Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 **May/June 2018**

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.

This document consists of **16** printed pages.

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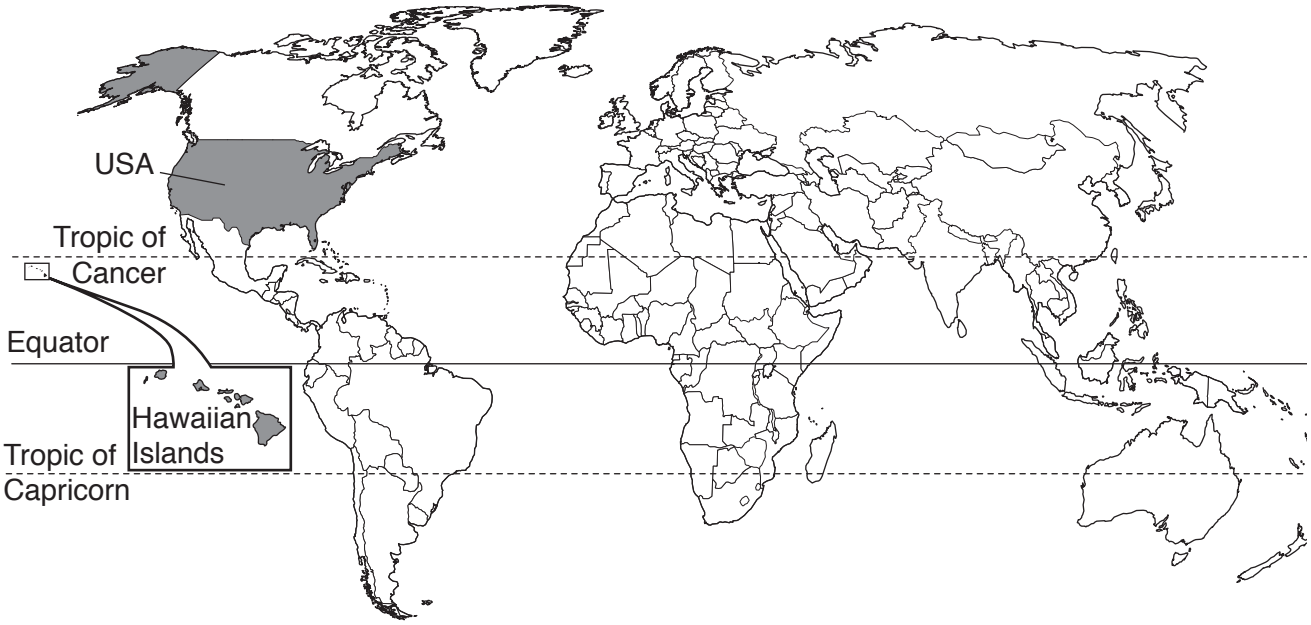
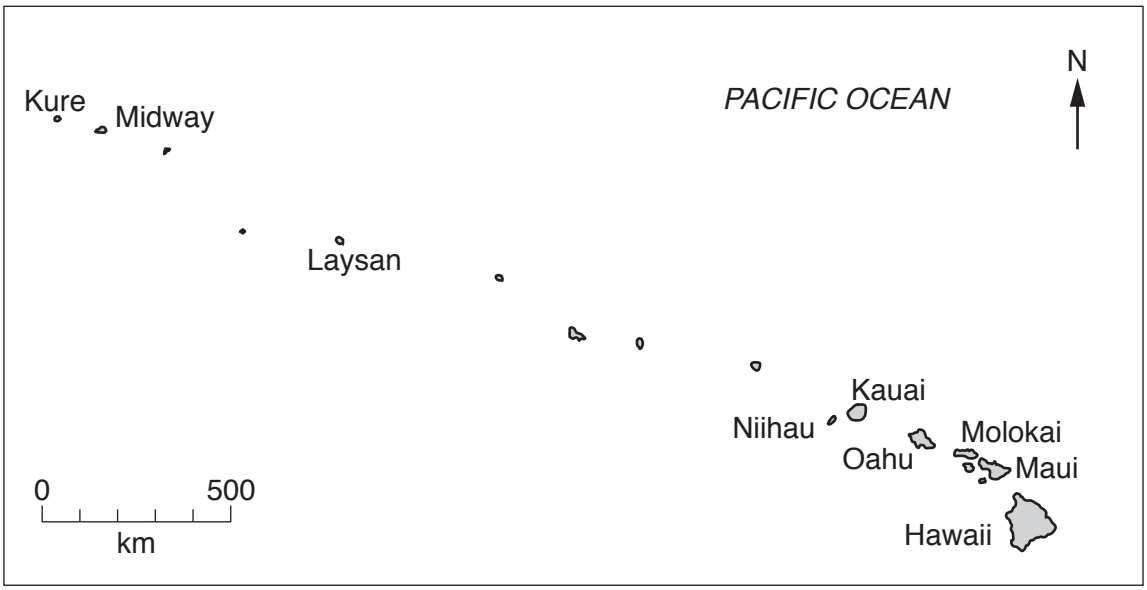
CAMBRIDGE International Examinations

map of the world



map of Hawaiian islands



area of the state of Hawaii: 28 311 km^2

population: 1.43 million (in 2015)

children per woman: 1.85

life expectancy: 81.3 years

currency: USD

languages: English, Hawaiian

main economic activities: agricultural production, fishing and tourism

1 Hawaii is a state of the USA, it is a long chain of volcanic islands. People only live on the larger islands. The small islands are uninhabited. Crops are grown on the lower slopes of the volcanoes. More than six million tourists visit this state every year.

(a) Use the map and scale to estimate the distance between

Oahu island and Laysan island ..... km

Oahu island and Midway island ..... km
[2]

(b) The population of the four largest Hawaiian islands is shown in the table.

island	population in 2015
Hawaii	202 700
Oahu	976 200
Kauai	71 400
Maui	168 000
total	.....

(i) Calculate the total population in 2015.
Complete the table. [1]

(ii) Calculate the percentage of the total population that lived on the island of Oahu in 2015.
Give your answer to one decimal place.

Show your working.

.....% [2]

(c) The table shows climate data from a weather station on Oahu.

	month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
average monthly temperature /°C	22	22	23	23	24	25	25	25	25	25	24	23
average monthly rainfall /mm	106	66	78	48	25	18	23	28	36	48	67	107
average monthly relative humidity at midday /%	66	67	65	64	64	63	63	64	65	66	67	68

(i) Calculate the annual average temperature range on Oahu.

.....°C [1]

(ii) Name the driest month and the wettest month.

driest..... wettest.....[1]

(d) Large numbers of tourists visit the Hawaiian islands in every month of the year.
Using information from the table, suggest **three** reasons why tourists can visit at any time of year.

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.....[3]

(e) The number of hotel rooms for tourists on the Hawaiian islands has doubled in recent years. Suggest **three** ways that this development could cause environmental damage.

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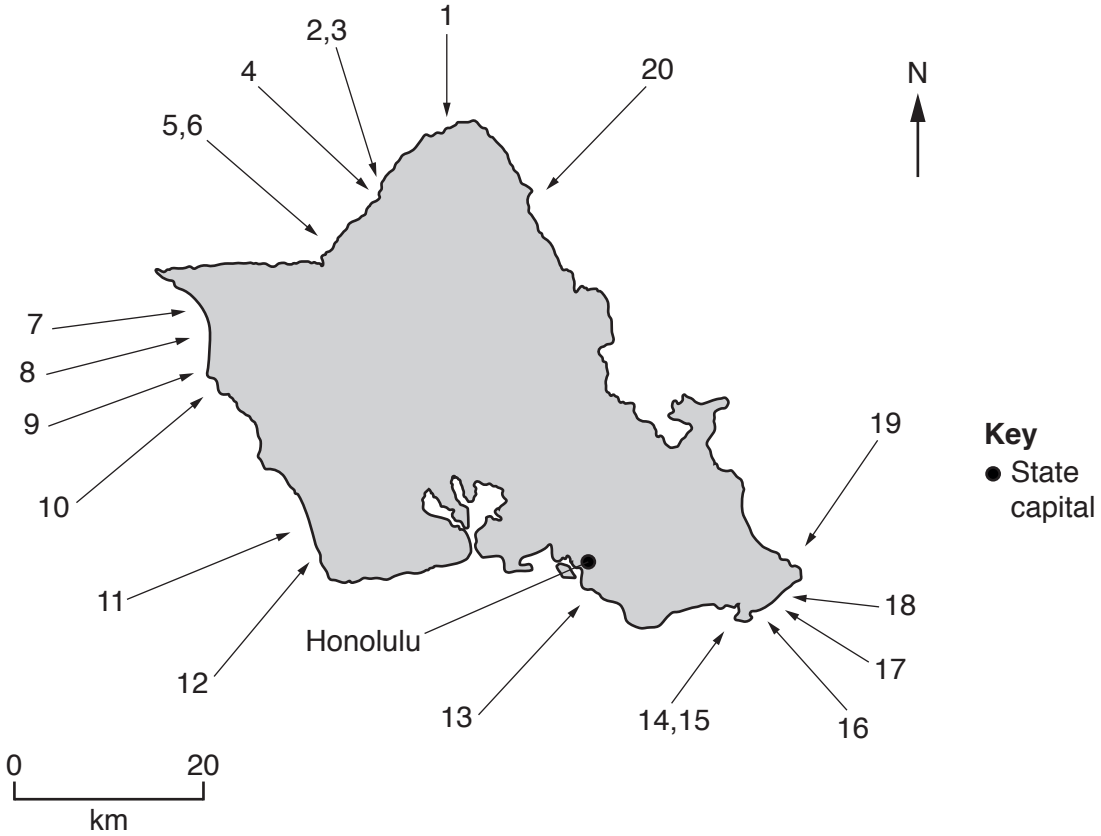
.....[3]

(f) Many tourists visit the Hawaiian islands to dive in lagoons formed by coral reefs and see the colourful wildlife. The map shows the location of the main diving sites on the island of Oahu.

Oahu diving sites



(i) Using the map, circle the **two** areas where you would expect to find the most damage as a result of diving.

2–6 **7–10** **11–15** **16–19**

[1]

(ii) Give reasons for your choices in **(i)**.

.....

.....

.....

.....[2]

(iii) Describe **three** ways diving can damage the environment in these areas.

1 .....

.....

2 .....

.....

3 .....

.....
[3]

(g) Large numbers of colourful fish are caught from lagoons and sold to pet shops in other states of the USA. Up to 90% of these fish die before they reach these pet shops.

Anyone can buy a fish collector licence for 50 USD and collect as many fish as they want to sell.

(i) Explain why this is **not** a good example of environmental management.

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.....[3]

(ii) Suggest suitable management strategies the state of Hawaii could use to maintain the marine environment.

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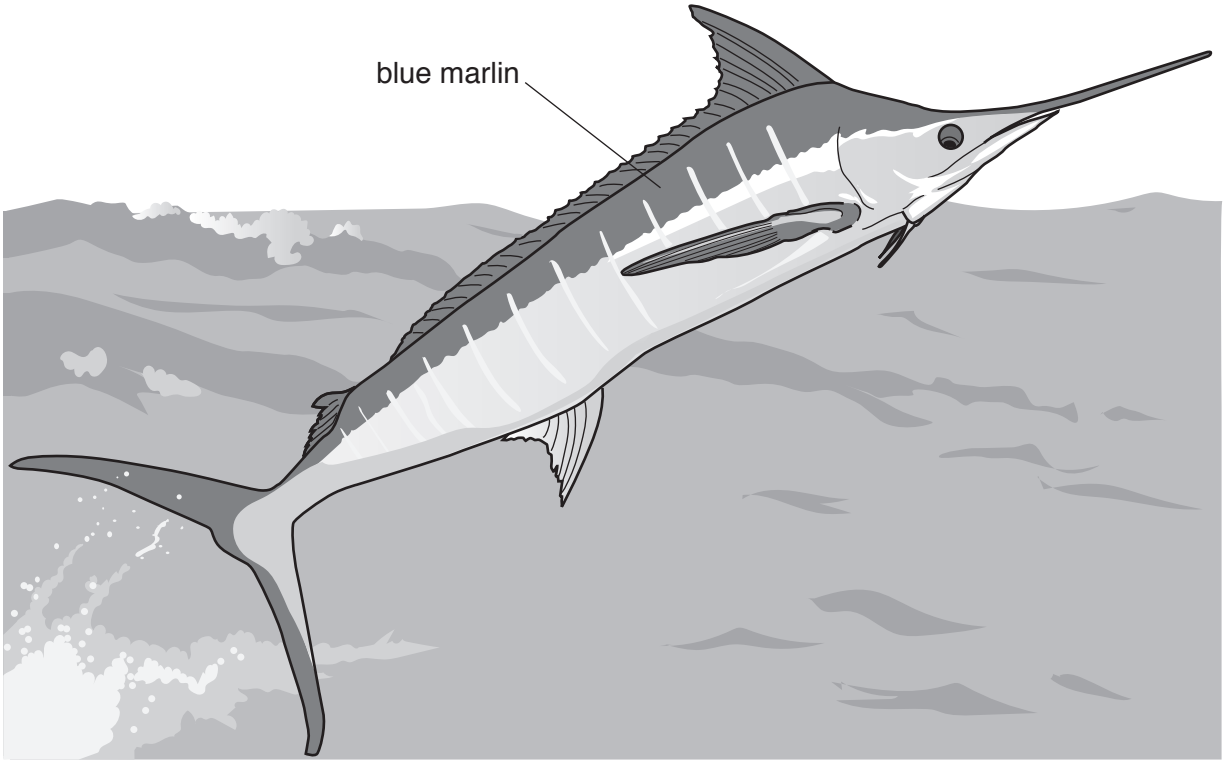
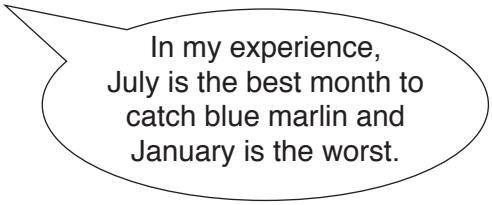
.....[3]

(h) Many tourists go sport fishing for a large fish called the blue marlin. These fish are caught out at sea by rod and line from hired boats.



A boat captain said



A student wanted to find out about the number of blue marlin caught in July and January. The student decided to ask the boat captains how many blue marlin they were catching.

The student proposed two different plans.

Plan one

Interview the captains of the first three boats that return to harbour in the afternoon. Do this on three separate days in both July and January.

Plan two

Interview the captains of the first five boats that return to harbour in the afternoon. Do this every Tuesday and Thursday in both July and January.

(i) Suggest **one** reason why the student decided to ask all the boat captains the same question.

.....

.....[1]

(ii) Explain why **plan two** is a better method than **plan one**.

.....

.....

.....

.....[2]

(iii) Draw a table to record the results of **plan two** for **one** week in January.

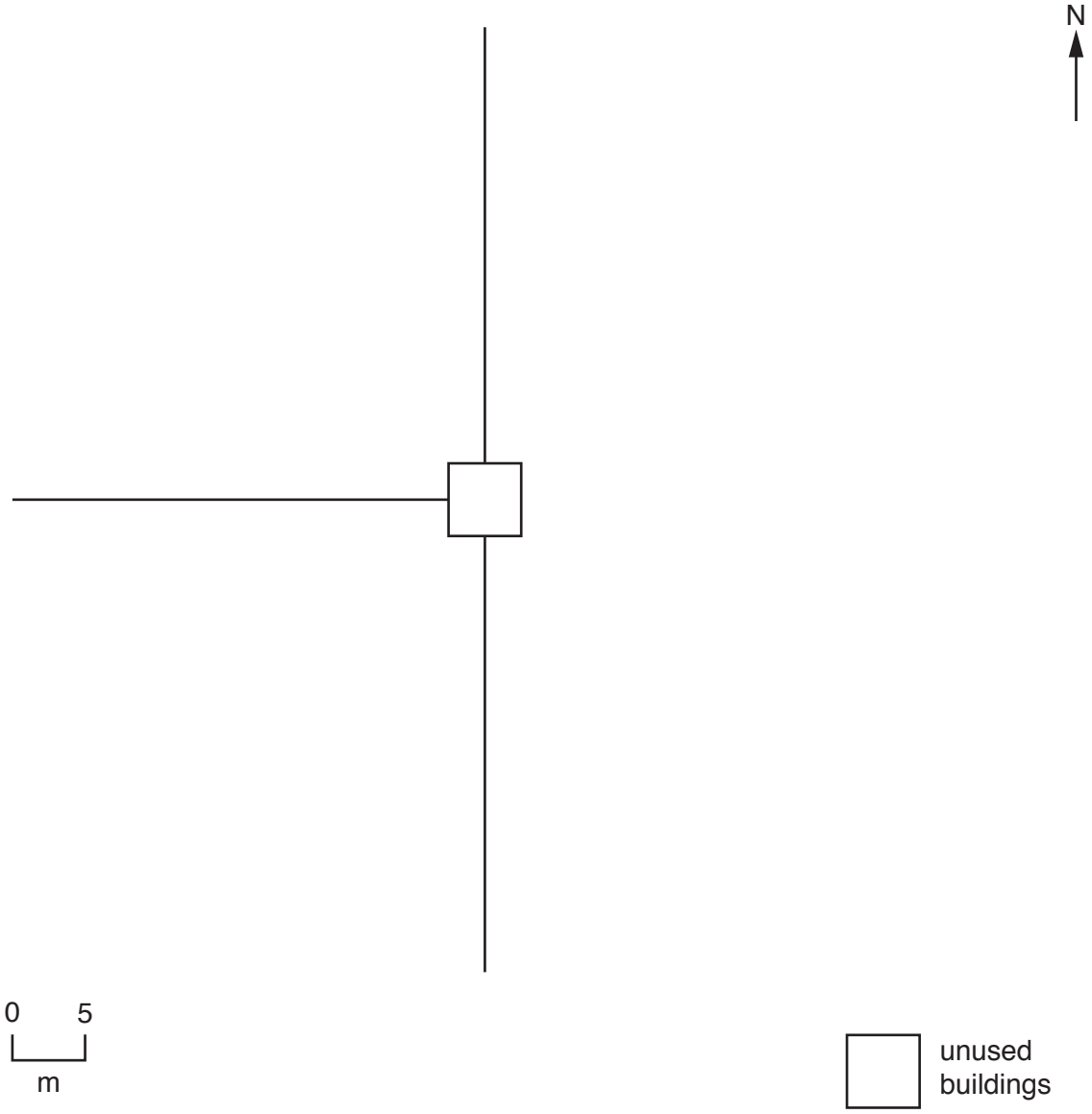
[3]

2 The photograph shows an albatross and chick. A survey of albatross nests with chicks on Midway island found the number of dead chicks increased near unused buildings. A scientist noticed that paint from the unused buildings was falling off and mixing with the sand. Samples of the paint and blood from dead chicks were analysed. Both were found to contain high concentrations of lead.

(a) The scientist decided to take sand samples using the following method.

- Using a compass, lay a 30 m tape due north of the buildings.
- Lay three more 30 m tapes due south, east and west of the unused buildings.
- Remove 1 kg sand samples at 5, 10, 15, 20 and 25 m from the buildings in each direction.

(i) Complete the diagram to show the position of **all** sample sites. Use the scale given.



[2]

(ii) Name the type of sampling used by the scientist.

.....[1]

The table shows the results of the sand samples.

	concentration of lead/ppm				
distance from unused buildings /m	North	South	East	West	average
5	1200	1400	1050	1350	1250
10	235	1150	947	1092	856
15	790	820	663	727	750
20	380	640	394	674	522
25	170	425	165	404	291

ppm = parts per million

(iii) The table contains one anomalous result. Identify the anomalous result.

distance/m ..... direction ..... [1]

(iv) Describe the pattern shown by these results.

.....

.....

.....

.....[2]

(v) The scientist also took one sample of sand from another island where there were no buildings.

Explain why the scientist decided to take this sample.

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.....[2]

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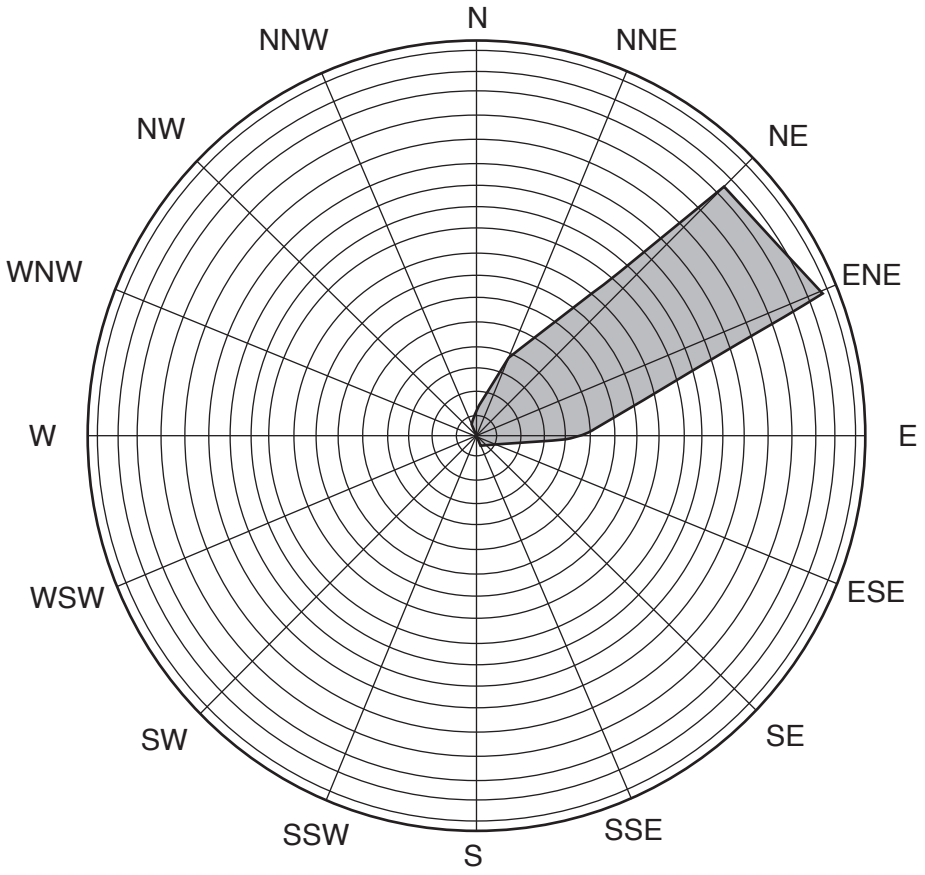
(b) The scientist also collected data about wind direction from an automatic weather station on Midway island.



(i) Suggest how this wind direction data explains the results shown in the table in **(a)**.

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.....[2]

(ii) Explain how even low concentrations of lead can cause the death of albatross chicks.

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.....[3]

(iii) Suggest **two** reasons why there are no plans to remove the source of lead contamination from Midway island.

1 .....

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2 .....

.....
[2]

(c) The scientist wanted to find out if lead contamination altered the growth of plants.

The scientist used the following method.

1. 25 pots were filled with 1.0 kg of a soil made from sand and manure.
2. Four groups of 5 pots had lead nitrate added.
3. Seeds of one species of bean were planted.
4. The pots were kept in the same conditions.
5. The pots were watered regularly.

The table shows the results after 20 days.

pots	**mass of lead nitrate added /g**	**average length of root /cm**	**average leaf area /cm^2**
1–5	0	4.9	48
6–10	2	3.5	35
11–15	4	2.8	23
16–20	6	1.7	16
21–25	8	0.6	10

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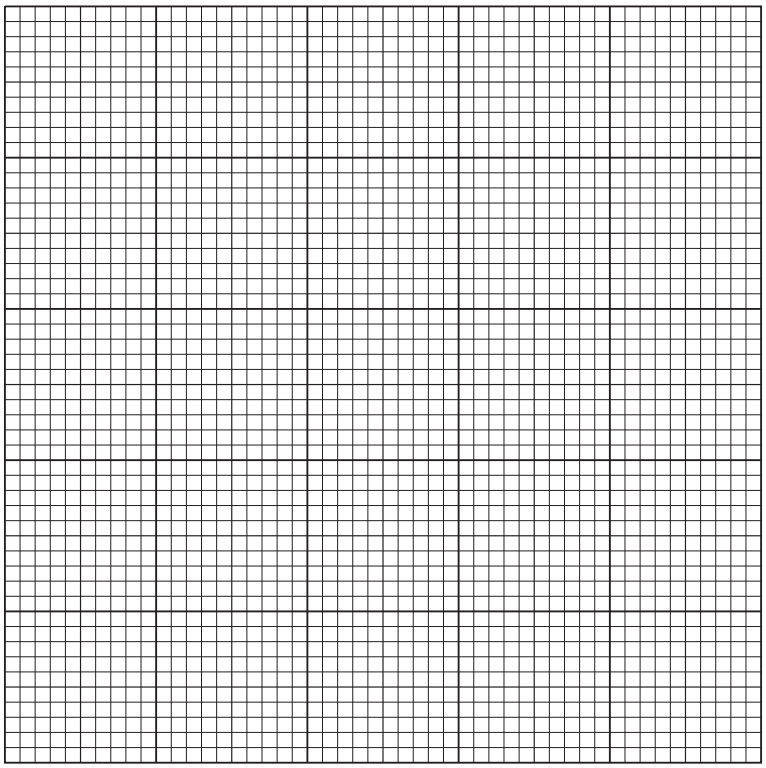
(i) Plot the data to show the effect of the mass of lead nitrate on leaf area.



[4]

(ii) Describe the pattern shown on the graph.

.....

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.....

.....[2]

(iii) This experiment would be difficult to repeat as the method instructions 3, 4 and 5 do not give necessary details. Describe one further detail that should have been included for each of these instructions.

instruction 3.....

.....

instruction 4.....

.....

instruction 5.....

.....

[3]

(iv) Suggest **two** different experiments to find out more about the effect of lead on plant growth.

1 .....

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2 .....

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[2]

(d) Suggest why many countries have laws that aim to control the release of lead from fuels into the atmosphere.

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.....[3]

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