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ENVIRONMENTAL MANAGEMENT **0680/23**

Paper 2 Management in Context **May/June 2022**

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

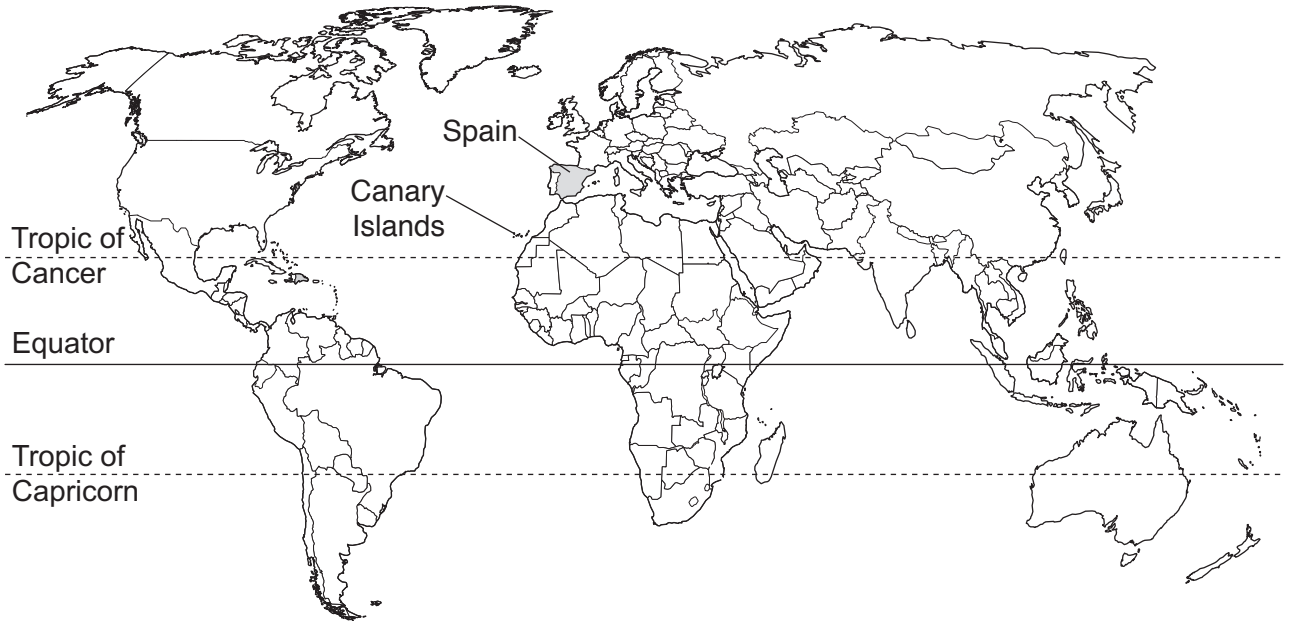
- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

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

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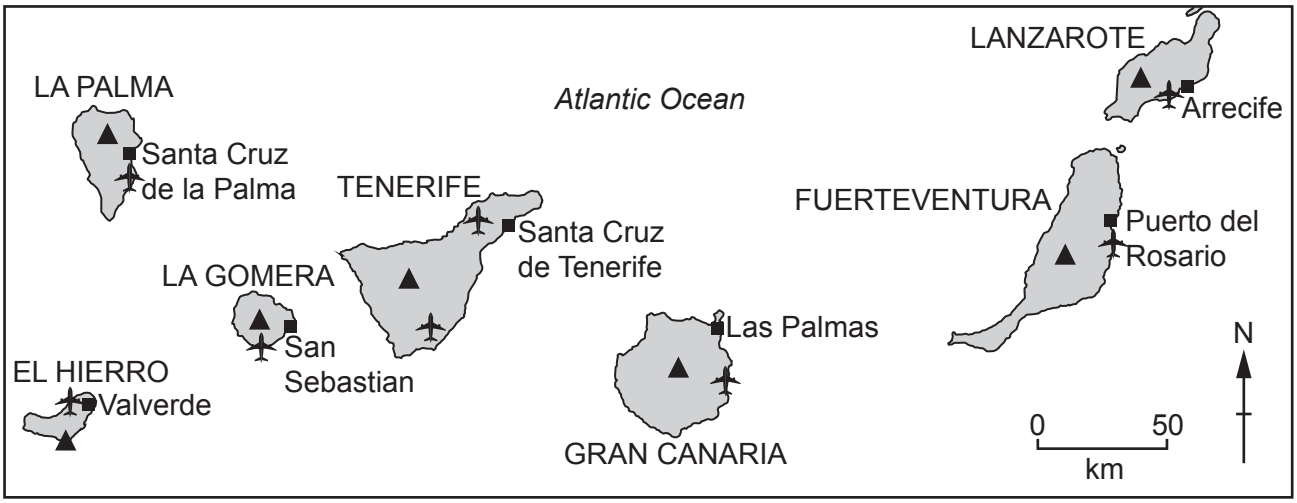
world map showing the location of Spain and the Canary Islands



map of the Canary Islands

Key

- ■ major city
- ▲ volcano
- ✈ airport



Area of the Canary Islands: 7493 km^2

Population: 2.15 million (in 2019)

Children per woman: 1.33

Life expectancy: 82.8 years

Currency: euro (1 EUR = 1.22 USD)

Language: Spanish

Climate of the Canary Islands: subtropical cooled by a cold ocean current and a wind that blows from the north-east most of the time

Terrain of the Canary Islands: volcanic mountains and narrow coastal plains

Main economic activities of the Canary Islands: tourism, shipping services, fishing, agricultural production including bananas and sugar

The Canary Islands are a part of Spain. They are located 100 km west of North Africa. They are a chain of islands formed by volcanic activity between 3 and 68 million years ago.

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[Turn over

1 The Canary Islands are volcanic islands.

(a) (i) Describe what causes a volcano to erupt.

.....

.....

.....

.....

.....

..... [3]

(ii) Granite is a rock formed by volcanic activity.

State the name of **one** other rock formed by volcanic activity.

..... [1]

(iii) Suggest reasons why each island in the Canary Islands is smaller than when it first formed millions of years ago.

.....

.....

.....

..... [2]

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(b) A student reads a newspaper article about a possible landslide at La Palma.

Landslide at La Palma could cause a tsunami

Recently, low-magnitude earthquakes have been recorded under the island of La Palma. These earthquakes had magnitudes of between 1.5 and 2.7.

Local people are worried that the earthquakes could cause one side of La Palma's volcano to collapse into the sea. This landslide could then cause a tsunami.

Similar-sized earthquakes have been recorded beneath the islands of El Hierro and Tenerife. However, no high-magnitude earthquakes have occurred in recent years on these islands.

(i) State the meaning of tsunami.

..... [1]

(ii) State the name of the scale used to record the magnitude of an earthquake.

..... [1]

(iii) Some scientists think there is only a low risk of a large-scale landslide at La Palma.

Suggest reasons why.

.....

.....

.....

..... [2]

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[Turn over

(iv) Describe the possible impacts of a landslide and tsunami on the island of La Palma.

.....

.....

.....

.....

.....

..... [3]

(v) State **three** strategies for managing the impacts of a tsunami.

1 .....

2 .....

3 .....
[3]

[Total: 16]

2 **(a)** The Canary Islands are 100 km west of North Africa.

Much of North Africa is covered by the Sahara Desert.

A wind from the east blows dust from the Sahara Desert to the Canary Islands. The dust increases the fertility of the soil on the islands.

(i) State the name of the Canary Island that is **first** to receive dust from the Sahara Desert when the wind blows from the east.

..... [1]

(ii) The dust from the Sahara Desert adds phosphorus to the soil of the Canary Islands.

State the name of **one** other important mineral found in a fertile soil.

..... [1]

(iii) Only 30% of the total land area of the Canary Islands is suitable for farming.

Calculate the area of the Canary Islands that is suitable for farming.

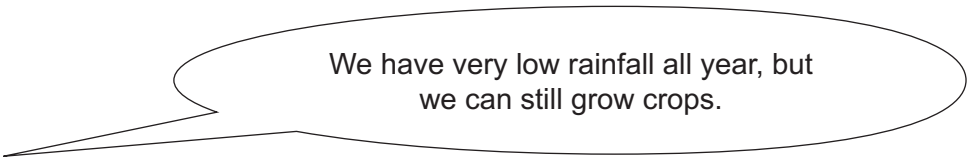
..... km^2 [1]

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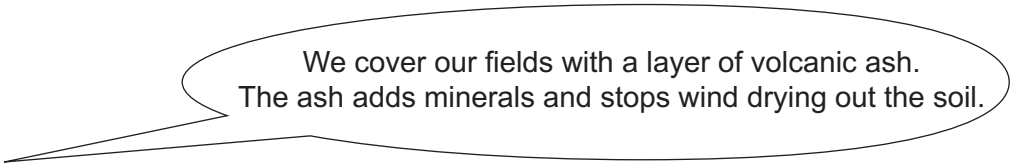
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(b) A student talks to three farmers from the Canary Islands.

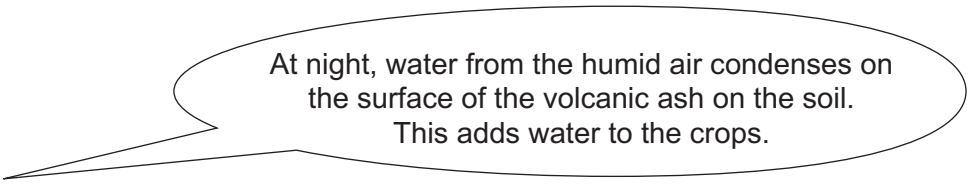
First farmer:



Second farmer:



Third farmer:



The student investigates if adding volcanic ash to soil improves plant growth.

The student:

- collects seeds from one species of wild plant growing on the Canary Islands
- fills three trays, A, B and C, with soil
- places 20 seeds in each tray
- does **not** add volcanic ash to tray A
- adds 1.0 g of volcanic ash to tray B
- adds 2.0 g of volcanic ash to tray C
- waits 15 days for the seeds to grow into seedlings
- records the number of seedlings with a minimum of two leaves in each tray every three days.

The results are shown in the table.

		number of days after planting					
		15	18	21	24	27	30
number of seedlings with a minimum of two leaves	tray A no ash	0	1	5	9	13	18
	tray B 1.0 g ash	0	4	9	14	19	20
	tray C 2.0 g ash	0	6	13	19	20	20

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(i) State **two** factors the student needs to keep the same in this investigation.

1 .....

2 .....
[2]

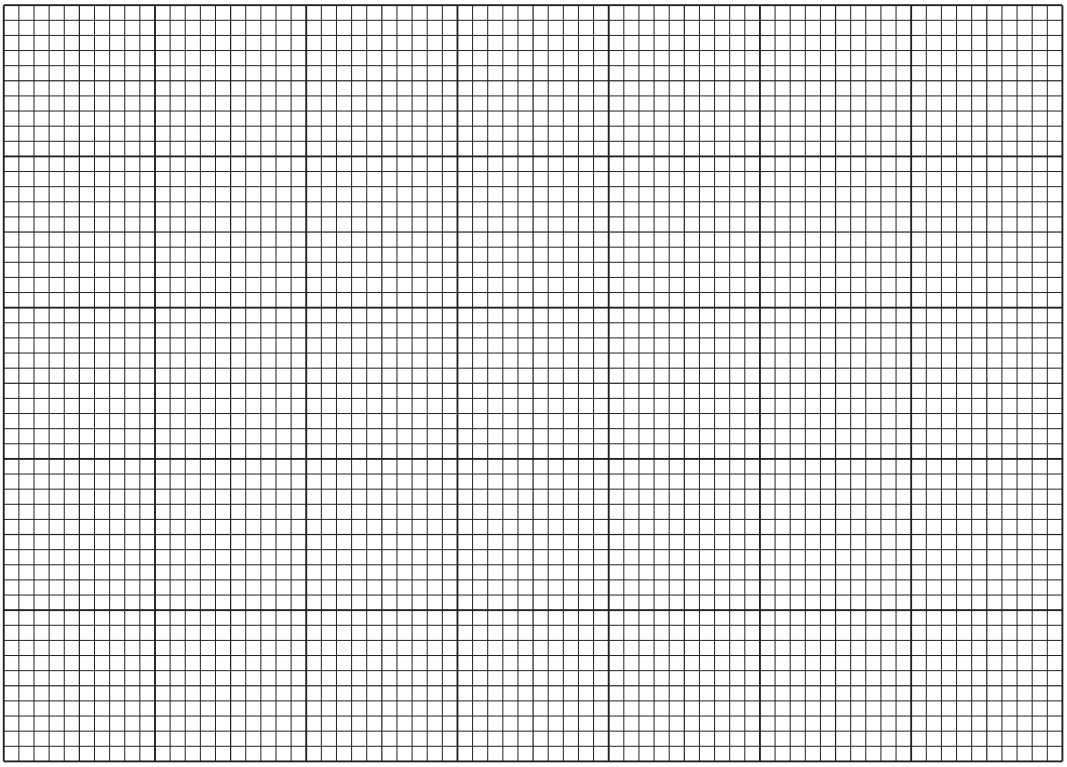
(ii) State why the student includes tray A in this investigation.

..... [1]

(iii) On the grid, plot a graph of number of seedlings with a minimum of two leaves (*y*-axis) against number of days after planting for tray B and for tray C.

Draw a straight line between each plotted point for tray B and for tray C.

Label the graphs as tray B and tray C.



[5]

(iv) Describe the difference in the trends shown in the graph.

.....

.....

.....

..... [2]

(v) Suggest a suitable conclusion for this investigation.

.....

..... [1]

(vi) Suggest **one** way the student could develop this investigation to find out more about the effect of volcanic ash on plant growth.

.....

..... [1]

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(c) The photograph shows Opuntia plants growing in a field in the Canary Islands.

The field is divided into small areas by low stone walls.



The low stone walls protect the Opuntia plants from strong winds.

The low stone walls reduce the wind speed across the soil.

The wind speed is reduced across the soil for a distance that is ten times the height of the wall.

(i) The height of the low stone wall is 85 cm.

Calculate the distance from the wall that has reduced wind speed across the soil.

..... cm [1]

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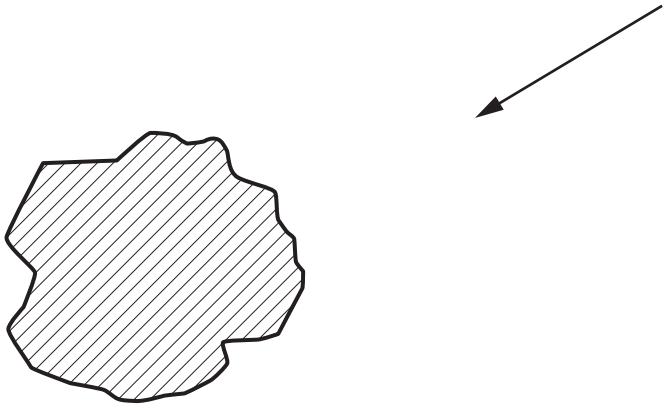
(ii) The diagram shows a field for growing Opuntia plants.

Key

field with Opuntia plants

wind direction

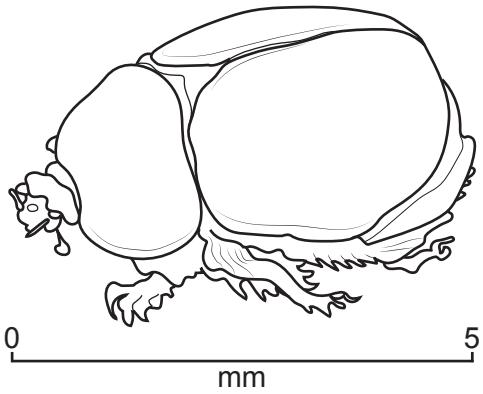
low stone wall



Draw on the diagram **one** low stone wall to protect the Opuntia plants from the strong winds. [2]

(d) The diagram shows a cochineal beetle.

The Opuntia plant is a food source for the cochineal beetle.



A red dye, called cochineal, is made from these beetles.

The following method is used to obtain the red dye.

- Farmers infect Opuntia plants with eggs of the cochineal beetle.
- The eggs hatch into larvae that feed on the Opuntia plant.
- 90 days after infection, the larvae change into beetles that have a red body.
- The farmers collect the beetles and extract the red dye.

(i) Explain why the cochineal beetle is a primary consumer.

..... [1]

(ii) Determine how many times cochineal beetles can be harvested in one year.

.....[1]

(iii) Explain why farmers call the red dye a cash crop.

.....

..... [1]

(iv) The farmers only need Opuntia plants and a supply of cochineal beetle eggs to produce the red dye.

Suggest why this farming of cochineal beetles is an example of sustainable farming.

.....

.....

.....

..... [2]

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(e) The photograph shows three fields for growing lemons on a steep slope in the Canary Islands.



(i) Use the photograph to explain why this is an example of good agricultural practice.

.....

.....

.....

.....

.....

..... [3]

(ii) Soils are classified according to their particle size.

There are three main particle sizes. Clay is one particle size.

State the names of the **two** other particle sizes.

1 .....

2 .....

[2]

(iii) Clay soil can become waterlogged.

Explain the impact of waterlogged soil on crop production.

.....

.....

.....

.....

.....

..... [3]

[Total: 31]

3 **(a)** The photograph shows one location in the Canary Islands that is **not** used for tourism.



(i) State **three** uses of the land shown in the photograph.

1 .....

2 .....

3 .....

[3]

(ii) Suggest why food production **cannot** be increased at the location shown in the photograph.

.....

.....

.....

..... [2]

(iii) Up to 90% of the food needed in the Canary Islands is imported.

Suggest **one** other item that needs to be imported.

..... [1]

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(b) (i) The government wants to use wind power to generate electricity on the Canary Islands.

An environmental impact assessment is needed at each possible wind turbine location before building can begin.

Explain why an environmental impact assessment is needed.

.....

.....

.....

..... [2]

(ii) Wind power is a renewable energy resource.

Describe other benefits of using wind power to generate electricity.

.....

.....

.....

..... [2]

(iii) Suggest **two** other renewable energy resources that can be used on the Canary Islands.

1 .....

2 .....
[2]

(c) The population of each island of the Canary Islands in 2019 is shown in the table.

island	population /1000
El Hierro	11
Fuerteventura	117
Gran Canaria	850
La Gomera	21
La Palma	82
Lanzarote	151
Tenerife	918

(i) Complete the table to show the population of each island from highest to lowest.

island	population /1000
Tenerife	918
La Gomera	21

[2]

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(ii) The table shows the number of tourists that visited four of the Canary Islands in 2019.

island	**number of tourists / million**
Tenerife	5.89
Gran Canaria	4.27
Lanzarote	3.07
Fuerteventura	2.02
total	.....

Complete the table to show the total number of tourists that visited these four Canary Islands in 2019. [1]

(d) In 2019, Tenerife was visited by 5.89 million tourists.

Some people think tourism is damaging the environment and a tourist tax should be introduced. The money from the tourist tax could then be used to support environmental projects.

A questionnaire was used to survey tourists about their views on a tourist tax.

	percentage response	
question	**yes**	**no**
Would you pay a tax of 1 euro each night to stay on Tenerife?	60	40
Do you agree with the idea of a tourist tax?	50	50

(i) Write **one** other question to survey tourists about their views on a tourist tax.

.....

..... [1]

(ii) The questionnaire was used at both the north airport **and** the south airport.

Suggest why the questionnaire was used at both airports.

.....

..... [1]

(iii) Describe a suitable method for selecting tourists to answer the questionnaire.

.....

.....

.....

..... [2]

(iv) Describe **one** benefit of using the questionnaire when tourists arrive **and** when tourists leave the island.

.....

.....

.....

..... [2]

(v) The average length of stay for tourists in Tenerife is nine days.

Calculate the total money raised in 2019 for a tourist tax of one euro per night.

..... million euros [1]

(vi) Money raised from a tourist tax can be used to invest in sustainable tourism.

Explain ways tourism can be made a sustainable activity.

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..... [4]

(e) Discuss whether tourism contributes to climate change.

Give reasons for your point of view.

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..... [5]

(f) Suggest why people living on small islands are very worried about climate change.

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..... [2]

[Total: 33]

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