Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2213048440

ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 Management in context **May/June 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
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.

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 **21** printed pages and **3** blank pages.

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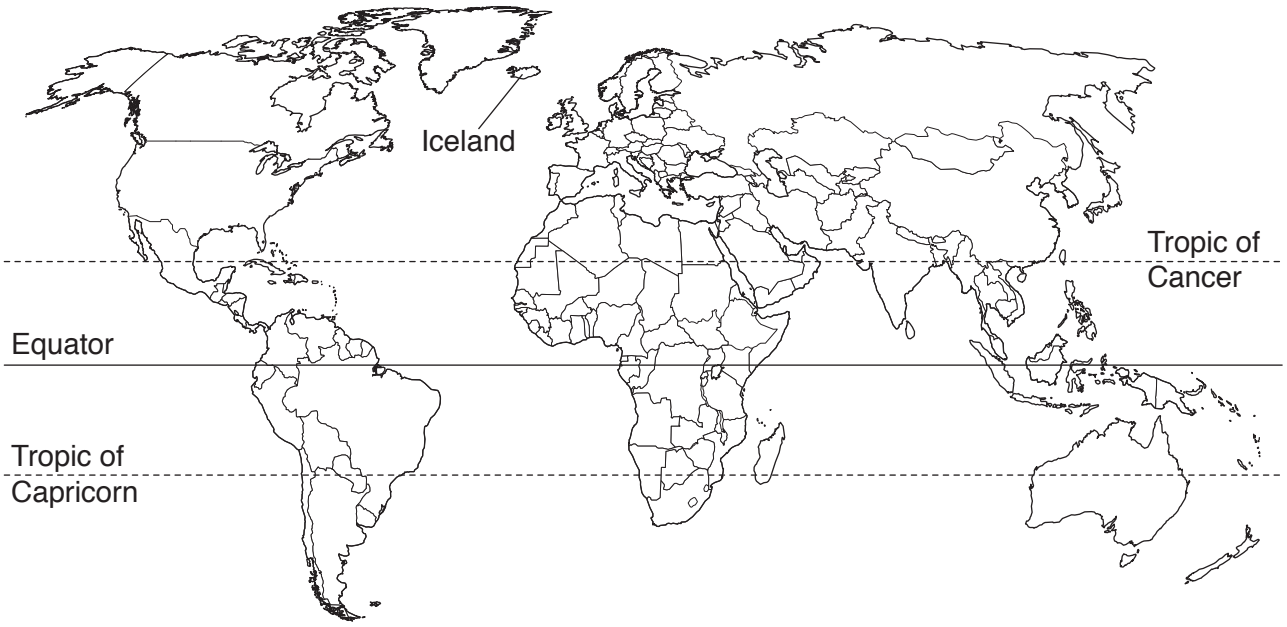
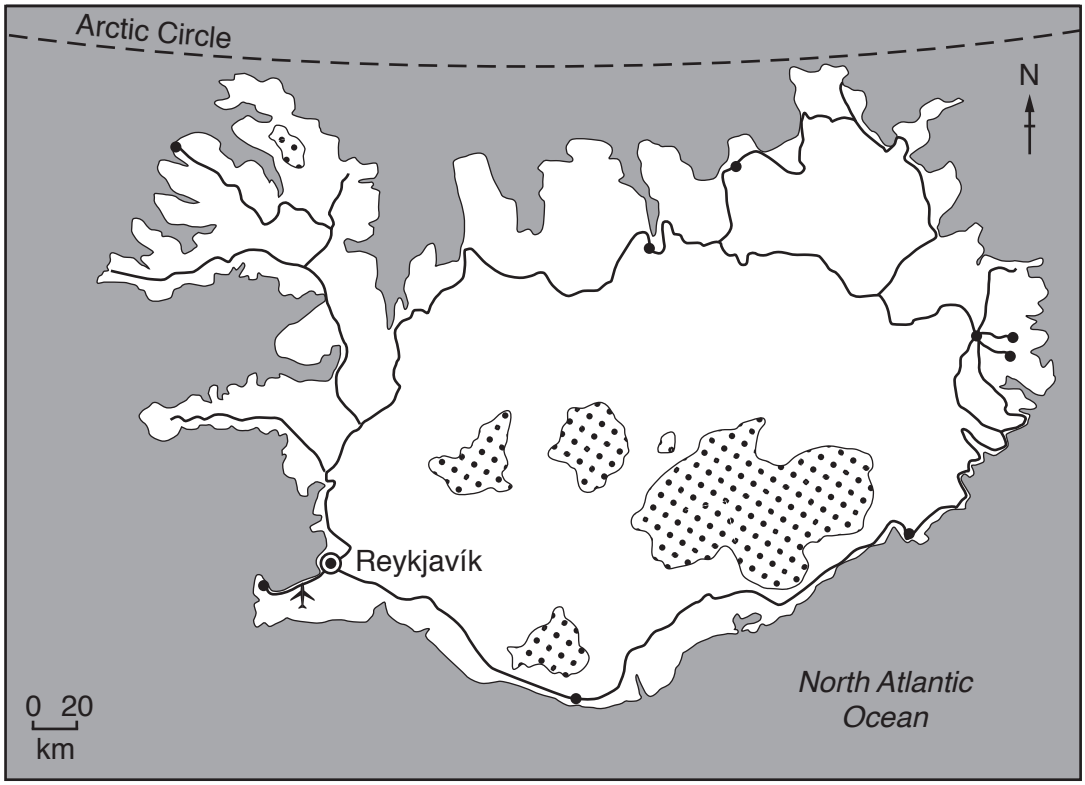
Cambridge Assessment International Education

world map showing the location of Iceland



map of Iceland



Key

- capital city
- town
- road
- airport
- glacier

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Area of Iceland: 103 000 km^2

Population: 335 878 (in 2017)

Children per woman: 2.01

Life expectancy: 83 years

Currency: Icelandic Krona (108.45 ISK = 1 USD)

Language: Icelandic

Climate of Iceland: temperate, moderated by North Atlantic current, cold, windy winters; damp, cool summers

Terrain of Iceland: mostly volcanic plateau with some mountain peaks, volcanoes, glaciers, coastal bays

Main exports of Iceland: fish and fish products, aluminium and ferrosilicon

Iceland is an island in the North Atlantic Ocean. 80% of the island is uninhabited. Half of the population are located in the capital city, with smaller towns along the coast. The economy depends heavily on fishing. Since 2010, tourism has become the main economic growth area for the island, with the number of tourists each year reaching 4.5 times the Icelandic population. The island makes use of geothermal and hydro-electric power, which are available in large quantities.

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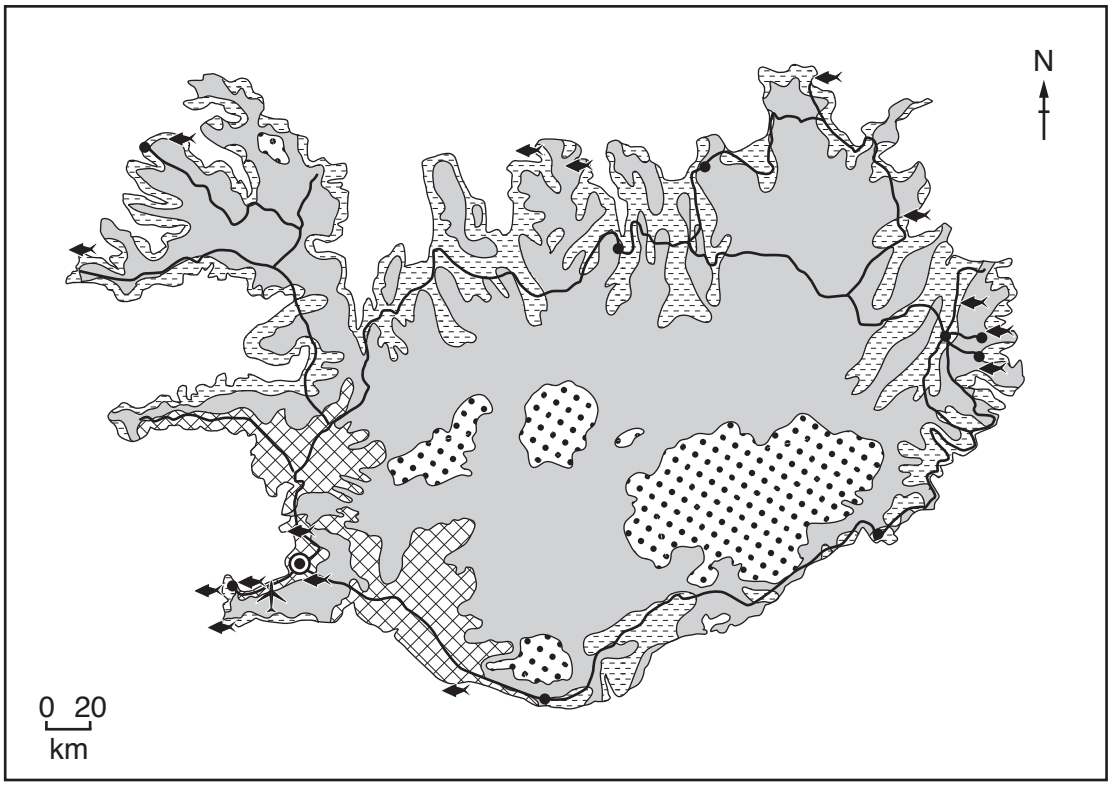
[Turn over

1 **(a)** The map shows how some of the land in Iceland is used.



Key

land use

- arable agriculture
- pastoral agriculture
- permanent ice and snow
- unused land
- fishing port and processing centre
- capital city
- town
- road
- airport

(i) Use the map to suggest reasons why 80% of the island is uninhabited.

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..... [3]

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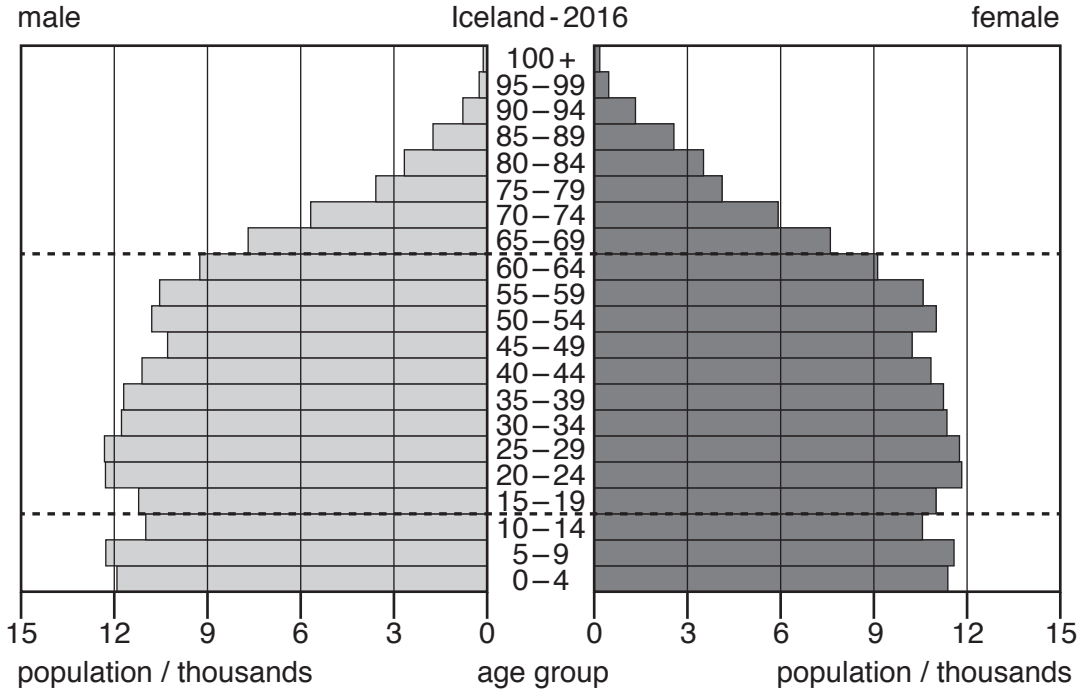
(ii) Estimate the population of the capital city of Iceland.

..... [1]

(iii) The diagram shows the population pyramid for Iceland in 2016.



Describe the age distribution of Iceland's population in 2016.

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..... [3]

(iv) The population of Iceland is expected to increase. Migration into the country is one reason for this.

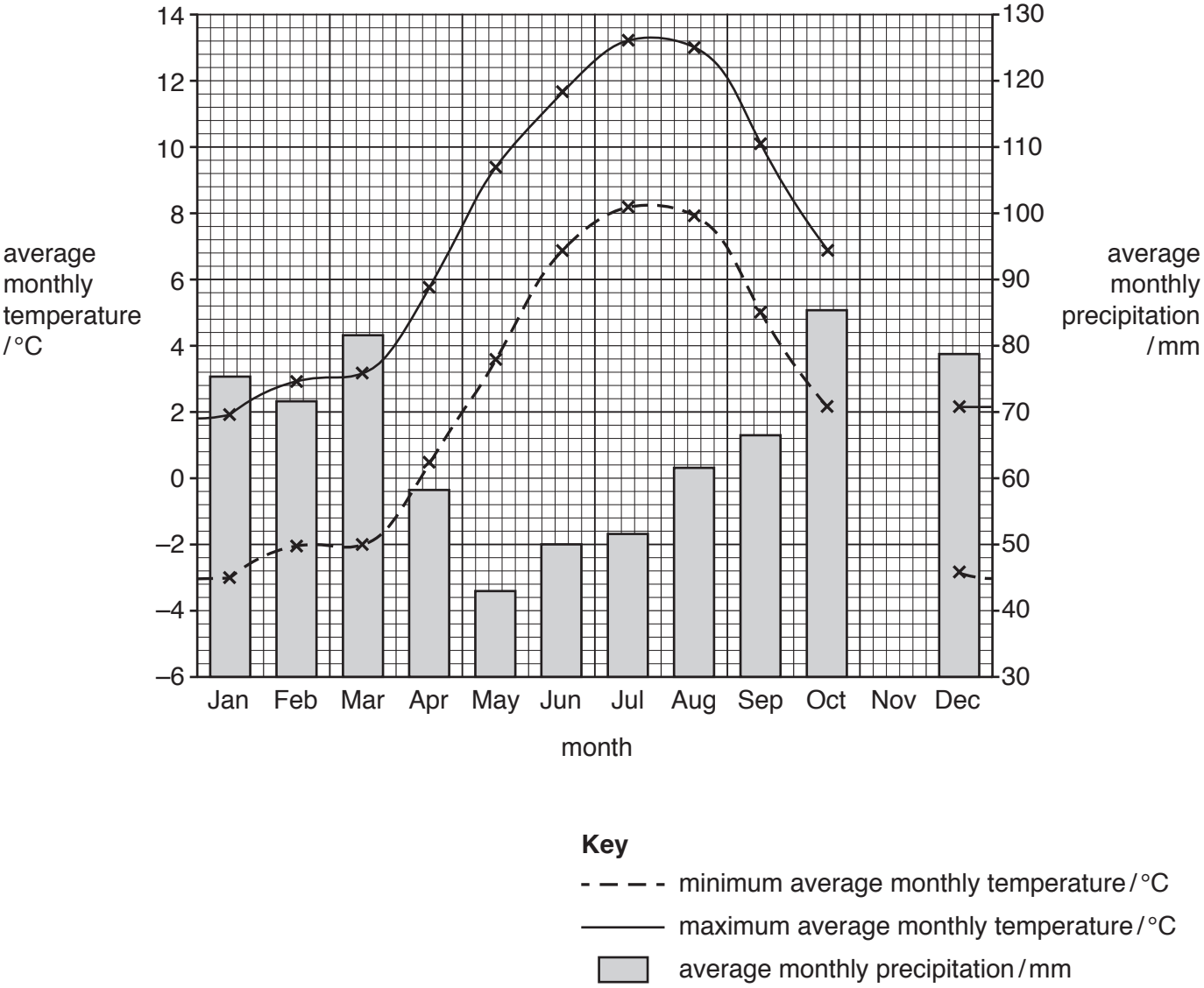
State **two** factors affecting migration.

1 .....

2 .....

[2]

(b) The graph shows climate data for a weather station near the capital city of Iceland.



(i) The table shows the climate data for November.

month	**average monthly minimum temperature / °C**	**average monthly maximum temperature / °C**	**average monthly precipitation / mm**
November	–1.2	3.4	72

Complete the graph using the climate data for November. [2]

(ii) Using information from the graph, explain why there is limited crop production in Iceland.

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..... [3]

(c) Iceland imports a large number of bananas each year.

It is possible to grow bananas in greenhouses in Iceland. The greenhouses need artificial lighting because there are only 5 hours of daylight during the winter months. It takes 1.5 to 2 years to produce a crop from each banana plant in Iceland compared with a few months in tropical countries.

(i) Suggest reasons why Iceland does **not** export bananas to other countries to sell.

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..... [3]

(ii) A controlled environment, such as a greenhouse, is one way to increase agricultural yields.

Describe **two** other techniques to improve agricultural yields.

1 .....

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2 .....

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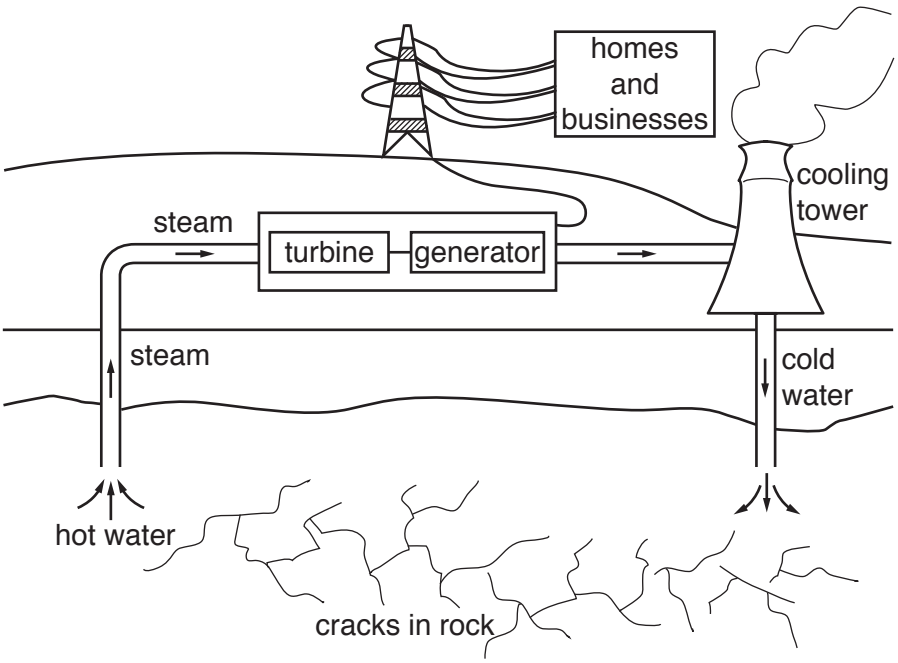
[2]

(d) Geothermal power is used to heat greenhouses and to generate electricity in Iceland.

The diagram shows how geothermally heated ground water is used to generate electricity.



(i) Use the diagram to describe how geothermally heated ground water is used to generate electricity.

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..... [4]

(ii) Geothermal power is a renewable energy resource.

State **one** other renewable energy resource.

..... [1]

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(iii) 'Using geothermal power for electricity generation is less harmful to the environment than using fossil fuels.'

To what extent do you agree with this statement? Give reasons for your answer.

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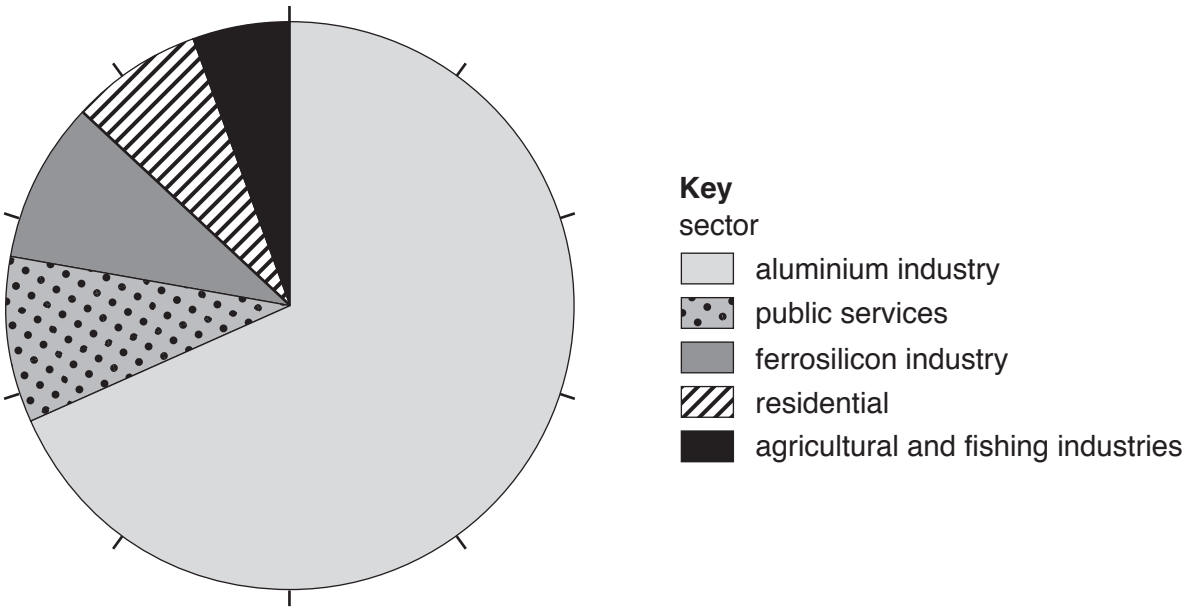
..... [4]

(e) The pie chart shows the percentage electricity consumption for different sectors in Iceland for 2013.



(i) Determine the total percentage electricity consumption for all the sectors of industry in Iceland.

.....% [1]

(ii) The agricultural and fishing industries have the lowest percentage electricity consumption for the industry sector.

Suggest reasons why this information cannot be used to predict the economic importance of these two industries.

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..... [2]

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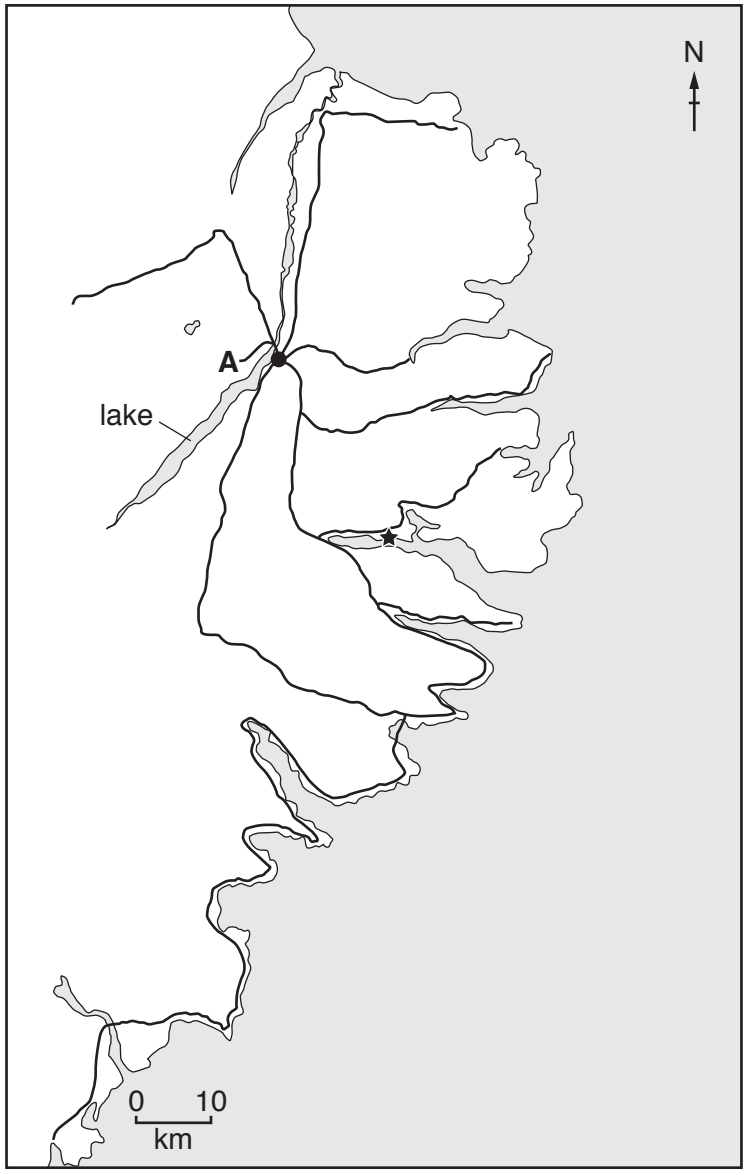
(f) A company wants to expand the aluminium industry in Iceland by building a new aluminium smelter. The smelter requires a large supply of fresh water and electricity.

The map shows a proposed location, **A**, for the smelter near the east coast of Iceland.



Key

road

★ port

A proposed location of the smelter

● town

(i) Estimate the distance by road from the port to the proposed location of the smelter.

..... km [1]

(ii) Suggest how the new smelter could be supplied with the fresh water it needs.

.....

..... [1]

(iii) Explain why an environmental impact assessment is needed before the smelter can be built.

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..... [2]

(iv) The company decided to use a questionnaire to find out people's views on expanding the aluminium industry.

Part of the questionnaire is shown.

	percentage response		
	yes	**no**	**do not know**
1. Would you like more employment opportunities in Iceland?	63	23	14
2. Are you in favour of Iceland becoming a wealthier country?	75	15	10
3. Do you think Iceland should rely mainly on fishing and tourism for its economy?	36	52	12

The company used information from the questionnaire to conclude that people did not object to expanding the aluminium industry in Iceland.

Do you agree with their conclusion? Give reasons for your answer.

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..... [2]

(v) The company selected people who work in the aluminium industry in Iceland to complete the questionnaire.

Suggest **two** limitations of this sampling method.

1 .....

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2 .....

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[2]

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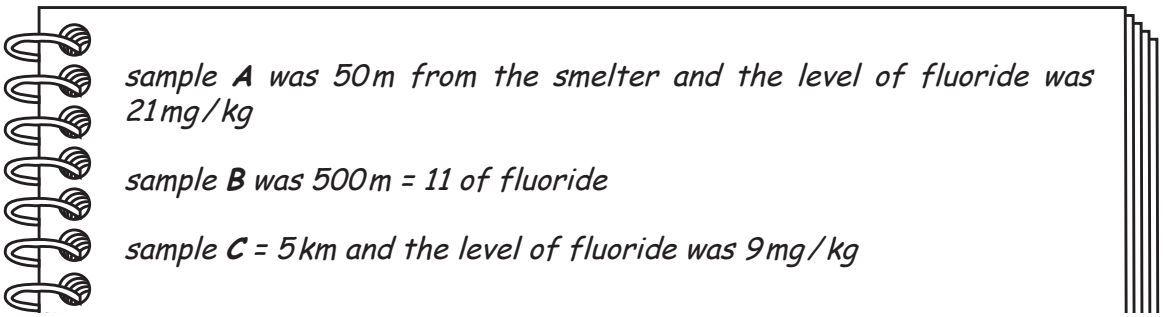
(g) Fluorides are gaseous chemicals produced during the smelting of aluminium.

A cattle farmer living near an aluminium smelter is concerned about the level of fluorides in the crops that the cattle eat.

The farmer tests samples of the crops at different distances from the aluminium smelter.

The farmer records the results in a notebook.



(i) Present the results in a suitable table.

[3]

(ii) The permitted safe level of fluorides in crops for cattle is 30 mg / kg.

Is the farmer right to be concerned about the level of fluorides in the crops? Give a reason for your answer.

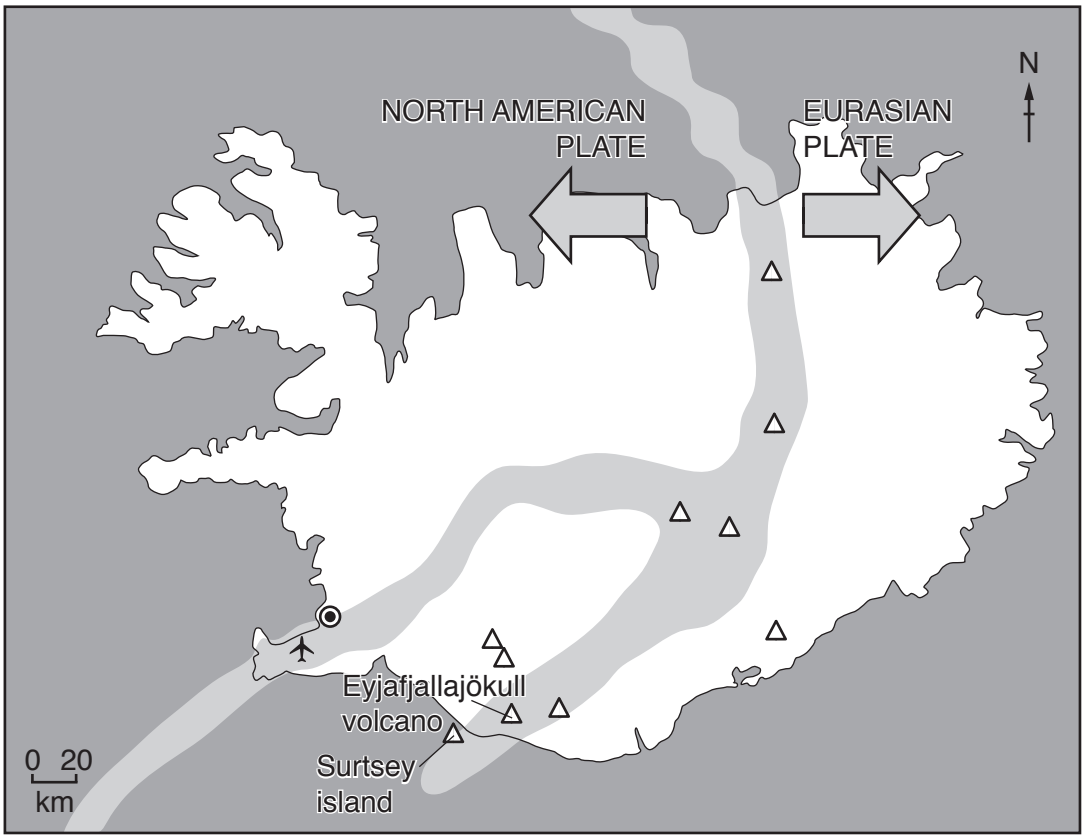
.....

..... [1]

[Total: 43]

2 **(a)** Iceland is situated on the Mid-Atlantic Ridge plate boundary. The two plates, the North American plate and the Eurasian plate, are slowly moving apart. This means Iceland becomes bigger every year, as the plates move apart and magma fills the middle of the island.

The map shows the plates, the Mid-Atlantic Ridge and the location of Iceland's major volcanoes.



Key

- capital city
- airport
- major volcano
- Mid-Atlantic Ridge

(i) Mark with an **X** on the map where the youngest rocks are located on Iceland. [1]

(ii) State the type of plate boundary that occurs in Iceland.

..... [1]

(iii) Use the map to describe the distribution of major volcanoes in Iceland.

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..... [2]

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(b) Surtsey island is an island nature reserve off the southern coast of Iceland.

The island and coastline are protected from the impact of humans by a marine buffer zone. No one is allowed onto the island and boats are not allowed to enter the marine buffer zone.

Suggest **two** reasons why the marine buffer zone might **not** be enough to protect Surtsey island from the impact of humans.

1 .....

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2 .....

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[2]

(c) In April 2010, Eyjafjallajökull volcano erupted in the south of Iceland. The eruption continued for 6 weeks.

A large ash cloud spread across Iceland, the Atlantic Ocean and the European mainland. The ash cloud disrupted air traffic all around the world and approximately 100 000 flights were cancelled.

The ash fall caused considerable damage to farmland used for crops and grazing animals.

The volcano is under a glacier and the eruption caused rapid melting of snow and ice. This resulted in flooding of river valleys, which also damaged farmland.

(i) Discuss how this volcanic eruption affected Iceland.

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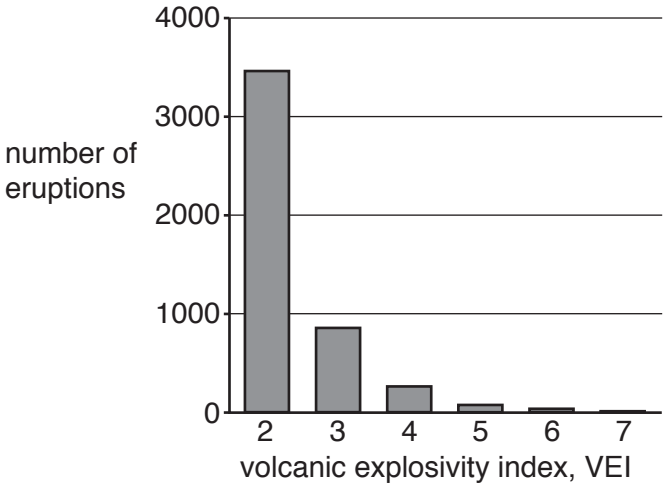
..... [4]

(ii) The volcanic explosivity index, VEI, is a measure of the explosiveness of volcanic eruptions. A VEI value of 0 is the least explosive and a VEI value of 8 is the most explosive.

The graph shows the VEI value for some eruptions around the world.



Describe what the graph shows about these volcanic eruptions.

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..... [2]

(iii) The table compares two volcanic eruptions, in 2010.

volcanic eruption	**A**	**B**
country	Indonesia	Iceland
location	Mount Merapi	Eyjafjallajökull
number of deaths	353	0
VEI value	4	4
economic status of country	LEDC	MEDC

Suggest reasons why the number of deaths from the Mount Merapi eruption was higher than the Eyjafjallajökull eruption.

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..... [4]

(iv) Suggest reasons why people live near active volcanoes, even though they know the volcano may erupt again.

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..... [3]

[Total: 19]

3 **(a)** There are very few trees or forests in Iceland as a result of deforestation.

(i) One impact of deforestation is climate change.

Explain how forests are involved in both carbon capture and carbon storage.

carbon capture .....

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carbon storage .....

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[2]

(ii) Deforestation may lead to soil erosion.

State **two** other human activities that can lead to soil erosion.

1 .....

2 .....

[2]

(iii) Describe the impacts of soil erosion.

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(b) The Alaskan lupine plant was introduced into Iceland in the 1960s.

The fact sheet shows some information about the Alaskan lupine plant.

Fact sheet about the Alaskan lupine plant

The Alaskan lupine plant grows well in Iceland's cold climate.

It has a wide-spreading root structure. The Alaskan lupine plant puts nitrogen compounds back into the soil.

The Alaskan lupine is planted in areas where soil erosion has occurred.

It is used by some people for making a herbal drink to use as medicine.

The Alaskan lupine plant grows 40 to 60 cm high and has a spread of 25 to 30 cm wide. The tall lupines create a shady canopy over shorter native plants (plants that grow naturally in Iceland).

The Alaskan lupine plant has a bitter taste compared to many native plants and is not eaten by sheep and goats. They prefer to graze on the sweeter tasting native plants.

Explain the benefits and possible negative impacts of introducing the Alaskan lupine plant to Iceland.

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..... [4]

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(c) (i) A student wants to estimate the population of Alaskan lupine plants in a field.

The student has:

- a 50 m length of string
- small wooden markers
- a tape measure
- notebook and pencil.

Describe how the student could use this equipment to estimate the population of Alaskan lupine plants in the field.

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..... [3]

(ii) Abiotic factors affect the growth of Alaskan lupine plants.

State **two** abiotic factors the student could measure during the investigation.

1 .....

2 .....

[2]

(iii) Suggest how the student could estimate the **total** number of Alaskan lupine plants in Iceland.

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..... [2]

[Total: 18]

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