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ENVIRONMENTAL MANAGEMENT **0680/23**

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.

DC (LK/CGW) 193259/3
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[Turn over

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

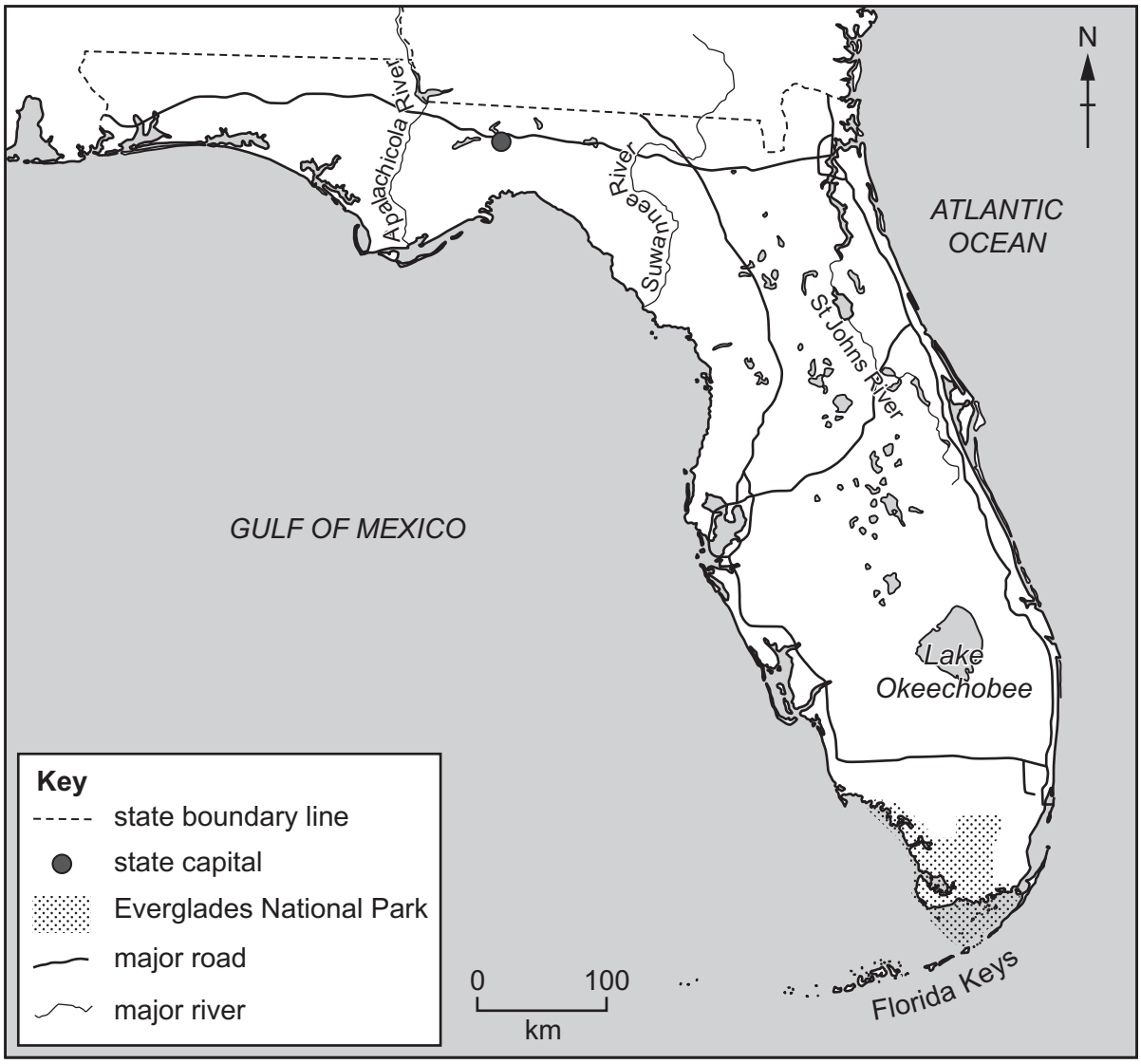
Life expectancy: 80 years

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.

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1 **(a)** **(i)** The population of Florida in 2016 was 18.8 million people.

Calculate the percentage increase in the population of Florida from 2016 to 2018.

..... % [2]

(ii) Suggest **two** impacts of the increasing population on the state of Florida.

1 .....

.....

2 .....

.....
[2]

(iii) State **two** strategies for managing human population size.

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 high temperature / °C	24	24	26	27	29	31	32	32	31	29	27	24
average low temperature / °C	18	19	20	22	24	26	27	27	26	24	22	19
average daily sunshine / hours	7	8	9	10	9	9	10	9	8	8	7	7

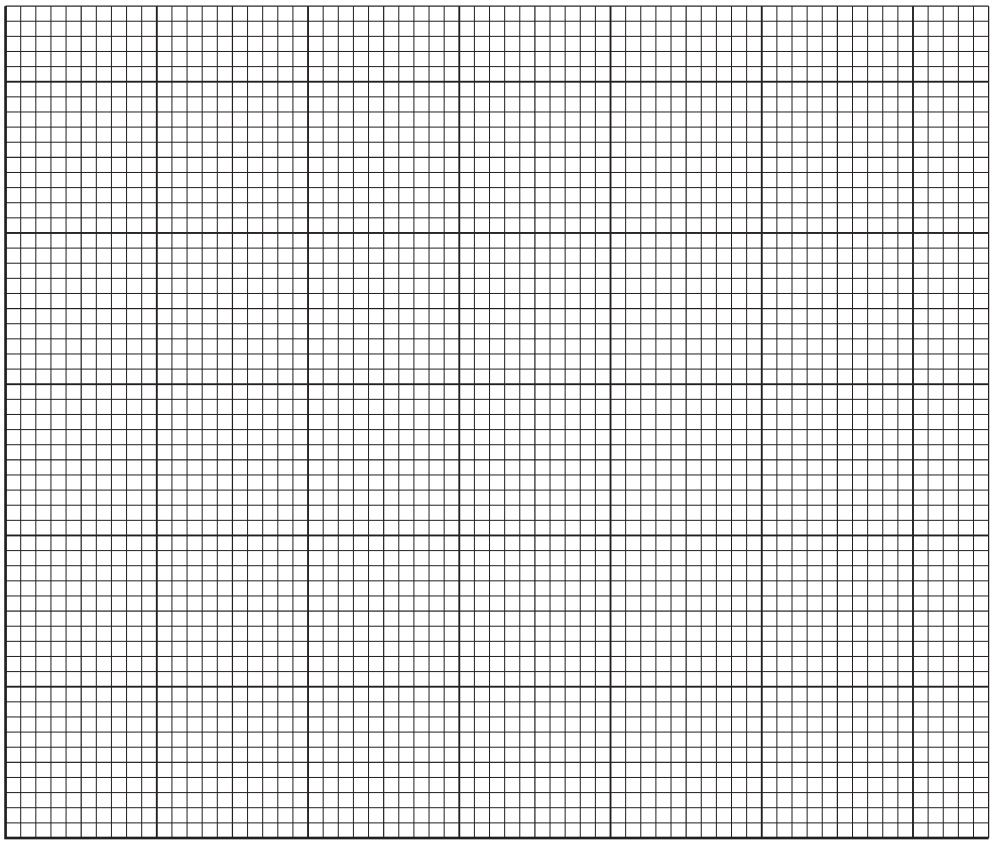
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(i) The range of the average low temperature is the difference between the maximum value and the minimum value.

Calculate the range of the average low temperature at this weather station.

..... °C [1]

(ii) Plot a bar chart of the average daily hours of sunshine.



[4]

(iii) Use the climate data to explain why Florida is a good location for growing crops such as tomatoes.

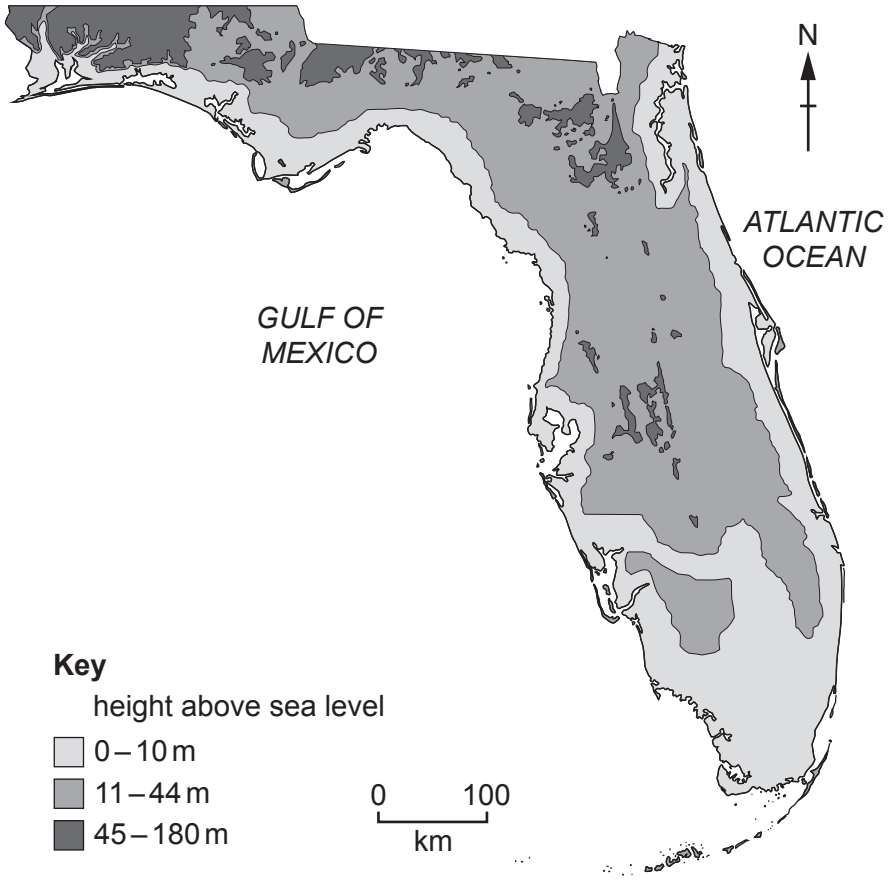
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..... [2]

(c) The map shows the height above sea level of the land in Florida.



(i) Suggest reasons why some people living in Florida are concerned about climate change. Use the map to support your answer.

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..... [3]

(ii) State **one** strategy for managing the causes of climate change.

Explain how this strategy can reduce the effects of climate change.

strategy .....

explanation .....

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[3]

(d) In 2017, Hurricane Irma hit Florida.

Hurricane Irma was classed as a category 4 hurricane when it hit Florida.

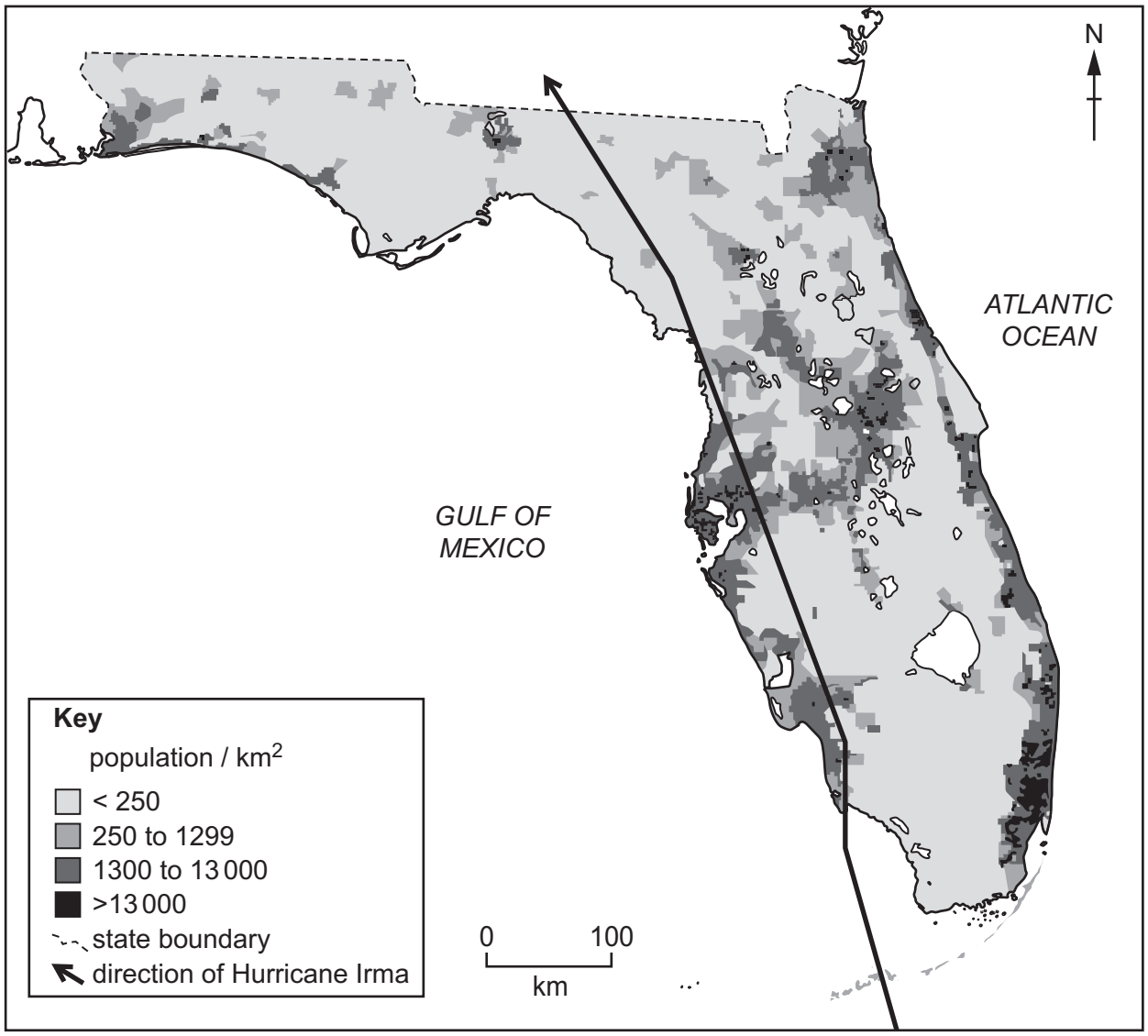
The table shows categories of hurricanes based on wind speed.

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

(i) Use the table to suggest a wind speed for Hurricane Irma when it hit Florida.

..... km/h [1]

(ii) The map shows the population density of Florida and the direction of Hurricane Irma.



Use the map to suggest how Hurricane Irma caused damage to Florida.

.....

.....

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..... [4]

(iii) Suggest ways Hurricane Irma affected Florida's farming industry.

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..... [4]

(iv) Four different people made comments after Hurricane Irma.

Government official in Florida:

> Before Hurricane Irma hit Florida, we evacuated over 6.5 million people. We used radio announcements to inform people of the evacuation. There were 700 emergency shelters for people that stayed behind.

Newspaper reporter:

> More than 90 people died as a result of Hurricane Irma. It caused 53 billion USD of damage to properties in Florida.

Volunteer aid worker:

> After Hurricane Irma, the government quickly helped to find temporary shelter for many people. Many homes had no water for weeks. We gave people bottled water to drink.

Local person:

> Florida gets more storms than any other state in the USA. We practise what to do in emergencies. There are evacuation and information signs on all our major roads.



evacuation and information signs on roads in Florida

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

Use information from the people's comments to support your view.

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..... [6]

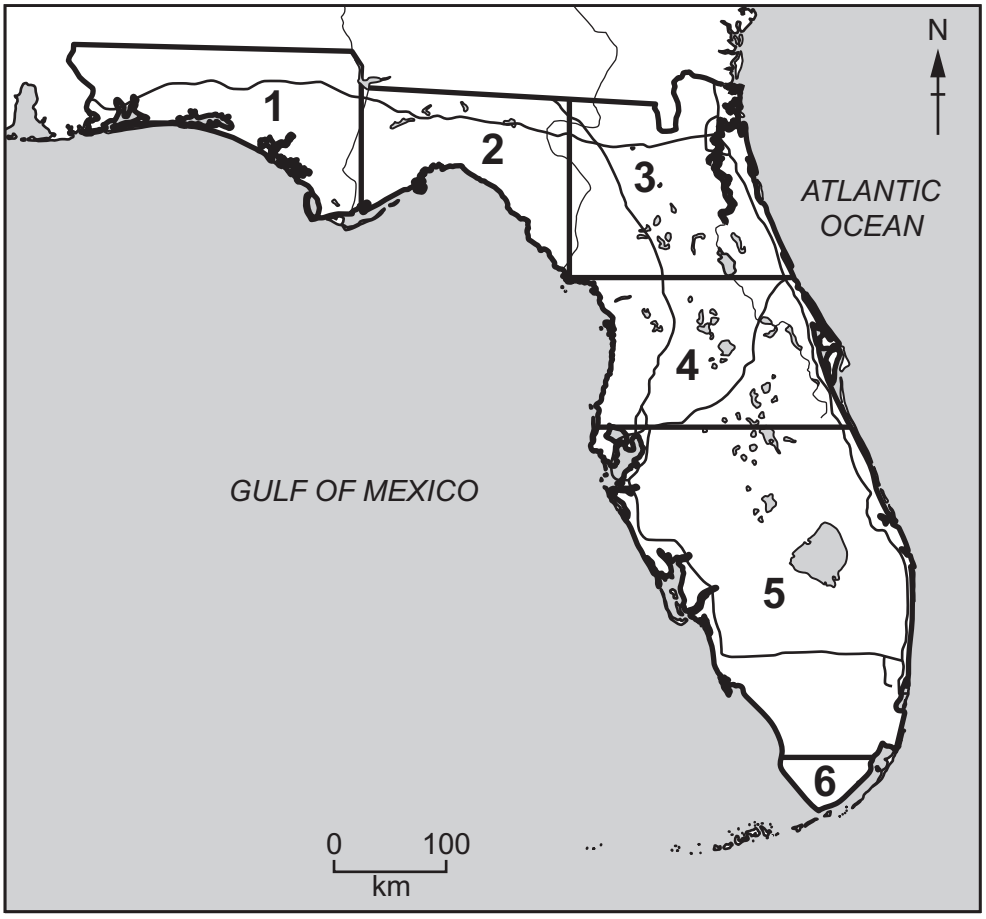
[Total: 34]

2 **(a)** The ‘sandhill crane’ is a threatened species of bird in Florida.

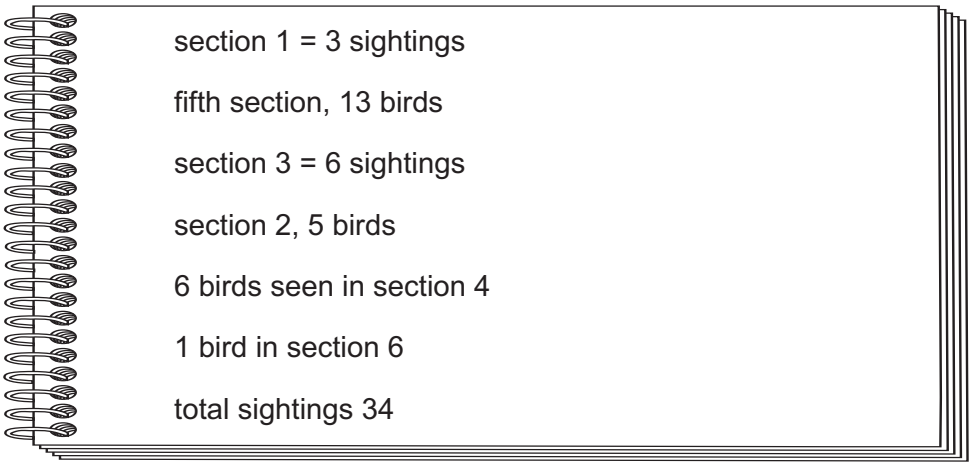
A student investigates the number of sandhill cranes in Florida after Hurricane Irma.

The student uses the following method:

- divides a map of Florida into 6 sections as shown



- counts the number of sandhill cranes observed in one day for each section
- records the results in a notebook, as shown.



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(i) Record the student's results in the table using a tally method, as shown.

section	number of sandhill cranes
total	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 IIII

[2]

(ii) Using the results, the student makes two conclusions.

conclusion 1 The number of sandhill cranes in section 6 is much lower than the other sections. This is a concern.

conclusion 2 There are 34 sandhill cranes in Florida.

Explain why the two conclusions are **not** valid.

conclusion 1 .....

.....

conclusion 2 .....

.....

[2]

(iii) A food chain that includes the sandhill crane is shown.

grass → cricket → Florida mouse → sandhill crane

Identify the producer in this food chain.

..... [1]

(iv) Sandhill cranes born in captivity are released into the wild.

Explain why captive breeding programmes can result in more sandhill cranes surviving compared with breeding in the wild.

.....

.....

.....

..... [2]

(b) A farmer investigates the effect of using two fertilisers, **X** and **Y**, on the yield of tomato plants.

Fertiliser **X** is an organic fertiliser and fertiliser **Y** is an artificial, non-organic fertiliser.

The farmer uses this method:

- select three fields, **1**, **2** and **3**, that have no planting history and have not previously been used to grow tomatoes
- use fertiliser **X** on the soil in field **1**
- use fertiliser **Y** on the soil in field **2**
- do not use fertiliser on the soil in field **3**
- plant the same variety of tomato plant in each field
- record the average yield of tomatoes per plant from each field
- repeat the method after 5 years and 20 years of planting history.

field	**average yield of tomatoes per plant in first year / g**	**average yield of tomatoes per plant after 5 years / g**	**average yield of tomatoes per plant after 20 years / g**
field **1** – fertiliser **X**	1372	1392	1072
field **2** – fertiliser **Y**	1642	1672	1421
field **3** – no fertiliser	956	952	723

(i) Suggest why the farmer does **not** use fertiliser in field **3**.

.....

..... [1]

(ii) Fertilisers are used to increase agricultural yields.

Use the table to write a conclusion on the effect of fertilisers **X** and **Y** on the yield of the tomato plants.

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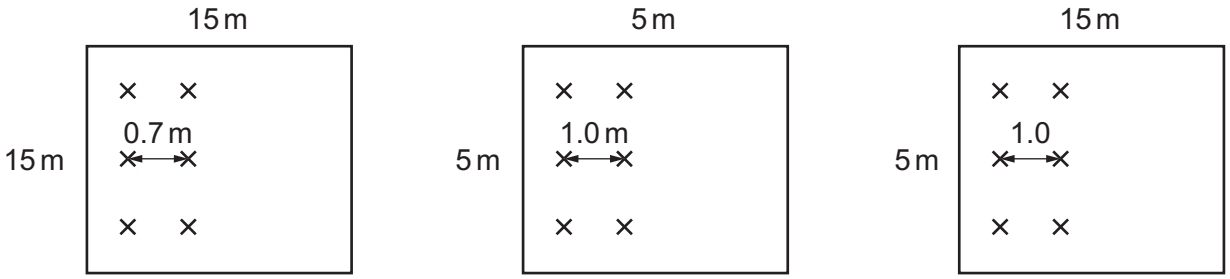
..... [2]

(iii) Diagrams of the three fields the farmer uses are shown.

The diagrams are **not** to scale.

Key

× ⟷ × distance between tomato plants



field **1**
fertiliser **X**

field **2**
fertiliser **Y**

field **3**
no fertiliser

Suggest **two** reasons why the farmer's results are **not** valid.

1 .....

.....

2 .....

.....
[2]

(iv) Suggest reasons why some farmers do **not** use artificial fertilisers.

.....

.....

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.....

..... [3]

(v) Using fertiliser is one way of increasing agricultural yields.

State **three** other ways of increasing agricultural yields.

1 .....

.....

2 .....

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3 .....

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[3]

(vi) The soil in the farmer's fields is a clay soil.

Describe **two** characteristics of a clay soil.

1 .....

.....

2 .....

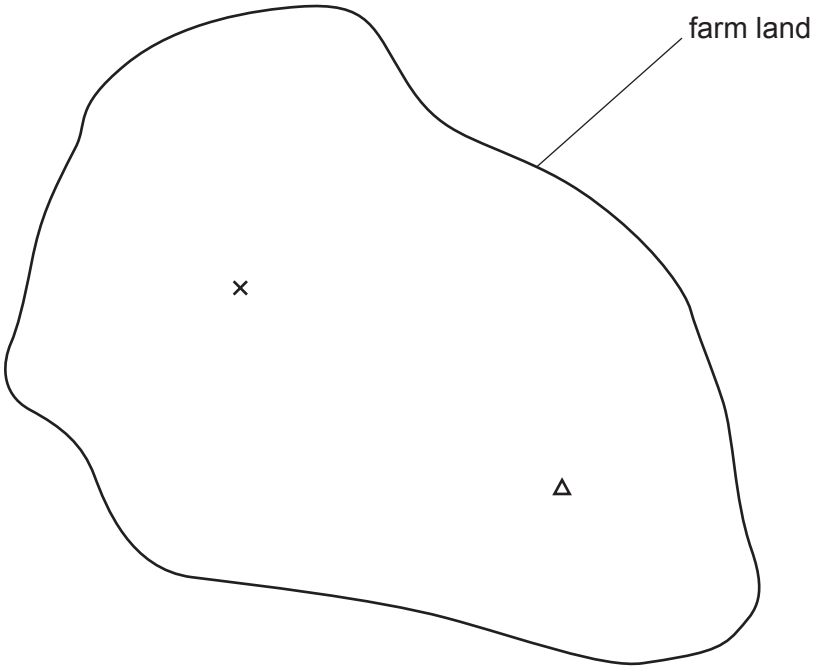
.....

[2]

(vii) The farmer wants to build a new farm building.

The nesting site of a pair of sandhill cranes is on the farm land.

The map shows the location of the nesting site and the suggested location of the new farm building.



Key

× suggested location of farm building

△ nesting site

The local government says the farm building **must** be a minimum distance of 4 km away from the nesting site.

Use the map to determine whether the farmer can build at the suggested location.
Give a reason for your answer.

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.....

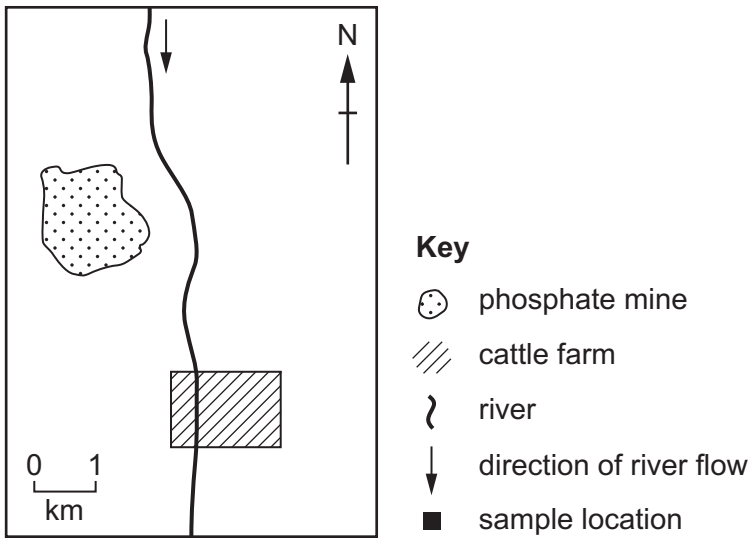
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..... [2]

(c) Phosphate is a component of fertilisers. Phosphate is extracted from the ground by surface mining.

A cattle farmer in Florida is concerned that a local phosphate mine is contaminating the river water that the cattle drink.

The map shows the phosphate mine, the cattle farm and the river.



The farmer wants to collect **five** samples of river water to analyse for phosphate contamination.

(i) Draw the ■ symbol on the map to identify **five** locations where the farmer should collect water samples from the river.

Explain why you have chosen these **five** sample locations.

.....

.....

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.....

..... [3]

(ii) Draw a table the farmer can use to record the results from the river water samples.

[2]

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

The company must do an Environmental Impact Assessment (EIA) before opening the mine.

(i) The EIA requires the mining company to find out the views of local people on opening a new phosphate mine.

The company decides to use a questionnaire to find out local people's views.

The company considers **two** methods of selecting people to ask for the questionnaire.

method 1 Ask every person living within 20 km of the planned mine.

method 2 Ask all the women aged over 18 in every third house within 20 km of the planned mine.

Describe the benefits and limitations of each method.

method 1 .....

.....

.....

.....

method 2 .....

.....

.....

.....

[4]

(ii) Other than finding out the views of local people, suggest **three** more requirements for the EIA.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 34]

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 wetland 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.



Water from the Everglades recharges the Biscayne aquifer. Recharging can be defined as water being added to an aquifer by natural processes in the water cycle.

The Biscayne aquifer is a source of drinking water for millions of people in southern Florida.

The size of the Everglades has decreased by 50% over the last 100 years.

More than 60 threatened or endangered species live and grow in the wetland area, including the American crocodile.

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(i) A national park was established in the Everglades in 1947.

Suggest reasons why Everglades National Park was established.

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..... [3]

(ii) Over one million tourists visit Everglades National Park each year.

Describe ways ecotourism can benefit Everglades National Park.

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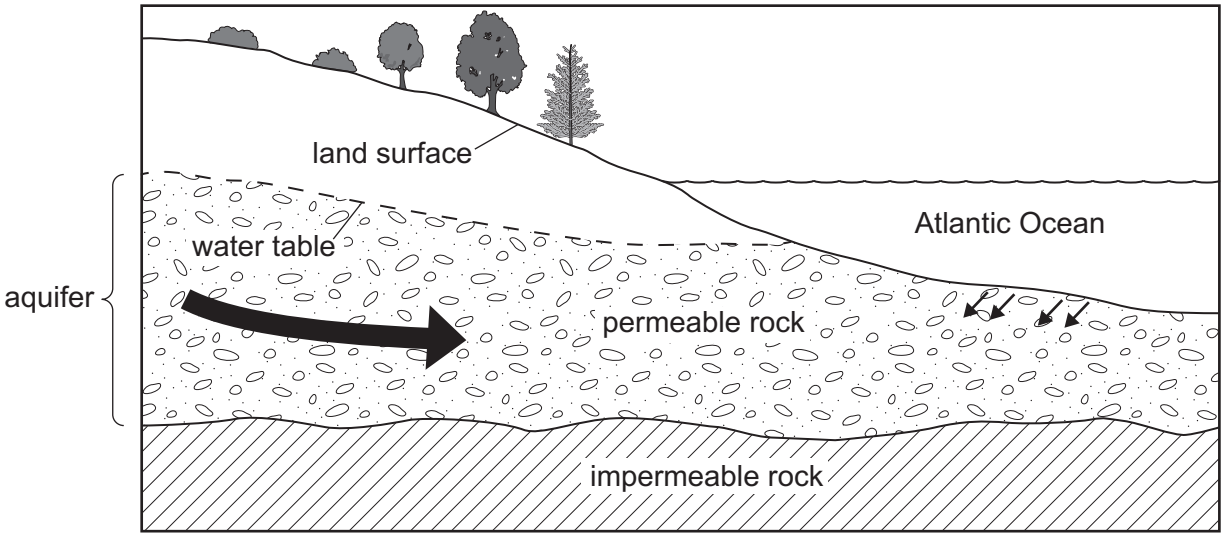
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..... [3]

(b) The Biscayne aquifer is a major source of drinking water for people in southern Florida.

The diagram shows the coastal part of this aquifer.



Key

permeable rock (where water can pass through)

impermeable rock (where water cannot pass through)

– – – – water table

overall direction of water flow

↙↙ salt water flow

The Biscayne aquifer is a layer of permeable limestone rock.

(i) Limestone is a sedimentary rock.

Name **one** other sedimentary rock.

..... [1]

(ii) Name **one** process in the water cycle that recharges (adds water to) the aquifer.

..... [1]

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(iii) The water table is the upper level of water within an aquifer.

If too much water is removed from the Biscayne aquifer, the overall direction of water flow shown in the diagram can reverse.

Use the diagram to explain why this is a problem.

.....

.....

.....

..... [2]

(iv) The level of a water table can increase and decrease.

The level of the water table in the Biscayne aquifer can get very close to the surface of the land.

Suggest reasons why this is a potential threat to the aquifer.

.....

.....

.....

..... [2]

[Total: 12]

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