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ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 Management in Context **October/November 2024**

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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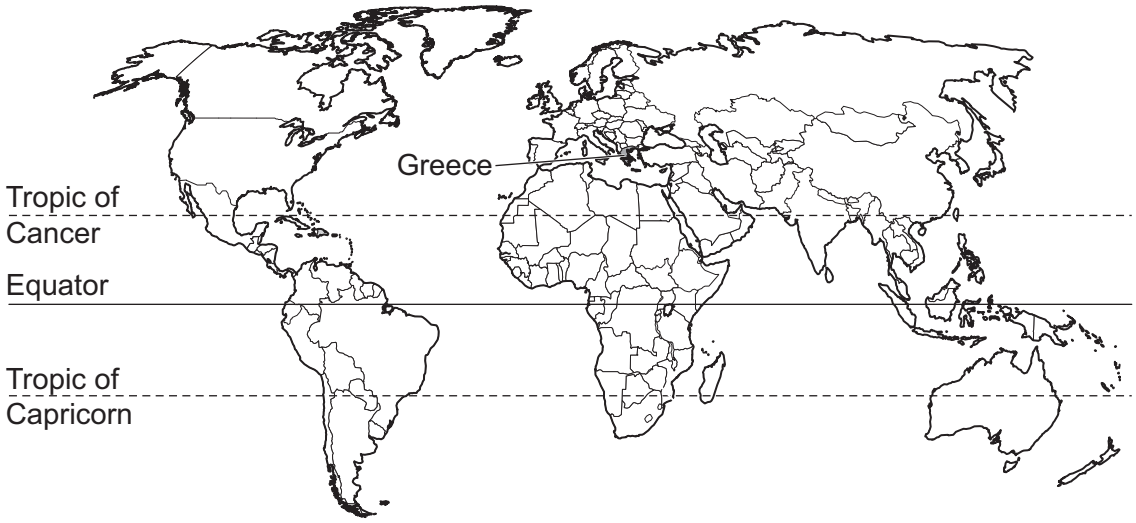
world map showing the location of Greece



map of Greece

Key

★ capital city

international boundary

DO NOT WRITE IN THIS MARGIN

Area of Greece: 131 957 km^2

Population of Greece: 10 300 000 (in 2022)

Children per woman: 1.39 (in 2022)

Life expectancy: 81.3 years

Currency: Euro (€1 = 1.10 USD in 2022)

Language: Greek

Climate of Greece: mild, wet winters; hot dry summers

Terrain of Greece: mountainous mainland with a very long coastline, forests and lakes and many islands

Main economic activities of Greece: tourism, shipping, textiles, extraction of minerals, agriculture

The population has access to electricity and drinking water. 35% of the population are unemployed. One third of the population lives in the capital city of Athens. The climate of Greece attracts many tourists. Earthquakes are common and there are many volcanoes. Most of the volcanoes are extinct and visiting these volcanoes is a popular tourist activity.

DO NOT WRITE IN THIS MARGIN

1 Cotton is a cash crop grown in Greece. Cotton is used to make textiles.

The photograph shows a cotton plant in a field in Greece.

(a) Greece is the largest cotton-producing country in Europe. In 2022, there were 45 000 cotton farmers in Greece.

Calculate the percentage of the population of Greece that were cotton farmers in 2022.

.....% [1]

(b) Food insecurity is when people do **not** have access to a reliable source of food.

Suggest why growing cotton plants can lead to food insecurity.

.....

.....

.....

..... [2]

DO NOT WRITE IN THIS MARGIN

(c) Cotton plants use the process of photosynthesis to grow.

(i) State the source of energy for photosynthesis.

..... [1]

(ii) Photosynthesis takes place in green leaves.

State the compound that gives plants their green colour.

..... [1]

(iii) State the word equation for photosynthesis.

..... [2]

(iv) State the general name for plants in a food web.

..... [1]

(d) The cotton crop is harvested using machines.

Suggest advantages and disadvantages of using machines rather than people to harvest crops.

advantages .....

.....

.....

.....

.....

disadvantages .....

.....

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.....

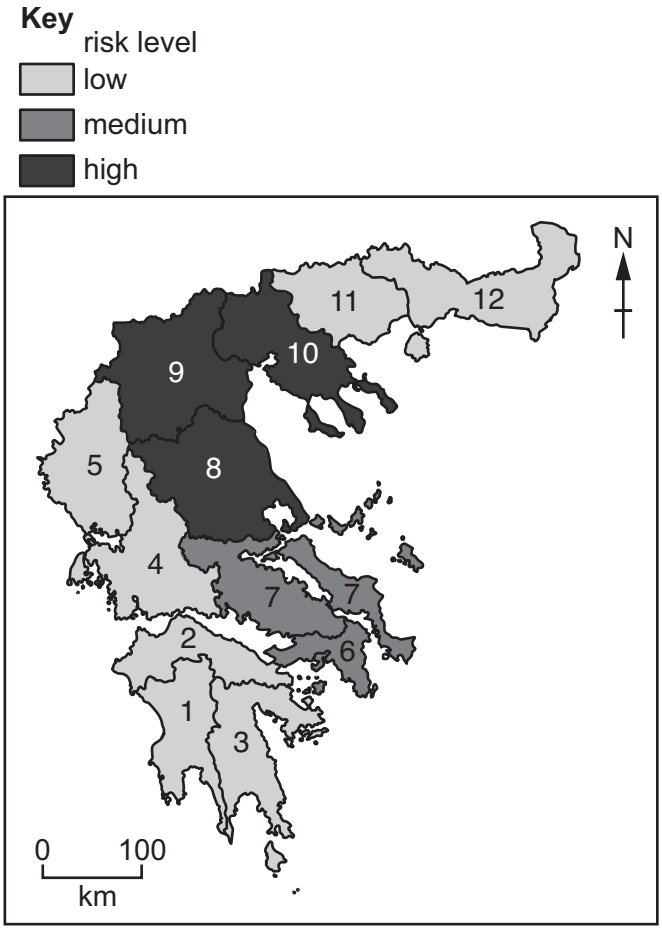
.....

[4]

DO NOT WRITE IN THIS MARGIN

(e) Water is extracted from ground water to irrigate crops like cotton. Water is added back to the ground water as part of the water cycle.

(i) The map shows 12 regions of mainland Greece and the risk of ground water shortages in each region.



State the number of regions identified as having a high risk of ground water shortages.

..... [1]

(ii) Explain how urbanisation can cause ground water shortages.

.....

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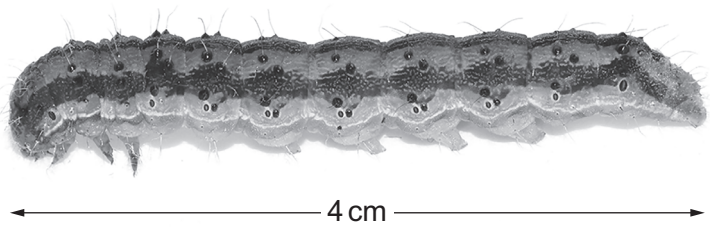
.....

..... [3]

DO NOT WRITE IN THIS MARGIN

(f) The cotton bollworm is an insect pest of cotton in Greece.

The photograph shows the larva of a cotton bollworm insect.



One method of controlling the impact of the cotton bollworm is to hand-pick the larvae from the cotton plant.

Suggest **two** limitations of this method.

1 .....

.....

2 .....

.....

[2]

DO NOT WRITE IN THIS MARGIN

(g) Another method for controlling the impact of the cotton bollworm is to spray the cotton plant with an insecticide.

A farmer wants to compare the effect of different insecticides on the yield of cotton from five different fields, **A** to **E**.

The cotton plants in:

- fields **A**, **B** and **C** are treated with different insecticides
- field **D** is treated with a biological control
- field **E** is **not** treated with an insecticide or a biological control.

field	yield / kg per ha
A	415
B	120
C	450
D	410
E	250

(i) Explain why an insecticide is **not** used in field **E** in this investigation.

.....

..... [1]

(ii) Calculate the range in yield for the five fields.

range = ... kg per ha [1]

(iii) Calculate the mean yield for the five fields.

mean yield = ... kg per ha [1]

(iv) The farmer concludes that field **B** has poor soil quality.

Suggest why this may **not** be a valid conclusion.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(v) Healthy soil contains mineral ions.

State the formula for the ion that provides:

- nitrogen .....
- phosphorus .....
- potassium. .....

[3]

(vi) State **two** components of soil other than mineral ions.

1 .....

2 .....

[2]

(vii) Suggest **two** reasons why the farmer chooses to use a biological control rather than an insecticide.

1 .....

.....

2 .....

.....

[2]

(viii) Genetically modified (GM) cotton is grown in some countries.

State **one** benefit of a GM crop.

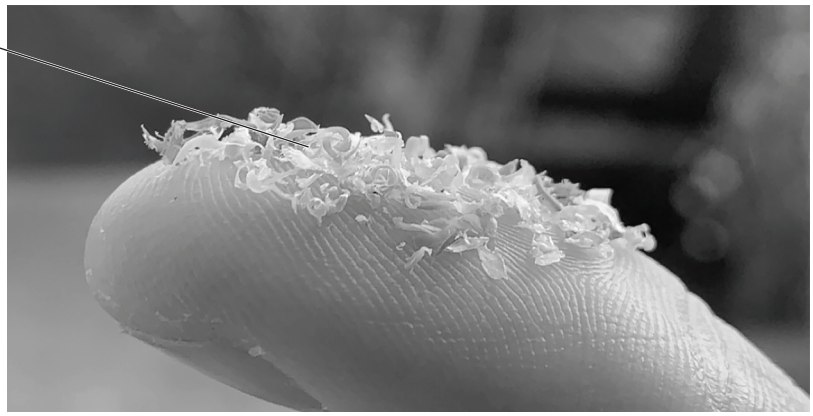
.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(h) Polyester is an alternative textile to cotton. Polyester is a type of plastic.

The photograph shows microplastic fibres which are produced when polyester textiles are washed.



(i) Suggest **three** environmental impacts of **washing** polyester textiles.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(ii) Polyester is made from crude oil. Crude oil is a fossil fuel.

Suggest **two** negative impacts of **making** polyester textiles.

1 .....

.....

2 .....

.....

[2]

[Total: 35]

DO NOT WRITE IN THIS MARGIN

2 **(a)** A student records some data on the number of earthquakes in a region of Greece during a 10-year period.

number of earthquakes
卌 卌 卌 卌 IIII

(i) State the number of earthquakes the student records.

..... [1]

(ii) A student writes a report on the impact of these earthquakes on people.

Describe the information the student needs for this report.

.....

.....

.....

.....

.....

..... [3]

(b) State why monitoring earthquake activity can reduce the impact of an earthquake.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

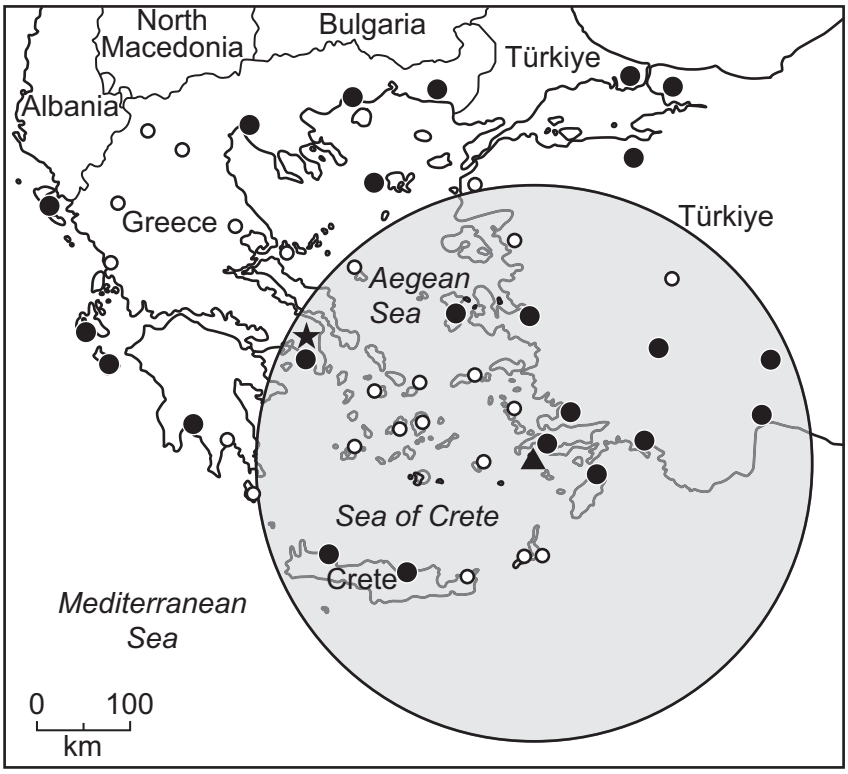
(c) The Greek island of Nisyros has a permanent population of 900. Nisyros is a popular tourist destination and 60 000 tourists visit the island each year.

Scientists predict the impact on air travel of a volcanic eruption on Nisyros.

The diagram shows a 300 km radius from Nisyros that could be affected by a volcanic eruption.

Key

★ Athens
▲ Nisyros island
● international airport
○ domestic airport
◯ 300 km radius



(i) State the number of **international** airports predicted to be affected by the volcanic eruption in the diagram.

..... [1]

(ii) Suggest why strategies for managing the impact of volcanic eruptions should include international agreement.

.....

..... [1]

DO NOT WRITE IN THIS MARGIN

(d) Volcanoes that erupt under the sea can cause a tsunami.

State what is meant by a tsunami.

..... [1]

(e) Geothermal energy is used in some areas with volcanic activity to generate electricity.

The stages in generating electricity from geothermal energy are shown.

The stages are **not** in the correct order.

A Hot rocks underground heat water to form steam.
B Cooled water is pumped back underground to be reheated.
C Pipes are drilled to underground hot rocks.
D Steam is cooled and condenses back to water.
E Steam rises through pipes.
F Steam turns the blades of turbines.
G Turbines turn generators.

Put the stages in order. One has been done for you.

C						

[3]

(f) State **two** factors that affect the demand for electricity.

1 .....

2 .....

[2]

(g) Fracking is a strategy used to extract a fossil fuel.

(i) State which fossil fuel is extracted by fracking.

..... [1]

(ii) Fracking extracts fossil fuel from a type of rock.

Suggest this type of rock.

..... [1]

(iii) In 2022, fracking was **not** allowed in Greece.

State **one** concern about the use of fracking to extract fossil fuels.

..... [1]

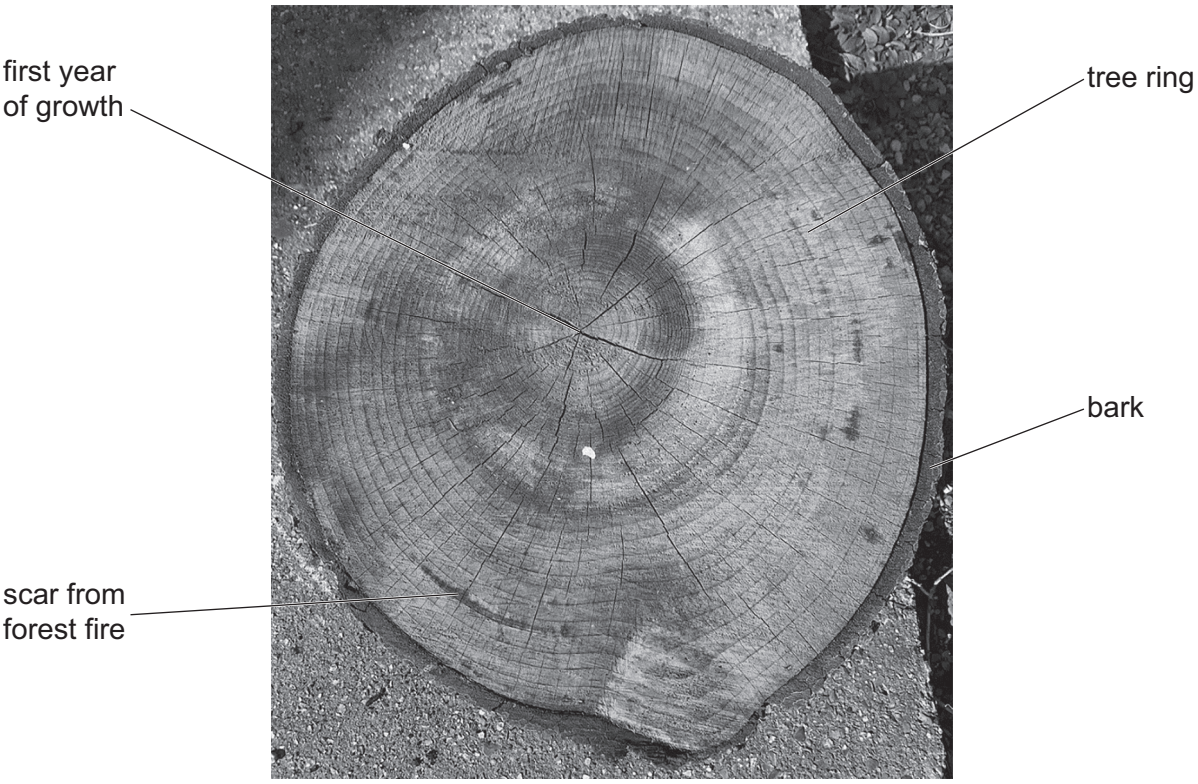
[Total: 16]

DO NOT WRITE IN THIS MARGIN

3 **(a)** Tree rings are used to investigate past environmental conditions. One tree ring represents one year of tree growth.

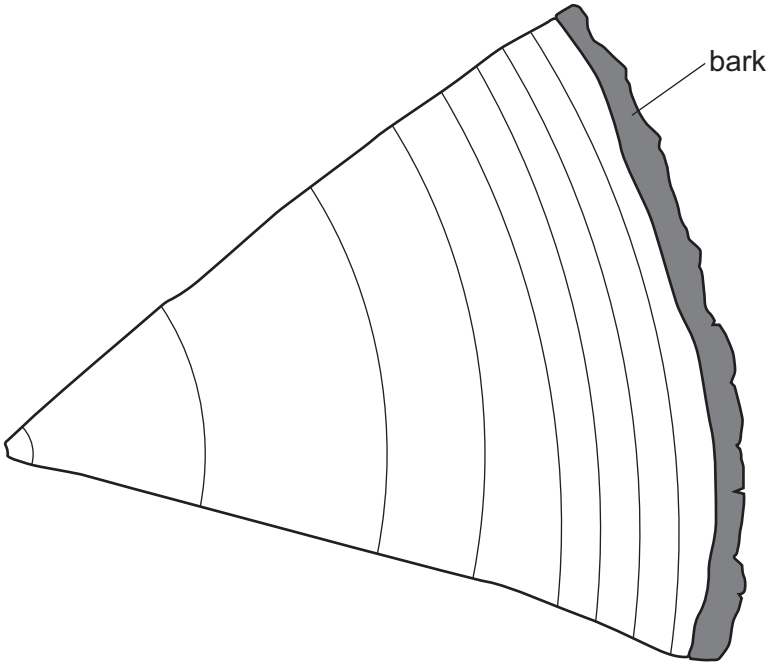
Tree rings are wider apart in wet years and are closer together in dry years.

The photograph shows tree rings from a tree in Greece.



DO NOT WRITE IN THIS MARGIN

The diagram shows a section of the tree rings from a different tree.
The tree is 9 years old.



Describe and explain what the diagram shows.

.....

.....

.....

..... [2]

(b) Evidence of forest fires is seen as dark patches in tree rings.

In 2021, there were thousands of wildfires in Greece. Three people were killed and many others were injured.

(i) The table compares the area of land burnt by wildfires in Greece in two years.

year	area of land burnt / ha
2020	9300
2021	527 000

Calculate the percentage increase in the area of land burnt from 2020 to 2021.

Give your answer to the nearest whole percent.

..... % [2]

DO NOT WRITE IN THIS MARGIN

(ii) Suggest **one** reason why some people blame climate change for the number of wildfires in 2021.

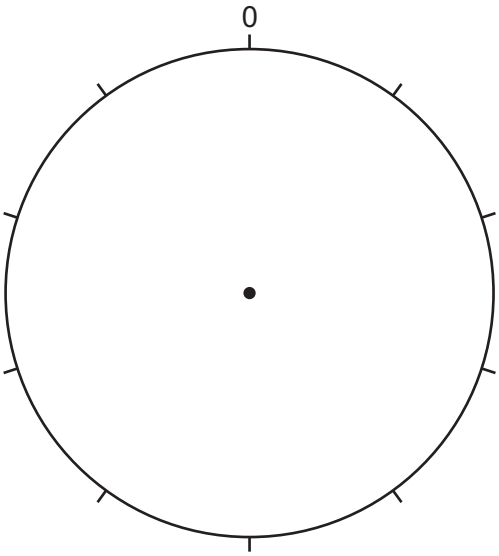
.....

..... [1]

(iii) The table shows the causes of wildfires in Greece in one year.

cause	percentage
accidental	25
deliberate	20
natural	3
unknown	52

Plot the data as a pie chart and complete the key.



Key

☐ .....

☐ .....

☐ .....

☐ .....

[4]

(iv) Suggest **three** economic impacts of wildfires.

1 .....

.....

2 .....

.....

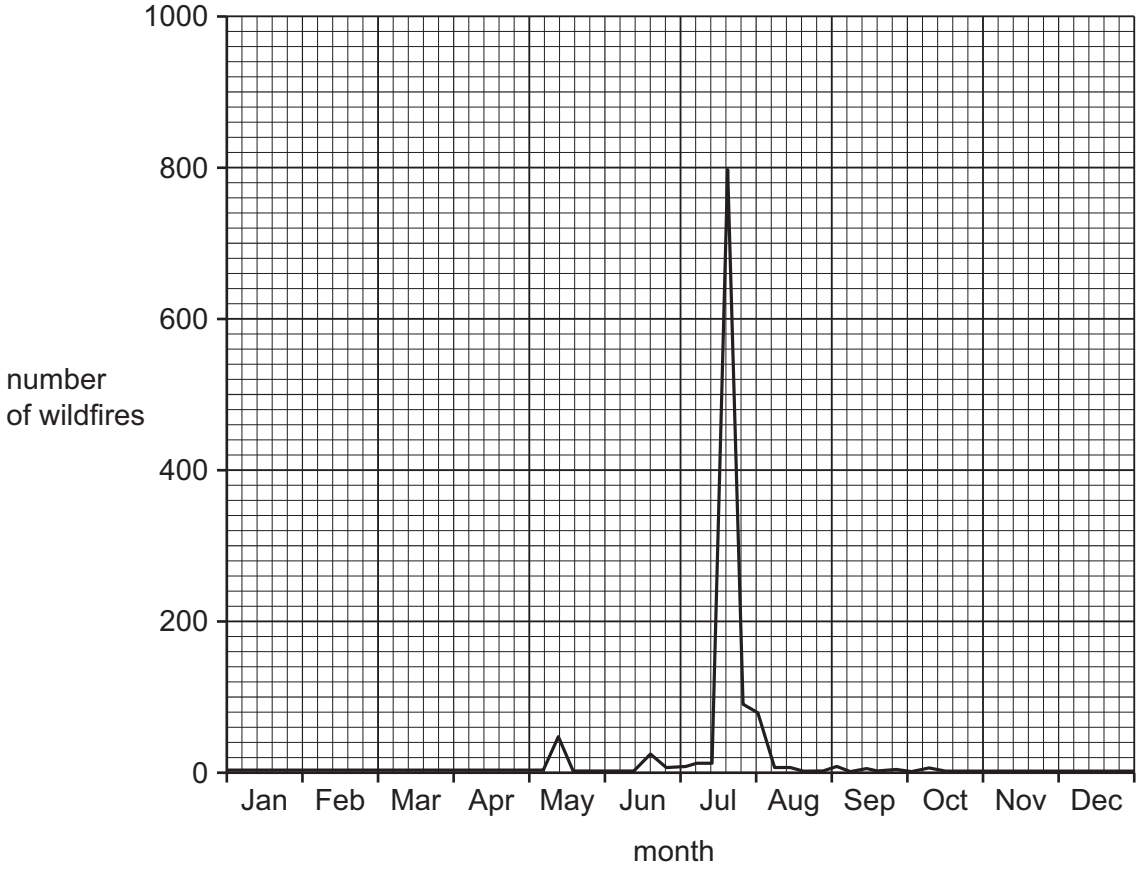
3 .....

.....

[3]

DO NOT WRITE IN THIS MARGIN

(c) The graph shows the number of wildfires in Greece in one year.

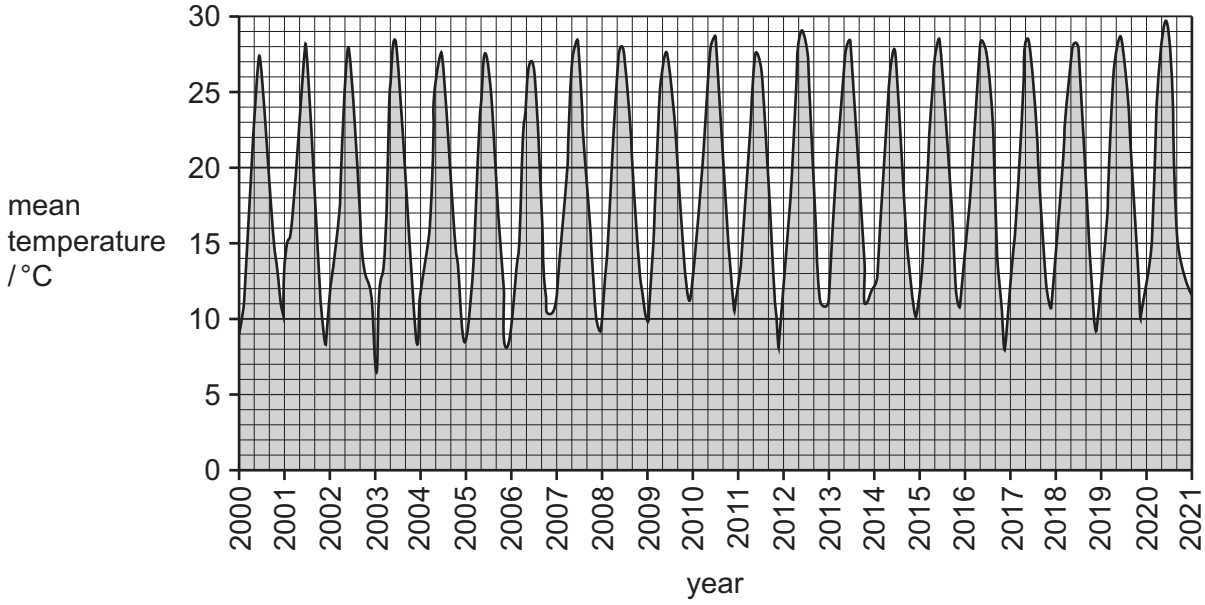


State the **two** months with the most wildfires.

..... [1]

DO NOT WRITE IN THIS MARGIN

(d) The graph shows data from the internet about the temperature in Greece from 2000 to 2021.



(i) Describe the trends in the data shown in the graph.

.....

.....

.....

..... [2]

(ii) Suggest **two** reasons why it is **not** possible to make conclusions about climate change using only this data.

1 .....

.....

2 .....

.....

[2]

(iii) Suggest **two** reasons why people living on Greek islands could be more affected by climate change than people living on the mainland of Greece.

1 .....

.....

2 .....

.....

[2]

[Total: 19]

DO NOT WRITE IN THIS MARGIN

4 Air quality is measured in Greece.

The concentrations of particulates, oxides of nitrogen and sulfur dioxide are measured.

(a) Explain why sulfur dioxide in the air is a concern.

.....

.....

.....

.....

.....

..... [3]

(b) Oxides of nitrogen and particulates form smog.

(i) State what is meant by an atmospheric temperature inversion.

.....

..... [1]

(ii) State why an atmospheric temperature inversion increases the impact of smog.

.....

..... [1]

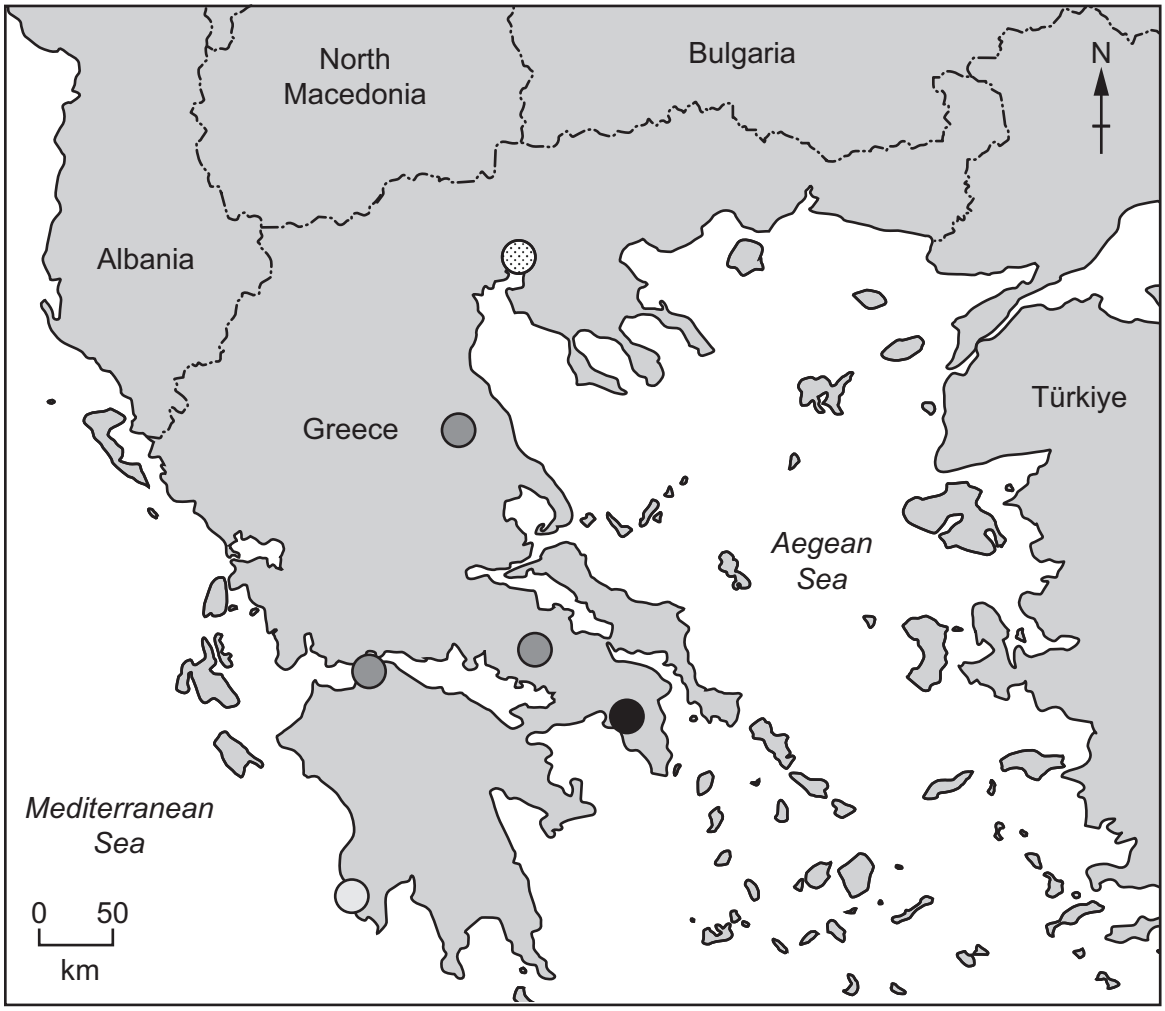
DO NOT WRITE IN THIS MARGIN

(c) Air quality is measured at monitoring stations.

The map shows the measured air quality for one day in Greece.

Key

- good
- moderate
- poor
- very poor



(i) Suggest **three** reasons for poor air quality.

1 .....

.....

2 .....

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3 .....

.....

[3]

DO NOT WRITE IN THIS MARGIN

(ii) A student concludes that the air quality in Greece is good.

Is this a valid conclusion?

Give reasons for your answer.

.....

.....

.....

..... [2]

[Total: 10]

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