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ENVIRONMENTAL MANAGEMENT **0680/23**

Paper 2 Management in Context **October/November 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

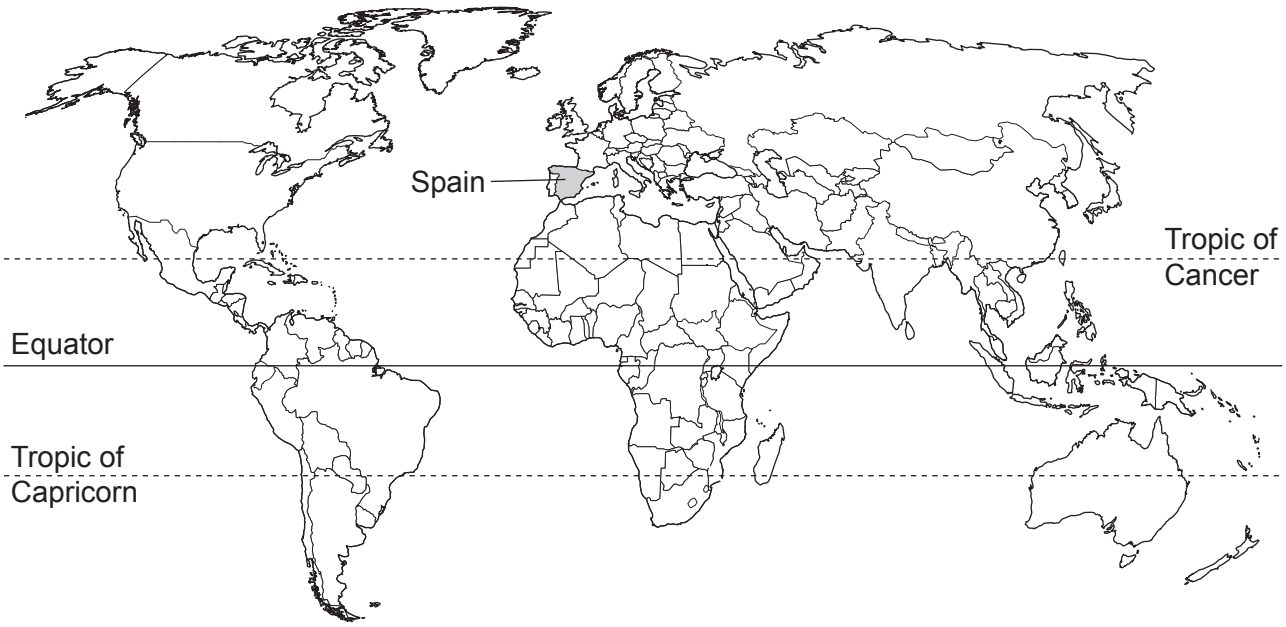
- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

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

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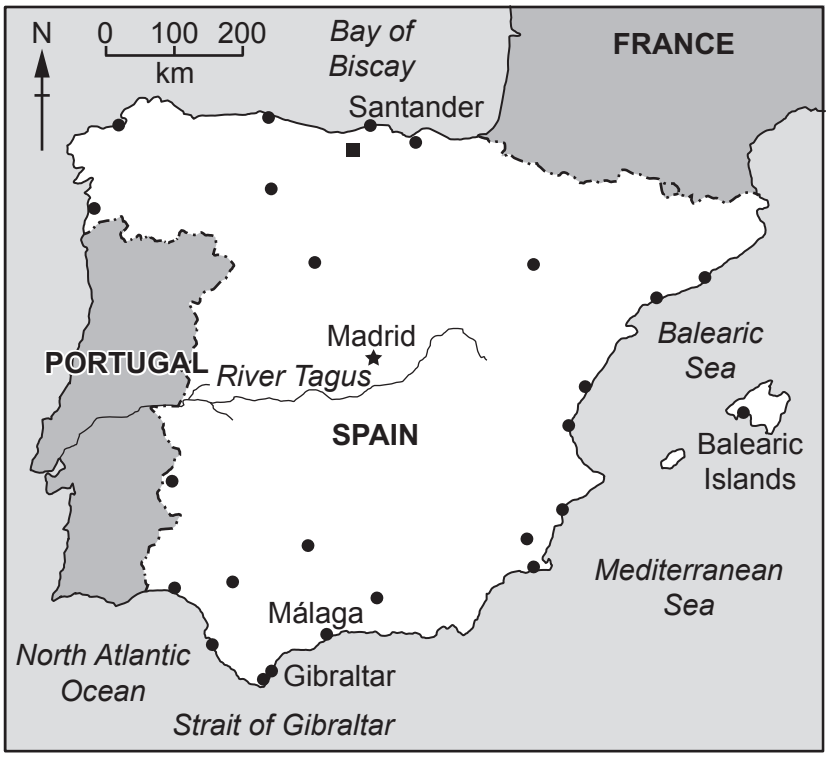
world map showing the location of Spain



map of Spain

Key

- ★ capital city
- ● major city
- ■ Picos de Europa mountains
- river
- international boundary



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Area of Spain: 505 370 km^2

Population of Spain: 50 million (in 2020)

Children per woman: 1.51 (in 2020)

Life expectancy: 82 years

Currency: euro (0.92 euro = 1 USD)

Language: Spanish, Catalan, Galician, Basque and other regional languages

Climate of Spain: the north has warm summers with high precipitation and cool winters; the centre has hot, dry summers and cold winters with little precipitation; the south has hot, dry summers and cool winters with high precipitation

Terrain of Spain: large area of high, flat land, surrounded by hills; mountains in the north

Main economic activities of Spain: food production, tourism, metal manufacture, motor vehicles, medicines

Spain suffered severe economic hardship that began in 2008. Since then, the economy has grown, helped by increased exports. Unemployment has fallen but still remains high. 100% of the population have access to electricity. Of the total area of land, 36% is forested and 54% is used for agriculture.

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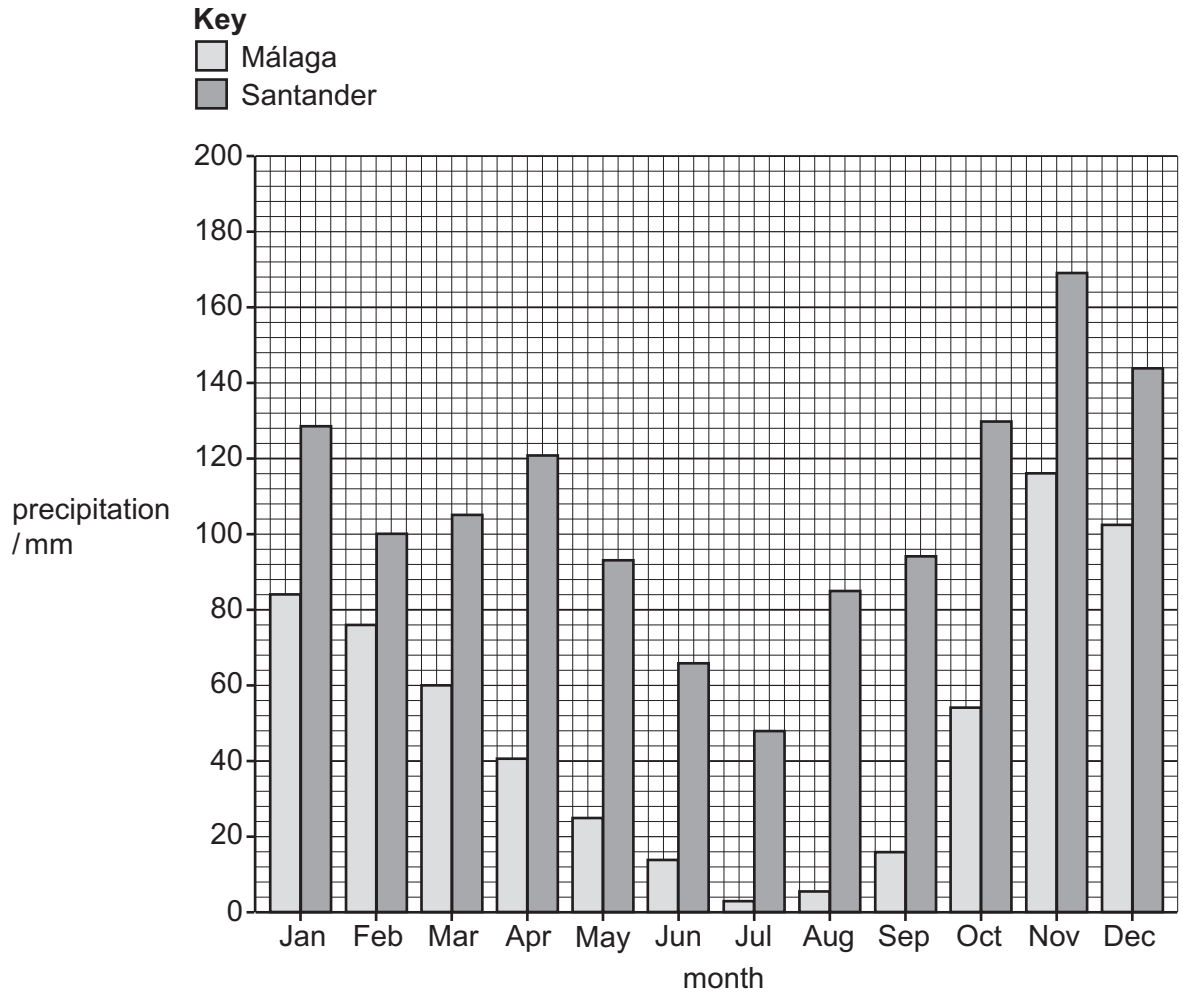
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1 **(a)** Spain has 6390 km^2 of land that is covered by fresh water, such as lakes and rivers.

Calculate the percentage of land in Spain that is covered by fresh water.

..... % [1]

(b) The bar chart shows the precipitation at two locations, Málaga and Santander, in Spain in 2020.



(i) Suggest which location is more likely to experience drought. Give a reason for your answer.

location .....

reason .....
[1]

(ii) Suggest **one** other piece of information that would help to support your answer to **(b)(i)**.

..... [1]

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(iii) The precipitation data are collected on the first day of each month.

Suggest **one** limitation of this data collection method.

.....

..... [1]

(iv) Describe the impacts of drought on soil.

.....

.....

.....

.....

.....

.....

.....

..... [4]

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(v) Drought increases the risk of wildfires.

A strategy for controlling wildfires is to clear an area of forest to create a fire break.

The photograph shows a fire break.



Suggest how fire breaks control the spread of wildfires.

.....

.....

.....

..... [2]

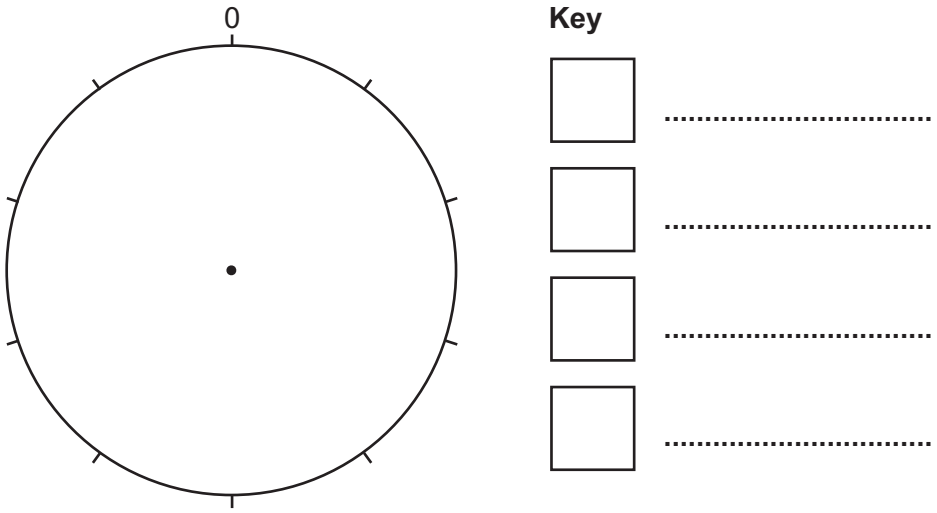
(c) Ground water is a source of fresh water.

A scientist investigates 107 ground water sources in Spain for pollutants.

The results are shown in the table.

main pollutant	percentage of ground water sources
salt	32
nitrate ion	26
other	22
arsenic	20

(i) Draw a pie chart for the data in the table and complete the key.



[4]

(ii) The 107 ground water sources were selected from a total of 699 sources.

Each source had an equal chance of being selected.

State the name of this method of sampling.

..... [1]

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(iii) Another scientist selects ground water sources from only one area of Spain.

Describe a limitation of sampling only one area of Spain.

.....

..... [1]

(iv) Suggest a source of high levels of salt in ground water.

.....

..... [1]

(v) Arsenic is a toxic substance.

Describe how arsenic can bioaccumulate in organisms.

.....

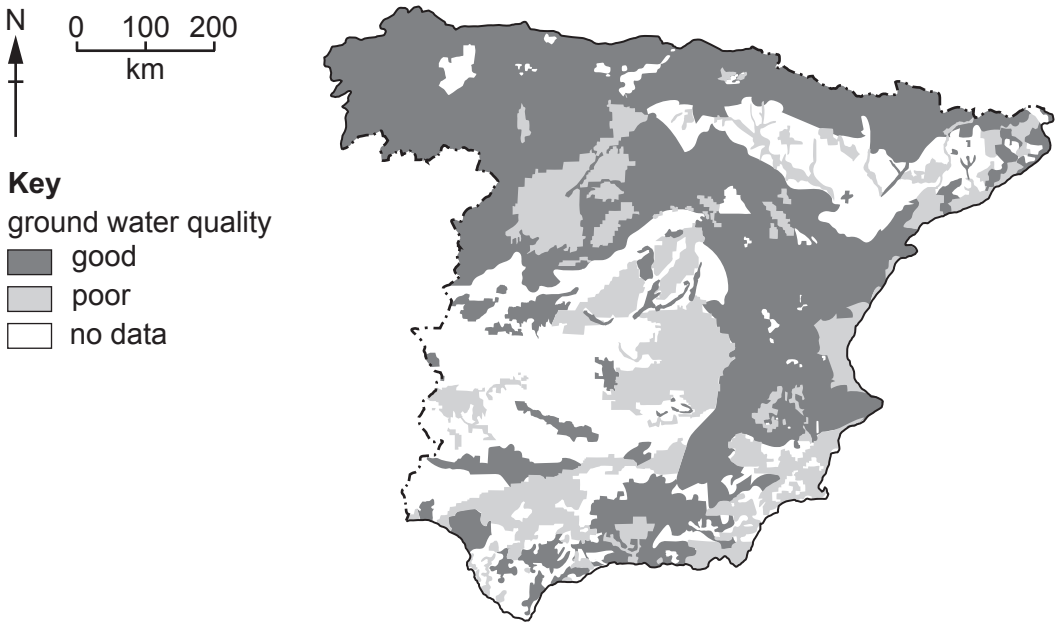
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.....

..... [2]

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(vi) The diagram shows the ground water quality in Spain.



Describe the distribution of poor ground water quality in Spain.

.....

.....

.....

..... [2]

[Total: 21]

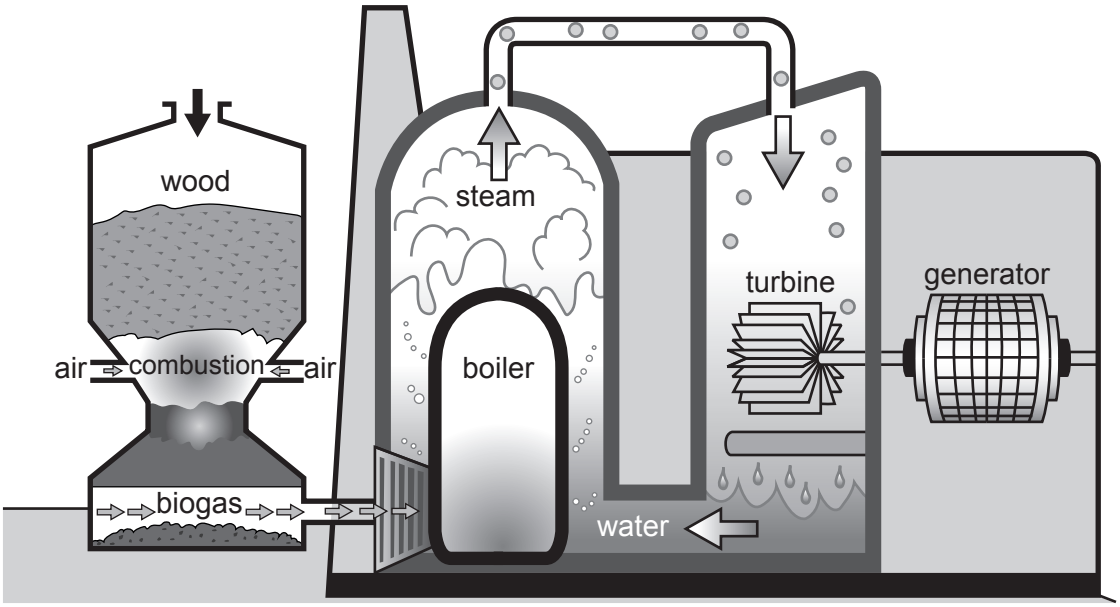
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2 **(a)** Wood from trees can be used to generate electricity.

(i) State the energy source for trees.

..... [1]

The diagram shows how wood is used to generate electricity in some rural locations in Spain.



(ii) Describe how wood is used to generate electricity.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) The electricity generated can be stored in a battery.

Suggest **one** benefit of storing the electricity in a battery.

.....

..... [1]

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(iv) Wood is a biofuel.

Describe **one** advantage and **one** disadvantage of using biofuels to generate electricity compared with using fossil fuels.

advantage .....

.....

.....

disadvantage .....

.....

.....

[2]

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(b) A new power station for converting wood and plant material into electricity opened in 2020 in Spain.

(i) The power station will produce 325 500 MWh per year of electricity and use 238 000 tonnes of wood and plant material.

State the electricity produced per day at the power station.

Give your answer to the nearest whole MWh.

..... MWh [2]

(ii) Questionnaires and face-to-face interviews were used to find out local people's views on the power station.

Suggest the advantages of using a face-to-face interview compared with a questionnaire to find out people's views.

.....

.....

.....

..... [2]

(iii) Suggest reasons why people are in favour of having the power station located in their local area.

.....

.....

.....

..... [2]

(iv) Suggest **two** factors, other than people's views, that must be considered before a power station can be built.

1 .....

.....

2 .....

.....

[2]

[Total: 16]

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3 **(a)** The photograph shows bunches of grapes.



A farmer grows grapes in five fields, A, B, C, D and E.

The farmer exports the grapes. Larger bunches of grapes earn the farmer more money.

The farmer investigates the best soil pH to produce large bunches of grapes.

The farmer:

- tests the soil pH from the five fields
- cuts one bunch of grapes from 10 different grape plants in each field
- measures the mass of the 10 bunches of grapes from each field
- records the results in a table.

field	soil pH	mass of 10 bunches of grapes / kg
A	4.5	40.5
B	5.8	70.6
C	8.2	32.1
D	6.0	82.3
E	7.5	36.8

(i) Suggest why the farmer only cuts **one** bunch of grapes from each plant.

.....

..... [1]

(ii) Calculate the average mass of **10** bunches of grapes.

..... kg [1]

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(iii) Calculate the pH range for the five soils.

..... [1]

(iv) Circle the fields that have acidic soils.

A B C D E

[1]

(v) Use the data to suggest the ideal soil pH for producing grapes.

..... [1]

(vi) Soils with a pH less than 5.5 have low concentrations of phosphorus.

Identify which field would benefit from phosphorus fertiliser.

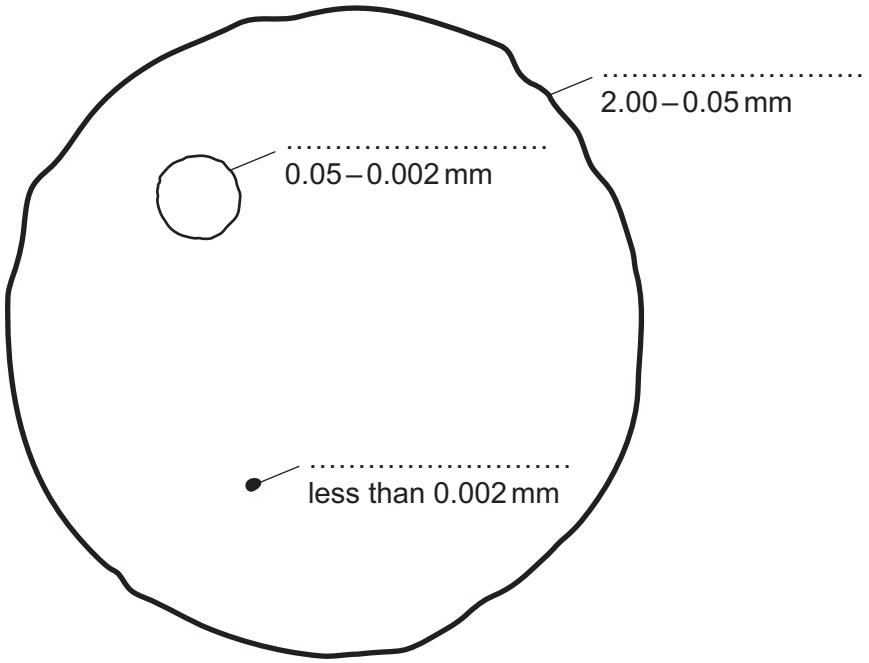
..... [1]

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[Turn over

(vii) The diagram shows the diameters of three mineral particles found in soil.

Complete the diagram with the names of the three mineral particles.



[3]

(viii) The farmer exports the grapes to many countries around the world.

The grapes are packaged into boxes at the farm before being transported for export.

Suggest **one** benefit of packaging the grapes at the farm.

.....

..... [1]

(ix) Grape plants can be genetically modified to make them resistant to cold temperatures.

Suggest why some people are **not** in favour of genetically modified plants.

.....

..... [1]

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(b) Some grape plants can become infected by a disease caused by fungi.

Two methods are used to control the disease:

method 1: Remove and destroy the infected grapes, leaves and stems of the plant.

method 2: Spray the plant with a fungicide.

(i) Suggest why farmers often choose method 2 and spray with a fungicide.

.....

..... [1]

(ii) Suggest why climate change can increase the risk of plant diseases caused by fungi.

.....

.....

.....

..... [2]

(iii) Young grape plants are easily damaged by strong winds.

Suggest how young grape plants can be protected from strong winds.

.....

.....

.....

..... [2]

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(c) The farmer has another 100 m × 100 m field that contains grass and some clover plants. The farmer uses this field for grazing animals.

The farmer wants to estimate the total number of clover plants in the field.

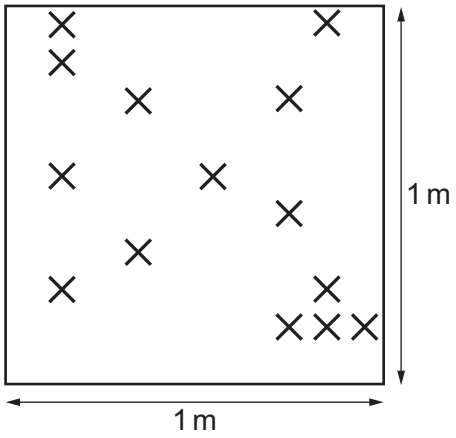
The farmer takes 10 measurements using a quadrat. The results for measurements 1–9 are shown in the table.

measurement	number of clover plants
1	𝍸 II
2	𝍸 𝍸
3	III
4	𝍸 I
5	𝍸 𝍸 𝍸 𝍸 I
6	𝍸 𝍸 𝍸 I
7	𝍸 III
8	I
9	III
10	

(i) The result for measurement 10 is shown in the diagram.

Key

× clover plant



Complete the table to show the result for measurement 10. [2]

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(ii) Describe how the farmer uses the quadrat to collect data and then estimates the total number of clover plants in the 100 m × 100 m field.

method of data collection .....

.....

.....

.....

method of estimation .....

.....

.....

.....

[4]

(iii) The farmer ploughs this field. All the grass and clover plants are left on the surface of the field.

Suggest the benefits of this agricultural technique.

.....

.....

.....

.....

.....

..... [3]

(iv) The farmer is a commercial farmer.

Describe how commercial farming is different from subsistence farming.

.....

.....

.....

..... [2]

[Total: 27]

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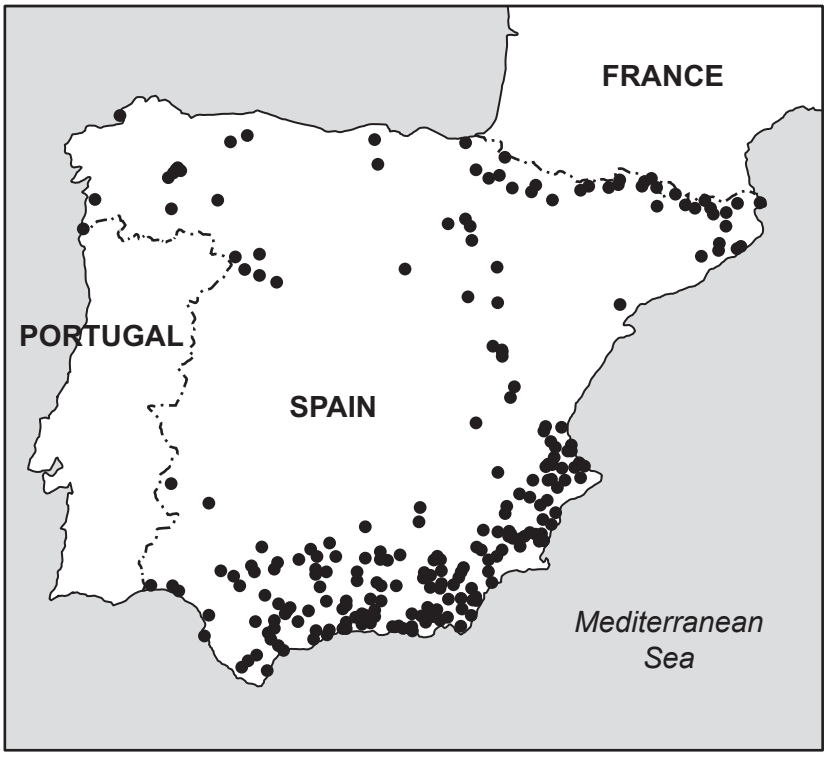
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4 **(a)** The map shows the location of earthquakes in Spain.

Key

- earthquake



Earthquakes can occur along fault lines. A fault line is a large crack in the Earth's crust.

(i) Draw a line on the map to show the possible location of a fault line. [1]

(ii) Suggest why earthquakes occur along fault lines.

.....

..... [1]

(iii) The map was drawn using data from historical reports and data recorded by instruments.

Suggest why data from historical reports on earthquakes are **not** as accurate as data recorded by instruments.

.....

..... [1]

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(iv) The table shows data for the magnitude of the largest earthquakes in Spain and the number of deaths caused by these earthquakes.

date	magnitude	number of deaths
Jan 2016	6.3	0
May 2011	5.1	9
Apr 2010	6.3	0
Apr 1956	5.0	11

Most buildings in Spain are **not** constructed to protect against earthquake damage.

Suggest reasons why this is justified.

.....

.....

.....

..... [2]

(v) Good building design is one strategy for reducing the impacts of an earthquake.

State **two** other strategies and explain how they reduce the impacts of an earthquake.

strategy 1 .....

explanation .....

.....

strategy 2 .....

explanation .....

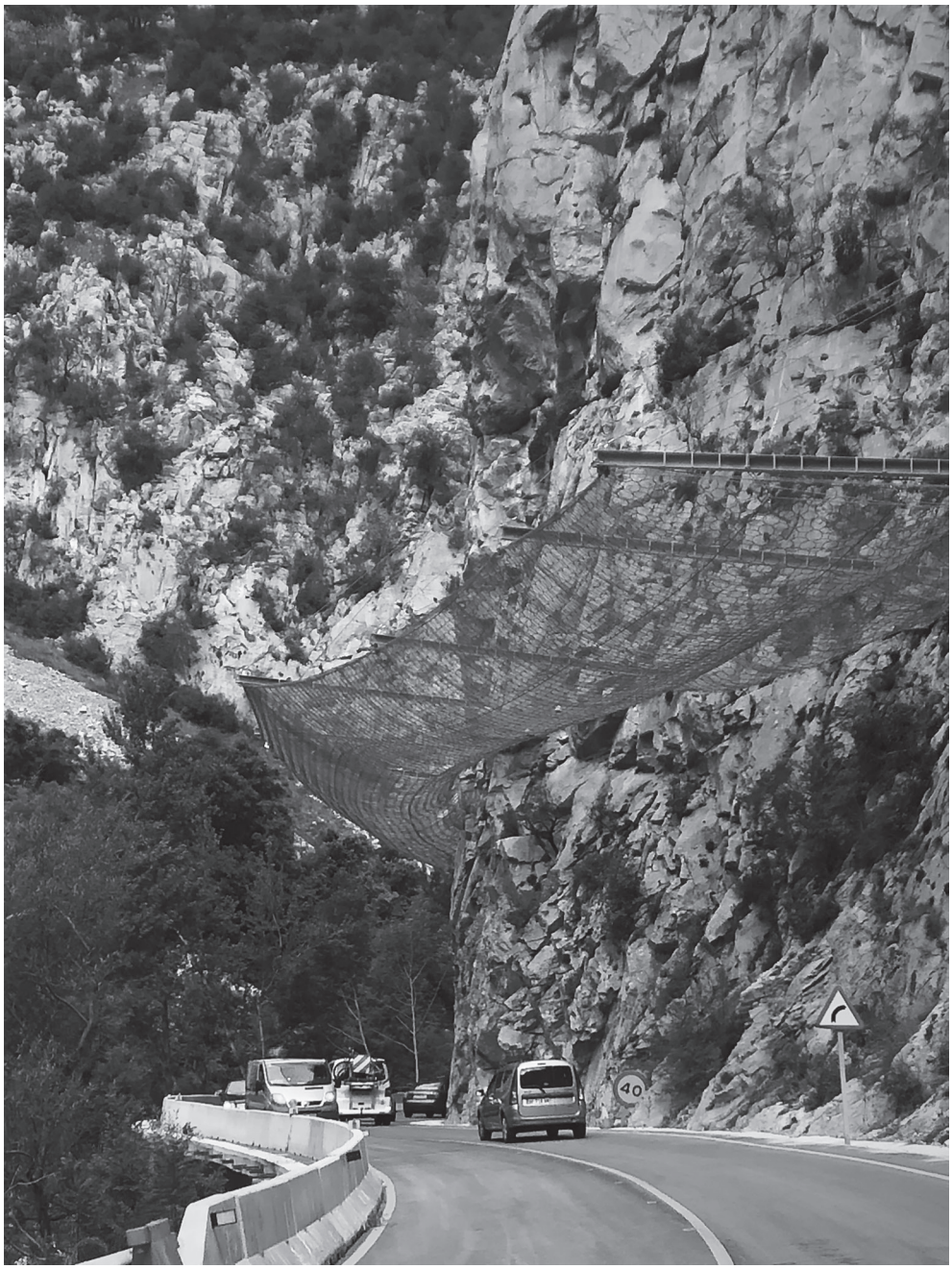
.....

[4]

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(b) Earthquakes can cause landslides.

The photograph shows a management strategy used to protect people from landslides.



Describe how this management strategy protects people from landslides.

.....

..... [1]

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(c) The north of Spain has a mountain range known as the Picos de Europa.

This range is the largest single mass of limestone mountains in Europe.

(i) Describe how limestone rock is formed.

.....

.....

.....

.....

.....

..... [3]

(ii) Explain why emissions from car exhausts are a threat to trees and lakes in these mountains.

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.....

.....

..... [3]

[Total: 16]

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