Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

0112202694

ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 Management in context **October/November 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **21** printed pages and **3** blank pages.

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[Turn over

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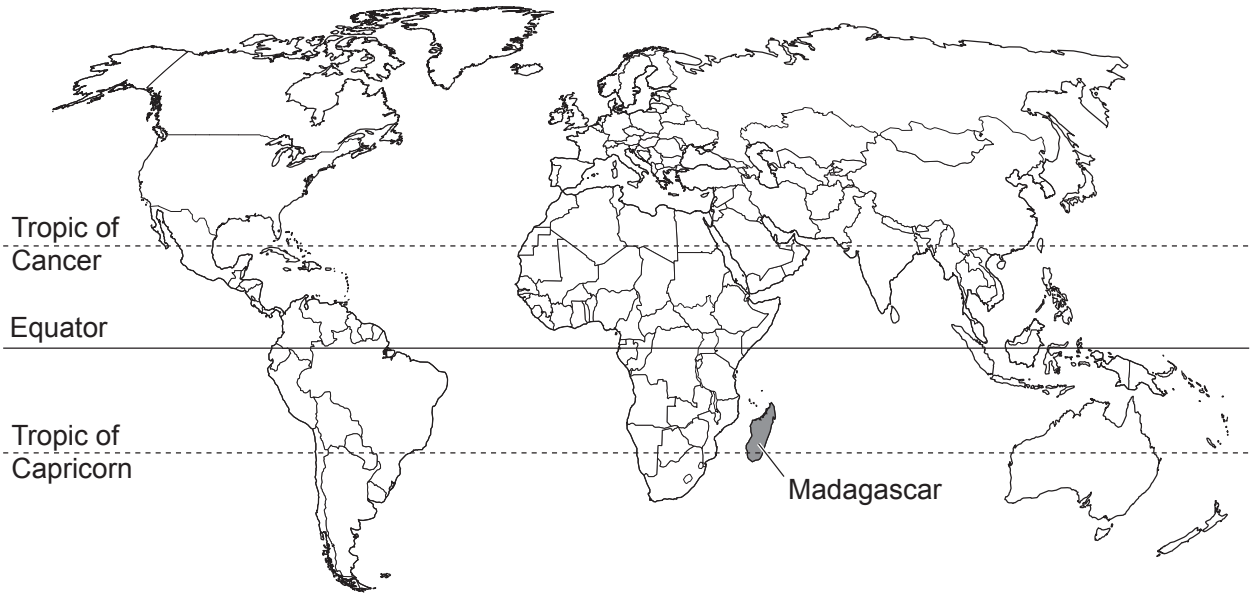
world map showing the location of Madagascar



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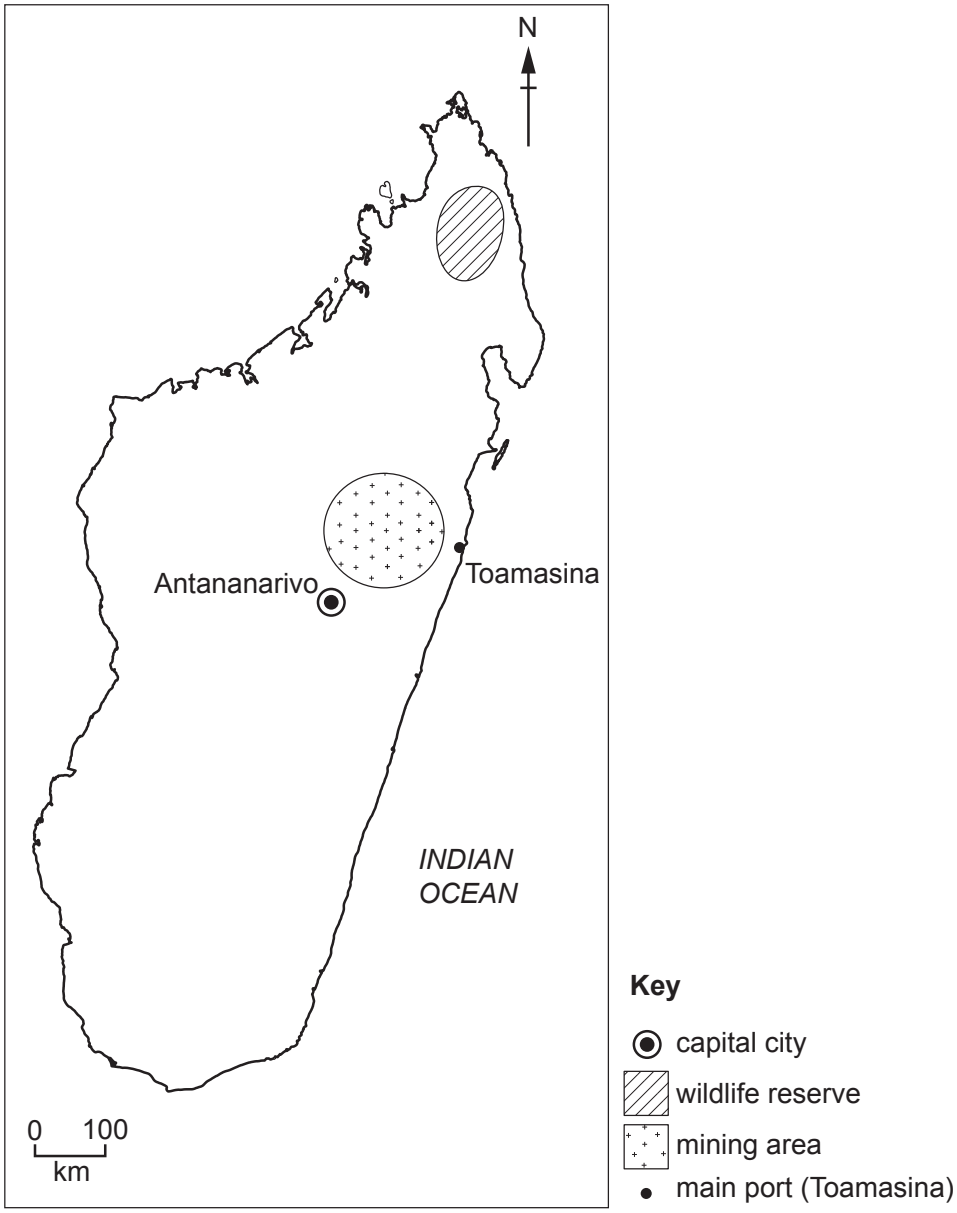
map of Madagascar



Area of Madagascar: 587 041 km^2

Population: 25.6 million (in 2017)

Children per woman: 4.12

Life expectancy: 65.9 years

Currency: Malagasy ariary (2940 MGA = 1 USD)

Languages: French, Malagasy, English

Climate of Madagascar: tropical along the coast, temperate inland, very little rain (arid) in the south

Terrain of Madagascar: narrow coastal plains and mountains inland

Main exports of Madagascar: agricultural products (coffee, lychees, vanilla and sugar), chromite, petroleum products and textiles

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Madagascar is the fourth largest island in the world. In 2017, 60% of the population lived in rural areas. Agriculture is the main economic activity. Mining and oil exploration are a developing part of the economy. The island has a high biodiversity including many endemic species, which are species found nowhere else in the world. There is great potential for sustainable tourism. Madagascar has very few roads and many people have a low standard of living.

1 **(a)** **(i)** Calculate the number of people living in rural areas in Madagascar in 2017.

..... [1]

(ii) Suggest **two** reasons why most people living in rural areas in Madagascar do **not** think they will benefit from the development of sustainable tourism.

1 .....

.....

2 .....

.....
[2]

(iii) As many as 300 000 tourists visit Madagascar each year.

Suggest **three** services that are needed by tourists.

1 .....

.....

2 .....

.....

3 .....

.....
[3]

(iv) Suggest **two** environmental problems that can be caused by large numbers of tourists.

1 .....

.....

2 .....

.....
[2]

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(b) Many tourists visit Madagascar to see the wildlife.

The photograph shows two lemurs. Lemurs are an endemic species in Madagascar.

Madagascar has 101 different species of lemur. Each species is adapted to a particular habitat.

(i) A recent survey of Madagascar found that 42 species of lemur are at risk of extinction.

Calculate the percentage of lemur species that are **not** at risk of extinction.

..... % [2]

(ii) Define the term *habitat*.

.....

..... [1]

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(iii) The habitat of many species of lemur has been reduced in recent years by deforestation.

Explain why deforestation occurs in some less economically developed countries (LEDCs).

.....

.....

.....

..... [2]

(iv) Explain how soil changes after trees have been removed.

.....

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.....

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.....

.....

..... [4]

(v) Lemurs eat fruits, flowers and small insects.

Explain why lemurs can be classified as both a primary and a secondary consumer.

.....

.....

.....

..... [2]

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(c) An area of mountainous rainforest covering 32 000 hectares has been set up as a wildlife reserve to protect 12 different species of lemur. Some tourists visit the wildlife reserve after a long journey over a rough track. There is a small visitor centre. If tourists stay overnight they have to sleep in a tent and bring their own food.

The following activities also take place in the reserve:

- plant and animal populations are surveyed by scientists
- trees are replanted by local people
- methods of sustainable farming are taught to local people
- fuel-efficient cooking stoves are promoted.

(i) Explain why surveys of plant and animal populations need to be done regularly.

.....

.....

.....

..... [2]

(ii) Describe **three** different methods of sustainable farming.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

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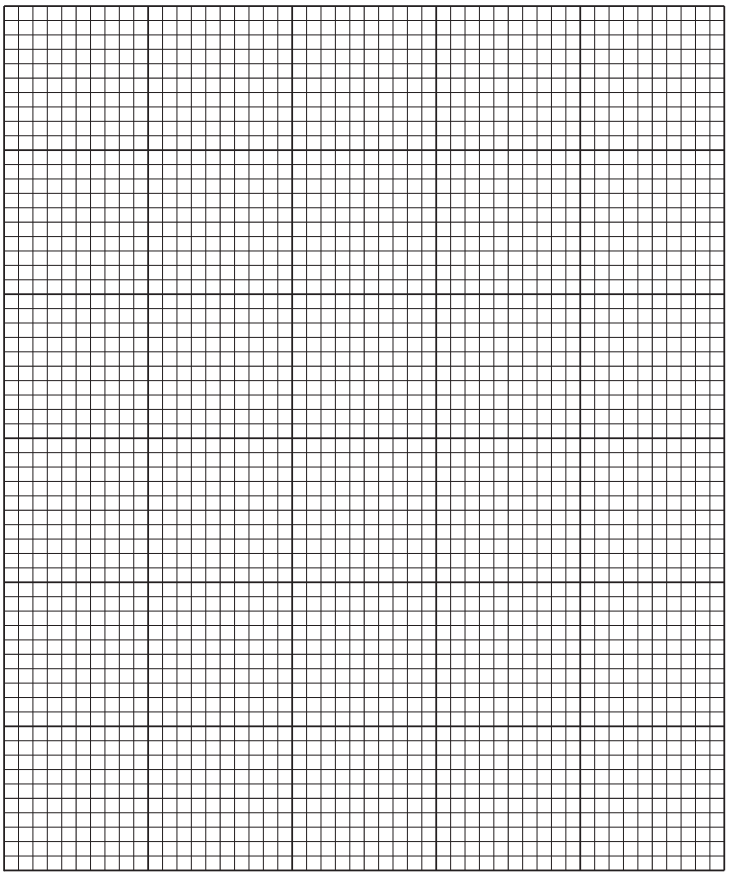
(d) Fuel-efficient cooking stoves reduce emissions of carbon dioxide.

The table shows the estimated sales of fuel-efficient cooking stoves over a 7-year period for one region of Madagascar.

year	estimated sales of fuel-efficient cooking stoves / thousands
1	2.0
2	5.5
3	11.0
4	18.0
5	26.5
6	36.0
7	45.0

(i) Plot a line graph of the data.



[4]

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(ii) Use your graph to predict the estimated sales of fuel-efficient cooking stoves in year 8.

..... [1]

(iii) Suggest **two** advantages to local people who live in rural areas of using fuel-efficient cooking stoves.

1 .....

.....

2 .....

.....
[2]

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(e) There are about 800 different species of orchid plant found only in Madagascar.

The photograph shows the flower of one species of orchid.

(i) Explain why an orchid plant is classified as a producer.

.....

..... [1]

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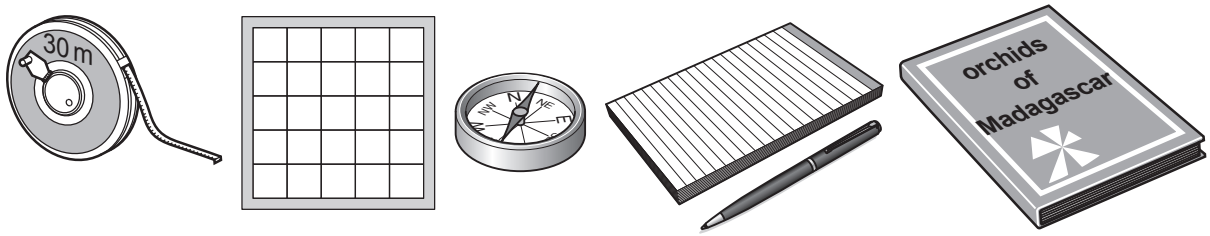
(ii) This orchid species is under threat from people collecting plants illegally.

A scientist decided to monitor the population of this orchid species to find out if any of three locations along a path had been visited by people collecting plants illegally.

The diagram shows the scientist's equipment.



30 m tape | 1 × 1 m square quadrat | compass | notebook and pen | book

Describe a method the scientist could use to monitor the population of this orchid species using the equipment shown in the diagram.

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..... [6]

[Total: 38]

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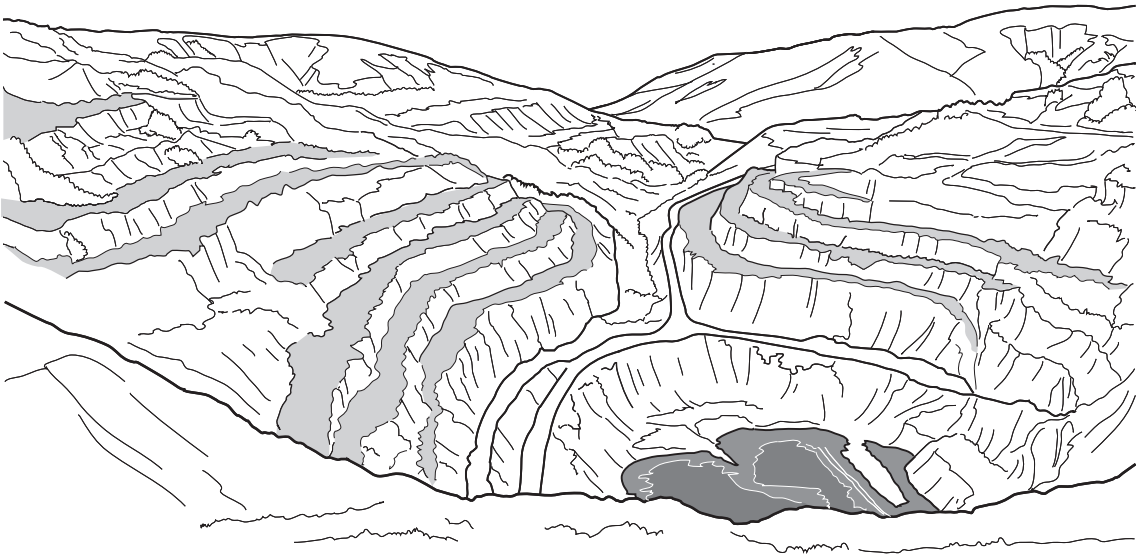
2 **(a)** The drawing shows a disused chromite mine near the port of Toamasina.



The disused chromite mine was reopened in 2009.

(i) Identify the type of mine shown in the drawing.

..... [1]

(ii) Suggest **two** benefits of mining in this way.

1 .....

.....

2 .....

.....
[2]

(iii) The chromite is being mined from igneous rock.

Explain how igneous rock is formed.

.....

.....

.....

..... [2]

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(iv) The ore is processed at the mine to increase the concentration of chromite in the crushed ore. The crushed ore is taken to the port of Toamasina for export.

Suggest **one** reason why the ore is processed at the mine.

.....

..... [1]

(v) A mining company has a permit to explore and then mine an area of 2000 km^2.

Describe the environmental impacts of starting a new mine.

.....

.....

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.....

..... [3]

(vi) Describe **two** economic impacts of mining.

1 .....

.....

2 .....

.....
[2]

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(b) Chromite is exported to other countries. Most chromite is used in the manufacture of stainless steel.

In 2010 the world price of chromite reached 3000 USD per tonne. By 2012 the price had fallen to 2000 USD per tonne.

(i) Calculate the percentage decrease in the world price of chromite per tonne from 2010 to 2012.

.....% [2]

(ii) Suggest **two** reasons why the world price of chromite decreased.

1 .....

.....

2 .....

.....
[2]

(iii) Describe ways chromite can be used sustainably.

.....

.....

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..... [3]

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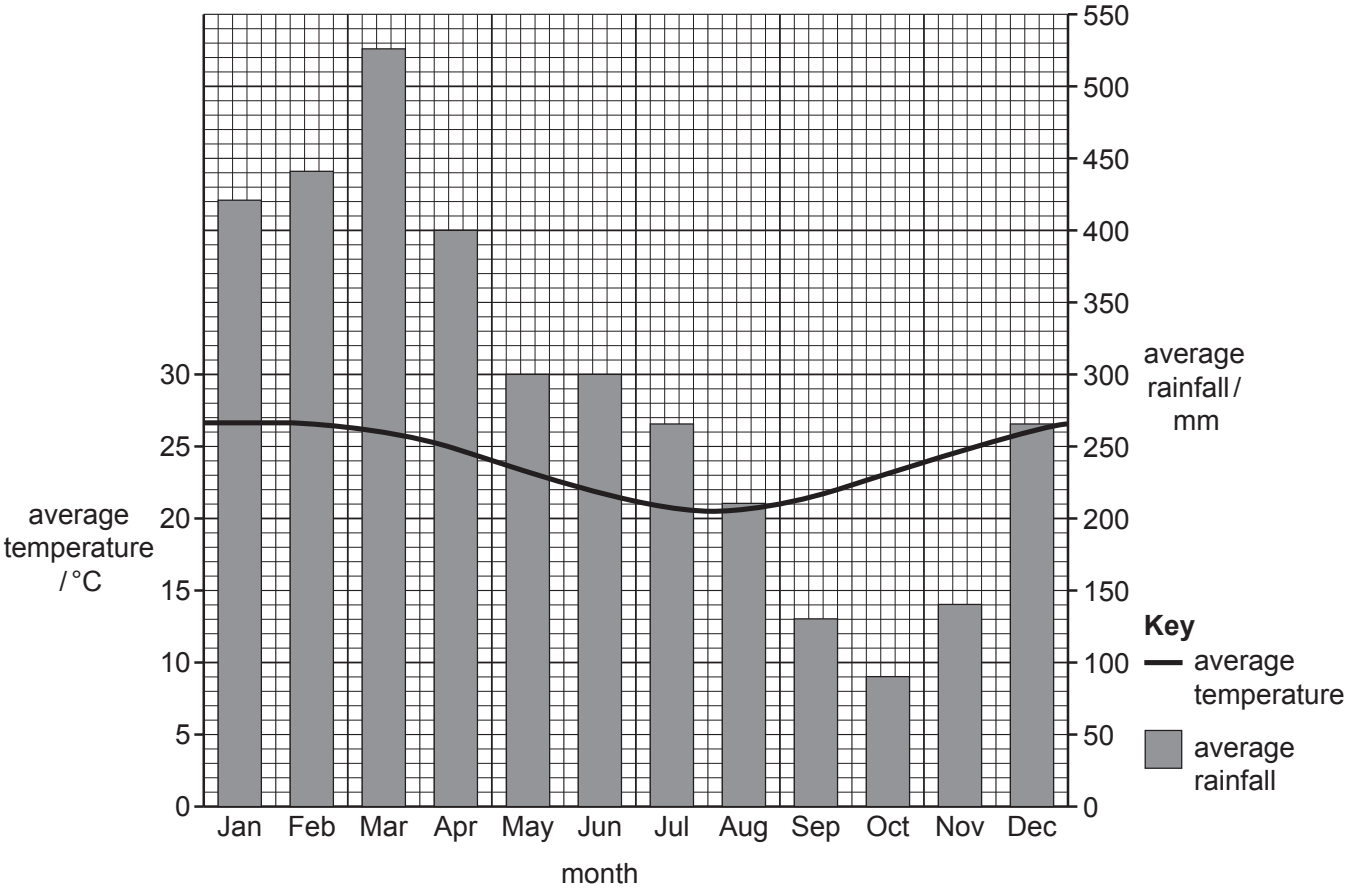
(c) The graph shows climate data from a weather station near the chromite mine.



(i) Suggest why there is a high risk of toxic chemicals being washed out of the mining waste.

.....

.....

.....

..... [2]

(ii) Some toxic chemicals can bioaccumulate in the environment.

Describe the process of bioaccumulation.

.....

.....

.....

.....

.....

..... [3]

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(d) There is a lake near the chromite mine.

A local fisherman said,

> I used to catch lots of large fish.
> I only catch a few large fish now, mainly I catch small fish.

(i) Suggest why there are only a few large fish to catch.

.....

..... [1]

(ii) Describe possible changes in the food chain that could explain why local fishermen mainly catch small fish.

.....

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.....

..... [2]

(iii) Do you think fishing in this lake is a sustainable activity? Explain your point of view.

.....

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..... [3]

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(e) The photograph shows the lake near the chromite mine.

Water hyacinth plants grow rapidly and cover large areas of the lake.

Two fishermen were talking about the lake.

We have to remove water hyacinth plants every year so we can get our boats to the fishing area.

Now the chromite mine has started working again we have to spend more time removing water hyacinth plants.

Suggest **one** way the water hyacinth plants that are removed from the lake could be used by local people.

.....

..... [1]

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(f) A student wanted to find out if toxic chemicals from the mining waste increase the number of water hyacinth plants.

The following method was used:

- six large pots were labelled **A** to **F**
- each pot was filled with water containing a different concentration of toxic chemicals
- 60 small water hyacinth plants of the same size were collected from an unpolluted lake
- 10 of these plants were placed in each pot
- the number of living plants in each pot was recorded after 14 days.

The results are shown in the table.

	pot					
	A	**B**	**C**	**D**	**E**	**F**
concentration of toxic chemicals / ppm*	0.0	0.5	0.75	1.0	2.0	5.0
number of plants at the start	10	10	10	10	10	10
number of plants after 14 days	20	23	27	17	15	13
increase in number of plants	.....	.....	.....	.....	.....	.....

*ppm = parts per million

(i) Complete the table to show the increase in the number of plants in each pot. [1]

(ii) Explain why the student included pot **A** in their method.

.....

..... [1]

(iii) State **two** factors the student should keep the same over the 14 days of the experiment.

1 .....

.....

2 .....

.....

[2]

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(iv) Describe the pattern shown by the results.

.....

.....

.....

..... [2]

(g) The student decided to take samples of water from the lake used by the fishermen. The samples were taken from five different locations, **P**, **Q**, **R**, **S** and **T**.

The student then repeated the experiment using the water samples from the lake.

The results are shown in the table.

	location of water sample				
	P	**Q**	**R**	**S**	**T**
number of plants at the start	10	10	10	10	10
number of plants after 14 days	26	17	12	20	22

The student decided that water sample **R** was likely to have the highest concentration of toxic chemicals.

Explain why the student came to this conclusion.

.....

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..... [2]

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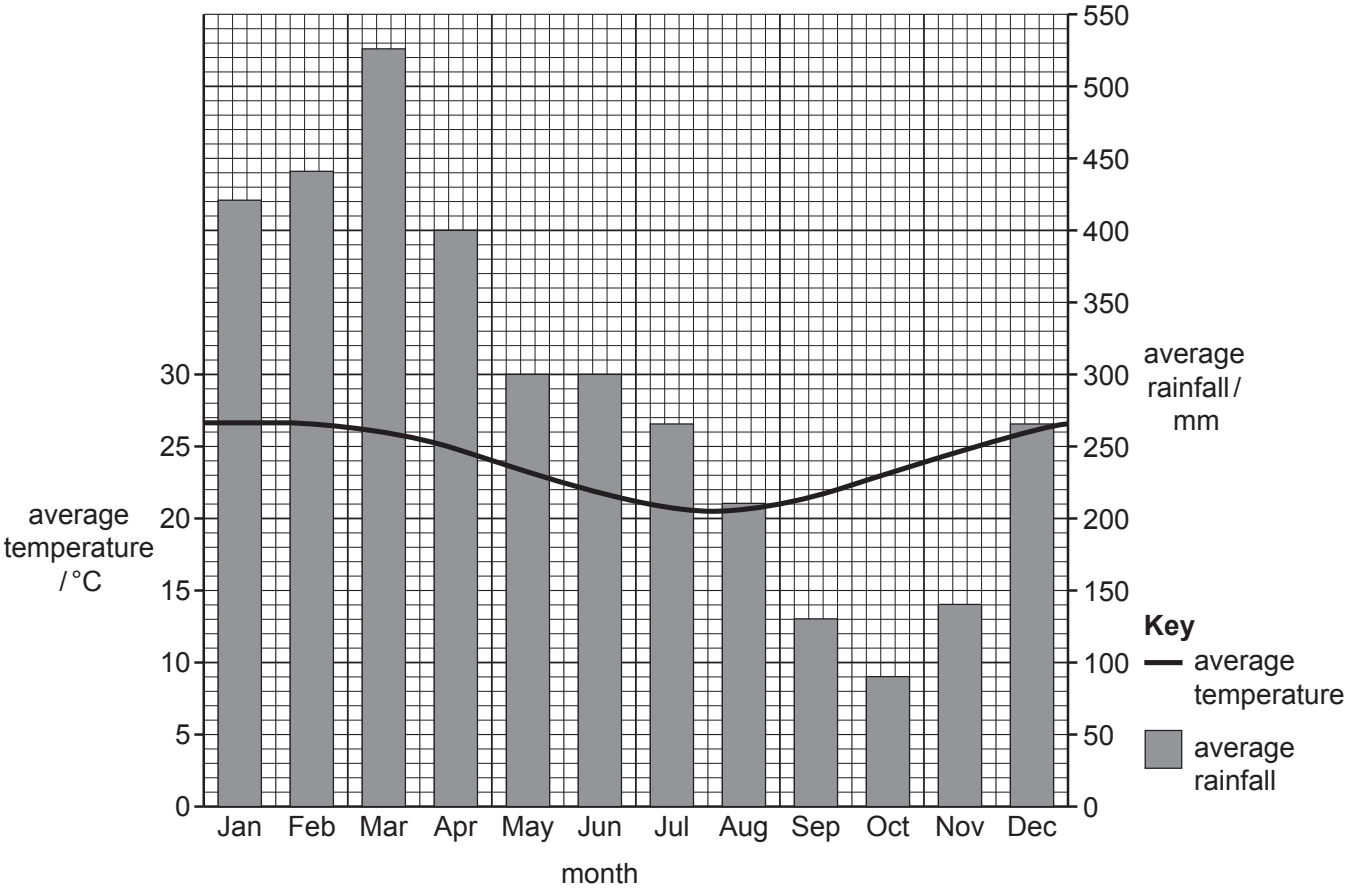
(h) The graph shows climate data from a weather station near the chromite mine and lake.



(i) Using information from the graph explain why the rate of evaporation will be high throughout the year.

.....

.....

.....

..... [2]

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(ii) The concentration of toxic chemicals in the lake changes during the year.

Predict the month that would have the lowest and highest concentration of toxic chemicals in the lake. Give a reason for your answer.

month with lowest concentration .....

reason .....

.....

month with highest concentration .....

reason .....

.....
[2]

[Total: 42]

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