Cambridge Assessment International Education

Example Responses – Paper 2

Cambridge IGCSE™

Environmental Management 0680

Cambridge O Level

Environmental Management 5014

For examination from 2022

Cambridge Pathway

Contents

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE / O Level Environmental Management 0680 / 5014.

This booklet contains responses to all questions from June 2022 Paper 22, which have been written by a Cambridge examiner. Responses are accompanied by a brief commentary highlighting common errors and misconceptions where they are relevant.

The question papers and mark schemes are available to download from the School Support Hub.

2022 Question Paper 22

2022 Mark Scheme 22

Past exam resources and other teaching and learning resources are available from the School Support Hub.

Question 1

(a) **(i)** Basalt is a rock formed by volcanic activity.

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

Granite ..... [1]

Examiner comment

- Graphite was a common incorrect response.
- Some candidates chose to give a list of responses when only one rock was asked for. These candidates often contradicted a previously correct answer. For example, 'granite which is a sedimentary rock' or 'granite and limestone'.

(ii) Scientists have identified a suitable location to develop a source of geothermal energy on the island of Gran Canaria.

State **one** benefit of geothermal energy.

It is renewable. ..... [1]

Examiner comment

- Some responses included a full sentence that repeated what was asked, such as 'one benefit of geothermal energy is that it is renewable.' It is unnecessary to repeat this information and wastes time during the examination.
- In this question, 'it' is unambiguous, but in general candidates should be clear what 'it' refers to in a question. This is particularly important if a comparison is asked for.

(iii) Describe how geothermal energy is used to generate electricity.

Pump cold water into rocks underground. .....

The cold water is heated and turns to steam. .....

The steam turns a turbine. .....

The turbine turns a generator. .....

..... [4]

Examiner comment

- More successful responses tended to be guided by the mark allocation to ensure they gave four separate steps in how geothermal energy is used to generate electricity. These candidates often used bullet points to ensure they made four separate steps.
- 'A generator generates electricity', was seen frequently. This was insufficient as it does not describe how this occurs.

(b) A student reads a newspaper article about an earthquake in Gran Canaria and Tenerife.

> **Earthquake in Gran Canaria and Tenerife**
>
> People living on Gran Canaria and Tenerife are used to small earthquakes with a magnitude between 1 and 2 on the Richter scale.
>
> On the morning of 18 January 2019, people felt an earthquake with a magnitude of 4.4.
>
> Many people were worried that volcanic activity might follow.
>
> Scientists think the earthquake was caused by tectonic activity 5 km below the islands.

(i) Describe how people knew that an earthquake occurred on the morning of 18 January 2019.

People felt the ground shake and saw buildings damaged.

..... [1]

Examiner comment

Less successful responses were limited to saying that people felt or saw the earthquake. This was not a full enough description.

(ii) Suggest reasons why people are **not** worried about earthquakes that have a magnitude of less than 2 on the Richter scale.

There is not much damage and buildings did not fall down.

This was because the buildings were built strongly and earthquake strengthened.

..... [2]

Examiner comment

Some responses only repeated the information in the question and stated, 'the magnitude was less than 2'. This was insufficient to be awarded any marks.

(iii) Describe how tectonic activity can cause an earthquake.

Tectonic plates move and rub next to each other.

This causes friction which builds up pressure.

When there is a sudden release of the pressure, there is an earthquake.

..... [3]

Examiner comment

- Better performing candidates tended to use bullet points to structure their response.
- Less successful responses stated that the plates interacted, but did not describe how the plates interact.

(iv) Describe the possible impacts of a high-magnitude earthquake on the islands of Gran Canaria and Tenerife.

People's homes fall down.

Roads and hospitals are damaged.

As it is by the sea there could be a tsunami which leads to flooding.

Drinking water could be contaminated with sewage and people could get cholera.

..... [4]

[Total: 16]

Examiner comment

Some candidates stated 'death' or 'harm' which was too vague and needed further description.

Question 2

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 **last** to receive dust from the Sahara Desert when the wind blows from the east.

El Hierro [1]

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

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

Nitrate ion [1]

Examiner comment

- Candidates should be familiar with nitrate, phosphate and potassium which are the stated ions in the syllabus that improve soil quality.
- Some candidates gave potassium as an answer. This had been given in the question and one other important mineral was asked for.

(iii) Only 30% of the total land area of the Canary Islands can be used for farming.

Calculate the area of the Canary Islands that **cannot** be used for farming.

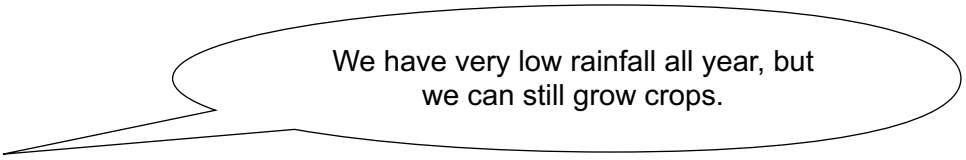
7493 x (70/100)
= 5245 km^2 [1]

Examiner comment

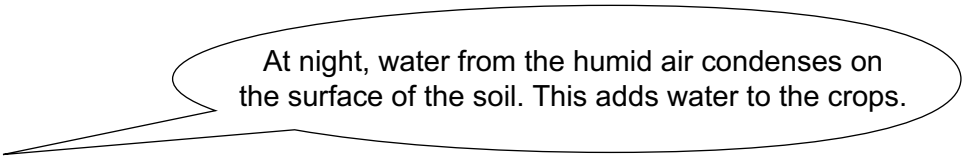
Some candidates misread the question and gave the area of the Canary Islands that can be used for farming.

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

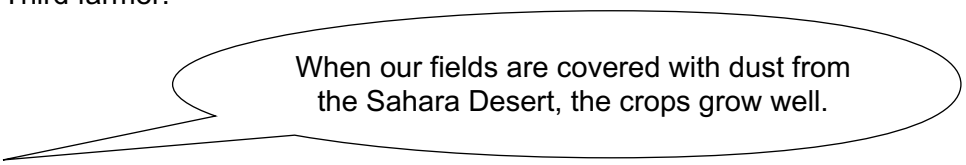
First farmer:



Second farmer:



Third farmer:



The student investigates whether adding dust from the Sahara Desert 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 dust to tray A
- adds 1.0 g of dust to tray B
- adds 2.0 g of dust to tray C
- waits 15 days for the seeds to grow into seedlings
- records the average height of the seedlings in each tray every three days.

The results are shown in the table.

		number of days after planting					
		15	18	21	24	27	30
average height of seedlings / cm	tray A no dust	1.2	1.7	3.0	4.1	5.0	6.2
	tray B 1.0 g dust	1.1	1.9	3.3	4.8	5.7	7.3
	tray C 2.0 g dust	1.3	2.0	3.4	4.8	5.6	7.2

(i) State the independent variable and the dependent variable in this investigation.

independent variable mass of dust

dependent variable average height of the seedlings

[2]

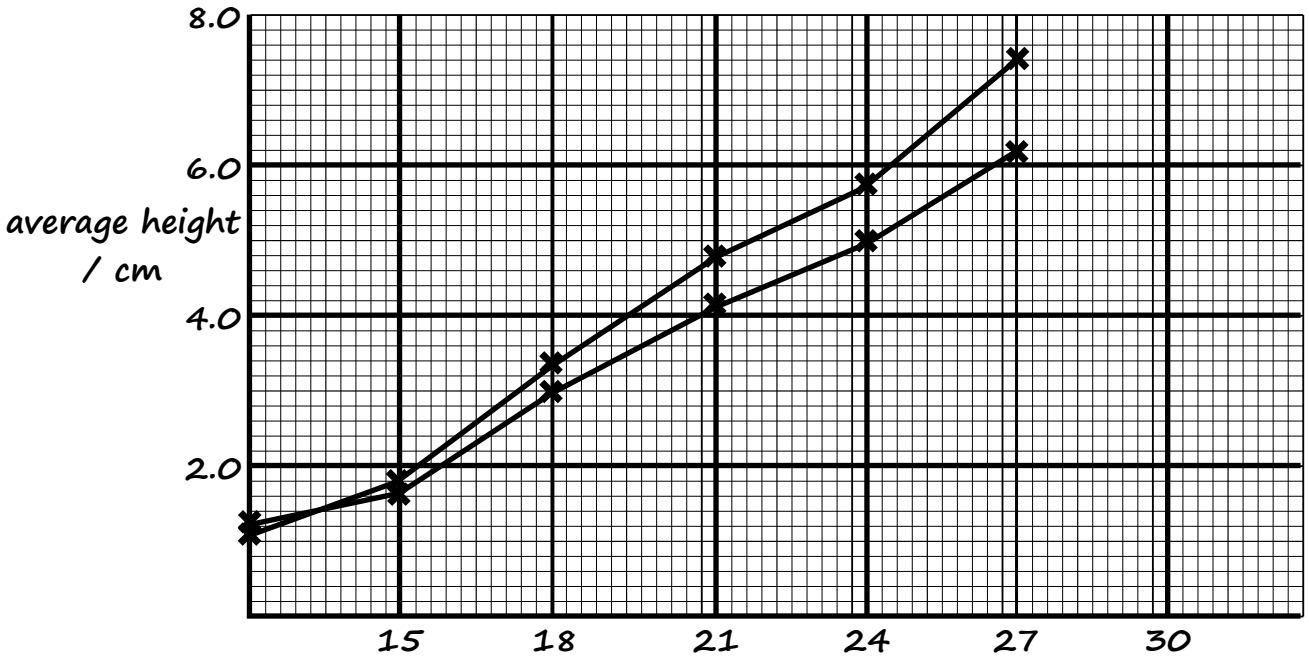
Examiner comment

Some candidates gave the volume of dust instead of the mass. Others confused the terms independent and dependent.

(ii) On the grid, plot a graph of average height of seedlings (*y*-axis) against number of days after planting for tray A and for tray B.

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

Label the graphs as tray A and tray B.



[5]

Examiner comment

- A few bar charts were given and many graphs did not use at least half of the gridded space.
- Some lines were not point to point and many were not labelled.
- A few responses did not use a linear scale.
- Many graphs were drawn in pen and this resulted in difficulties for candidates who made errors and were unable to correct the pen. The best graphs were drawn using a ruler and sharp pencil.

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

Line B has a steeper gradient.

..... [1]

Examiner comment

Some candidates did not describe the differences and just stated that both lines increased.

(iv) Use the results to suggest a suitable conclusion for this investigation.

The tray with dust had plants that grew more.

This shows that dust increase soil fertility.

..... [2]

Examiner comment

Vague answers such as 'dust improves soil' were not enough to be awarded marks. Candidates had to conclude why this occurred.

(v) Suggest **one** reason why the student decides to repeat the investigation with seeds of different plant species.

To see if any results were anomalous.

..... [1]

Examiner comment

Many vague answers were seen such as 'to check accuracy or precision'. It was necessary to suggest how repeating the investigation could achieve this.

(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 in this field is 65 cm.

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

650 cm [1]

(ii) A farmer plans to build a house.

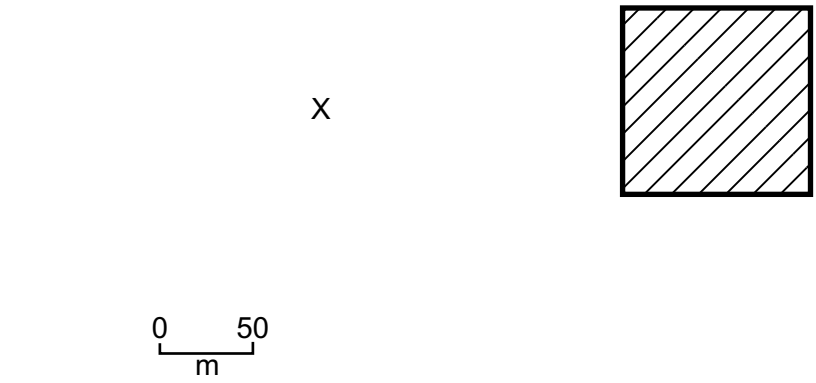
The diagram shows the planned location X of the house.

The house must **not** be more than 200 m from the wall surrounding the field.

Key

walled field with Opuntia plants

X planned location of house



Use a calculation to determine whether the house can be built at location X.

Show your working.

The distance from X to the field is 4.1 cm.

The scale is 1.3 cm = 50 m

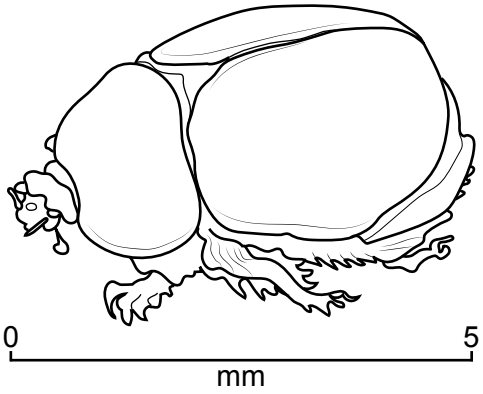
So, 200 m = 1.3 x 4 = 5.2 cm. The distance between X and the field is 4.1 cm so the house can be built. [2]

Examiner comment

Many candidates found this a challenging calculation. It was clear that some candidates were not confident using a scale.

(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 most of the beetles and extract the red dye.

(i) Explain why the Opuntia plant is a producer.

The plant uses photosynthesis to make glucose.

..... [2]

Examiner comment

It was not enough to state that the Opuntia was a plant as this was a repeat of the information in the question.

(ii) Suggest why the farmers do **not** collect all the beetles to make the red dye.

So that they can reproduce and lay more eggs. ..... [1]

(iii) Explain why farming cochineal beetles for dye is an example of commercial farming.

The product is sold so the farmer earns money.

.....

Examiner comment

There was some confusion between the terms ‘intensive farming’, ‘arable farming’ and the correct answer.

(e) The photograph shows three terraced fields with lemon trees on a steep slope in the Canary Islands.

(i) Suggest agricultural techniques that can be used to make the farming of terraced fields sustainable.

Organic fertiliser such as manure can be put onto soil.

A biological control to remove pests can be used.

Wind breaks such as bunds.

An improved method of irrigation such as trickle-drip irrigation can be used.

..... [4]

Examiner comment

Some candidates only gave two or three techniques. It often helped candidates to use bullet points to help structure their responses to ensure the number of techniques they suggested matched the mark allocation for the question.

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

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

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

1 *Silt*

2 *Clay*

[2]

Examiner comment

Salt, dirt and stones were common incorrect answers.

(iii) Bunds help prevent soil erosion.

Describe how bunds help prevent soil erosion.

Bunds reduce wind speed and decrease the speed of water flowing over soil.

This reduces the amount of topsoil and organic matter that is lost.

There is less surface run-off and leaching.

And soil is not blown or washed away.

[4]

[Total: 32]

Examiner comment

Some candidates did not know the meaning of the term ‘bund’. It is good practice to know the meaning of all syllabus terms.

Question 3

3 **(a)** 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) Calculate the percentage of the total population of the Canary Islands living on Lanzarote in 2019.

(151/2150 x 100)

= 7 ..... % [2]

(ii) The table shows information about the population of four of the Canary Islands.

Complete the table.

island	population / 1000	area / km^2	population density / people per km^2
Fuerteventura	117	1660	70
Gran Canaria	850	1560	545
Lanzarote	151	846	178
Tenerife	918	2034	451

[1]

Examiner comment

Occasionally, incorrect rounding was seen. The calculator answer of 178.4869976 should be rounded down to 178 as the 4 is less than 5.

(i) Suggest what might happen to the numbers of tuna fish and herring fish if tourists catch too many blue marlin fish. Give a reason for your answer.

tuna fish *the number of tuna fish increases because they are not eaten by their predator, the blue marlin.*

herring fish *the number of herring fish decreases because there are more tuna fish predators to eat them.*

[2]

Examiner comment

A few candidates did not give a reason, as instructed in the question.

(ii) State **four** ways the government can control the number of blue marlin fish caught by tourists each year for sport.

1 *set quotas on how many fish can be caught*

2 *have no fishing areas*

3 *all boats should have a licence to fish*

4 *fishing rules are being followed and issue fines if they are not*

[4]

Examiner comment

Responses that referred to zoos and fish farms did not answer the question asked, which required ways of controlling the number of blue marlin fish caught and not how to increase numbers.

(c) In 2019, 3.07 million tourists visited Lanzarote.

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

A questionnaire was used to find out the views of tourists and the views of local people about tourism on Lanzarote.

	percentage response			
	tourists		local people	
question	yes	no	yes	no
Do you think there should be a limit to the number of blue marlin fish caught each day?	21	79	37	63
Do you think there should be a limit to the number of tourists visiting Lanzarote?	18	82	32	68
Do you think tourists should pay a tax of one euro each night to stay on the island?	40	60	65	35

(i) Suggest **two** conclusions that can be written in a report to the government about the responses to the questionnaire.

A majority of tourists and locals think there should be a limit to the number of blue marlin caught each day.

More locals than tourists think that a tourist tax should be introduced. [2]

Examiner comment

Conclusions should summarise the main aspects of data. Some conclusions focused on only tourist or local opinions, but not both.

(ii) Describe a systematic method for selecting **local people** on Lanzarote to answer the questionnaire.

Select every 10th house in different regions.

Sample each house at the same time.

[2]

Examiner comment

Candidates found this question very challenging. Many random methods were given rather than systematic methods.

(iii) Discuss whether a tourist tax should be introduced in Lanzarote.

Give reasons for your point of view.

The benefits of a tourist tax are:

It raises money for the government, which they can use to help local people build better roads and hospitals, for example.

The money can fund environmental projects like advertising campaigns to limit blue marlin fishing.

It can also be used to improve tourist facilities like hotels.

The negatives of a tourist tax are:

It might put people off from visiting the island. If numbers decrease, this will decrease the money going to local businesses.

Overall, there are more benefits than negatives. [5]

(d) The photograph shows land use at one location on the island of Lanzarote.

Use the photograph to suggest why this location is **not** developed for tourists.

Give reasons for your answer.

It is surrounded by steep mountains. This has a risk of landslides and makes transport to the area difficult as there are few roads and no airport visible.

There are not obvious tourist attractions such as a nice beach and not facilities for tourists such as hotels.

There are mostly local houses and farming land.

[4]

Examiner comment

- Many responses did not give enough reasons and it was common for only two reasons to be stated.
- Some candidates did not use the photograph as instructed in the question.

(e) The photograph shows a desalination plant on the island of Lanzarote.

The desalination plant produces potable fresh water that is piped to all parts of Lanzarote.

(i) Describe the process of desalination.

Heat seawater so that it evaporates. Then condense the steam and collect pure water. The salt is left behind when the water evaporates. This is called distillation.

..... [2]

Examiner comment

- A large number of candidates did not know about the process of desalination.
- It was common to see answers that referred to water treatment such as chlorination and filtration.

(ii) Potable fresh water is also available from wells dug into the volcanic rock. This water is supplied in plastic bottles.

Suggest **one** reason why people choose to drink bottled water from the wells rather than piped water from the desalination plant.

Some people don't like the taste.

..... [1]

Examiner comment

Vague answers state 'cost' or 'convenience' as reasons which were not accepted.

(i) Suggest factors that must be considered before installing solar panels.

Cost of the panels.

There might not be enough land for the panels as they take up a large area.

The number of hours the sun shines in the area.

The outcome of an environmental impact assessment.

..... [3]

Examiner comment

'People's opinion' was too vague, and it was necessary to suggest what the opinion might be, such as 'causes visual pollution' in order to be awarded marks.

(ii) Solar power is a renewable energy resource.

Describe other environmental benefits of solar power.

Carbon dioxide is not produced.

This means they do not contribute to global warming.

Fossil fuels do not need to be used so there are more reserves for future generations to use.

[3]

Examiner comment

- There was a misconception that carbon dioxide emissions cause ozone depletion.
- Some candidates stated renewable energy resource. This is correct, but was given in the question so not accepted as 'other' benefits were asked for.

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

Wind power [1]

[Total: 32]

Examiner comment

A minority of candidates stated solar power, but this was not accepted as it was given in the question so one 'other' resource was asked for.

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