Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

4992463680

ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 Management in Context **October/November 2020**

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. Blank pages are indicated.

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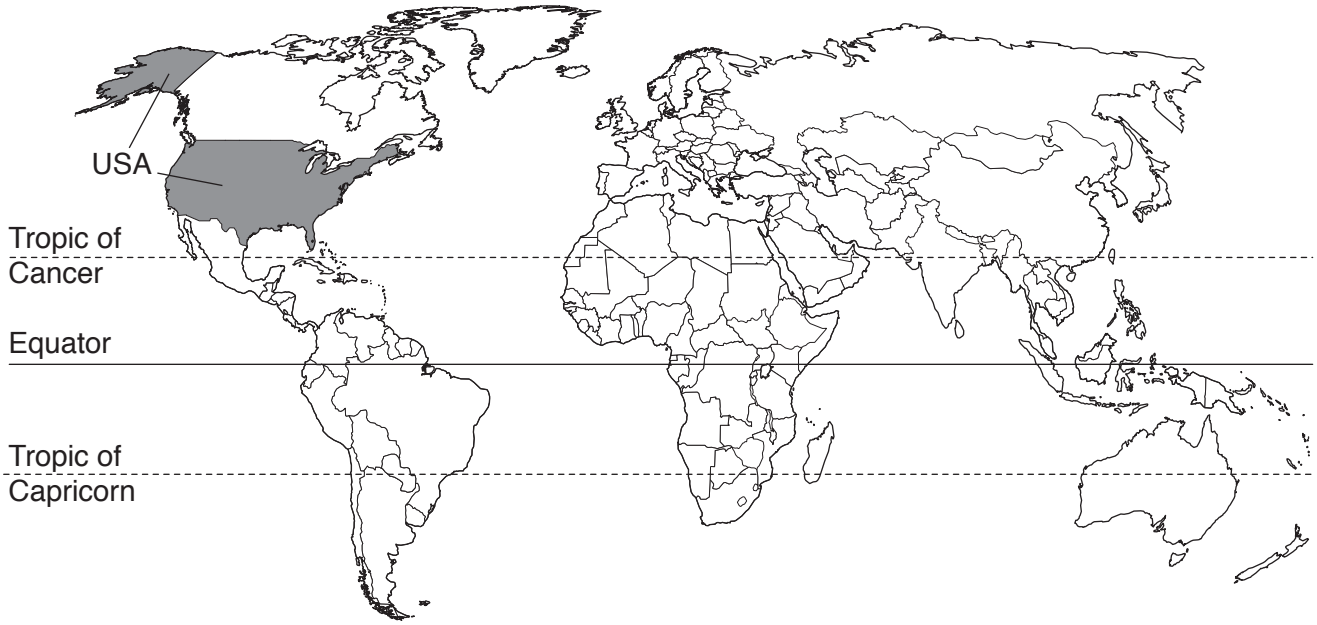
world map showing the location of mainland United States of America, USA



Area of USA: 9.83 million km^2

Population of USA: 326 million (in 2018)

Children per woman: 1.87

Life expectancy: 80 years

Currency: USD

Language: English and Spanish

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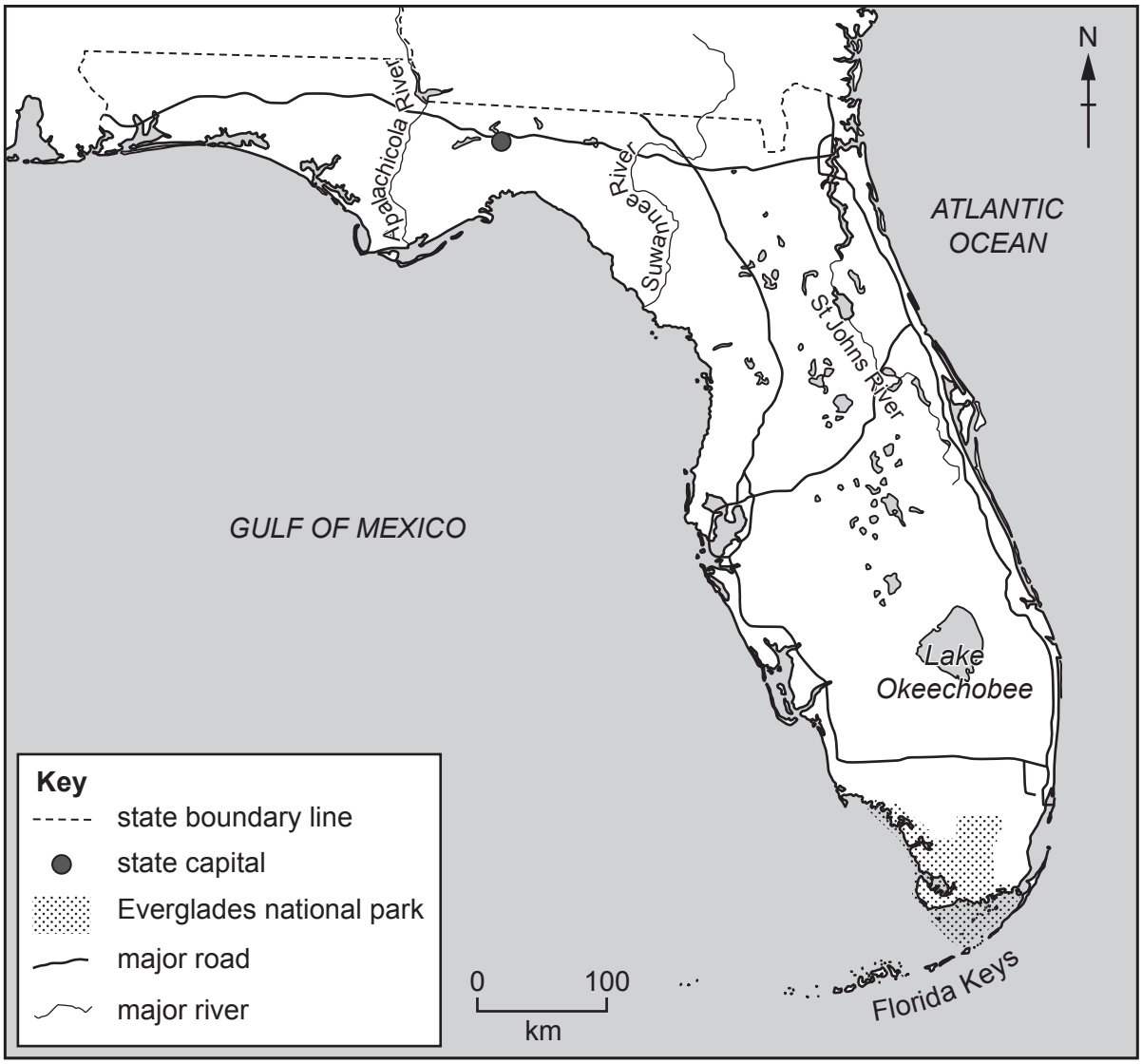
map of state of Florida



Climate of Florida: humid and subtropical in north, tropical in south

Terrain of Florida: low-lying with many lakes and rivers, hills in the north, wetlands in the Everglades, flat around the coastline with coral reefs and sandbars, a chain of islands in the south called the Florida Keys

Main economic activities of Florida: aircraft, electronic products, citrus fruit, tomatoes, phosphate for fertilisers, tourism

Florida is a state in the south-east of the USA. It has an area of 170 305 km^2, with 2 170 km of coastline. It is the third most populous state in the USA, with a population of 21.3 million in 2018. Florida has the highest percentage of people over 65 in the USA: 17% of the population of Florida are over 65. Tourism is the largest money-earning sector of Florida's economy. Florida is the largest producer of citrus fruit in the USA.

1 **(a)** Many older people move to live in Florida.

(i) Calculate the number of people aged over 65 living in Florida in 2018.

..... million [1]

(ii) Suggest **two** impacts of an increasing number of older people in a population.

1 .....

.....

2 .....

.....
[2]

(b) The table shows climate data for a weather station in southern Florida.

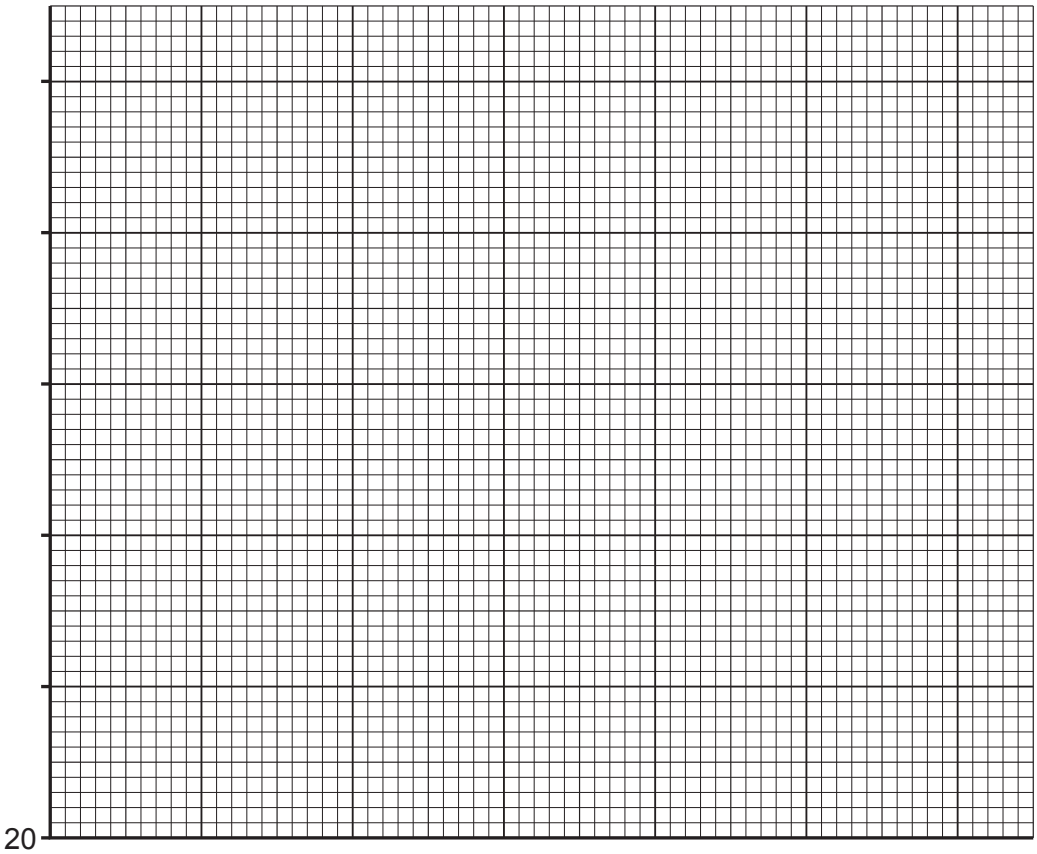
month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
average rainfall / mm	52	38	52	52	76	104	90	137	170	125	58	56
average temperature / °C	21	21	23	25	27	28	29	29	28	27	24	22

(i) The range of the monthly average rainfall is the difference between the maximum value and the minimum value.

Calculate the range of the monthly average rainfall for this weather station.

..... mm [1]

(ii) Plot, on the grid, a line graph of average temperature against month.



[4]

(iii) Use the average temperature data to suggest **one** impact of climate on energy demand in southern Florida in July and August.

Give a reason for your answer.

impact on energy demand .....

reason .....

[1]

(iv) In one year, the weather station records 249 sunny days out of 365.

Explain why the climate of southern Florida is suitable for growing crops such as tomatoes.

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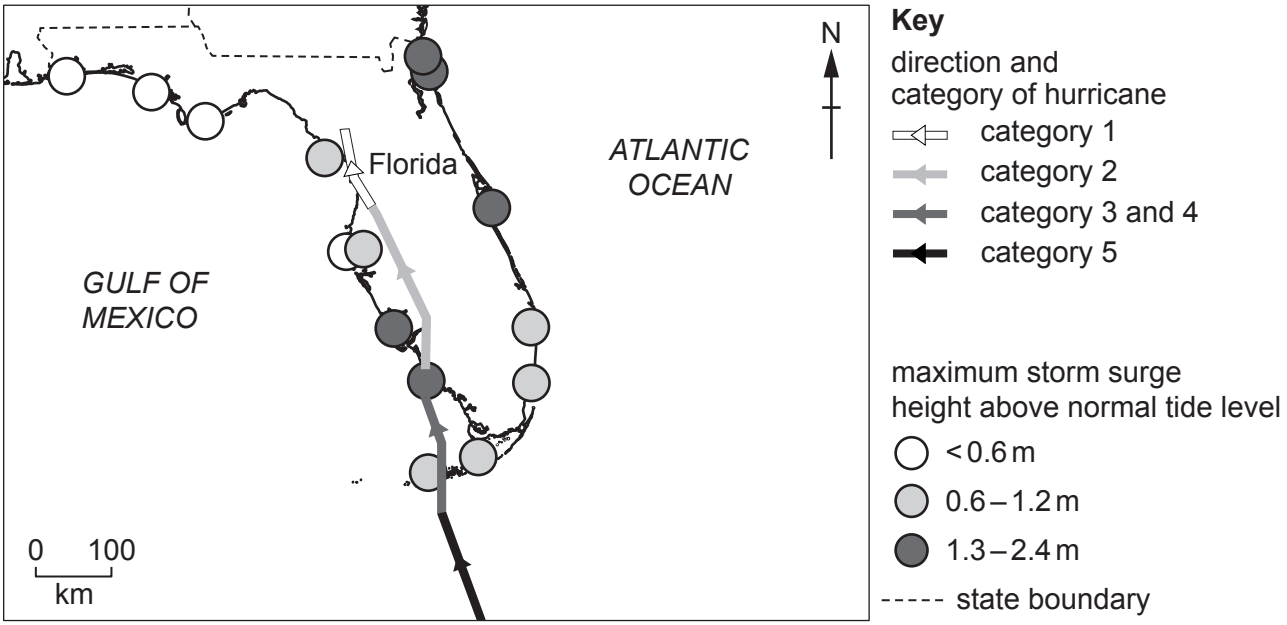
..... [2]

(c) In 2017, Hurricane Irma hit Florida.

The map shows some data for Hurricane Irma.



The category of hurricane is based on wind speed, as shown in the table.

category of hurricane	wind speed in km / h
1	119 – 153
2	154 – 177
3	178 – 208
4	209 – 251
5	≥ 252

(i) Describe what the map shows about Hurricane Irma.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) Florida contains some of the largest deposits of phosphate in the USA.

The phosphate is extracted by strip mining.

Suggest ways Hurricane Irma affected the extraction and exporting of phosphate from Florida.

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.....

.....

.....

..... [4]

(iii) A tourist on holiday in Florida during Hurricane Irma writes about the evacuation.

I do not speak English very well. The day before the hurricane, a radio announcement told people to evacuate the area, but I didn't understand it. A local resident explained that I needed to evacuate.

I was staying in the Florida Keys islands. There is only one road out of the Florida Keys.

road sign to an emergency shelter

I had never been to Florida before, and I did not know the evacuation route. I followed road signs to an emergency shelter.

At the shelter, there was food, fresh water, and a doctor.

There was no phone signal in the shelter, so I couldn't speak to my family for four days. However, someone from the local government sent a message to my family that I was safe.

Afterwards, some local people had nowhere to go because their homes were destroyed. The government provided temporary housing for these people and gave them food and water.

Do you think the strategies for managing the impacts of Hurricane Irma were effective?

Use information from the tourist's writing to support your view.

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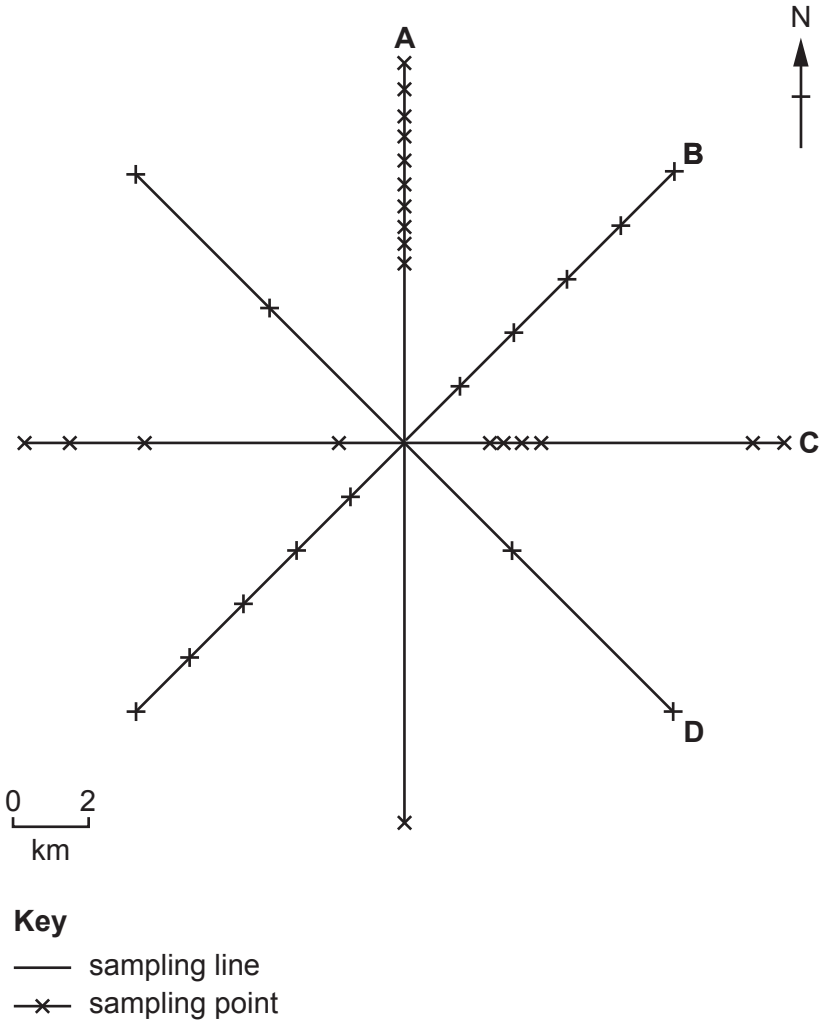
..... [6]

[Total: 25]

2 **(a)** A mining company wants to open a new phosphate mine in Florida.

The company will take samples from the ground to find out where the most phosphate is located.

(i) The diagram shows four different sampling methods, **A**, **B**, **C** and **D**.



The mining company decides to use sampling method **B**.

Suggest reasons why the mining company did **not** use sampling method **A**, **C** or **D**.

A .....

.....

C .....

.....

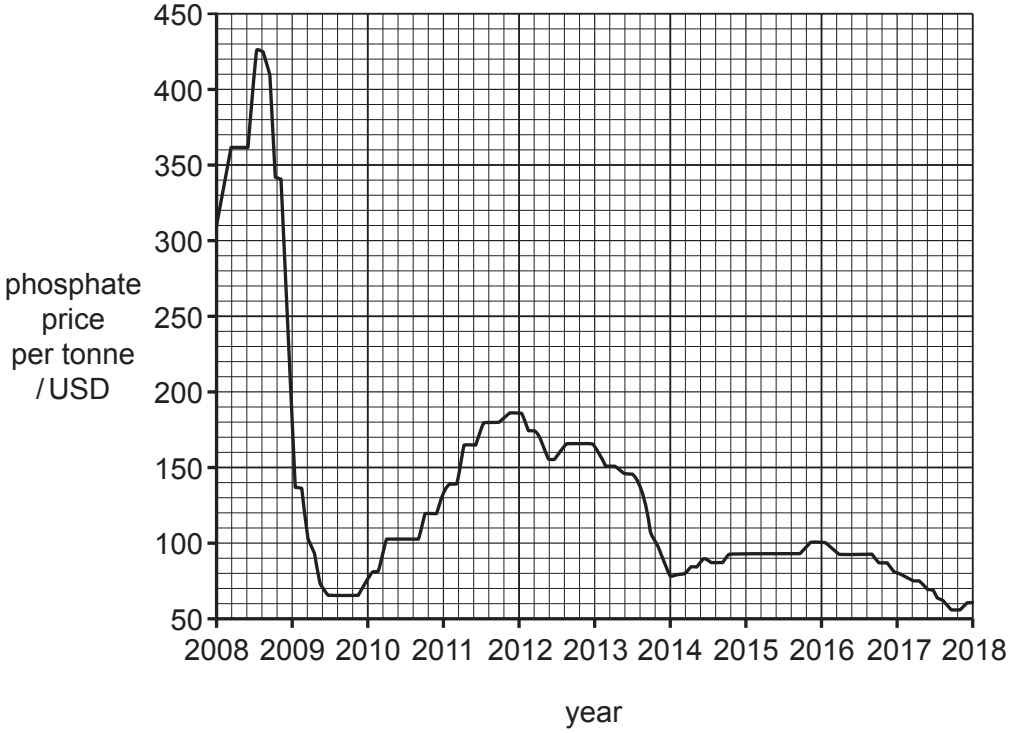
D .....

.....

[3]

(ii) The mining company locates a good source of phosphate using sampling method **B**.

The graph shows the price per tonne of phosphate extracted from mines between 2008 and 2018.



Use the graph to suggest **one** reason why the mining company might decide **not** to extract the phosphate.

.....

..... [1]

(iii) The mining company decides to use a questionnaire to find out people's views on the new phosphate mine.

question	**response**		
	yes	no	do not know
1. Would you like more employment opportunities in your area?			
2. Would you like better infrastructure such as more roads?			
3. Would you like more money invested in the local area?			

Explain why this questionnaire will **not** give useful data.

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.....

.....

..... [2]

(iv) Suggest **one** question the mining company can use to find out people's views on the new phosphate mine that **will** give useful data.

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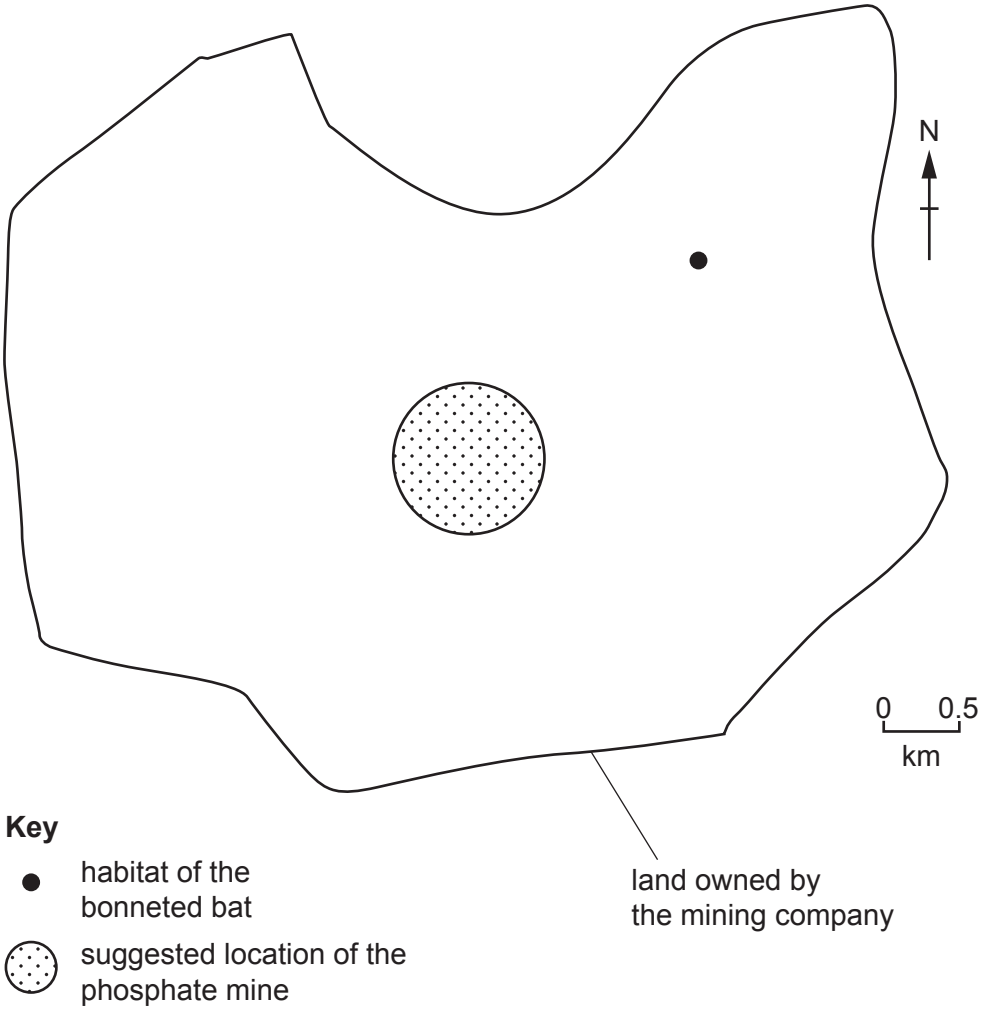
..... [1]

(v) The map shows the suggested location of the new phosphate mine. This is near the habitat of an endangered species called the bonneted bat.



The local government says the new phosphate mine **must** be a minimum distance of 1200 m away from the habitat of the bonneted bat.

Use the map to determine whether the mining company can mine at the suggested location.
Give a reason for your answer.

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..... [2]

(vi) Vegetation is cleared before strip mining starts.

Describe the environmental impacts of clearing vegetation from an area.

.....

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..... [2]

(vii) A statement from the mining company says,

'The current generation of people needs phosphate. We aim to meet the needs of people today whilst also making sure we can still meet the needs of future generations.'

Describe **two** strategies the company can use to meet this aim.

1 .....

.....

2 .....

.....
[2]

(viii) Strip mining for phosphate damages landscapes. Two strategies for restoring landscapes are land restoration and land reclamation.

Land restoration puts the land back to how it was before mining began.

Land reclamation puts the land into beneficial use after mining ends.

Suggest why some mining companies prefer land reclamation to land restoration.
Give a reason for your answer.

.....

.....

.....

..... [2]

(b) **(i)** Phosphate is a component of fertilisers.

The picture shows a bag of fertiliser. The letter P represents the phosphorus in phosphate.

Suggest what the letters N and K represent.

N .....

K .....
[2]

(ii) Explain why some farmers in Florida use fertilisers on their crops.

.....

.....

.....

..... [2]

(iii) Suggest reasons why some farmers might **not** use fertilisers on their crops.

.....

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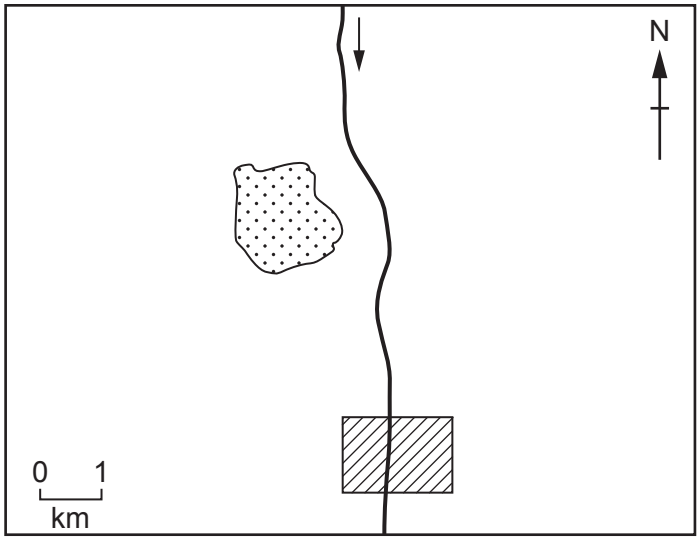
..... [2]

(c) A farmer in Florida thinks a phosphate mine is contaminating a river that flows through a field of crops.

The map shows the mine, the river and the field of crops.



Key

phosphate mine

field of crops

river

direction of river flow

The farmer collects samples of river water every 500 m between the mine and the field of crops. The samples are tested for phosphate.

The farmer records the results in a notebook.

0.5 km distance = 0.52 mg/l

distance from mine of 1 km = a phosphate concentration of 0.45 mg/l

concentration is 0.39 mg/l at 1.5 km distance

2.0 km away is 0.3 mg/l

2.5 km distance = concentration of 0.24 mg/l

(i) Present the farmer's results in a suitable table.

[3]

(ii) The farmer decides to collect two samples of river water from the river north of the mine.

Suggest how these samples can confirm that the mine is the cause of the phosphate contamination in the river water.

.....

..... [1]

(iii) The farmer is concerned about vehicle emissions from the diesel trucks that transport the phosphate from the mine.

Diesel is made from oil.

Describe the formation of oil.

.....

.....

.....

.....

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..... [3]

(iv) The trucks emit carbon dioxide into the atmosphere.

Suggest reasons why the farmer is concerned about carbon dioxide in the atmosphere.

.....

.....

.....

..... [2]

(v) State **three** strategies for reducing the concentration of carbon dioxide in the atmosphere.

1 .....

.....

2 .....

.....

3 .....

.....
[3]

(vi) State why atmospheric pollution is a global concern.

.....

..... [1]

[Total: 34]

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3 **(a)** The fact sheet shows information about the Everglades.

The Everglades

The Everglades is an area of sub-tropical wetlands in the south of Florida.

The ecosystem has marshes, fresh water ponds and lakes, rivers and islands. This ecosystem is under threat.

There are over 2500 km of canals in the Everglades. People have been building canals here for over 100 years.

In 1900, the area of the Everglades was 10 360 km^2. In 2018, the area had decreased by 50%.

There are many endangered species in the Everglades.

(i) Calculate the area of the Everglades in 2018.

..... km^2 [1]

(ii) Suggest reasons for the decrease in size of the wetlands in the Everglades.

.....

.....

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..... [2]

(iii) Part of the Everglades is a national park.

Suggest other ways the Everglades can be protected.

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..... [2]

(b) The Everglades is the only place on Earth where crocodiles and alligators live in the same wild habitat.

The American crocodile is an endangered species. The American alligator is **not** an endangered species.

Alligators and crocodiles look very similar.

Suggest why the American alligator is protected even though it is **not** an endangered species.

.....

..... [1]

(c) **(i)** A food chain for organisms in the Everglades is shown.

orchid plant → mosquito → frog → racoon → crocodile

Name the producer in this food chain.

..... [1]

(ii) Mosquitoes are found in Florida, but Florida is malaria-free. This means the malaria disease is not found in Florida.

Describe strategies used to make an area malaria-free.

.....

.....

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..... [3]

(d) The Brazilian pepper plant is a threat to the Everglades ecosystem. It is a plant species that is **not** native to Florida.

It is estimated that 3% of the Everglades is covered by the Brazilian pepper plant.

(i) Suggest reasons why the introduction of a species that is **not** native to Florida, such as the Brazilian pepper plant, is a serious problem.

.....

.....

.....

..... [2]

(ii) The 3% estimated coverage of the Brazilian pepper plant was made by conducting a visual survey from the air.

Suggest **one** limitation and **one** advantage of this type of visual survey.

limitation .....

.....

advantage .....

.....
[2]

(iii) A student wants to estimate the percentage coverage of the Brazilian pepper plant in a 50 m × 50 m area of the Everglades using a quadrat.

Describe a method the student could use.
Include any other equipment the student needs and how the student should process the results.
You can include a diagram in your answer.

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.....

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..... [5]

(iv) One way of controlling plant species that are not native to the Everglades is 'planned burning' of the area where they grow.

Suggest **two** reasons why some people are **not** in favour of planned burning.

1 .....

.....

2 .....

.....
[2]

[Total: 21]

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