



General Certificate of Secondary Education  
2024

Centre Number

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Candidate Number

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## Statistics

### Unit 2 (With Calculator)

Foundation Tier



[GST21]

\*GST21\*

**MONDAY 17 JUNE, AFTERNOON**

#### TIME

1 hour 30 minutes.

#### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

Complete in black ink only. **Do not write with a gel pen.**

Questions which require drawing can be completed using an HB pencil.

Any working **must** be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.

Answer **all nine** questions.

#### INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and protractor.

There is no formula sheet for this examination.

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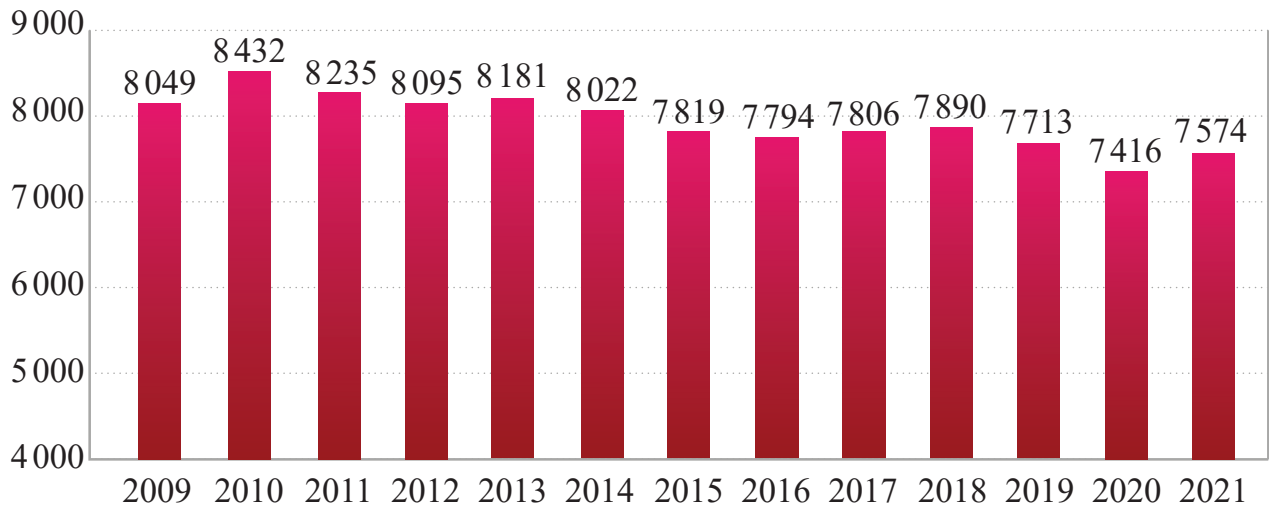


\*24GST2101\*

Answer **all** questions

- 1 The chart below shows total annual electricity consumption in Northern Ireland for each year from 2009 to 2021

**Total annual electricity consumption in Northern Ireland (GWh), 2009 to 2021**



Source: NISRA: [www.nisra.gov.uk](http://www.nisra.gov.uk) / NIE Networks

- (a) During which year was the electricity consumption highest?

Answer \_\_\_\_\_ [1]

- (b) Between which two consecutive years did electricity consumption decrease the most?

Answer \_\_\_\_\_ and \_\_\_\_\_ [1]



(c) Find the median electricity consumption between 2009 and 2021

Answer \_\_\_\_\_ GWh [2]

(d) Find the range of electricity consumption between 2009 and 2021

Answer \_\_\_\_\_ GWh [1]

(e) Compare the electricity consumption between 2013 and 2015 with the electricity consumption between 2016 and 2018

\_\_\_\_\_  
\_\_\_\_\_ [1]

Darcey is looking at the heights of the bars in the chart and states:

*“It looks like energy consumption has fallen by around 25%  
between the highest and the lowest years.”*

(f) Why is Darcey over-estimating the fall in consumption by looking at the heights of the bars?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

[Turn over



- 2 The two-way table below gives information on the four types of home in a small town and the type of heating they use.

	Detached	Semi-detached	Terraced	Apartment	Total
Oil	52	85		6	167
Gas	27		54	68	
Electric		18	12	4	42
Total	87	165	90		420

- (a) How many detached houses use oil heating?

Answer \_\_\_\_\_ [1]

- (b) Complete the missing values in the two-way table above.

[2]

A semi-detached house is selected at random.

- (c) Is this house more likely to use oil, gas or electric for their heating?

Answer \_\_\_\_\_ [1]



(d) Complete the blank spaces:

A terraced house is twice as likely to use \_\_\_\_\_  
as \_\_\_\_\_ for heating. [1]

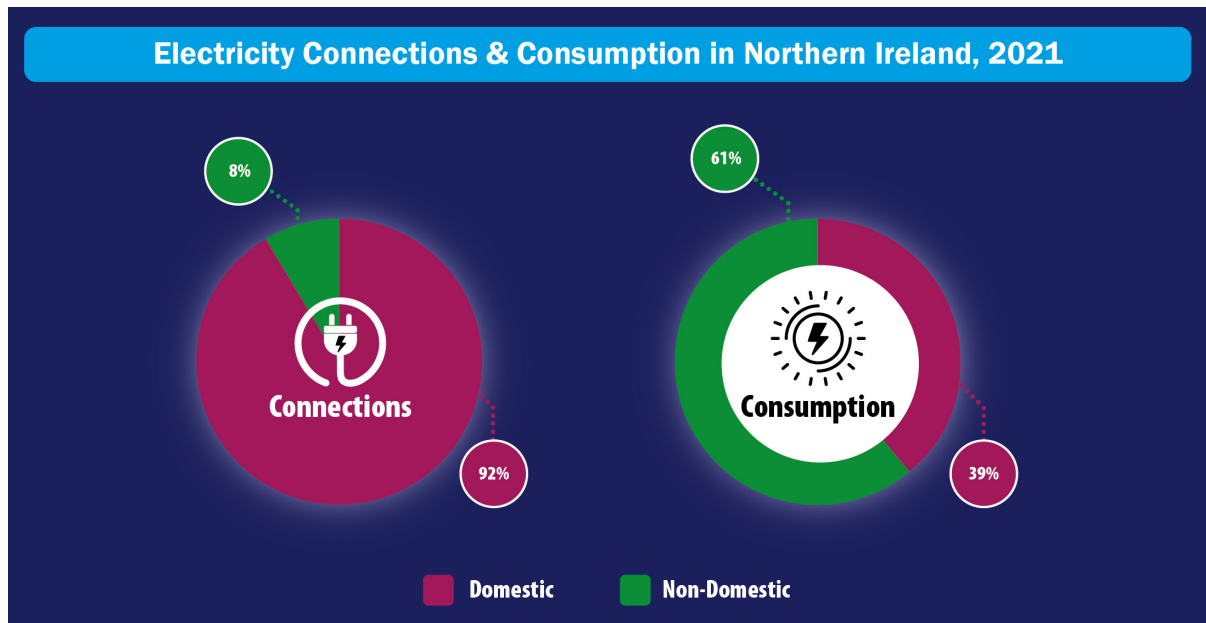
A home which uses gas is selected at random.

(e) What is the probability that it is a terraced house?

Answer \_\_\_\_\_ [2]



- 3 The charts below show how electricity connections and consumption are divided between domestic and non-domestic properties.



Source: NISRA: [www.nisra.gov.uk](http://www.nisra.gov.uk) / NIE Networks

- (a) What feature of these charts make them a suitable way to present this data?

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[1]

Stephanie is looking at the electricity consumption and makes the statement:

*“Non-domestic consumption accounts for twice as much as domestic consumption.”*

- (b) (i) Is Stephanie correct?

Tick the correct box.

Yes

No

[1]

- (ii) Give a reason for your answer.

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[1]



(c) Suggest a reason why domestic is such a large percentage of electricity connections but a small percentage of electricity consumption.

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[2]



- 4 Luke is carrying out a survey to find out what type of products the Year 12 students in his school would like to see in the school's vending machines.

He decides to write a questionnaire to collect the information.

- (a) What type of data will Luke be collecting?

Tick the correct box.

Primary

Secondary

[1]

Luke writes the following question to include in his survey:

Research suggests that energy drinks affect students' ability to concentrate in class.  
Would you like energy drinks to be available in the vending machines?

- (b) State one problem with this question.

---

---

[1]

- (c) Write down an example of a closed question which Luke could use in his questionnaire.

Include a response section.

[2]



Luke's friend says that he should include some open questions in his questionnaire, as they will allow people to give information which Luke may not have thought of asking about.

Luke says that this information might not be relevant.

- (d) Give another reason why Luke might decide not to include any open questions in his questionnaire.

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[1]

Luke decides to carry out a census with the questionnaire.

- (e) What is the population for his census?

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[1]

- (f) Suggest a reason why Luke may have chosen to carry out a census instead of a sample survey.

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---

[1]

- (g) Give an example of one difficulty which Luke might encounter when carrying out his census.

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[1]

[Turn over



5 Wendy works for a tourism company. She is collecting information on the amount of money families spent on holiday accommodation in 2022 and 2023

To obtain a sample of households to survey, Wendy forms a list of towns which she believes are representative of Northern Ireland as a whole.

(a) What is the statistical name given to this list?

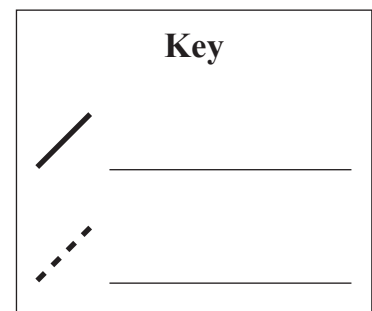
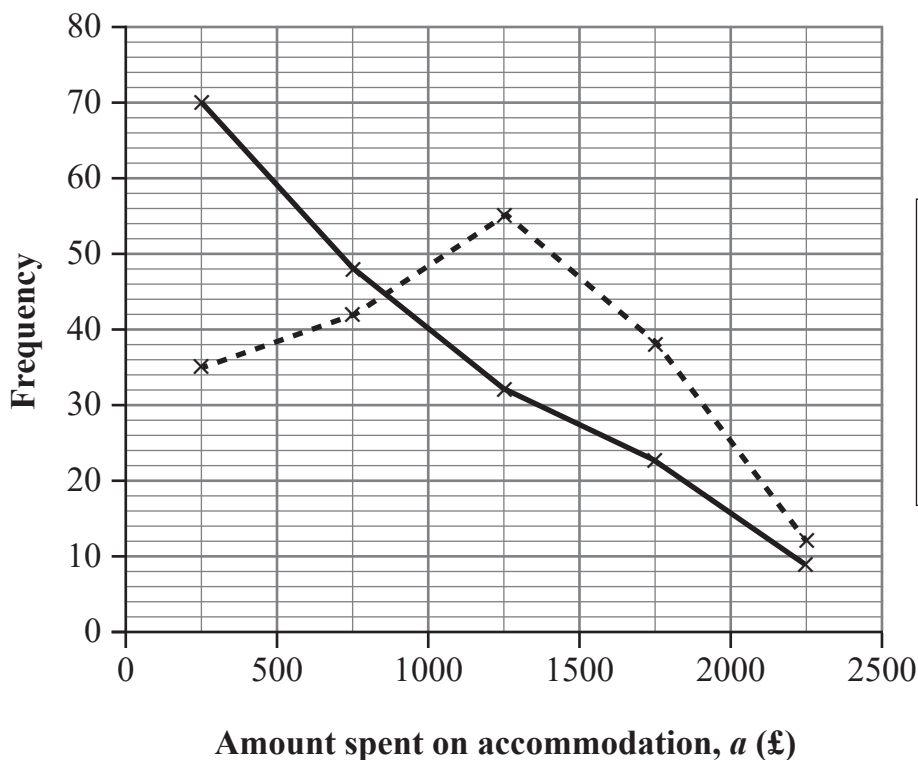
\_\_\_\_\_ [1]

She then selects one town at random from the list and sends a team of researchers to survey each household in the town.

(b) Write down the name of this method of sampling.

\_\_\_\_\_ [1]

The graph below shows the data collected for both years.



(c) What is the name of this type of graph?

Tick the correct box.

Frequency polygon

Cumulative frequency diagram

[1]

The modal class for 2022 was  $1000 \leq a < 1500$

(d) Use this information to complete the key on the opposite page.

[1]

(e) Write down the modal class for 2023

Answer \_\_\_\_\_ [1]

(f) What does the graph show about the differences in the amount of money families spent on holiday accommodation in Northern Ireland in 2022 and 2023?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(g) Suggest one disadvantage of the way in which Wendy collected the data for her survey.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(h) Comment on the reliability of the answers which people gave to the survey.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

[Turn over



- 6 The table below shows index numbers for the price of a loaf of bread in 5-year intervals from 1987 to 2022

Year	1987	1992	1997	2002	2007	2012	2017	2022
Index number		138.5	157.5	176.2	206.6	242.7	272.5	313.2

The base year for the index numbers is 1987

- (a) Complete the index number in the table above for 1987 [1]

The index number for 2007 is 206.6

- (b) Explain what this value means in relation to the base year.

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[2]

- (c) (i) Which 5-year period shown in the table has seen the biggest rise in the price of bread? [1]

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- (ii) How is this shown in the table? [1]

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Anna wants to display the index numbers from 1987 to 2022 on a graph to help her see the trend.

- (d) What would be the most suitable type of graph to display this information? [1]

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**(Questions continue overleaf)**



7 Mr McManus is Head of Year 8. He is investigating whether pupils earn more merit points in Term 1 or Term 2

(a) State a suitable hypothesis which Mr McManus could use for this investigation.

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[1]

The table below shows the number of merit points gained by some pupils in 8C, one of the four classes in Year 8, during Terms 1 and 2

<b>Term 1</b>	23	45	33	23	32	35	17	26	54	26	42	30
<b>Term 2</b>	18	20	15	19	30	22	24	23	31	22	17	26

Mr McManus decides to calculate the average number of merits gained per pupil in Term 1

(b) (i) Which is the more appropriate average for this data?

Tick the correct box.

Mean       Median  [1]

(ii) Explain your answer.

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---

[1]

(c) Comment on the reliability of looking at data for only these pupils to carry out this investigation.

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[2]



Mr McManus wants to sort and order the data for these pupils from 8C into a single diagram.

- (d) Draw an ordered back-to-back stem and leaf diagram using the template below to display the data for Term 1 and Term 2

Term 1		Term 2

[5]

- (e) (i) Does the information in your stem and leaf diagram support the hypothesis you stated in part (a)?

Tick the correct box.

Yes

No

[1]

- (ii) Explain your answer.

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[1]

Q7 continues on page 17

[Turn over



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A pupil who joined the class at the start of Term 2 didn't have their merit points included in the original list.

Mr McManus decides to include them. This pupil gained 30 merit points.

(f) What effect will this have on the Term 2:

(i) range;

Tick the correct box.

Increase       No change       Decrease       [1]

(ii) median;

Tick the correct box.

Increase       No change       Decrease       [1]

(iii) mean?

Tick the correct box.

Increase       No change       Decrease       [1]

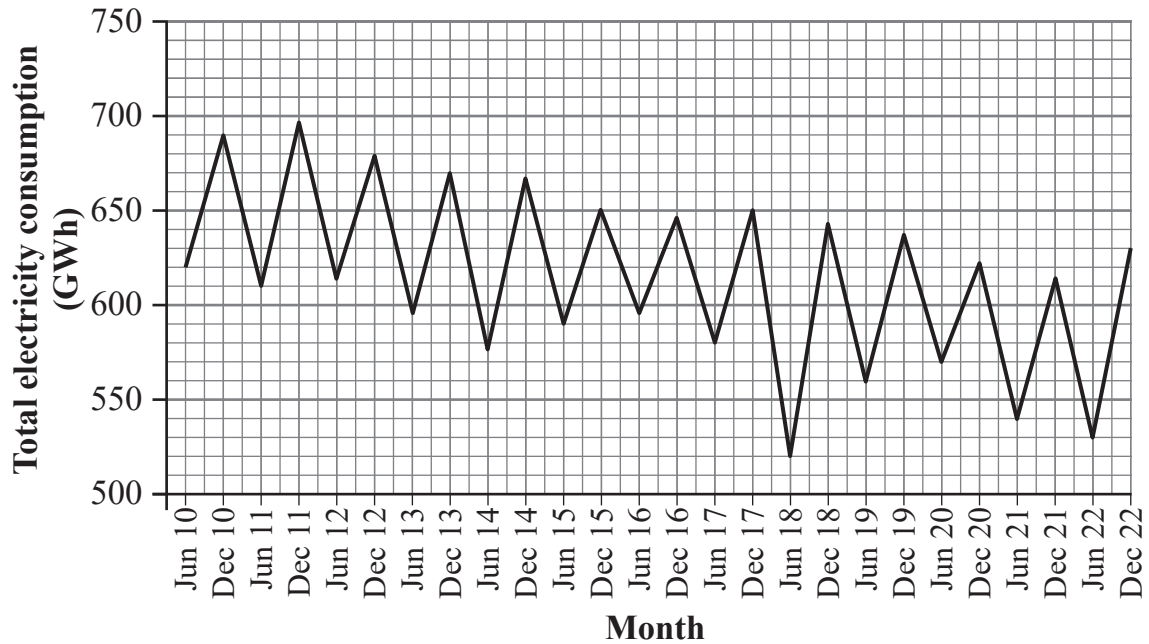
[Turn over



8 Graham works for a large international company.

He records the company's total electricity consumption every six months.

His results for 2010 to 2022 are shown in the time series graph below.



(a) What is a time series?

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[2]

(b) In what month and year was the total electricity consumption the lowest?

---

[1]

(c) Draw a trend line on the graph above.

[1]



(d) What does your trend line show about the company's total electricity consumption over this period?

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[1]

Graham wants to use a trend line to predict the total electricity consumption for 2023

(e) What assumption must Graham make in order to do this?

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[1]

[Turn over



- 9 The table below shows data relating to domestic and non-domestic electricity consumption at district council level in Northern Ireland for 2020 to 2021

### Electricity consumption statistics at district council level, 2020 to 2021

Council name	Domestic			Non-domestic		
	Total consumption (GWh)	Total number of meters	Average consumption per meter (kWh)	Total consumption (GWh)	Total number of meters	Average consumption per meter (kWh)
Antrim & Newtownabbey	234	63 647	3 676	332	4 130	80 392
Ards & North Down	282	75 867	3 715	183	4 847	37 774
Armagh City, Banbridge & Craigavon	357	90 030	3 965	529	7 347	71 942
Belfast	505	165 019	3 061	827	13 681	60 482
Causeway Coast & Glens	255	67 723	3 758	226	5 630	40 215
Derry City & Strabane	231	65 108	3 550	406	5 373	75 496
Fermanagh & Omagh	194	49 995	3 877	321	5 077	63 258
Lisburn & Castlereagh	242	64 233	3 767	241	4 363	55 337
Mid & East Antrim	234	62 887	3 729	248	4 622	53 698
Mid Ulster	245	57 243	4 283	476	6 348	74 933
Newry, Mourne & Down	304	74 520	4 081	283	6 689	42 317
Unallocated	6	2 628	2 273	16	190	82 403
<b>Northern Ireland</b>	<b>3 089</b>	<b>838 900</b>	<b>3 682</b>	<b>4 088</b>	<b>68 297</b>	<b>59 861</b>

Source: © Crown copyright / BEIS (Sub-national electricity consumption statistics in Northern Ireland, gov.uk website)



(a) (i) Show that the mean total consumption of non-domestic electricity for the 11 council areas (i.e. excluding Unallocated) is 370 GWh to the nearest whole number.

[2]

(ii) Write down the name of the council area in which the total consumption of non-domestic electricity is closest to the mean for all 11 council areas.

[1]

\_\_\_\_\_

Ryan is investigating whether there is a link between the total consumption of domestic electricity and the total consumption of non-domestic electricity for each of the 11 council areas.

He calculates the product moment correlation coefficient to be 0.793

(b) How might Ryan interpret this value?

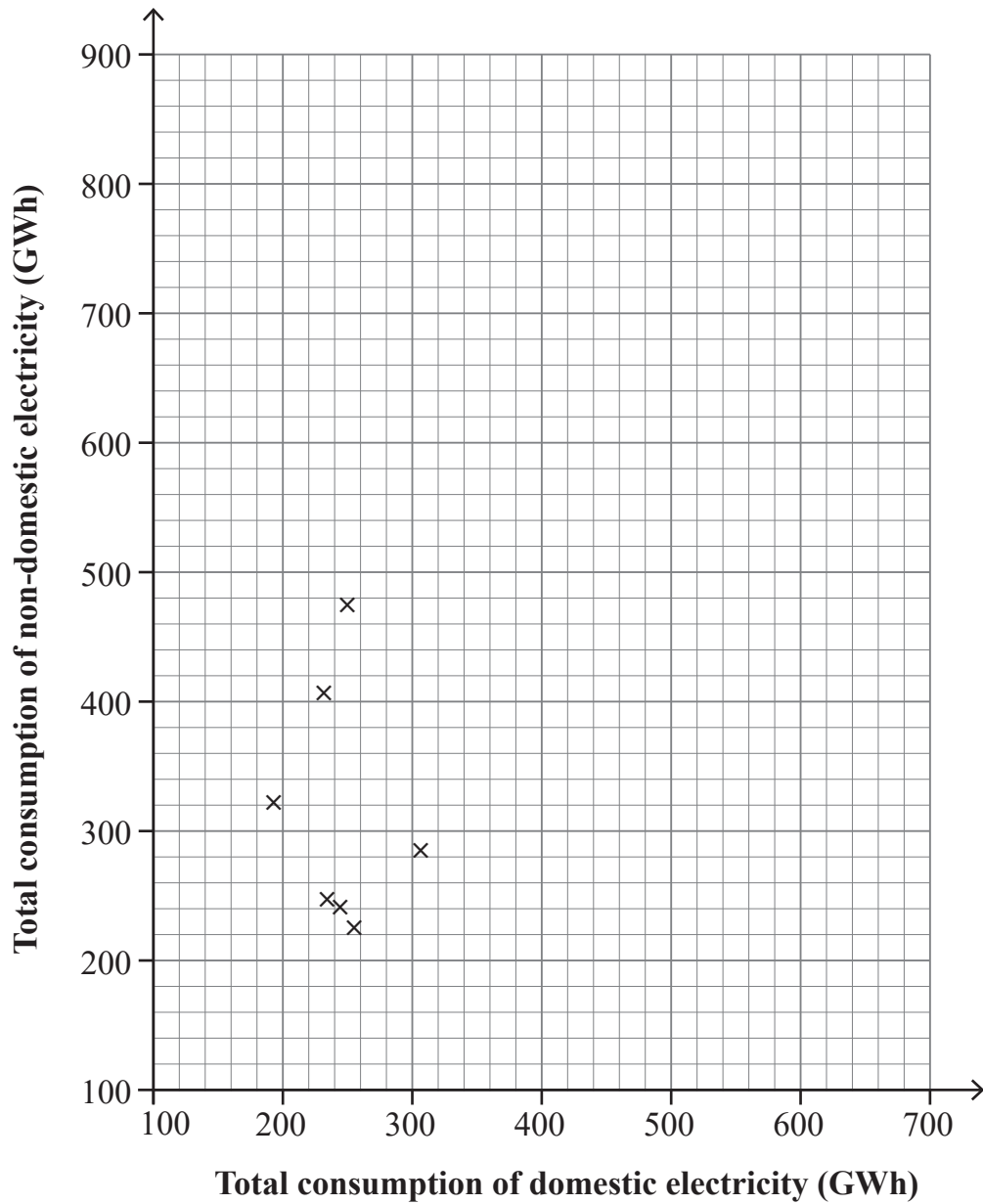
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

[2]

[Turn over



Ryan notices that there may be an outlier in the data, so he decides to plot a scatter diagram.



(c) On the scatter diagram above, plot the points for the first four council areas from the table overleaf.

The points for the other council areas have already been plotted.

[2]



- (d) (i) On the scatter diagram opposite, draw a circle around the point which represents the outlier and write down the name of the council area.

\_\_\_\_\_ [2]

- (ii) Suggest a possible explanation for this.

\_\_\_\_\_  
\_\_\_\_\_ [2]

- (e) With the outlier removed, calculate the product moment correlation coefficient for the remaining 10 council areas, giving your answer correct to three decimal places.

Answer \_\_\_\_\_ [2]

- (f) What conclusion could Ryan draw from the value calculated in part (e)?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

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<b>For Examiner's use only</b>	
<b>Question Number</b>	<b>Marks</b>
1	
2	
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9	

<b>Total Marks</b>	
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Examiner Number

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