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

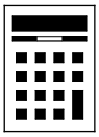
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Foundation Tier Paper 2

Monday 19 June 2023 Afternoon 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
1-3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
TOTAL	

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

1 Ted has these 10 letter cards.

V	O	L	L	E	Y	B	A	L	L

He selects one card at random.

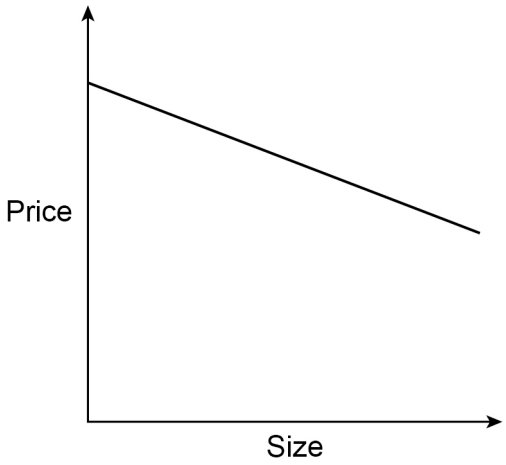
What is the probability that Ted selects the letter L?

Circle your answer.

[1 mark]

$\frac{1}{2}$ $\frac{4}{10}$ $\frac{6}{10}$ $\frac{4}{6}$

2 Here is a line graph.



Circle the letter that best describes the relationship shown by the graph.

[1 mark]

A As the size increases, the price increases.

B The size and price are not related.

C As the size decreases, the price decreases.

D As the size increases, the price decreases.

Do not write outside the box

3 Here are seven numbers.

2 4 9 11 14 14 14

3 (a) What is the value of the median?

Circle your answer.

[1 mark]

4 11 12.5 14

3 (b) What is the value of the lower quartile of the seven numbers?

Circle your answer.

[1 mark]

2 3 4 11

4

Turn over for the next question

Do not write outside the box

4 Seb asks a sample of 24 people how many films they have watched at the cinema in the last month.

Here are his results.

1	3	0	1	1	2	4	1
2	2	5	0	1	1	1	2
3	3	5	0	1	3	2	2

4 (a) Seb's data can be described as raw data.

What are raw data?

[1 mark]

4 (b) Complete the tally chart to show Seb's results.

[3 marks]

Number of films watched	Tally	Frequency
0		
1		
2		
3		
4		
5		

Do not write outside the box

4 (c) Seb writes this conclusion,

The average number of films watched was 1

Which average does Seb use to make this conclusion?

[1 mark]

Answer _____

4 (d) Seb says,

"In my sample, $\frac{1}{4}$ of people did **not** watch a film at the cinema in the last month."

Is Seb correct?

Tick (✓) a box.

Yes ☐ No ☐

Give a reason for your answer.

[2 marks]

_____

_____

_____

7

Turn over for the next question

Do not write outside the box

5 The table shows the number of single-use plastic bags issued by two supermarkets in different years.

Year	Plastic bags issued by supermarket A (thousands)	Plastic bags issued by supermarket B (thousands)
2015	750	314
2016	420	235
2017	309	168
2018	184	73
2019	96	44
2020	75	28
2021	No data	24

5 (a) Work out the **total** number of single-use plastic bags issued by supermarket A and supermarket B in 2016.

[2 marks]

Answer _____ thousand

5 (b) Describe the trend in the number of single-use plastic bags issued by **supermarket B**.

[1 mark]

5 (c) Between which two consecutive years was the biggest change in the number of single-use plastic bags issued by **supermarket B**?

[2 marks]

Answer _____ and _____

Do not write outside the box

5 (d) The manager of **supermarket A** claims that the number of plastic bags issued by this supermarket dropped by more than a third between 2017 and 2018.

Do the data in the table support this claim?

Tick (✓) a box.

Yes ☐ No ☐

You **must** show your working.

[3 marks]

5 (e) There are no data for **supermarket A** in 2021.

Give **one** possible reason why no data are available.

[1 mark]

9

Turn over for the next question

Do not write outside the box

6 Anna owns a shop.

She wants to find out what her past customers think about the quality of the headphones they bought.

6 (a) Write down **two** advantages of asking a sample of customers rather than taking a census.

[2 marks]

1 _____

_____

2 _____

_____

6 (b) Anna considers asking all the contacts listed on her mobile phone.

Give **two** reasons why this is **not** a good sample.

[2 marks]

1 _____

_____

2 _____

_____

4

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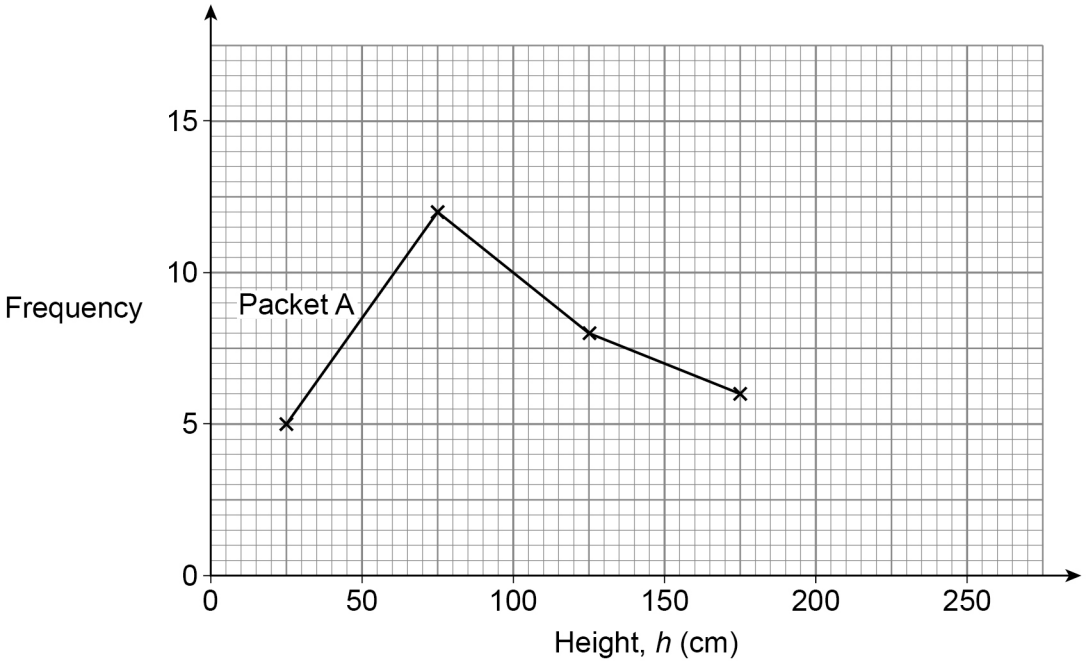
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ANSWER IN THE SPACES PROVIDED

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7 Peter grows sunflowers in his garden from two packets of seeds, A and B.

The frequency polygon shows information about the heights of the sunflowers he grows from **packet A**.



7 (a) Show that Peter grows 31 sunflowers from **packet A**.

[1 mark]

7 (b) Tick (✓) the correct statement about the maximum height of a sunflower that Peter grows from **packet A**.

[1 mark]

The maximum height **must** be less than 175 cm. ☐

The maximum height **could** be less than 175 cm. ☐

The maximum height **must** be greater than 200 cm. ☐

The maximum height **could** be greater than 200 cm. ☐

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The table shows information about the heights of sunflowers he grows from **packet B**.

Height, *h* (cm)	**Frequency**
$0 \leqslant h < 50$	2
$50 \leqslant h < 100$	3
$100 \leqslant h < 150$	9
$150 \leqslant h < 200$	13
$200 \leqslant h < 250$	4

7 (c) On the grid on page 10, draw a frequency polygon to show the information in the table about sunflowers from **packet B**.

[3 marks]

7 (d) Give **two** comparisons between the heights of the sunflowers grown from packet A and packet B.

[2 marks]

Comparison 1 _____

_____

_____

Comparison 2 _____

_____

_____

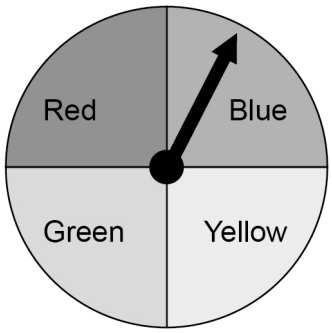
7

Turn over for the next question

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8 Bob has a fair spinner and a fair, six-sided dice.

In an experiment, Bob spins the spinner and rolls the dice.





8 (a) Complete the sample space diagram below to show all the possible outcomes.

[2 marks]

		Dice					
		1	2	3	4	5	6
Spinner	Red (R)					R5	
	Blue (B)		B2				
	Yellow (Y)						
	Green (G)						

8 (b) (i) Write down the probability of getting a yellow **and** a 5

[1 mark]

Answer _____

Do not write outside the box

8 (b) (ii) Work out the probability of getting a blue **and** a number less than 3

[2 marks]

Answer _____

8 (c) Bob says,

> "If I repeat my experiment a total of 60 times, I would expect to get more than 25 results that are a green **or** a 4 **or** both."

Show that he is **not** correct.

[3 marks]

8

Turn over for the next question

Do not write outside the box

9 The table, from the Driver and Vehicle Standards Agency, shows information about driving tests taken by 17- to 25-year-olds in two different centres in England.

Age (years)	Centre A		Centre B	
	Number of tests taken	Percentage of tests passed	Number of tests taken	Percentage of tests passed
17	1566	43.0	972	59.1
18	1160	36.9	553	57.9
19	671	34.4	414	52.2
20	506	33.0	326	46.9
21	444	38.3	290	50.3
22	407	37.8	247	49.0
23	386	40.9	262	49.6
24	269	37.5	228	52.2
25	270	39.6	219	47.5
Total	**5679**	**38.5**	**3511**	**53.6**

Source: gov.uk

9 (a) (i) What type of data are shown in the table?

Tick (✓) a box.

Primary data ☐ Secondary data ☐

Give a reason for your answer.

[1 mark]

Do not write outside the box

9 (a) (ii) Give **one** advantage and **one** disadvantage of using this type of data.

[2 marks]

Advantage _____

_____

Disadvantage _____

_____

9 (b) What proportion of people aged 17 to 25 who took their test at **Centre B** were aged 23 years or older?

Give your answer as a percentage.

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____ %

9 (c) (i) Comment on the difference between the number of tests taken by **18-year-olds** at the two centres.

[1 mark]

_____

_____

9 (c) (ii) Suggest a possible reason for this difference.

[1 mark]

_____

_____

Question 9 continues on the next page

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Here is the table again.

Age (years)	Centre A		Centre B	
	Number of tests taken	**Percentage of tests passed**	**Number of tests taken**	**Percentage of tests passed**
17	1566	43.0	972	59.1
18	1160	36.9	553	57.9
19	671	34.4	414	52.2
20	506	33.0	326	46.9
21	444	38.3	290	50.3
22	407	37.8	247	49.0
23	386	40.9	262	49.6
24	269	37.5	228	52.2
25	270	39.6	219	47.5
Total	**5679**	**38.5**	**3511**	**53.6**

Source: gov.uk

9 (d) How does the number of tests change at both centres as age increases?

[1 mark]

Do not write outside the box

9 (e) Kim is **20 years old**.

She can book her driving test at Centre A or Centre B.

Kim says,

> "The number of 20-year-olds **passing** their driving test is greater at Centre A than at Centre B, so I shall book my test at Centre A."

Comment on her statement and her decision to book her test at Centre A.

Use calculations to support your answer.

[4 marks]

The number of 20-year-olds passing at Centre A is greater

Kim's decision to book at Centre A

13

Turn over for the next question

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10 Lydia is a farmer.

She is investigating whether changing to a more expensive hen food will increase the number of eggs her hens produce.

10 (a) (i) Name the **explanatory** variable in Lydia's investigation.

[1 mark]

Answer _____

10 (a) (ii) Name the **response** variable in Lydia's investigation.

[1 mark]

Answer _____

Do not write outside the box

Lydia decides to test the new food on a sample of her hens.

10 (b) Write down the population for Lydia's investigation.

[1 mark]

10 (c) Lydia has the following information on her hens.

Age, a (years)	**Frequency**
$0 \leqslant a < 2$	104
$2 \leqslant a < 4$	72
$4 \leqslant a < 6$	45
$6 \leqslant a < 8$	19

10 (c) (i) Lydia uses stratification before selecting her sample.
She stratifies by age.

Suggest a reason why it might be sensible to stratify by age.

[1 mark]

10 (c) (ii) Lydia uses a sample of 50 hens.

Show that her sample should contain 15 hens in the age group $2 \leqslant a < 4$

[2 marks]

6

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11 The table shows the monthly number of downloads, in thousands, for a music album.

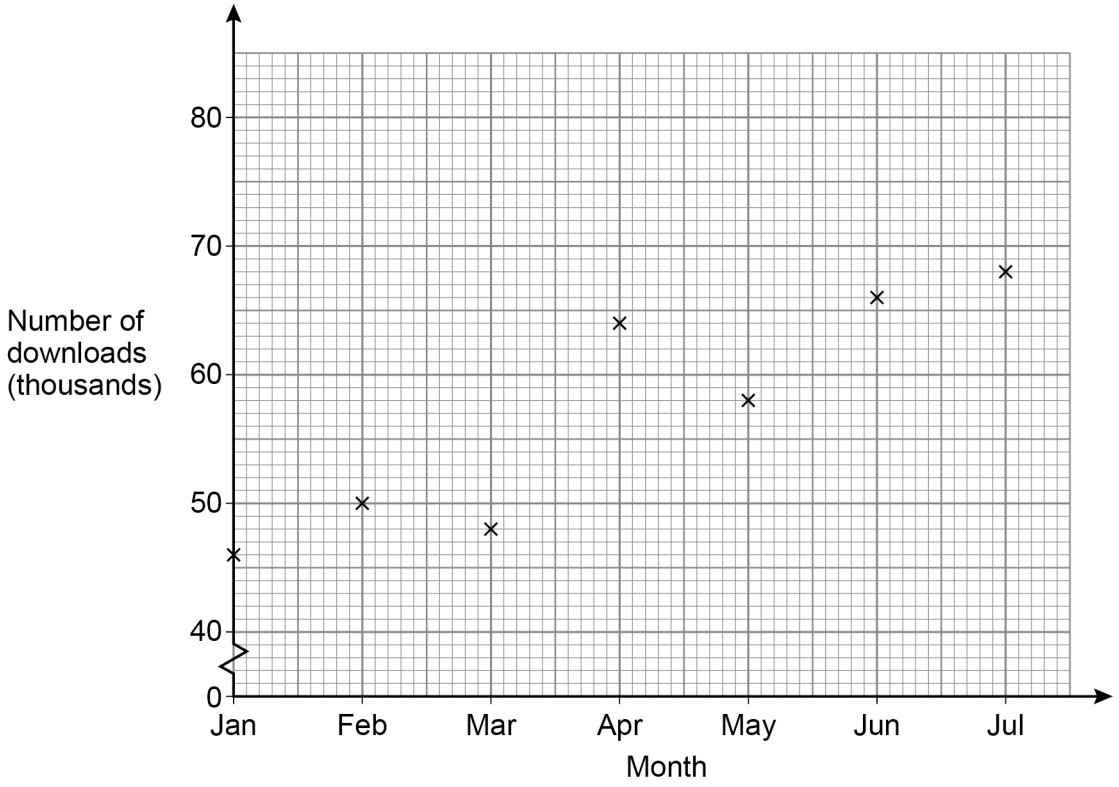
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**
Number of downloads (thousands)	46	50	48	64	58	66	68
Moving average							

11 (a) Calculate the four-point moving averages for these data and write them in the table above.

[3 marks]

Do not write outside the box

The graph shows the data for the number of downloads, in thousands, per month.



11 (b) Plot the moving averages on the graph above.

[2 marks]

5

Turn over for the next question

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12 The table shows information about births in the UK in 2010 and 2019.

	Year	
	2010	**2019**
Number of births	807 300	712 700
Total population	62 260 000	66 650 000
Birth rate		10.7

Source: ONS

12 (a) Complete the table by finding the birth rate in 2010.

Use the formula,

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

[2 marks]

12 (b) The birth rate in Iceland in 2019 was 12.5

Jack concludes,

> "Iceland had a higher number of births than the UK in 2019 because it had a higher birth rate."

Comment on Jack's conclusion.

[1 mark]

3

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13 An app allows students to complete work set by their teacher.

Mr Roper wants to test the effectiveness of the app in an experiment.

He tells his class of 30 students that they have a test next week.

To revise, he gives the app to half of the class, whilst the other half just use their books.

Mr Roper ensures that there are the same numbers of boys and girls in each group.

13 (a) Name **one** other consideration for Mr Roper when grouping the students.

[1 mark]

13 (b) The test scores for the **app group** are shown in the stem-and-leaf diagram.

4	5
5	2 3 7
6	4 5 6 8
7	0 3 5 7
8	1 9
9	2

Key: 4 | 5 represents 45%

13 (b) (i) Work out the median score.

[1 mark]

Answer _____ %

13 (b) (ii) Show that the interquartile range is 20%

[2 marks]

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13 (c) The percentage scores of the 15 students who were in the **book group** are,

71	46	57	37	50
44	69	40	58	83
42	56	39	55	79

Use these results to complete the back-to-back stem-and-leaf diagram that shows both sets of results on the same diagram.

Remember to complete the key and the labels for the diagram.

[4 marks]

							App group			
						4	5			
						5	2	3	7	
						6	4	5	6	8
						7	0	3	5	7
						8	1	9		
						9	2			

Key | | represents

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13 (d) Using your stem-and-leaf diagram and the values from **part (b)**,

compare statistically the scores in the test for those who revised using the app and those who used their books.

[5 marks]

13 (e) Give **one** criticism of the experiment set up by Mr Roper.

[1 mark]

14

END OF QUESTIONS

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