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ENVIRONMENTAL MANAGEMENT **0680/02**

Paper 2 Environmental Management in Context **For examination from 2027**

SPECIMEN PAPER **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. Do **not** use correction fluid or tape.
- 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 **18** pages. Any blank pages are indicated.

[Turn over

1 **(a)** Figure 1.1 shows data collected at a farm in Finland.

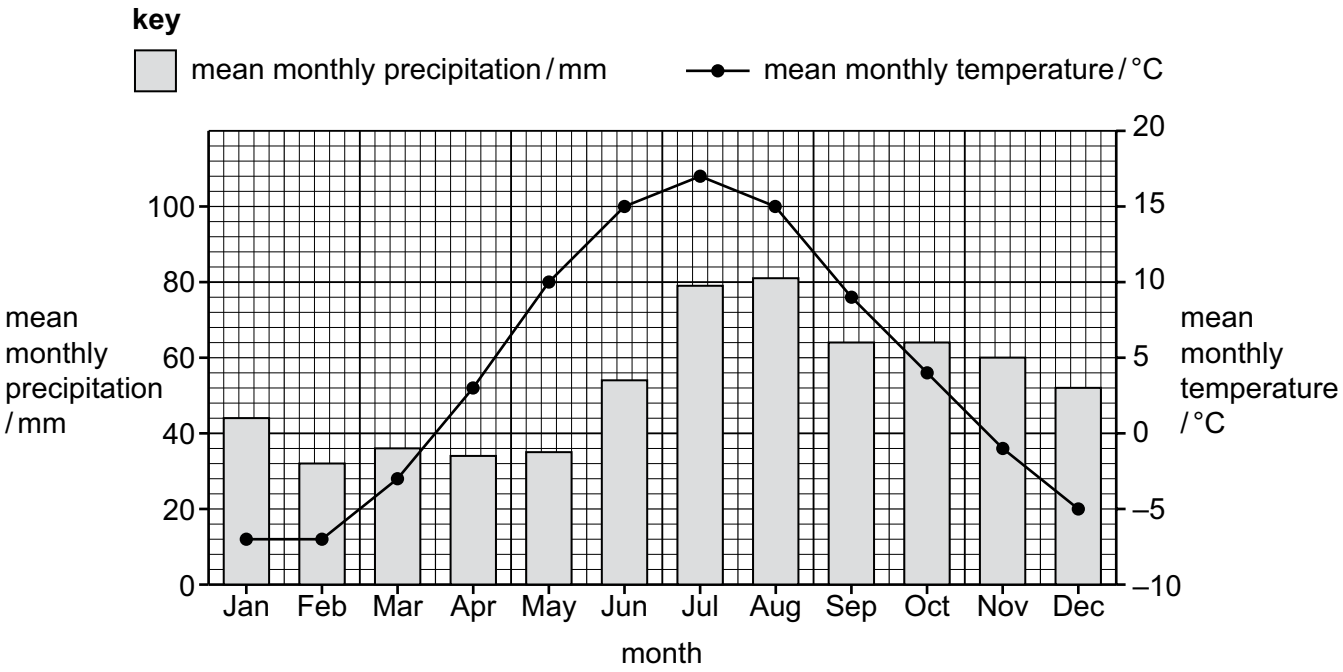


Figure 1.1

(i) Identify the month with the highest mean monthly precipitation.

..... [1]

(ii) State the number of months with a mean monthly precipitation less than 60 mm.

..... [1]

(iii) Calculate the annual temperature range for this farm.

..... °C [2]

(iv) Sorghum is a crop plant. Sorghum needs a growing season of four months.

Sorghum seeds need a minimum temperature of 12 °C to start to grow.

Sorghum plants need a minimum temperature of 15 °C to grow into a crop that can be harvested.

Suggest why sorghum is **not** a suitable crop to grow on the farm in Finland.

Use Figure 1.1 to support your answer.

.....

.....

.....

..... [2]

(v) A student uses the data in Figure 1.1 to make two conclusions:

- February is always the wettest month in Finland.
- The temperature in October is always higher than the temperature in November in Finland.

Suggest **two** limitations of these conclusions.

Explain these limitations.

limitation 1 .....

explanation 1 .....

.....

limitation 2 .....

explanation 2 .....

.....

[4]

(b) The farmer reports that soil erosion has reduced crop yield.

(i) State **three** other impacts of soil erosion.

1 .....

2 .....

3 .....

[3]

(ii) The farmer builds bunds to reduce soil erosion.

Explain how bunds reduce soil erosion.

.....

.....

.....

..... [2]

[Total: 15]

2 Figure 2.1 shows a giant African land snail.

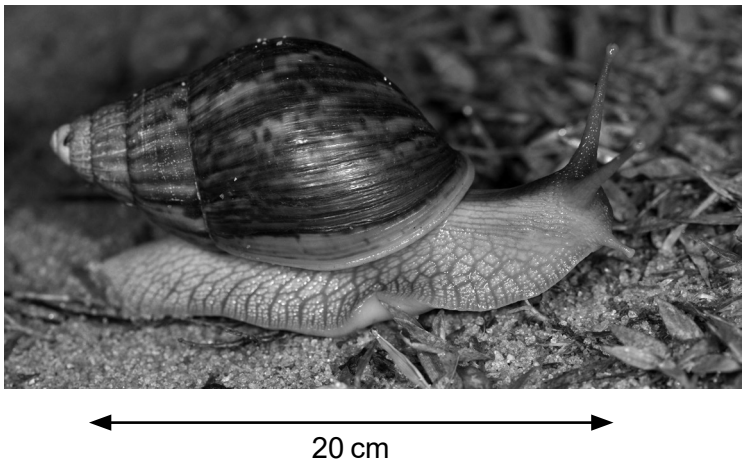


Figure 2.1

Giant African land snails eat plants.

In 2022, two populations of giant African land snails were found in the state of Florida, USA.

Figure 2.2 shows the location of these two populations.

key

- population of giant African land snails

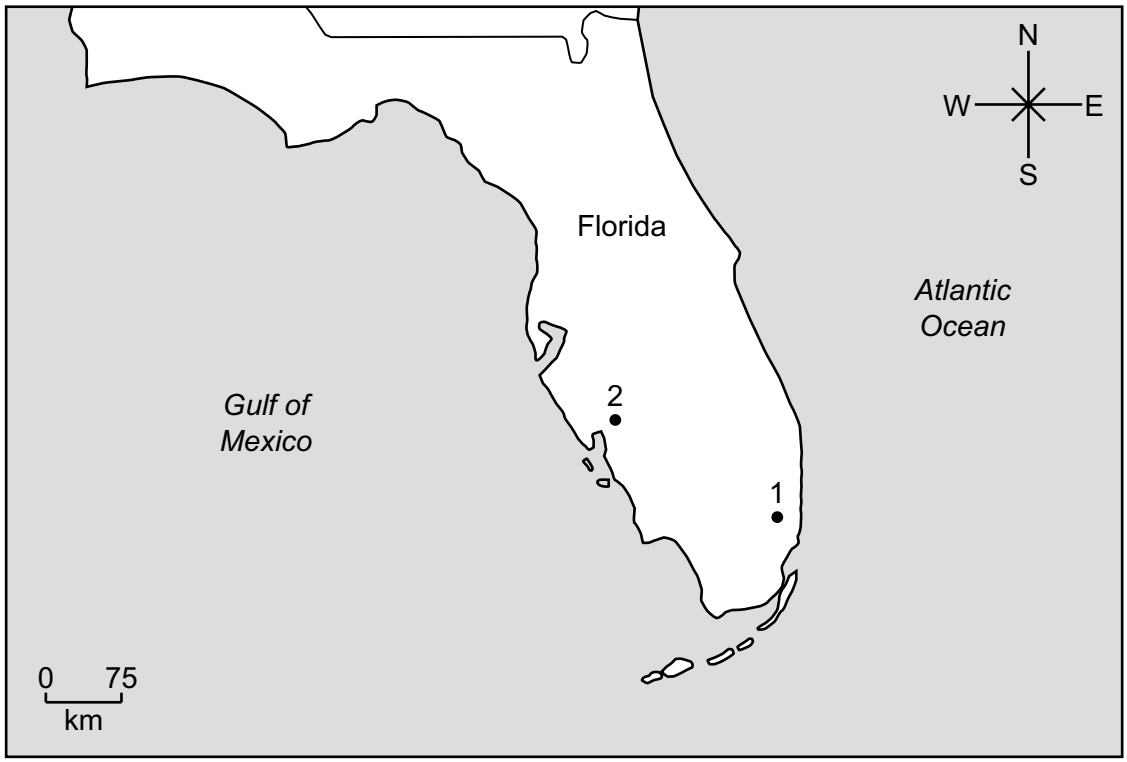


Figure 2.2

(a) (i) Use Figure 2.2 to calculate the distance between the two populations.

Show your working.

..... km [2]

(ii) Give the direction of population 2 from population 1.

..... [1]

(b) A scientist wants to use a random sampling strategy to estimate the population of giant African land snails in Florida.

Describe a random sampling strategy to estimate the population of giant African land snails in Florida.

In your answer include a method to:

- select the area to sample
- collect and record your data
- estimate the population of giant African land snails in Florida.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(c) The scientist also uses a systematic sampling strategy to estimate the population of giant African land snails.

Suggest benefits and limitations of using a systematic sampling strategy to estimate the population of giant African land snails in Florida.

benefits .....

.....

.....

.....

limitations .....

.....

.....

.....

[3]

(d) Giant African land snails are an invasive species in Florida.

Suggest **two** other reasons why scientists are concerned about the populations of giant African land snails in Florida.

1 .....

.....

2 .....

.....

[2]

[Total: 13]

3 A scientist investigates soils.

(a) Figure 3.1 shows the composition of a soil.

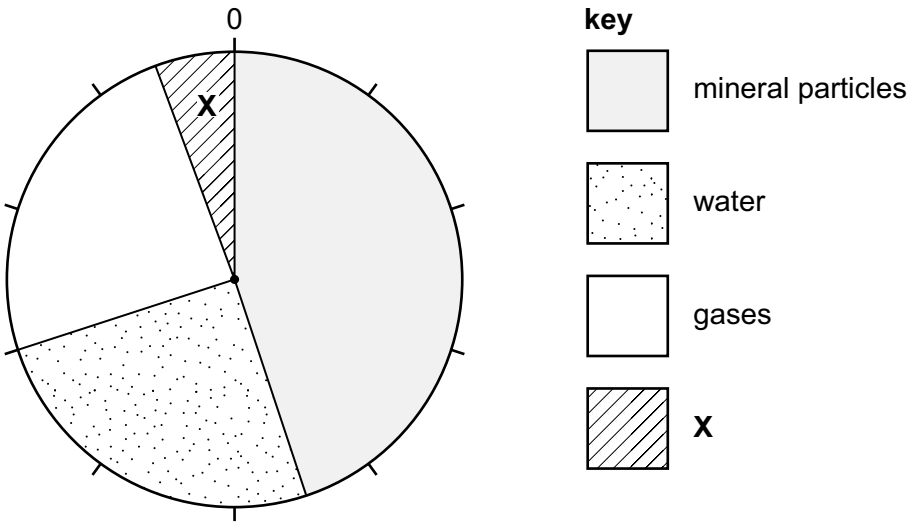


Figure 3.1

(i) Identify the component of the soil labelled **X**.

..... [1]

(ii) Determine the percentage of the soil that is mineral particles.

.....% [1]

(iii) Calculate the percentage of the soil that is pore space.

.....% [1]

(iv) Explain why the gas content of a soil is important for plant growth.

.....

.....

.....

.....

.....

..... [3]

(b) The scientist investigates the effect of three different fertilisers on the crop yield of maize plants.

Table 3.1 shows the results of the investigation.

Table 3.1

fertiliser used	formula for ion	days until harvest	crop yield / thousand kg per Ha
nitrate	.....	94	31
phosphate	.....	98	28
potassium	K^+	95	25
control		96	18

(i) Complete Table 3.1. [2]

(ii) The investigation uses a control. The control is pure water.

Suggest why a control is used in this investigation.

.....

..... [1]

(iii) The scientist concludes:

'Adding fertiliser to maize crops decreases the number of days until harvest.'

Explain **one** way the data:

supports the conclusion .....

.....

.....

does **not** support the conclusion .....

.....

.....

[2]

(iv) Give **one** conclusion about the effect of fertilisers on the crop yield of maize.

Justify your conclusion.

conclusion .....

.....

justification .....

.....

.....

[2]

(v) State the independent variable in this investigation.

..... [1]

(vi) State **one** dependent variable in this investigation.

..... [1]

(vii) State **two** control variables in this investigation.

1 .....

.....

2 .....

.....

[2]

(c) Figure 3.2 shows lettuce plants surrounded by a layer of mulch.

Figure 3.2

Describe **four** ways that mulch increases crop yield.

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

[4]

[Total: 21]

4 **(a)** Iceland is situated on the Mid-Atlantic Ridge plate boundary.

Figure 4.1 shows the plates, the Mid-Atlantic Ridge and the location of Iceland's major volcanoes.

key

- capital city
- plate movement
- major volcano
- Mid-Atlantic Ridge

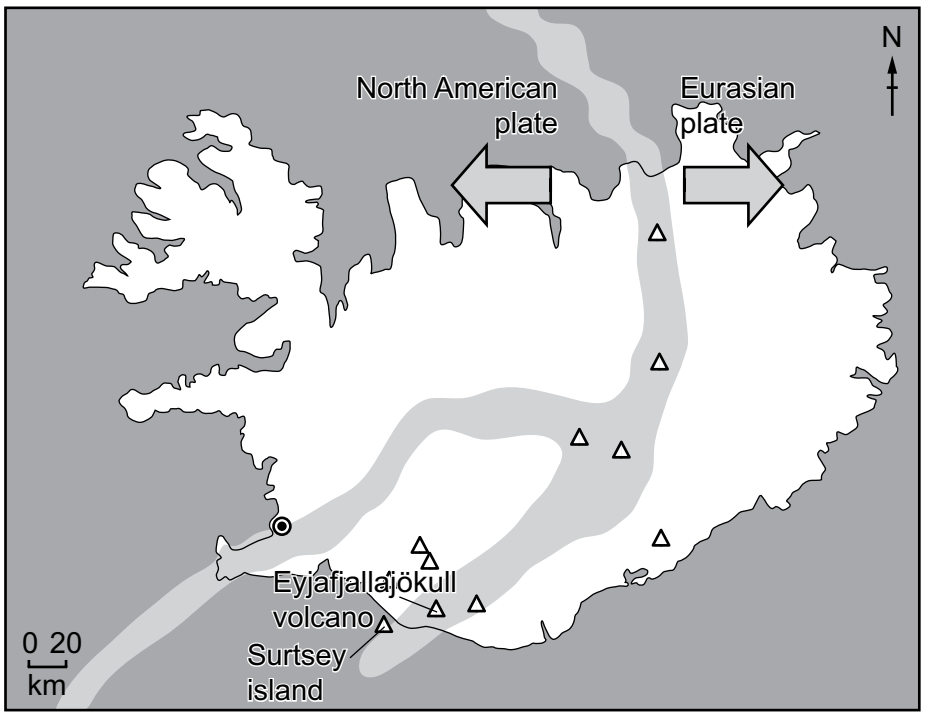


Figure 4.1

(i) On Figure 4.1, write an **X** to show where the youngest rocks are located on Iceland. [1]

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

..... [1]

(iii) Use Figure 4.1 to describe the distribution of major volcanoes in Iceland.

.....

.....

.....

.....

.....

..... [3]

(b) 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.

Figure 4.2 shows the VEI value for some eruptions around the world.

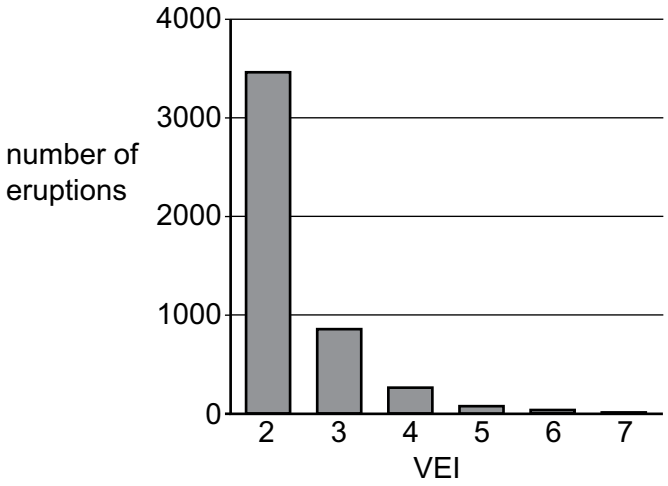


Figure 4.2

(i) Describe what Figure 4.2 shows about these volcanic eruptions.

.....

.....

.....

..... [2]

(ii) Table 4.1 compares two volcanic eruptions, **A** and **B**, in 2010.

Table 4.1

volcanic eruption	A	B
country	Iceland	Indonesia
location	Eyjafjallajökull	Mount Merapi
number of deaths	0	353
VEI value	4	4
world bank classification of country	HIC	MIC

Suggest why the number of deaths from eruption **A** was lower than the number of deaths from eruption **B**.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(c) During volcanic eruptions, magma rises to the surface to form lava.

Name **two** other substances emitted from volcanoes.

1 .....

2 .....
[2]

(d) Volcanic activity provides opportunities for people.

State **three** of these opportunities.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 17]

5 **(a)** Figure 5.1 shows a factory manufacturing cement.

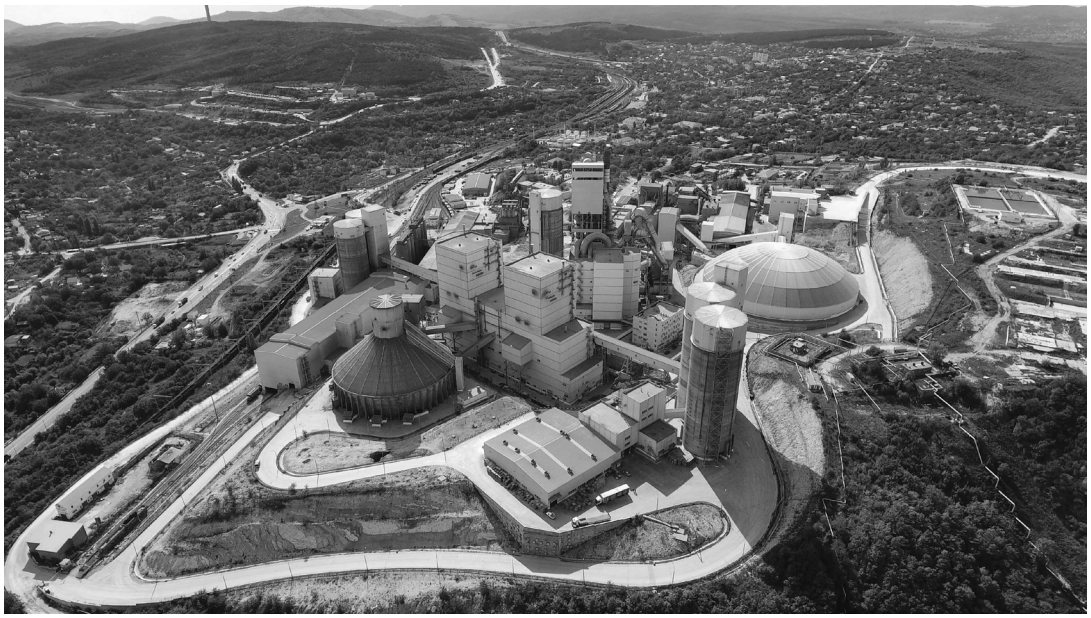


Figure 5.1

The manufacture of cement releases carbon dioxide. Carbon dioxide is an atmospheric pollutant.

(i) Use information in Figure 5.1 to suggest **one** other environmental impact and **one** economic impact of this factory.

environmental impact .....

.....

economic impact .....

.....

[2]

(ii) Table 5.1 contains statements about manufacturing cement.

Complete Table 5.1 by adding a tick (✓) in each row to show if the statement is true or false.

Table 5.1

statement	true	false
Calcium carbonate is the raw material for manufacturing cement.		
Calcium carbonate is also known as lime.		
Calcium oxide is also a product of manufacturing cement.		
Calcium oxide is also known as limestone.		

[2]

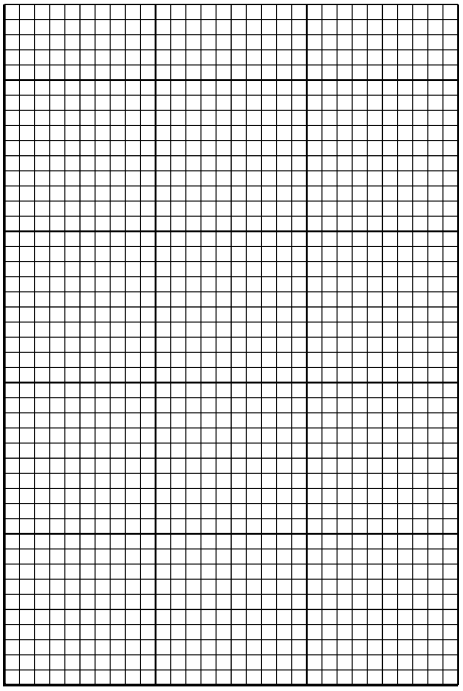
(b) Table 5.2 shows the global production of carbon dioxide from manufacturing cement from 1980 to 2020.

Table 5.2

year	global production of carbon dioxide from manufacturing cement / thousand million tonnes
1980	400
1990	480
2000	700
2010	1240
2020	1600

(i) Use Table 5.2 to plot a line graph on the grid to show the global production of carbon dioxide from manufacturing cement from 1980 to 2020.

Draw a straight line between each plotted point.



[5]

(ii) A scientist wants to predict the global production of carbon dioxide from manufacturing cement in 2040.

The scientist states:

'700 thousand million tonnes of carbon dioxide were produced in 2000.

1600 thousand million tonnes of carbon dioxide were produced in 2020.'

The scientist uses this data to predict there will be 2300 thousand million tonnes of carbon dioxide produced in 2040.

Suggest **two** reasons why this prediction may **not** be the actual value of carbon dioxide produced in 2040.

1 .....

.....

2 .....

.....

[2]

(c) Increased carbon dioxide concentrations in the atmosphere contribute to climate change.

One strategy for managing the impacts of climate change is climate change adaptation.

(i) State what is meant by climate change adaptation.

.....

..... [1]

(ii) Describe **two** examples of climate change adaptation.

1 .....

.....

2 .....

.....

[2]

[Total: 14]

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