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ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 Management in Context **May/June 2025**

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 **20** pages.

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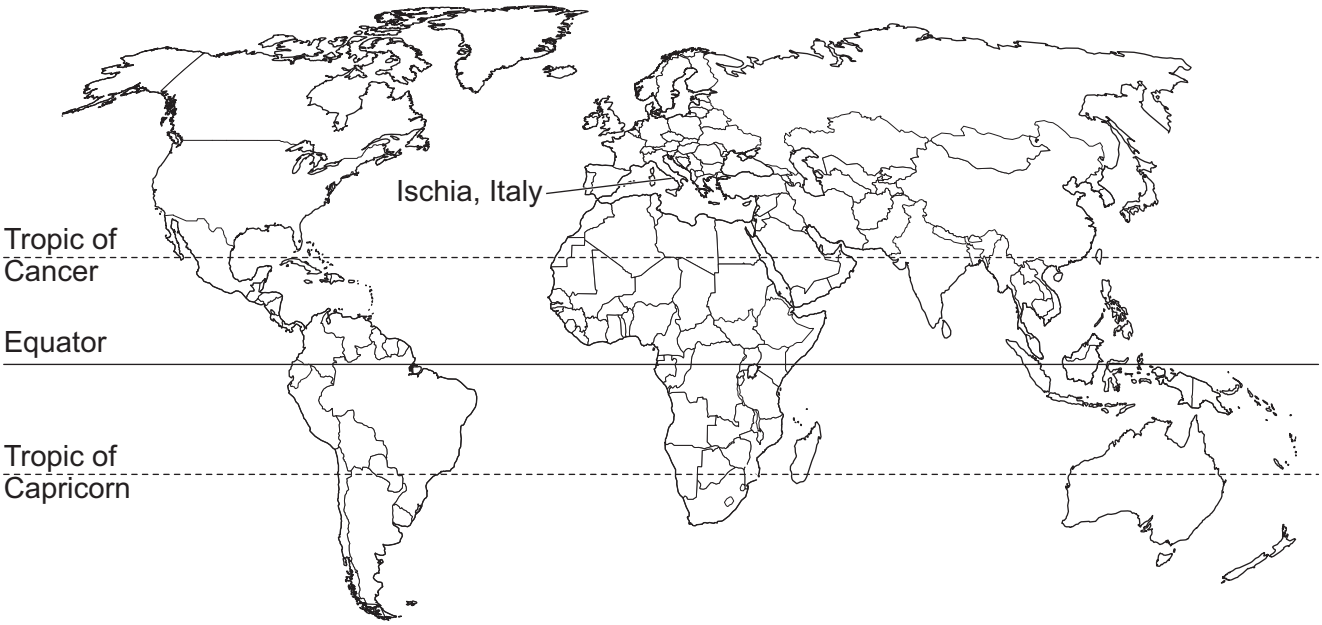
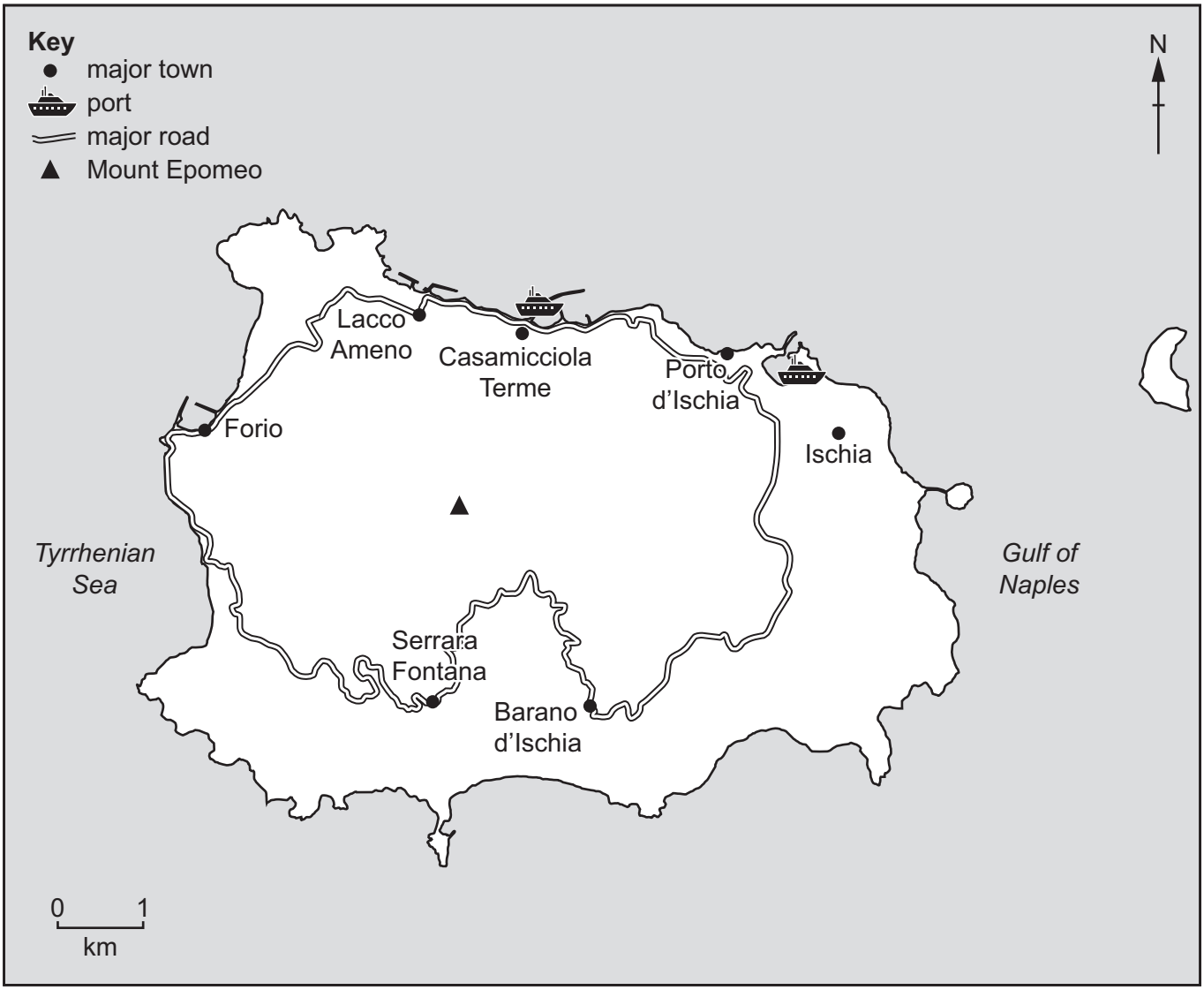
world map showing the location of Ischia, Italy



map of Ischia



DO NOT WRITE IN THIS MARGIN

Area of Ischia: 46 km^2

Population of Ischia: 62 000 (in 2023)

Children per woman in Italy: 1.24 (in 2023)

Life expectancy in Italy: 82.8 years

Currency: Euro (0.92 EUR = 1 USD in 2023)

Language: Italian

Climate of Ischia: long, hot summers and mild winters

Terrain of Ischia: mountainous volcanic rock, highest peak at 788 m Mount Epomeo

Main economic activities of Ischia: tourism, wheat, olive oil, citrus fruit and wine production

Ischia is an Italian island 30 km from mainland Italy. Italy is a member of the European Union. Tourism is the main industry in Ischia. Unemployment is high and many local people are unable to afford accommodation on the island. There are some illegally constructed buildings.

DO NOT WRITE IN THIS MARGIN

1 **(a)** Ischia is a densely populated island.

Calculate the number of people per km^2 on Ischia.

Give your answer to the nearest whole number.

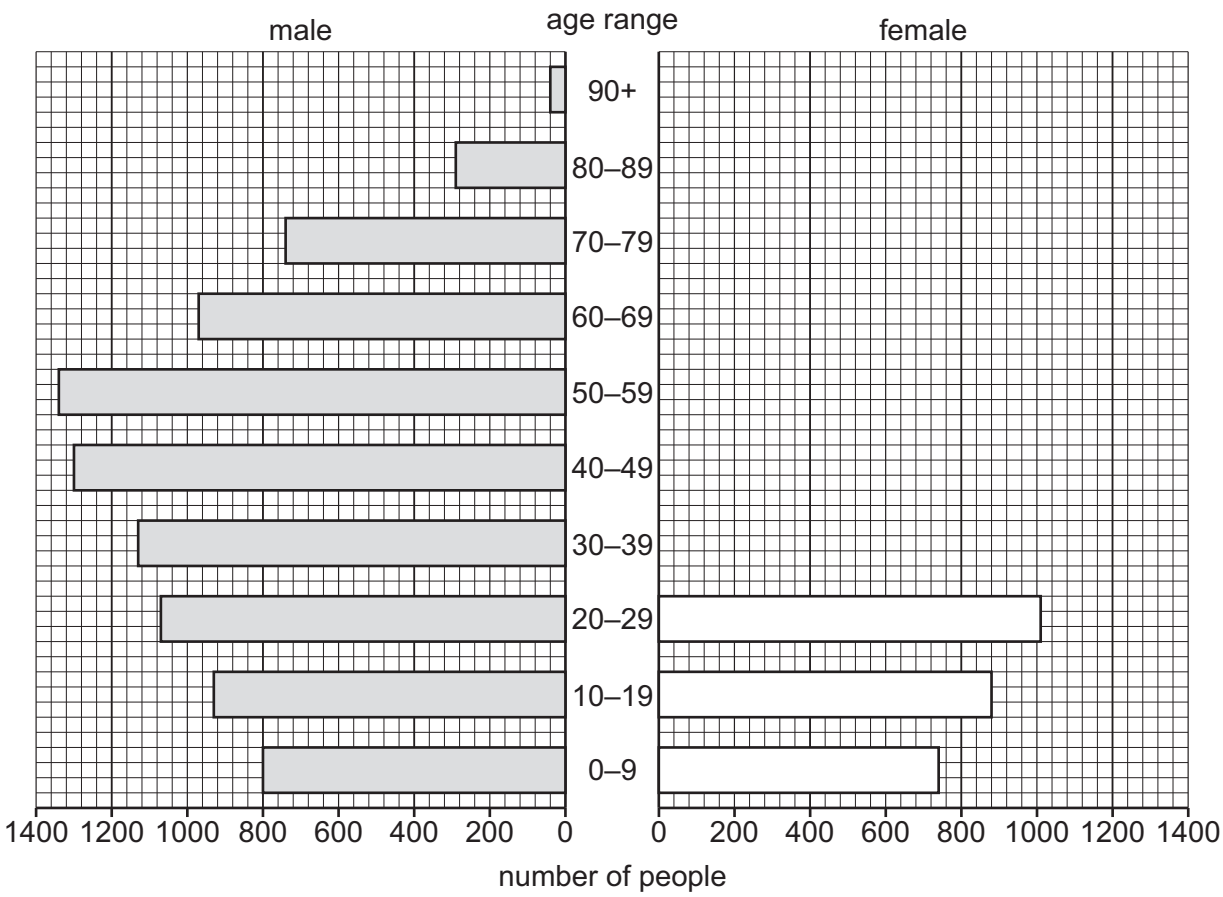
..... people per km^2 [2]

(b) Forio is a town on Ischia.

The table shows the number of females in different age ranges in Forio for 2022.

age range	number of females
30–39	1400
40–49	1300
50–59	1360
60–69	1100
70–79	800
80–89	410
90+	100

(i) Complete the population pyramid for females in Forio.



[3]

DO NOT WRITE IN THIS MARGIN

(ii) Determine the total number of people over 90 years old in Forio.

..... [1]

(iii) The population in Forio in 2011 was 16 597. This increased to 17 348 in 2023.

Calculate the percentage increase.

..... % [2]

(c) The population data was collected using a questionnaire.

The questionnaire was sent to every home on Ischia.

(i) Explain why a pilot survey is used before the main questionnaire is sent.

.....

.....

.....

..... [2]

(ii) Suggest **three** limitations of using a questionnaire to collect data.

1 .....

2 .....

3 .....

[3]

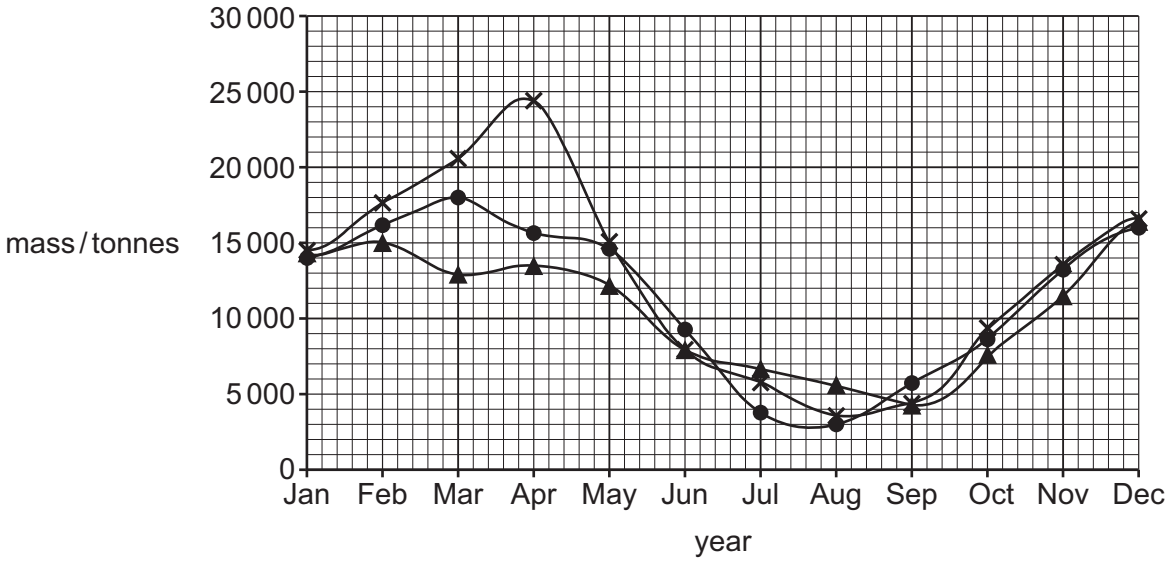
[Total: 13]

DO NOT WRITE IN THIS MARGIN

2 Lemons from Ischia are included in the mass of lemons sold to other countries by the European Union.

(a) The graph shows the mass of lemons sold to other countries by the European Union each month.

Key
—✕— 2020
—●— 2021
—▲— 2022



(i) Circle the year with the greatest mass of lemons sold to other countries.

2020 **2021** **2022**

[1]

(ii) Name the month in 2021 with the greatest mass of lemons sold.

..... [1]

DO NOT WRITE IN THIS MARGIN

(b) A farmer grows lemon trees in a field in Ischia.

For maximum growth, the trees in each row must be 4 m apart and each row of trees must be 5 m apart.

Suggest why the trees should **not** be closer together. Give reasons for your answer.

.....

.....

.....

..... [2]

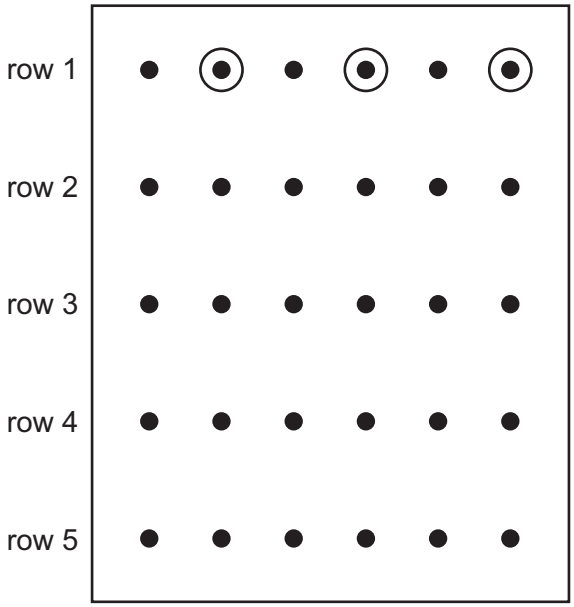
(c) A farmer on Ischia investigates the best fertiliser to use on lemon trees.

The diagram shows the lemon trees in a field.

Key

● lemon tree

◉ sampled tree



The farmer selects every second tree in each row to sample.

Each tree the farmer selects in row 1 is circled on the diagram.

(i) Name this method of sampling.

..... [1]

(ii) Determine the total number of trees the farmer samples in the field using this method.

..... [1]

DO NOT WRITE IN THIS MARGIN

(d) The farmer investigates the effect of 4 different fertilisers on the annual yield of lemons.

Each fertiliser contains nitrate, phosphate and potassium ions in different concentrations.

The fertilisers are added at the start of each year.

The table shows the fertilisers used on each tree row.

	concentration / arbitrary units		
tree row	**nitrate ions**	**phosphate ions**	**potassium ions**
1	no fertiliser used		
2	8	8	8
3	6	5	6
4	6	6	6
5	10	10	10

The table shows the effect on the annual yield.

	annual yield / kg		
tree row	**year 1**	**year 2**	**year 3**
1	200	180	150
2	205	200	205
3	230	230	240
4	250	240	255
5	180	130	95

(i) Explain why fertiliser was **not** used on tree row 1.

.....

..... [1]

(ii) Suggest **one** reason why the yield for tree row 1 decreased from year 1 to year 3.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(iii) Write a different conclusion for each of these tree rows:

tree row 2 .....

.....

tree row 4 .....

.....

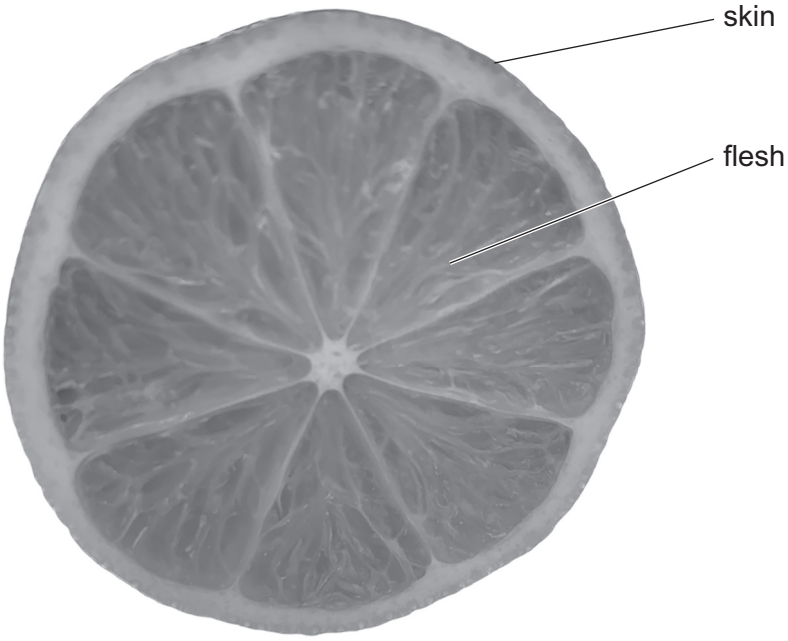
tree row 5. .....

.....

[3]

DO NOT WRITE IN THIS MARGIN

(e) The photograph shows a lemon.



The farmer wants lemons with a large mass of flesh and a thin skin.

(i) Name the measuring instrument used to record mass.

..... [1]

(ii) Draw a suitable table the farmer can use to record:

- the mass of lemon flesh
- the thickness of lemon skin.

[1]

DO NOT WRITE IN THIS MARGIN

(iii) Describe how selective breeding can be used to obtain the lemons the farmer wants.

.....

.....

.....

.....

.....

..... [3]

(iv) State **two** techniques to increase the yield of lemons other than fertiliser use and selective breeding.

1 .....

.....

2 .....

.....
[2]

[Total: 18]

DO NOT WRITE IN THIS MARGIN

3 **(a)** There was heavy rainfall on Ischia on 26 November 2022.

Rainfall is part of the water cycle.

Complete the sentences about the water cycle.
Use words from the list. Each word may be used once, more than once or not at all.

atmosphere **condensation** **evaporation** **gas**

interception **liquid** **run-off**

soil **solid** **through-flow**

The process of water turning from a liquid to a gas is ..... .

Water transfers from the leaves of plants to the atmosphere as a ..... .

More water is transported through the plant and to the leaves from the ..... .

The movement of water on the land surface is called ..... .
[4]

(b) A few hours after the heavy rainfall on Ischia, a large section of Mount Epomeo moved towards the sea. This caused large quantities of mud and loose rock to flow through the town of Casamicciola Terme.

The photograph shows some of the damage caused by this landslide.

11 people were killed by the landslide and many people were injured. Drinking water was contaminated with sewage.

DO NOT WRITE IN THIS MARGIN

(i) Suggest **two** other impacts of the landslide on people.

1 .....

.....

2 .....

.....
[2]

(ii) The island has illegally constructed buildings. Large areas of land on the island have been cleared of vegetation for these buildings.

Suggest why removing vegetation makes landslides more likely to happen.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) Suggest **one** reason why illegal construction makes landslides more likely to happen, other than removing vegetation.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(c) Ischia is a popular tourist destination. Approximately 6 million tourists visit the island each year.

(i) Illegal construction and increased use of vehicles are negative impacts of tourism.

Suggest **two** other negative impacts of tourism on Ischia.

1 .....

.....

2 .....

.....
[2]

(ii) Suggest a suitable transport policy that would reduce the impact of the 6 million tourists on the island. Explain how the policy reduces the impact.

policy .....

.....

explanation .....

.....
[2]

(d) The landslide washed sewage into the sea.

E. coli are bacteria found in sewage. *E. coli* may cause infectious bacterial diseases.

A scientist investigates the concentration of *E. coli* in seawater around Ischia.

The table shows information on the investigation.

column 1	**column 2**	**column 3**	**column 4**
volume of water collected / cm^3	**distance from edge of land into the sea / m**	**concentration of *E. coli* / arbitrary units**	
		sample 1	**sample 2**
100	1	550	576
200	10	423	32
300	100	371	348
400	1 km	297	282

(i) Use column 1 to identify **one** limitation with the investigation.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(ii) Use column 2 to identify **one** error in how the data is recorded in this column.

.....

..... [1]

(iii) Use columns 3 and 4 to identify **one** anomalous result.

..... [1]

(iv) Suggest **one** safety factor to consider during this investigation.

.....

..... [1]

(v) The maximum safe concentration of *E. coli* in water is 500 arbitrary units.

Use this information to write a conclusion about the investigation.

.....

..... [1]

(vi) Name **one** infectious bacterial disease caused by water contaminated with sewage.

..... [1]

(vii) Boiling is used to make water safe to drink.

State **one** other method used to make water safe to drink.

..... [1]

[Total: 22]

DO NOT WRITE IN THIS MARGIN

4 Solar power is used to generate electricity on Ischia.

(a) The photograph shows solar panels with cars parked under the solar panels.

Suggest **one** benefit of this method for locating solar panels.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(b) Electricity generated by solar power is stored in batteries to be used later.

A report stated that more than 11 million tonnes of used lithium-ion batteries will have accumulated globally by 2030.

The table shows the components in a typical lithium-ion battery.

component	percentage
carbon	13
iron	28
lithium	3
phosphate	18
plastic	8
other	30

(i) Suggest the best type of graph or chart to present this data.

..... [1]

(ii) Many batteries are recycled.

Suggest **two** benefits of recycling batteries.

1 .....

.....

2 .....

.....

[2]

(iii) Suggest **two** reasons why batteries are **not** recycled in some locations.

1 .....

.....

2 .....

.....

[2]

[Total: 6]

DO NOT WRITE IN THIS MARGIN

5 Mount Epomeo is an extinct volcano. The volcano last erupted in 1302.

(a) Igneous rock is found in many parts of Ischia.

(i) Describe how igneous rock forms.

.....

.....

.....

.....

.....

..... [3]

(ii) Name **one** igneous rock.

..... [1]

(b) Some rocks are extracted from subsurface mines.

(i) State **three** factors that affect the decision to extract rocks.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(ii) Suggest **one** reason why subsurface mining is more dangerous than surface mining.

.....

..... [1]

(iii) Describe the social benefits of rock extraction to local people.

.....

.....

.....

..... [2]

DO NOT WRITE IN THIS MARGIN

(iv) The photograph shows a landscape damaged by rock extraction.

State **two** negative impacts of rock extraction shown in the photograph.

1 .....

.....

2 .....

.....
[2]

(v) Landscapes damaged by rock extraction can be restored by bioremediation.

Describe bioremediation.

.....

.....

.....

..... [2]

DO NOT WRITE IN THIS MARGIN

(c) Explain why crops grow well on the slopes of Mount Epomeo.

.....

..... [1]

(d) The island experiences earthquakes.

(i) Describe what is meant by the Richter scale.

.....

.....

.....

..... [2]

(ii) A disaster plan is a strategy for reducing the impact of an earthquake.

State what should be included in a disaster plan. Give **four** answers.

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

[4]

[Total: 21]

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