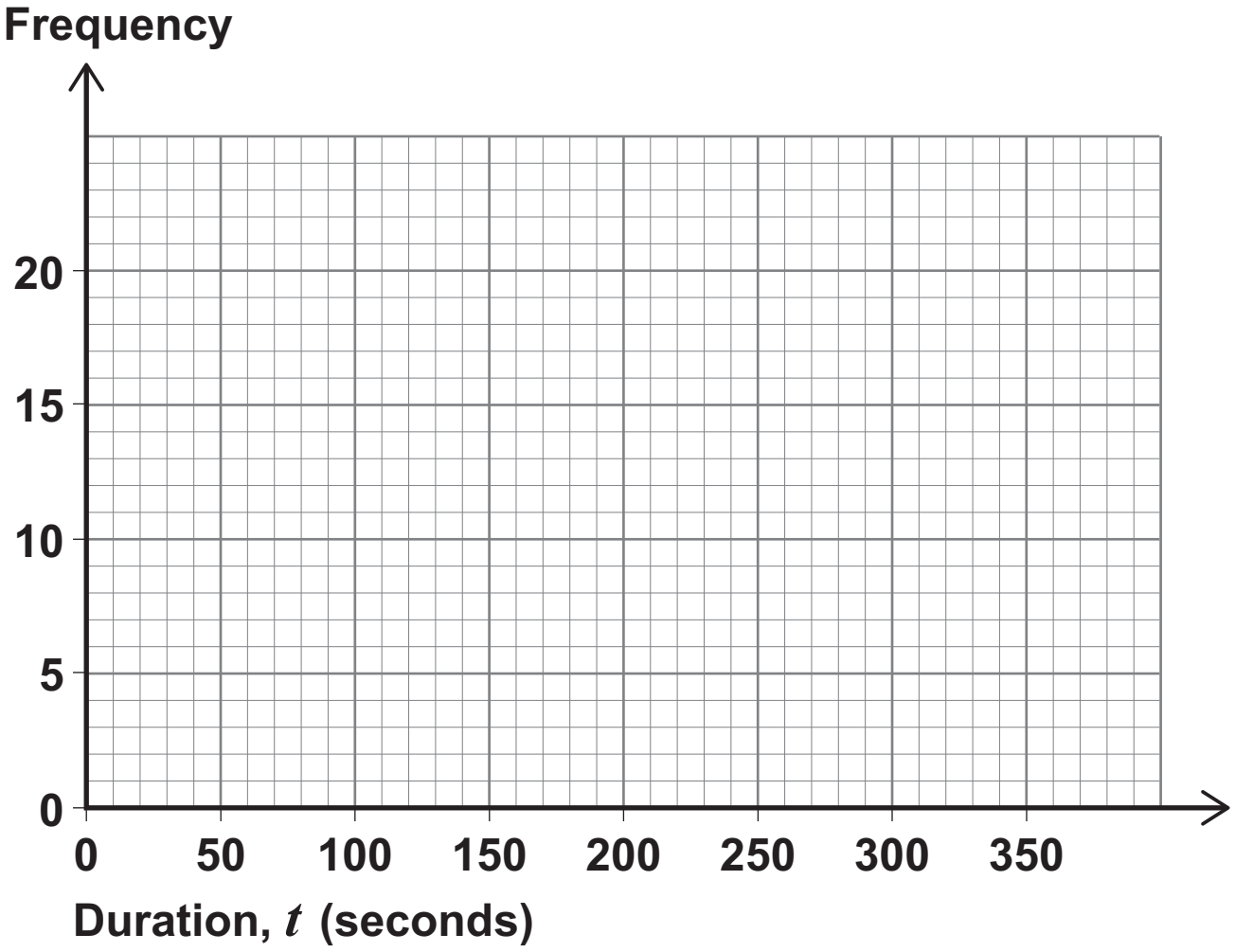
10 **A geyser is a spring which erupts from time to time and shoots a column of hot water into the air, as shown in the image below.**



The table shows the duration of 80 eruptions of a geyser.

DURATION, t (SECONDS)	FREQUENCY
$40 < t \leqslant 80$	1
$80 < t \leqslant 120$	19
$120 < t \leqslant 160$	17
$160 < t \leqslant 200$	1
$200 < t \leqslant 240$	17
$240 < t \leqslant 280$	20
$280 < t \leqslant 320$	5
TOTAL	80

10 (a) Draw a frequency polygon to show this information. [3 marks]



10 (b) Calculate an estimate of the mean duration of an eruption. [1 mark]

Use $\sum ft = 14\,960$

_____

_____

Answer _____ seconds

10 (c) **Give a reason why the mean is NOT a typical value for this set of data. [1 mark]**

_____

_____

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5

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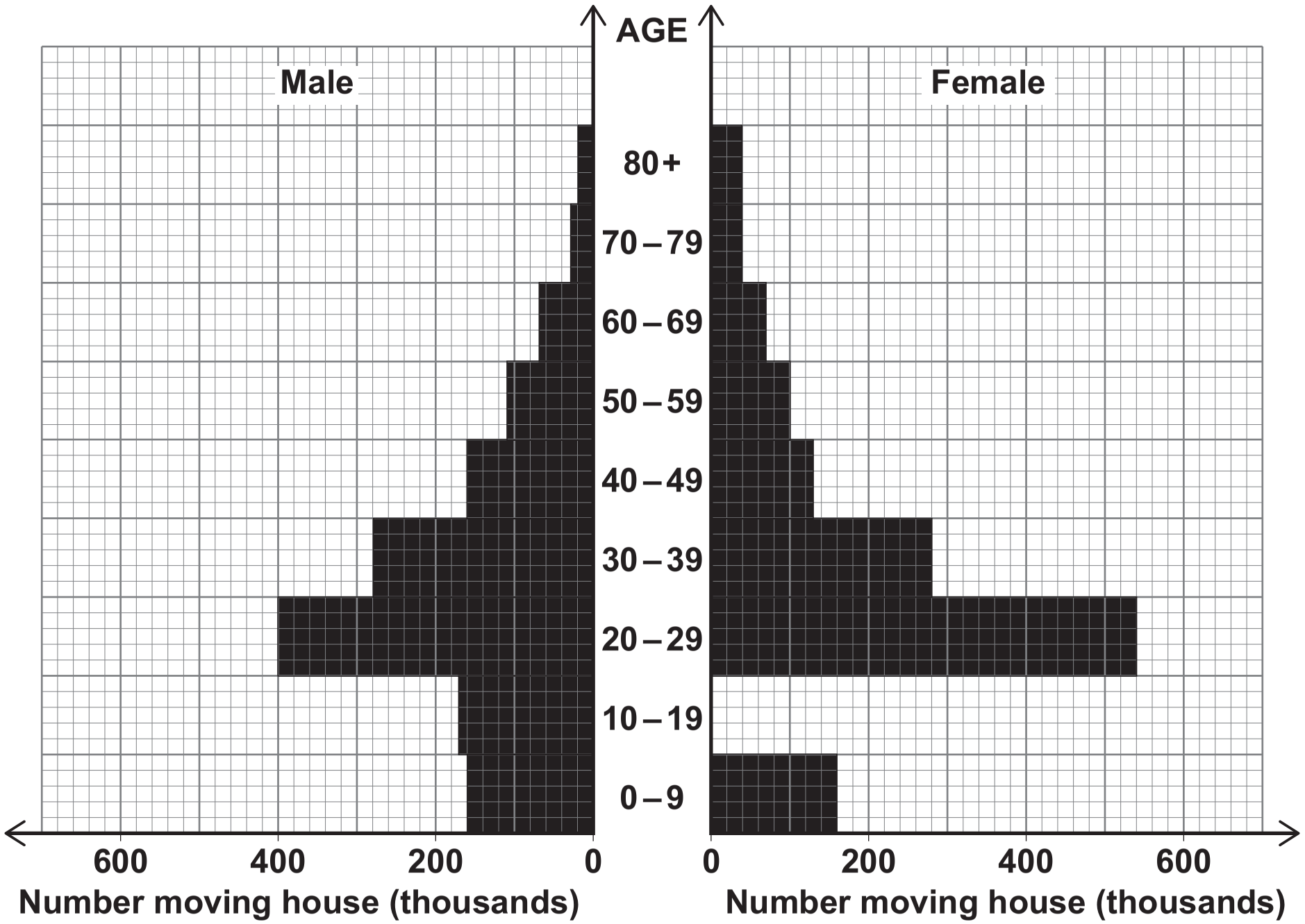
[Turn over]


Male
AGE
Female
80+
70 – 79
60 – 69
50 – 59
40 – 49
30 – 39
20 – 29
10 – 19
0 – 9
600
400
200
0
0
200
400
600
Number moving house (thousands)
Number moving house (thousands)

Total number of males moving house is 1400 thousand	Total number of females moving house is 1550 thousand

Source: ONS

11 The population pyramid, on page 26, shows the ages of people who moved house in England and Wales in 2016.

One bar has not been drawn.

11 (a) 350 000 females aged UNDER 20 YEARS moved house in 2016.

Complete the population pyramid by drawing the bar for females aged 10–19 years. [2 marks]

11 (b) (i) **Calculate the percentage of all people who moved who were aged 20–29 years. [3 marks]**

Answer _____ %

11 (b) (ii) **Suggest ONE reason why such a large proportion of people moving are aged 20–29 years. [1 mark]**

_____

_____

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6

12 The table shows some information about people with hearing loss in the UK.

AGE	NUMBER WITH HEARING LOSS	UK POPULATION
60 years and over	8 290 000	15 590 000
Under 60 years	2 750 000	50 450 000
Total	11 040 000	66 040 000

Sources: ONS and actiononhearingloss.org.uk

12 (a) Mike says,

"The risk of hearing loss for people aged 60 years and over is about 10 times greater than the risk for people aged under 60 years."

Comment on Mike's statement.

You MUST show your working. [3 marks]

12 (b) **About one in nine people in the UK aged over 60 years have SIGHT LOSS.**

Calculate an estimate of the number of people in the UK aged over 60 years who have sight loss. [1 mark]

Answer _____

4

[Turn over]

13 A machine fills bottles with orange juice.

The amount of orange juice in a bottle follows a normal distribution with a mean of 500 ml and a standard deviation of 10 ml.

13 (a) Approximately, what percentage of bottles contain MORE than 510 ml of orange juice?

Circle your answer. [1 mark]

16% 32% 68% 84%

13 (b) The manufacturer would like ALMOST ALL bottles to contain between 488 ml and 512 ml of orange juice.

Sophie says that this could be achieved by reducing the standard deviation to 4 ml.

Comment on Sophie's claim.

You MUST show your working. [2 marks]

3

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[Turn over]

14 **The table shows the value of UK imports of clothing, in £ million, from the rest of the world between 2015 Quarter 3 and 2017 Quarter 4**

Some of the four-point moving averages are also shown.

YEAR AND QUARTER	IMPORTS (£ MILLION)	FOUR-POINT MOVING AVERAGE
2015 Q3	4970	
2015 Q4	4730	4625
2016 Q1	4600	4675
2016 Q2	4200	4725
2016 Q3	5170	4762.5
2016 Q4	4930	4870
2017 Q1	4750	4940
2017 Q2	4630	
2017 Q3	5450	
2017 Q4	5190	

Source: ONS

14 (a) **Complete the table by calculating the last moving average. [1 mark]**

_____

_____

14 (b) **Comment on the trend in the data. [1 mark]**

_____

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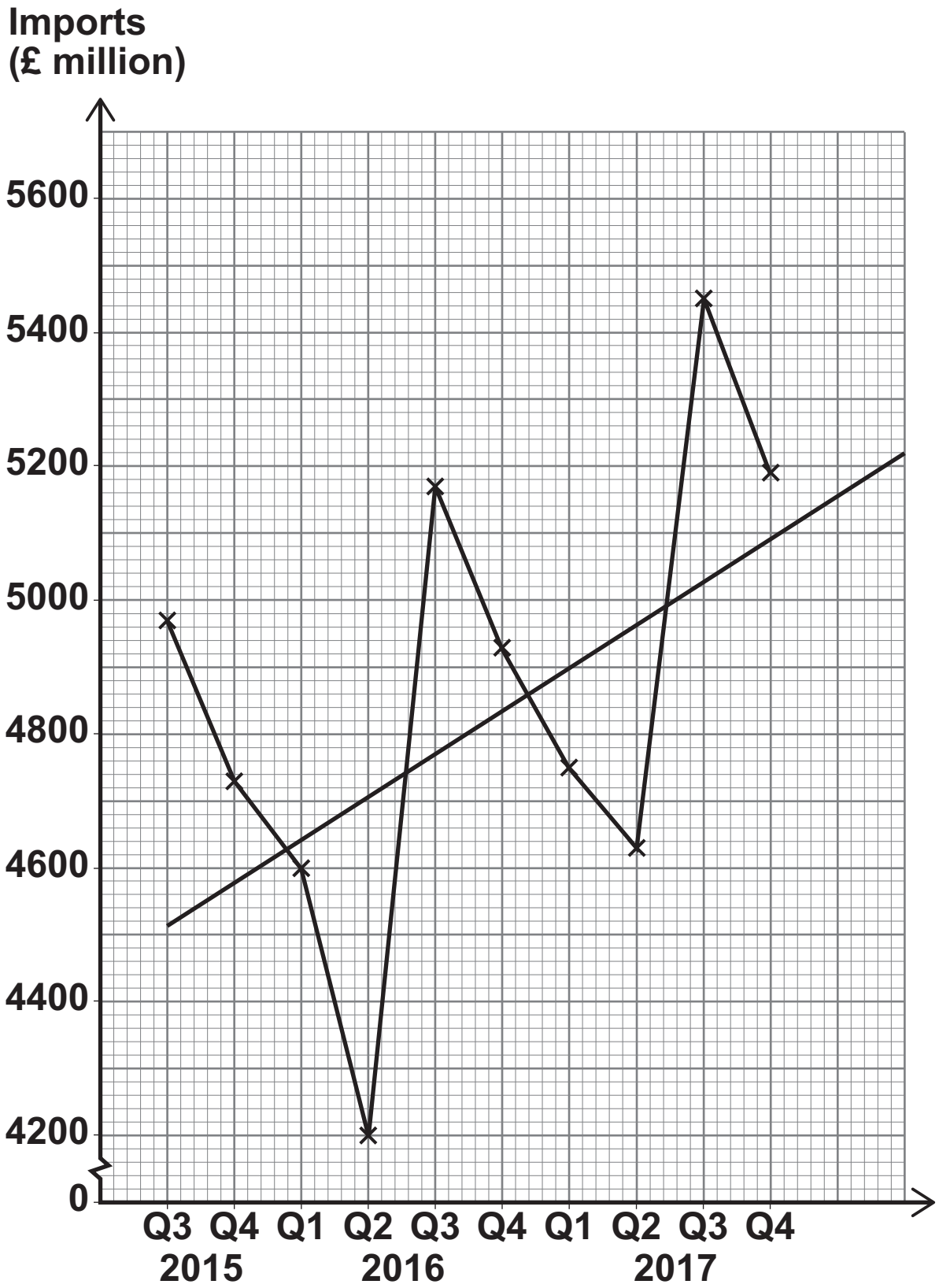
_____

[Turn over]

The diagram shows the value of UK clothing imports in each time period.

A trend line has also been drawn.



14 (c) **Make ONE comment about the seasonal variation shown in the data. [1 mark]**

_____

_____

_____

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_____

[Turn over]

14 (d) **The SEASONAL VARIATIONS (seasonal effects) for Q1 are shown in the table.**

2016 Q1	2017 Q1
−40	−150

14 (d) (i) **By calculating the mean seasonal variation, predict the value of UK imports in 2018 Q1.**

You MUST show your working. [3 marks]

_____

_____

_____

_____

_____

Answer £ _____ million

14 (d) (ii) **Write down ONE assumption that you made in making your prediction in PART (d)(i). [1 mark]**

_____

_____

_____

7

[Turn over]

15 **In this question you will need to use,**

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

Swimmers in a competition swim two races.

Swimmers use breaststroke in Race 1 and backstroke in Race 2

The mean and standard deviation of the times in each race are shown in the table.

	MEAN (SECONDS)	STANDARD DEVIATION (SECONDS)
RACE 1	45.5	2.4
RACE 2	41.7	1.8

15 (a) **Rachel's time in RACE 1 was 48.7 seconds.**

Her standardised score in both races was the same.

Calculate Rachel's time in RACE 2
[3 marks]

_____

_____

_____

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_____

_____

_____

_____

_____

Answer _____ seconds

[Turn over]

15 (b) Kim and Pria also swim in the competition.

Their times in each race are shown in the table below.

	KIM		PRIA	
	Time (secs)	Standardised score	Time (secs)	Standardised score
RACE 1	43.7		44.3	
RACE 2	40.5		40.3	

Complete the table and use it to decide which race each girl swam better in.

Give a reason for each of your decisions. [5 marks]

8

[Turn over]

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16 In a golf tournament, players take part in several rounds of golf.

Players try to complete the course taking as few golf strokes as possible.

Justin wants to compare the number of strokes taken by the players in the first two rounds of a tournament.

He collects data for the top 50 players.

Justin's hypothesis is,

In which of the first two rounds will players take the fewer strokes on average?

16 (a) What mistake has Justin made when writing his hypothesis? [1 mark]

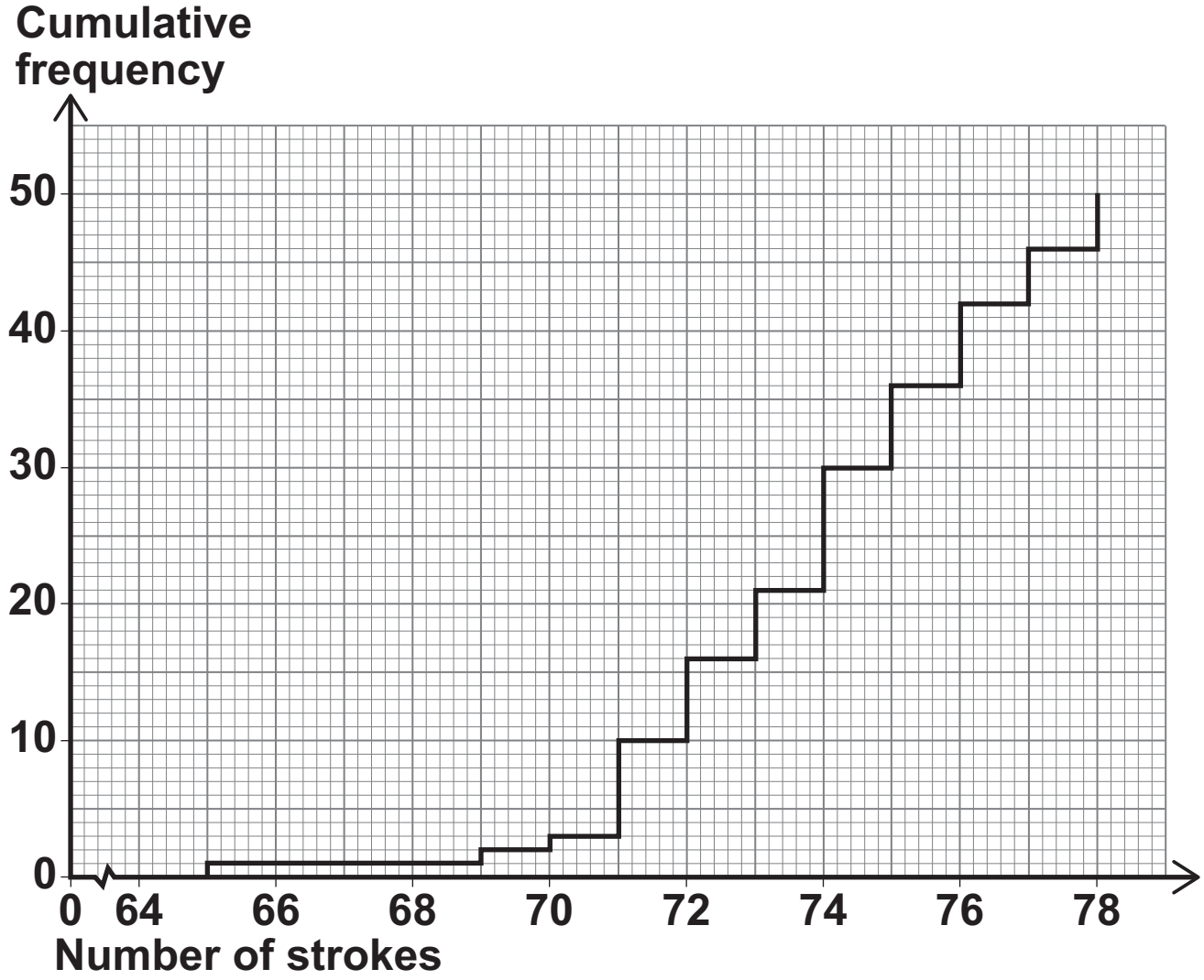
_____

_____

_____

[Turn over]

Justin draws a cumulative frequency step polygon to show the results for players in ROUND 1



16 (b) **Explain why a cumulative frequency step polygon is an appropriate graph for the data. [1 mark]**

16 (c) **Work out the percentage of players who took 72 strokes or fewer for ROUND 1 [2 marks]**

_____

_____

_____ %

16 (d) **Complete this table summarising the number of strokes taken by players in ROUND 1 [1 mark]**

MEDIAN	LOWER QUARTILE	UPPER QUARTILE
74	72	

_____

_____

_____

[Turn over]

16 (e) **The lowest number of strokes taken in ROUND 1 is 65**

Show by calculation that this value is an outlier. [3 marks]

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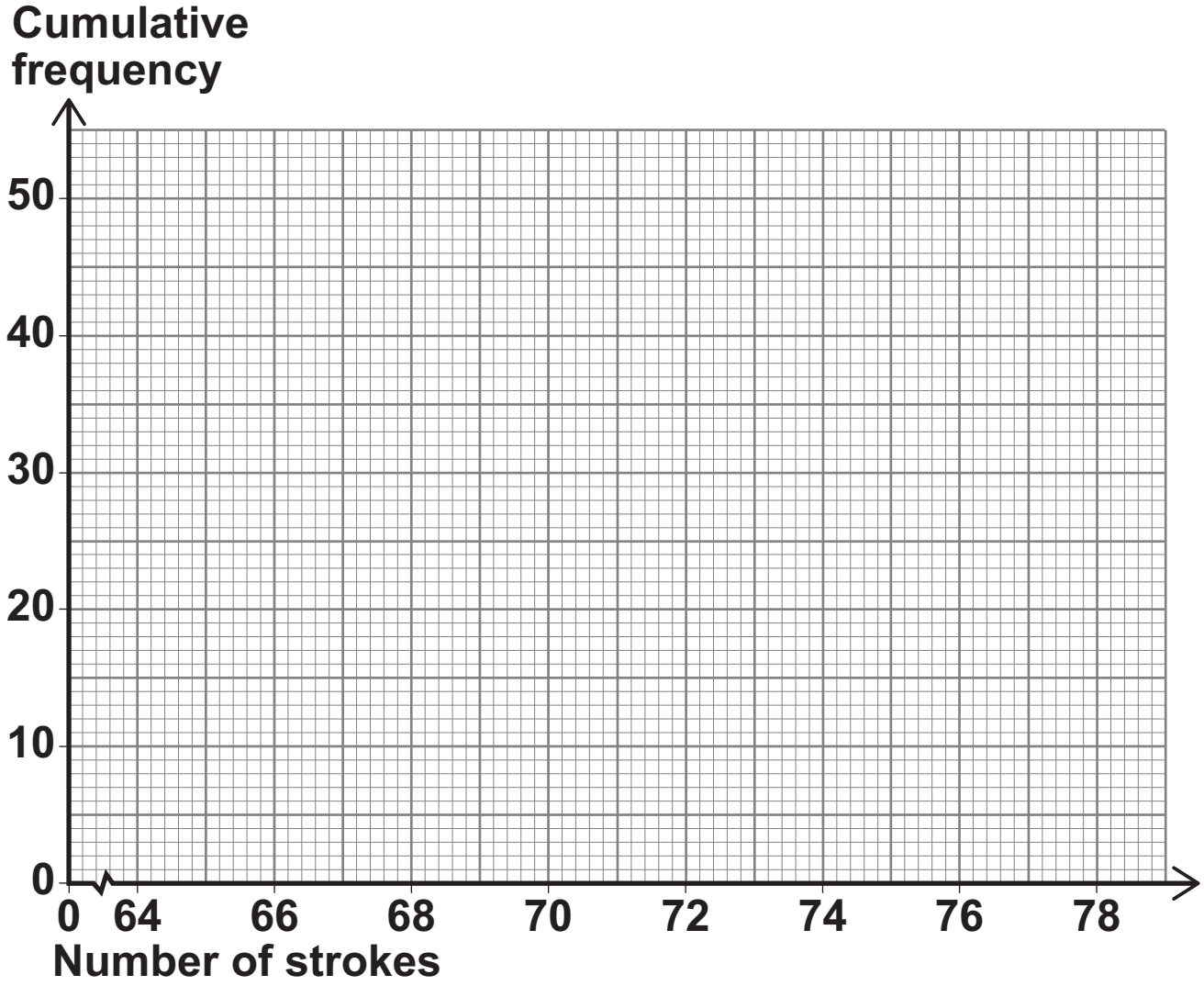
[Turn over]

The table shows a summary of the number of strokes taken by the same players in ROUND 2

NUMBER OF STROKES	FREQUENCY
69	4
70	5
71	7
72	11
73	8
74	6
75	3
76	4
77	2

CUMULATIVE FREQUENCY

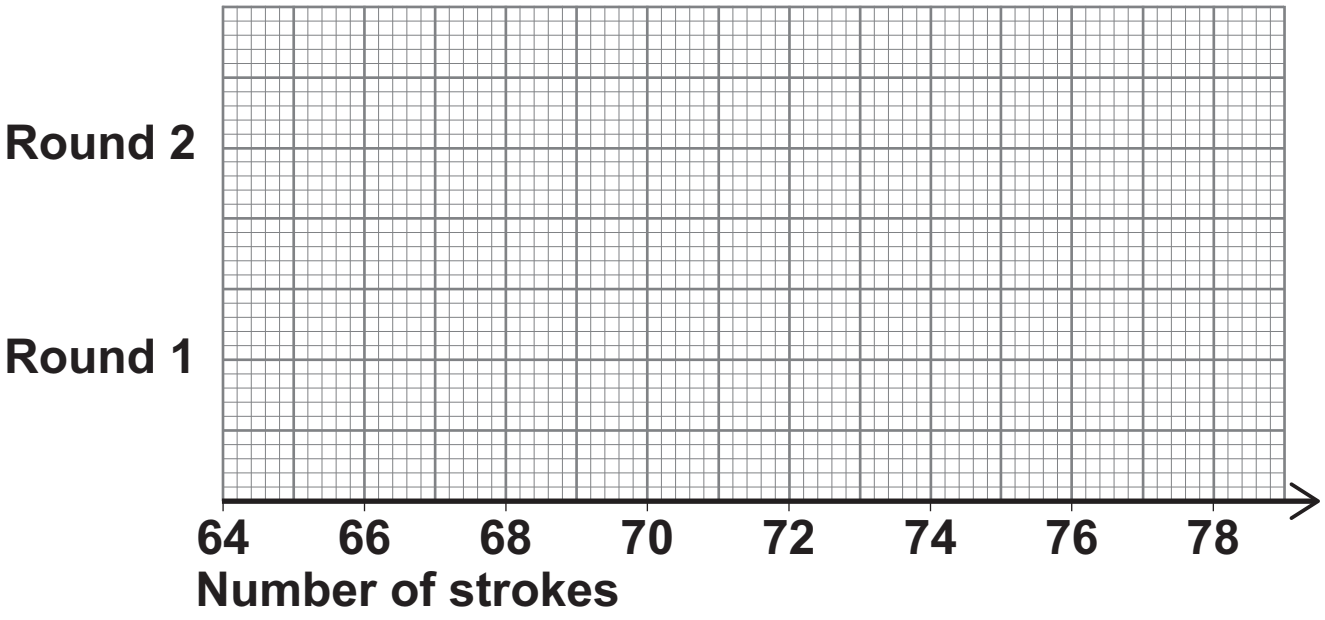
16 (f) **Draw a cumulative frequency step polygon to show the results for ROUND 2 [3 marks]**



[Turn over]

16 (g) **Draw separate box plots, on the grid below, for the number of strokes in ROUND 1 and ROUND 2**

Mark clearly the outlier for ROUND 1
[4 marks]



16 (h) **Compare statistically the number of strokes taken for ROUND 1 and ROUND 2 [2 marks]**

16 (i) **Write down a factor that could explain the difference between the number of strokes in the two rounds. [1 mark]**

18

END OF QUESTIONS

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For Examiner's Use	
Question	Mark
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13	
14	
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16	
TOTAL	