Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8992618010

ENVIRONMENTAL MANAGEMENT **5014/22**

Alternative to Coursework **May/June 2015**

1 hour 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

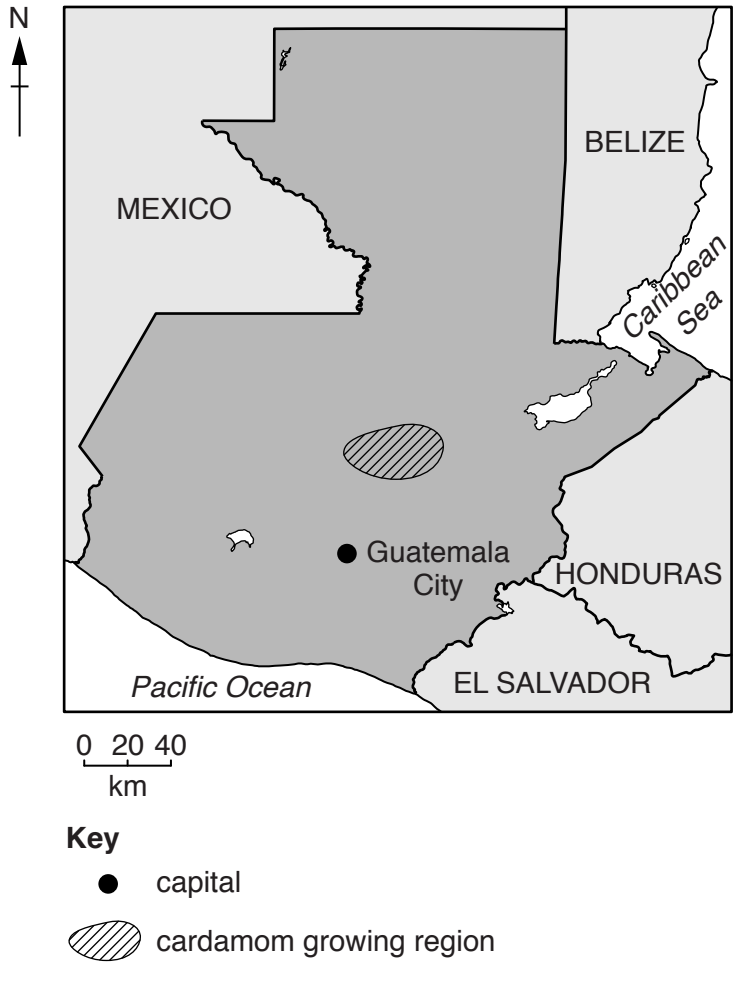
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

Study the appropriate source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

map of the world

map of Guatemala



Area of Guatemala: 108 900 sq km

Population: 14 400 000

Children per woman: 3.1

Life expectancy: 71.4 years

Currency: Quetzal (8.0 GTQ = 1 US$)

Languages: Spanish, Amerindian

Climate: tropical, cooler in the highlands

Terrain: mostly mountains with a narrow coastal plain

Main exports: coffee, sugar, bananas, cardamom, clothing and petroleum products

[Turn over

1 **(a)** Guatemala is the world's largest exporter of the spice, cardamom. About 25 000 tonnes are produced each year. Cardamom is grown on small farms on mountain slopes. The cardamom pods can be harvested at any time of year. The peak for harvesting is between September and January when world demand is at its highest.

(i) Explain how an increase in world demand of cardamom helps farmers and their families.

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(ii) Cardamom seeds have a hard coat that can stop seeds germinating. A student wanted to find a way of improving germination. Fifty cardamom seeds were soaked in each of the different solutions for 10 minutes before planting in soil-filled pots.

soaking solution	number of seeds germinating after 20 days	percentage of seed germination
water	25	50
hydrochloric acid	30	60
nitric acid	29	.....
acetic acid	31	.....
mixture of the three acids	40	.....

Complete the table. [2]

(iii) Explain why some cardamom seeds were soaked in water.

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(iv) Suggest **two** reasons why many farmers do not want to soak the seeds before planting.

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(b) Sometimes cardamom seedlings die from a fungal disease. The fungus can be killed by spraying the seedlings with a solution of copper sulfate.

Describe the damage to the environment that can be caused by using heavy metal compounds, such as copper sulfate, to control plant diseases.

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(c) Farmers prepare new seedbeds every year and leave old seedbeds to rest for two years. Describe and explain **one** advantage of working in this way.

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[Turn over

(d) A student wanted to find the planting method that produced the most seedlings for planting in the fields. The student proposed three different methods.

method one

Add 50 seeds to the first tray, 100 seeds to the second tray and 150 seeds to the third tray. Repeat this. Record the number of seedlings at 20 days.

method two

Use two sets of three trays. Add 50 seeds to the first tray, 100 seeds to the second tray and 150 seeds to the third tray. Record the number of seedlings at 20 days.

method three

Use two sets of three trays. Add 50 seeds to the first tray, 100 seeds to the second tray and 150 seeds to the third tray. Record the number of seedlings at 20 days and again at 25 days.

(i) Suggest why the student decided to use two sets of trays for each planting density in methods **two** and **three**.

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(ii) Explain why the student decided to use method **three** instead of methods **one** or **two**.

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(iii) Another student wanted to repeat the methods. Suggest **three** other pieces of information that would be needed.

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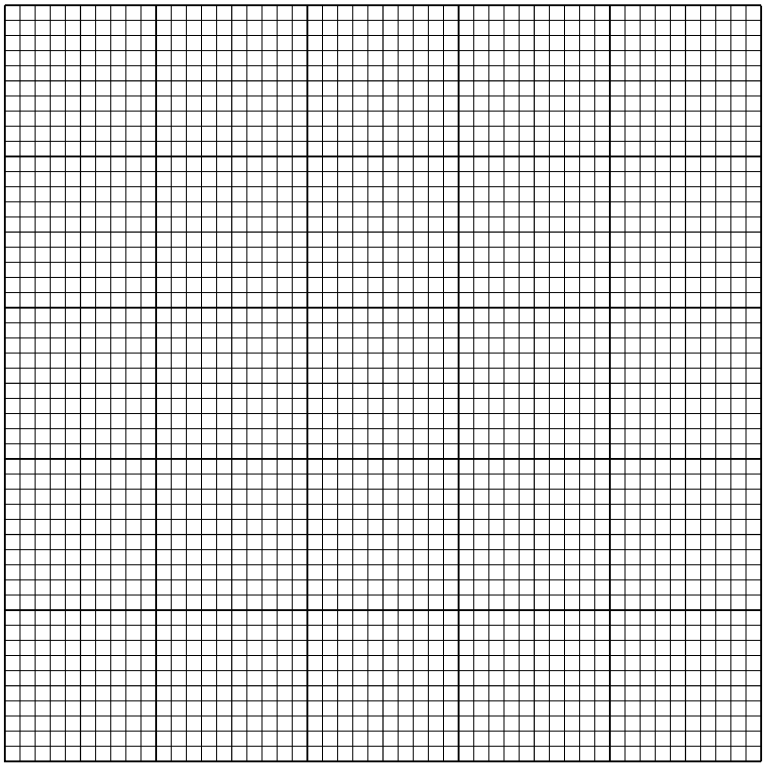
..... [3]

(e) Some of the results from method **three** are shown in the table below.

planting density (seeds per tray)	average number of seedlings after 25 days
50	40
100	80
150	120
200	150
250	150

(i) Plot the data as a graph on the grid below.



[4]

(ii) Describe the pattern shown by the graph.

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(iii) What advice could the student give the farmer about planting density?
Give a reason for your answer.

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(f) A weather station recorded data for one year on a cardamom farm.

month	J	F	M	A	M	J	J	A	S	O	N	D
temperature / °C	23	22	22	23	24	24	24	25	25	24	23	23
rainfall / mm	230	155	200	185	290	350	445	390	417	315	312	257

(i) Calculate the annual temperature range recorded at the weather station.

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(ii) Explain why farmers are able to grow cardamom plants all year round.

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(iii) Look at the rainfall data in the table. Suggest problems this could cause for cardamom farmers.

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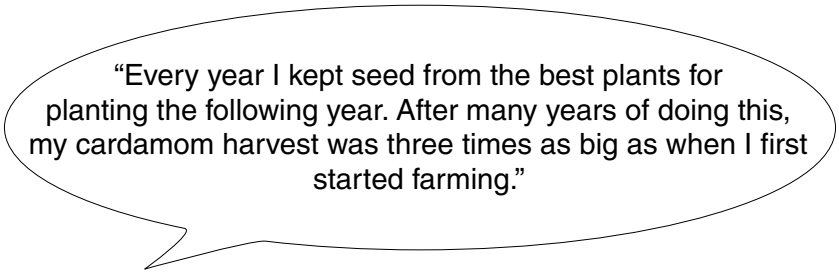
(g) A farmer said,



(i) Explain why the farmer's cardamom harvest increased.

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(ii) The new high yield variety is now grown on many farms. State how higher yielding cardamom plant varieties could be produced more quickly.

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2 The government of Guatemala estimate that demand for electricity will increase by 2022. They plan to increase each type of electricity production method to meet the need.

The table shows the percentage of total electricity used from different sources in Guatemala in 2012.

electricity source	percentage of total electricity used
coal	6.8
geothermal	2.1
hydro-electric power (HEP)	32.9
oil	41.4
imported from Mexico	16.8

(a) Describe the disadvantages of this plan.

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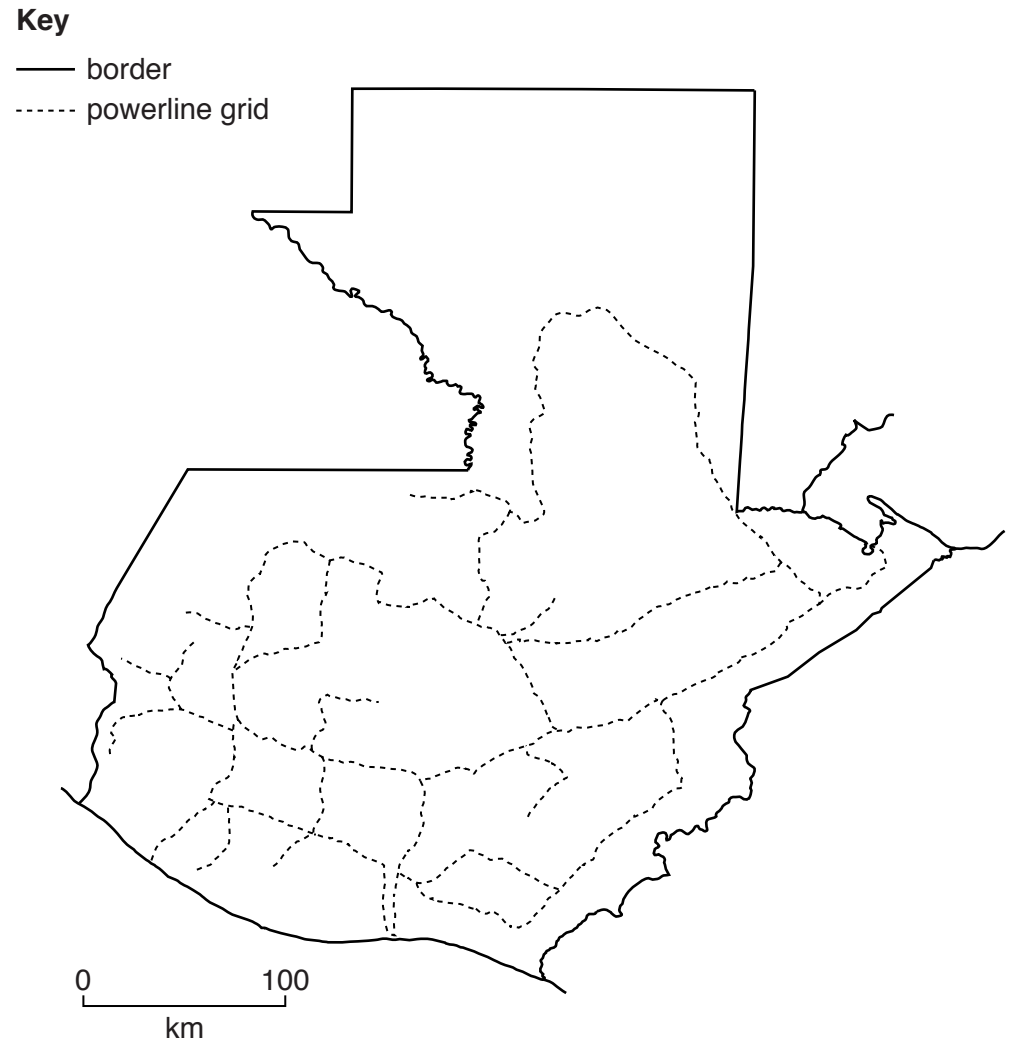
(b) To deliver electricity to most parts of the country the government of Guatemala plan to build more powerlines to create an electricity supply grid.



Suggest reasons why the powerline grid will not reach the northern parts of the country.

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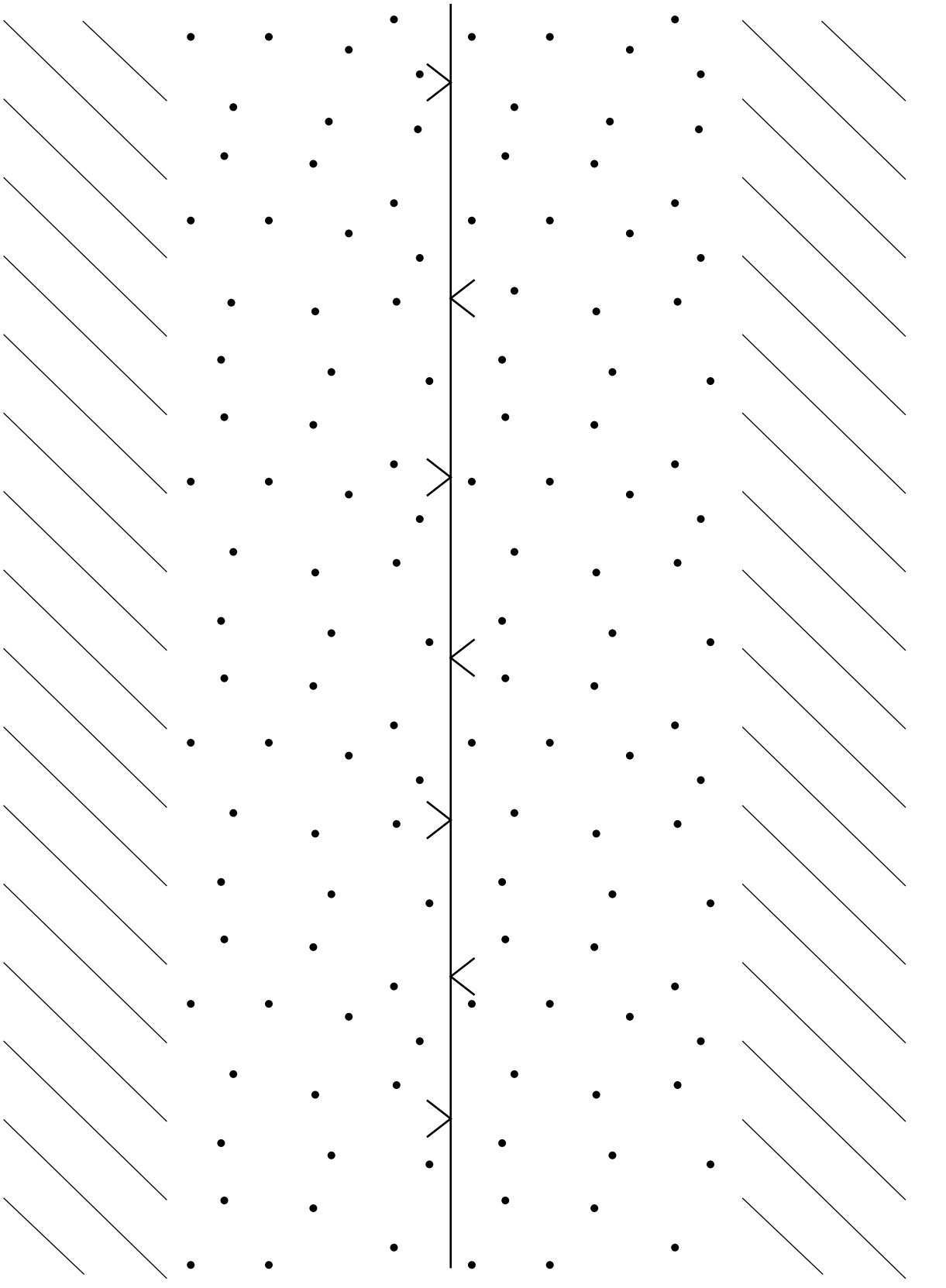
(c) The diagram shows an area of tropical rainforest in which an overhead powerline is located.



(not to scale)

Key

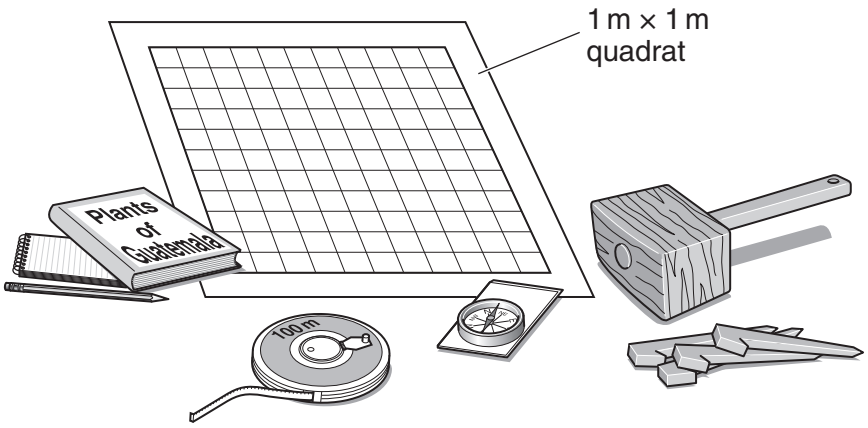
powerline

cut forest

tropical rainforest

A survey found that cutting down a strip of tropical rainforest to build the powerlines did not reduce plant biodiversity.

The diagram shows the equipment used in the survey.



(i) A student wanted to investigate changes in biodiversity between the edge of the forest and the powerlines. Describe how the equipment above could be used to carry out the survey.

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(ii) Suggest how the reliability of the survey could be improved.

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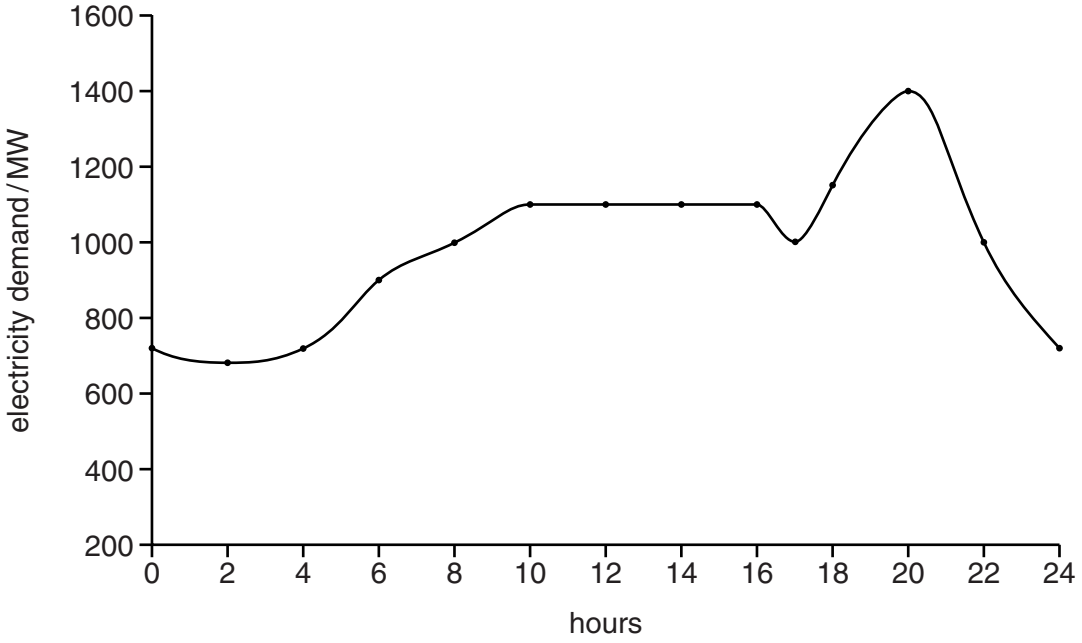
(d) The changes in electricity demand during one day in Guatemala are shown in the graph.



(i) State when electricity demand is at its lowest. .....hours [1]

(ii) Suggest reasons why the highest demand is between 18.00 and 21.00 hours.

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(iii) Suggest arguments that could be used to persuade the government of Guatemala to invest in reducing demand for electricity, rather than increasing electricity production.

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(e) The northern parts of Guatemala are not going to be connected to the electricity supply grid. They will have to rely on small-scale electrical generation, such as biomass plants.

On one small farm, 82 percent of its electricity needs are met by biogas.

(i) Suggest how the farm could meet the remaining 18 percent of its electricity needs.

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..... [1]

(ii) A student visited some farms in the northern parts of Guatemala to survey the farmers to find their views on building and running small-scale electrical generating plants.

Part of the questionnaire used is shown below.

Complete the questionnaire with **three** further questions.

1. How old are you? under 20 21–30 31–40 41–50 51+

2. How many children do you have? 0–1 2–3 4–5 6+

3. .....

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5. .....

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[4]

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