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ENVIRONMENTAL MANAGEMENT **0680/21**

Paper 2 Management in Context **October/November 2023**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

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world map showing the location of the United Kingdom (UK)



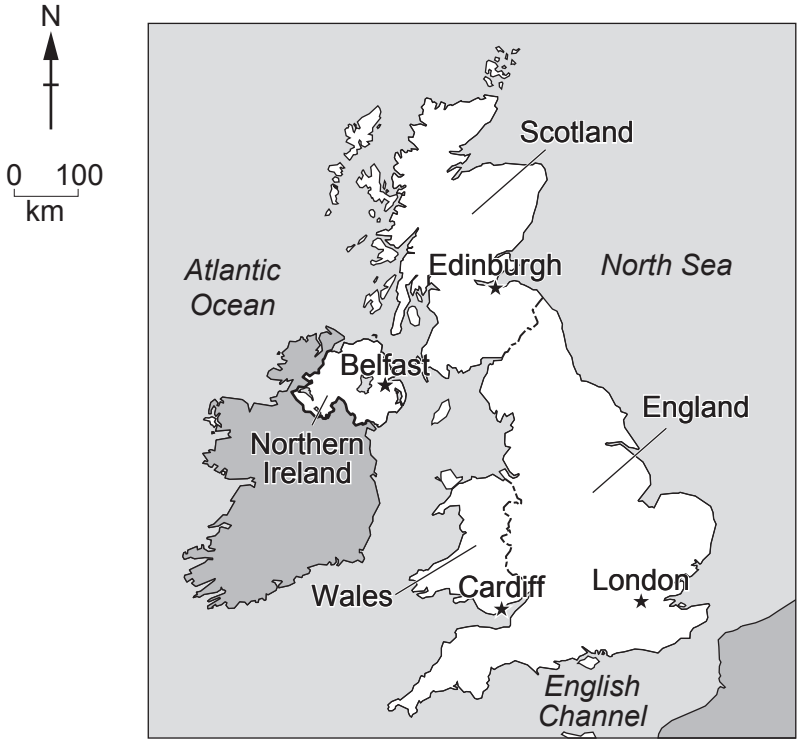
map of the United Kingdom (UK)

Key

★ capital city

national border

international border



Area of the UK: 243 610 km^2

Population of the UK: 66 million (in 2021)

Children per woman: 1.86 (in 2021)

Life expectancy: 81.3 years

Currency: GBP (1 GBP = 1.39 USD)

Language: English, regional languages

Climate of the UK: cool, wet winters and warm, wet summers; wetter in the west, colder in the north

Terrain of the UK: hills and mountains in the north and west with lower land around the coast and in the south and east of England

Main economic activities of the UK: financial and business services, food production, manufacturing and tourism

The United Kingdom consists of four countries: England, Scotland, Wales and Northern Ireland. The UK is one of the largest economies in Europe. 100% of the country's population have access to good sanitation and electricity supply. In recent years, air pollution has improved but remains a concern in cities. Marine and coastal habitats are under threat from housing, tourism and industry.

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[Turn over

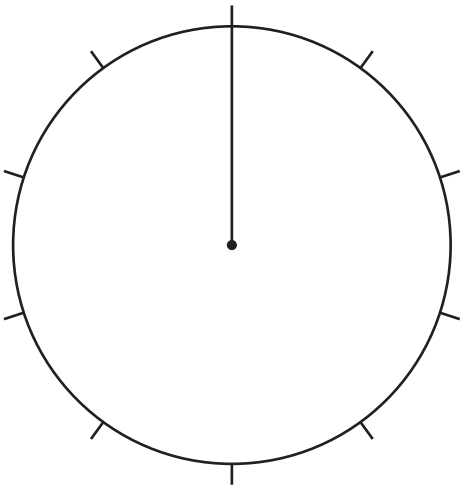
1 **(a)** The table shows the percentage of total land area for different types of land use in the UK.

land use	percentage of total land area of the UK
pasture	46
arable	25
forest	12
other	17

(i) Calculate the total area of land in the UK used for pasture and arable.

..... km^2 [2]

(ii) Plot the data in the table as a pie chart and complete the key.



Key

.....

.....

.....

.....

[4]

(b) Most farmers in the UK use intensive agricultural practices.

Approximately 2% of the working population are involved in agriculture.

Agricultural practices produce 60% of the UK's food needs.

(i) State **three** intensive agricultural practices.

1 .....

2 .....

3 .....

[3]

(ii) State the benefits and negative impacts of intensive agricultural practices.

benefits .....

.....

.....

.....

.....

negative impacts .....

.....

.....

.....

.....

[4]

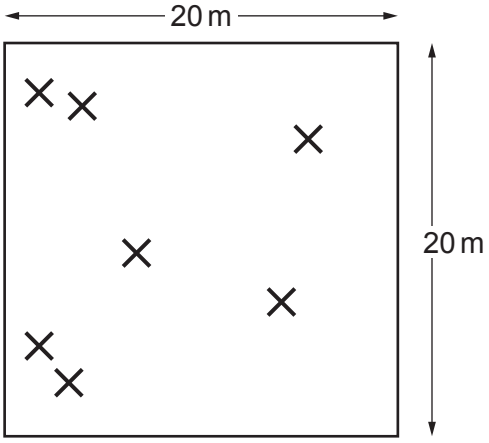
(c) A farmer is concerned about the mineral ion content of the soil in a field.

The farmer collects seven soil samples from the field.

The diagram shows the locations of the seven sampling points.

Key

× sampling point



State the type of sampling method shown in the diagram.

..... [1]

(d) The farmer uses this method to collect the seven soil samples:

- Record the weather conditions on the sampling day.
- Collect a 100 g soil sample.
- Pass the soil sample through a 2 mm sieve.
- Dry the soil sample.
- Put all seven soil samples into a large container and mix the samples together.
- Analyse the soil in the large container for mineral ion content.

(i) Suggest **one** reason why the soil samples are passed through a 2 mm sieve.

.....

..... [1]

(ii) The soil samples are dried to remove the water.

Suggest **one** reason why the water is removed.

.....

..... [1]

(iii) Suggest **one** reason why all seven soil samples are put into the same large container before being analysed.

.....

..... [1]

(e) The diagram shows the chart the farmer uses to analyse the soil sample result for nitrate ions.

nitrogen as nitrate ions mg / kg



(i) Describe the impact on the environment if a soil has a reading of 53 mg / kg for nitrate ions.

.....

.....

.....

.....

.....

..... [3]

(ii) State the impact on agricultural yields if a soil has a reading of 5 mg / kg for nitrate ions.

.....

..... [1]

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(f) The farmer writes a list of some of the components of soil.

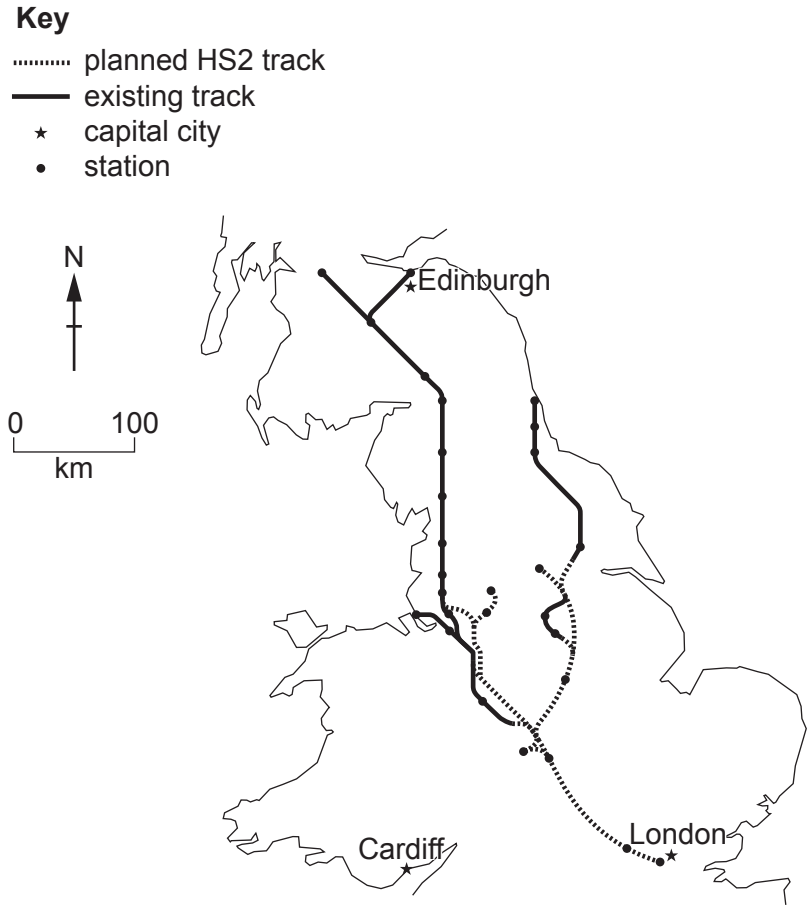
Add **three** other components of soil to the list.

- mineral particles
- mineral ions
- .....
- .....
- .....

[3]

[Total: 24]

2 The map shows the planned route of HS2. HS2 is a railway track for high-speed trains in the UK.



(a) High-speed trains will travel on 249 km of HS2 tracks.

The government of the UK expects this to reduce carbon emissions in the UK.

(i) Suggest other benefits of HS2 to people living in the UK.

.....

.....

.....

..... [2]

(ii) The government estimates that 90 000 new houses will be built near the HS2 stations.

One impact of this construction is loss of natural habitat.

Suggest **two** other impacts of building a large number of houses near the HS2 stations. Give a reason for each impact.

impact 1 .....

reason .....

.....

impact 2 .....

reason .....

.....
[4]

(b) The government estimates that travelling by HS2 will emit 17 times less carbon than travelling by aircraft and seven times less carbon than travelling by car.

Explain why emitting less carbon is important.

.....

.....

.....

.....

.....

..... [3]

(c) Scientists are concerned that 108 mature forests are under threat due to the construction of HS2.

Explain how trees help to reduce carbon emissions.

.....

.....

.....

..... [2]

(d) The HS2 company must make a 'green corridor' next to the track.

The green corridor replaces old habitats destroyed during construction with new habitats that are linked together.

Suggest why the green corridor must be made **before** construction of the track begins.

.....

..... [1]

(e) Japanese knotweed is an invasive plant species. This means it is **not** native to the UK and does not grow naturally in the UK.

(i) Suggest **one** reason why Japanese knotweed is removed from the green corridor.

.....

..... [1]

(ii) Suggest **one** reason why vehicles in an area with Japanese knotweed must be washed before leaving the area.

.....

..... [1]

[Total: 14]

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3 The factsheet gives information about the Bechstein bat.

The Bechstein bat



The Bechstein bat is very rare in the UK and has a population of only 21 000.

Bats are nocturnal, which means they are active at night. The Bechstein bat hunts and eats small flying insects.

The Bechstein bat hibernates during the winter months. Hibernation is a state of very little activity, similar to sleep. The Bechstein bat uses hibernation to conserve energy and survive the cold weather conditions and lack of food in winter.

(a) Suggest **one** reason why some people are concerned that the construction of houses in the UK may cause some Bechstein bats to die from starvation.

.....

..... [1]

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(b) Bat population surveys often include information from local people.

A form is used to collect the information about different bat species.

name:	
date of survey:	survey location:
species of bat:	type of sighting: in flight / roost / swarming / bat box

Key

in flight	bat observed in flight
roost	bat observed emerging from a roost (resting place), such as a building or tree
swarming	large number of bats observed in flight
bat box	bat observed emerging from an artificial nest

(i) Suggest a reason why the survey should be carried out between sunset and sunrise.

.....

..... [1]

(ii) Suggest a reason why this type of survey can result in an overestimate of the bat population.

.....

..... [1]

(iii) Suggest **four** benefits of asking **local people** to complete bat population surveys.

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

[4]

(c) The table shows temperature data for one year from an area of the UK where the Bechstein bat lives.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
monthly temperature /°C	**max**	6	6	8	12	15	18	21	20	18	14	9	7
	min	1	1	2	4	7	10	12	12	10	7	4	3

(i) Determine the temperature range for this area.

..... °C [1]

(ii) The Bechstein bat hibernates from the beginning of November to the end of May.

Calculate the average **maximum** (max) temperature during this hibernation period.

..... °C [1]

(iii) Suggest a reason why climate change could shorten the length of time that Bechstein bats hibernate.

.....

..... [1]

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(d) A food chain for the Bechstein bat is shown.

evening primrose plant → white ermine moth → Bechstein bat → tawny owl bird

(i) State the name of the primary consumer in this food chain.

..... [1]

(ii) Suggest the short-term impact of a reduction in Bechstein bat numbers on the tawny owl bird.

Give a reason for your answer.

impact .....

reason .....
[1]

(e) Some species of bat are good pollinators.

State **two** other ways pollination can occur.

1 .....

2 .....
[2]

(f) Bioaccumulation of toxic substances can affect Bechstein bats.

Explain what is meant by bioaccumulation.

.....

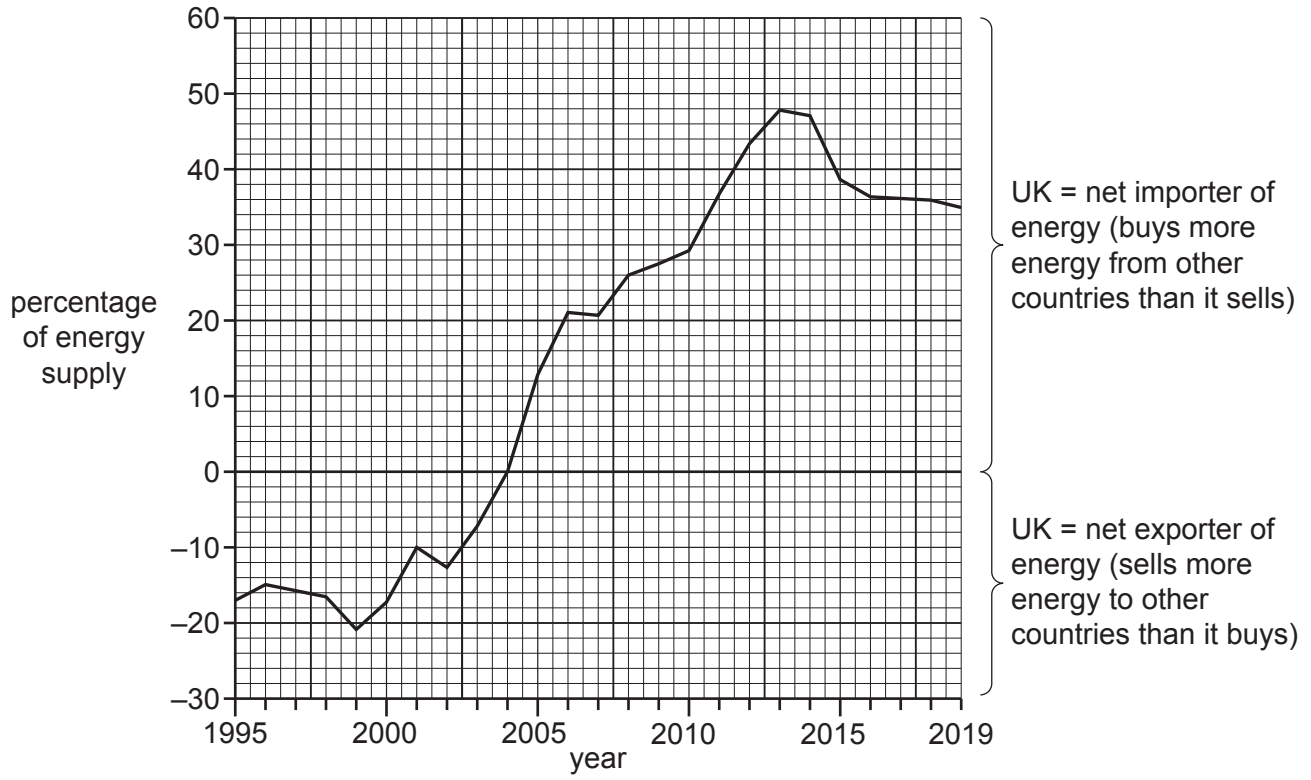
.....

.....

..... [2]

[Total: 16]

4 **(a)** The graph shows the net percentage of energy supply that was imported and exported from 1995 to 2019 for the UK.



(i) State the year that the UK became a net importer of energy.

..... [1]

(ii) Suggest **two** reasons why a country is a net importer of energy.

1 .....

.....

2 .....

.....

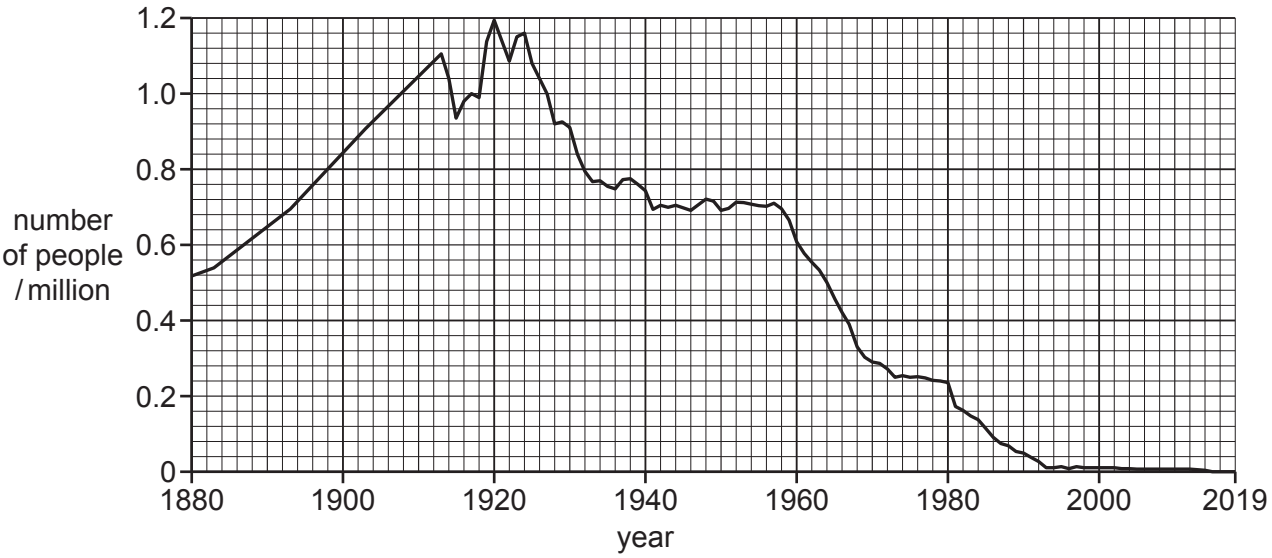
[2]

(iii) Suggest **one** limitation for a country being a net importer of energy.

.....

..... [1]

(b) The graph shows the total number of people employed in the coal industry in the UK from 1880 to 2019.



(i) Describe the trends shown by the data in the graph.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest reasons for the trends shown by the data.

.....

.....

.....

..... [2]

(c) Shale rock is a sedimentary rock found in the UK.

The processes involved in the formation of sedimentary rock are shown.

cementation **compaction** **deposition** **sedimentation** **transport**

Put the processes in the correct order for the formation of sedimentary rock.

One has been completed for you.

……..	**deposition**	……..	……..	…….

[3]

(d) Fracking is a method used to extract gas or oil from shale rock in some countries.

Questionnaires are used to ask local people for their opinions on fracking.

(i) State why a pilot questionnaire is carried out before the main questionnaire.

.....

..... [1]

(ii) Suggest why fracking might go ahead even if local people are against the idea.

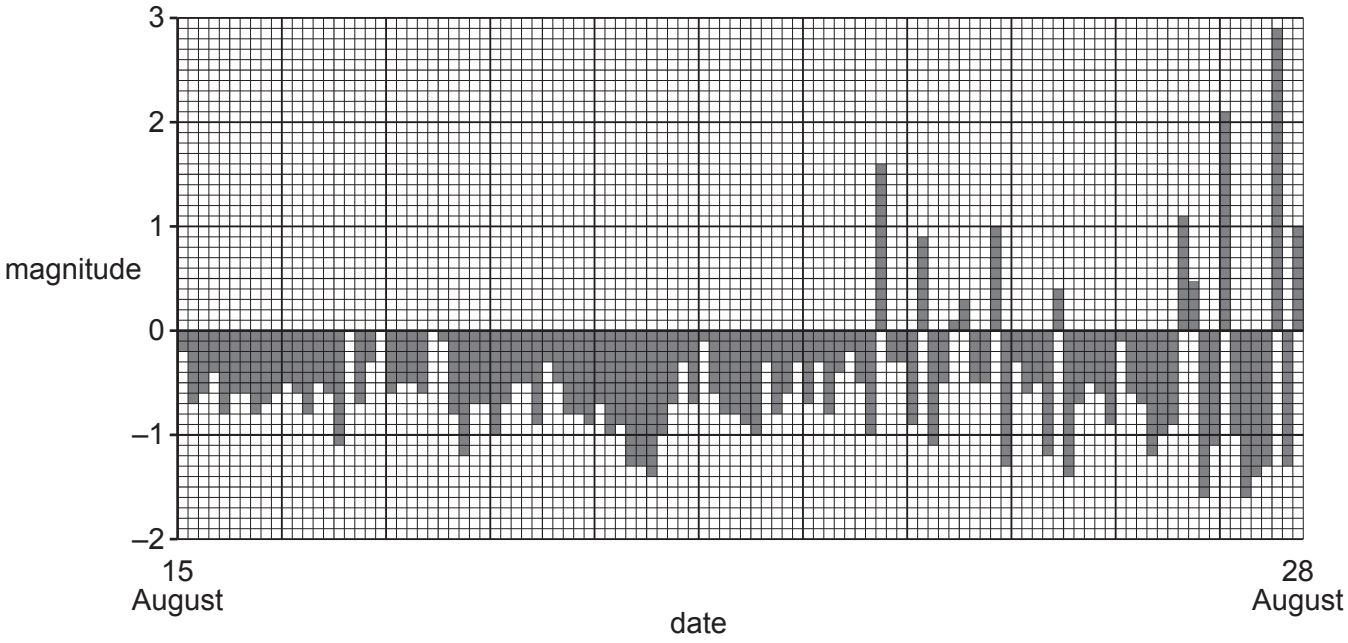
.....

..... [1]

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(e) Fracking is thought to cause earthquakes. Earthquake activity at fracking locations is monitored.

The graph shows the magnitude of earthquake activity during a two-week period in August 2019 at one fracking location in the UK.



(i) In 2019, the UK government required fracking to stop for 18 hours if earthquake activity above 0.5 magnitude was recorded.

State the number of earthquake events that required fracking to stop during the two-week period.

..... [1]

(ii) Earthquake events above 2.0 can be felt on the Earth's surface.

State the number of earthquake events that were felt on the Earth's surface during the two-week period.

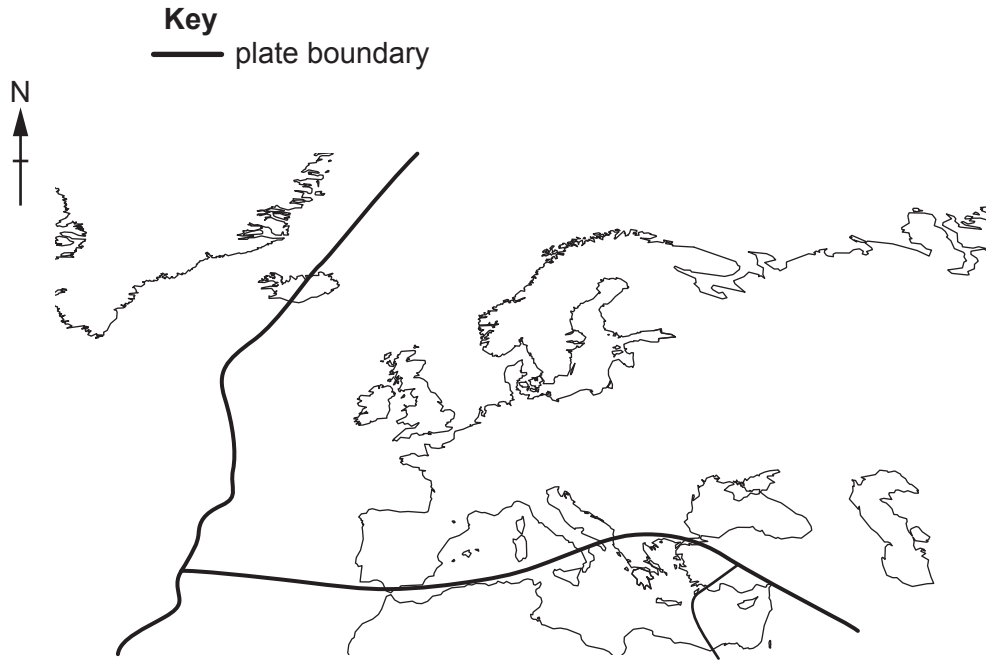
..... [1]

(iii) Suggest **one** reason why the UK government decided to stop fracking in November 2019.

.....

..... [1]

(f) The map shows the location of major plate boundaries around the UK.



(i) Use the map to explain why earthquakes have only caused three deaths in the UK in the last 100 years.

.....

..... [1]

(ii) Disaster preparation helps to prevent deaths during a natural hazard.

State **three** ways to prepare for a natural hazard to help prevent deaths.

1 .....

2 .....

3 .....

[3]

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(g) Some parts of the UK experience regular flooding.

(i) State **three** causes of flooding.

1 .....

2 .....

3 .....

[3]

(ii) Explain how flooding can benefit farmers.

.....

.....

.....

..... [2]

[Total: 26]

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