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ENVIRONMENTAL MANAGEMENT **0680/22**

Paper 2 Management in Context **February/March 2023**

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 [ ].

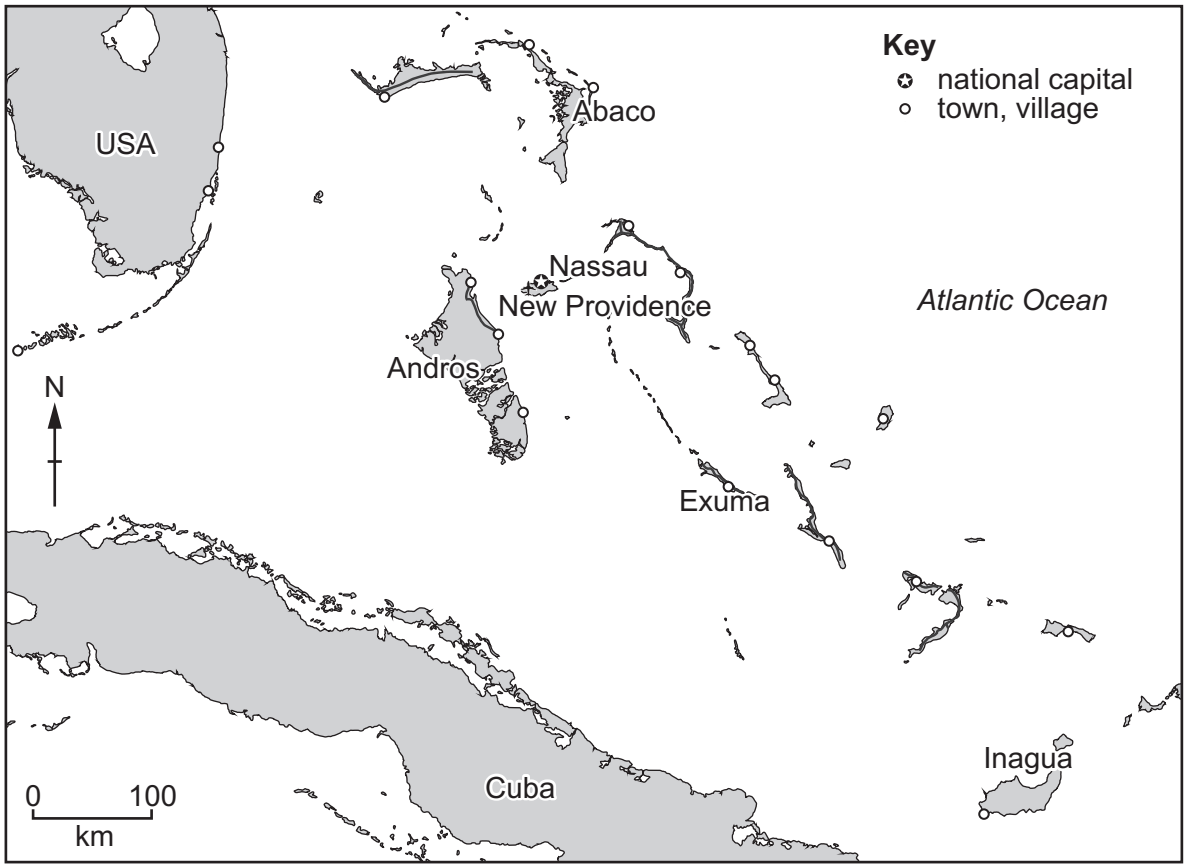
This document has **20** pages. Any blank pages are indicated.

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world map showing the location of The Bahamas



map of The Bahamas



Area of The Bahamas: 13 940 km^2

Population: 389 482 (in 2019)

Children per woman: 1.75

Life expectancy: 73 years

Currency: Bahamian Dollars (1BSD = 1USD)

Language: English

Climate of The Bahamas: tropical with wet summers and dry winters

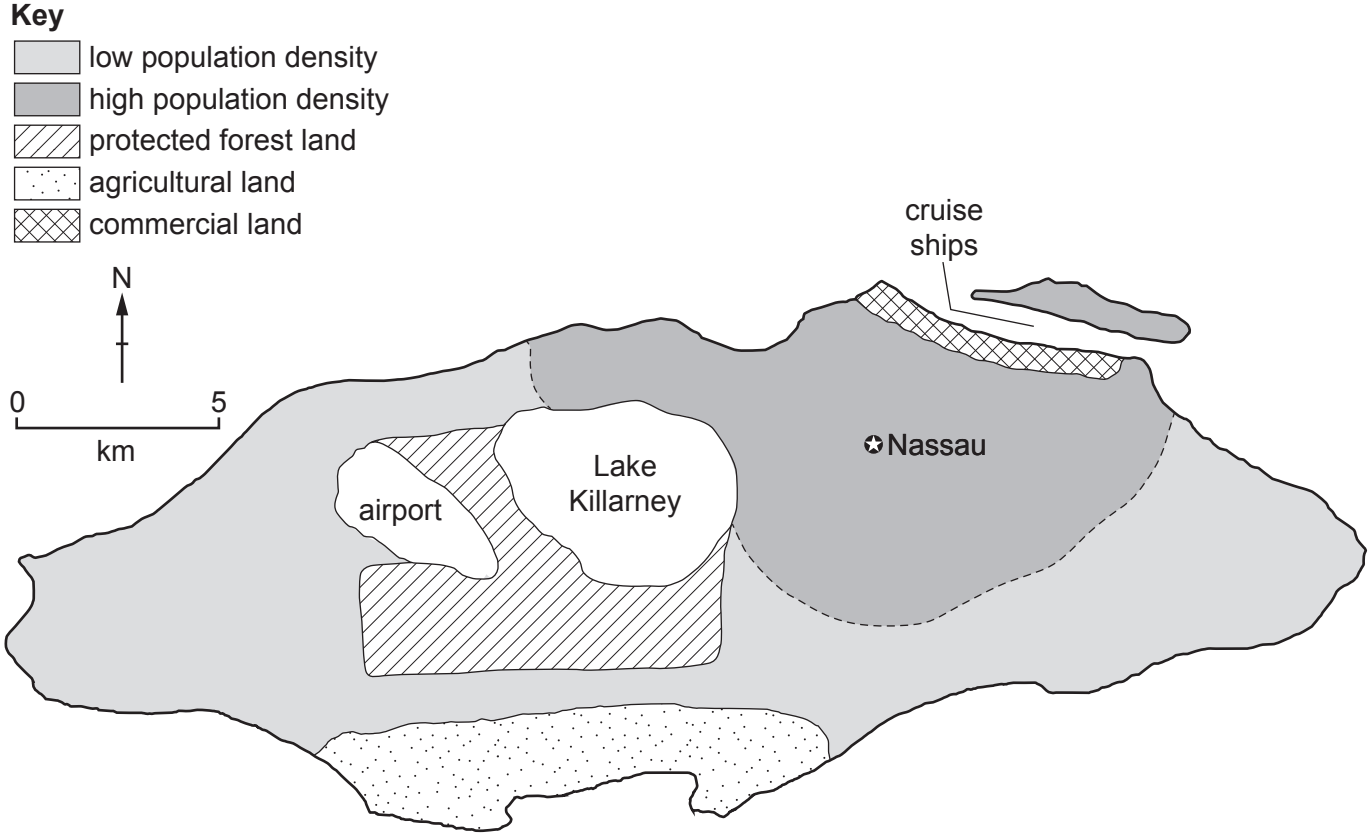
Terrain of The Bahamas: generally flat with the highest point being 63 m

Main exports of The Bahamas: lobster, fish, processed oil, salt

The Bahamas is a long chain of islands extending nearly 950 km. There are nearly 700 islands, of which about 30 are inhabited. Most of the population live in the capital city, Nassau, on the island of New Providence. The economy is dependent on tourism. Banking, oil processing and fishing are also important.

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1 The map shows the island of New Providence and the capital city, Nassau.



(a) (i) Describe the population distribution of New Providence.

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..... [2]

(ii) Suggest **two** reasons for the population distribution on New Providence.

1 .....

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2 .....

.....

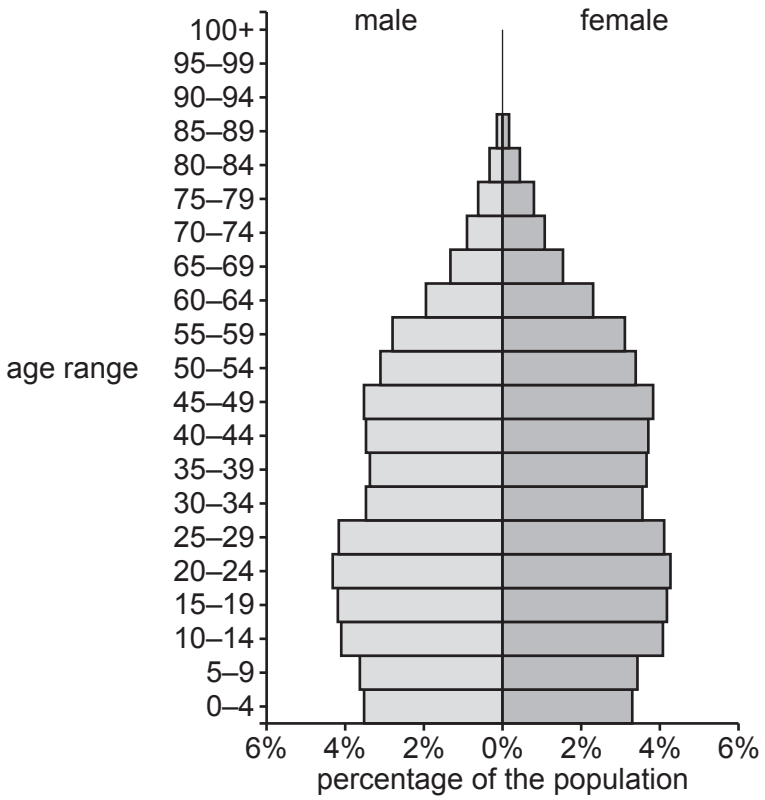
[2]

(b) It is estimated that 70% of the population of The Bahamas live on New Providence.

Calculate the number of people living on New Providence.

number of people = ... [1]

(c) The diagram shows the population pyramid for The Bahamas in 2019.



(i) Describe the age distribution for The Bahamas population in 2019.

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.....

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..... [3]

(ii) The population of The Bahamas is increasing. One cause of this increase is migration.

Suggest **three** reasons why people migrate to The Bahamas.

1 .....

2 .....

3 .....

[3]

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(d) There are no rivers in The Bahamas. However, Andros Island has large stores of fresh water located in underground rocks. The water is extracted using wells.

To meet the demand for fresh water in the capital city, water is transported from Andros Island using water barges. Water barges are large ships designed to carry water.

(i) State the name of the water source located in underground rocks.

..... [1]

(ii) State **two** other sources of fresh water that can be used in The Bahamas.

1 .....

2 .....
[2]

(iii) Describe the benefits and limitations of using water barges to meet the demand for fresh water.

benefits .....

.....

.....

.....

.....

limitations .....

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.....

.....
[4]

[Total: 18]

2 The fact sheet gives information on the Caribbean flamingo. The photograph shows Caribbean flamingos and their chicks.



Flamingos feed on small shrimp that live in shallow, salty lakes. The shrimp eat microscopic organisms called phytoplankton. Phytoplankton produce energy by photosynthesis. Flamingo chicks are preyed upon by vultures.

(a) (i) Construct a food chain, including four trophic levels, using the information in the fact sheet.

[2]

(ii) Explain why the energy in the body of the flamingo is dependent on chlorophyll.

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..... [4]

(b) (i) In the 1950s, scientists studied a population of Caribbean flamingos on Inagua Island. The scientists found that the population was decreasing and in 1956 only 100 flamingos lived on Inagua Island.

Suggest strategies to protect the Caribbean flamingos on Inagua Island.

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..... [4]

(ii) The strategies used to protect the flamingos allowed the population to increase. In 2022, scientists estimated that over 80 000 flamingos lived on Inagua Island.

Describe a method for estimating the population of Caribbean flamingos on Inagua Island.

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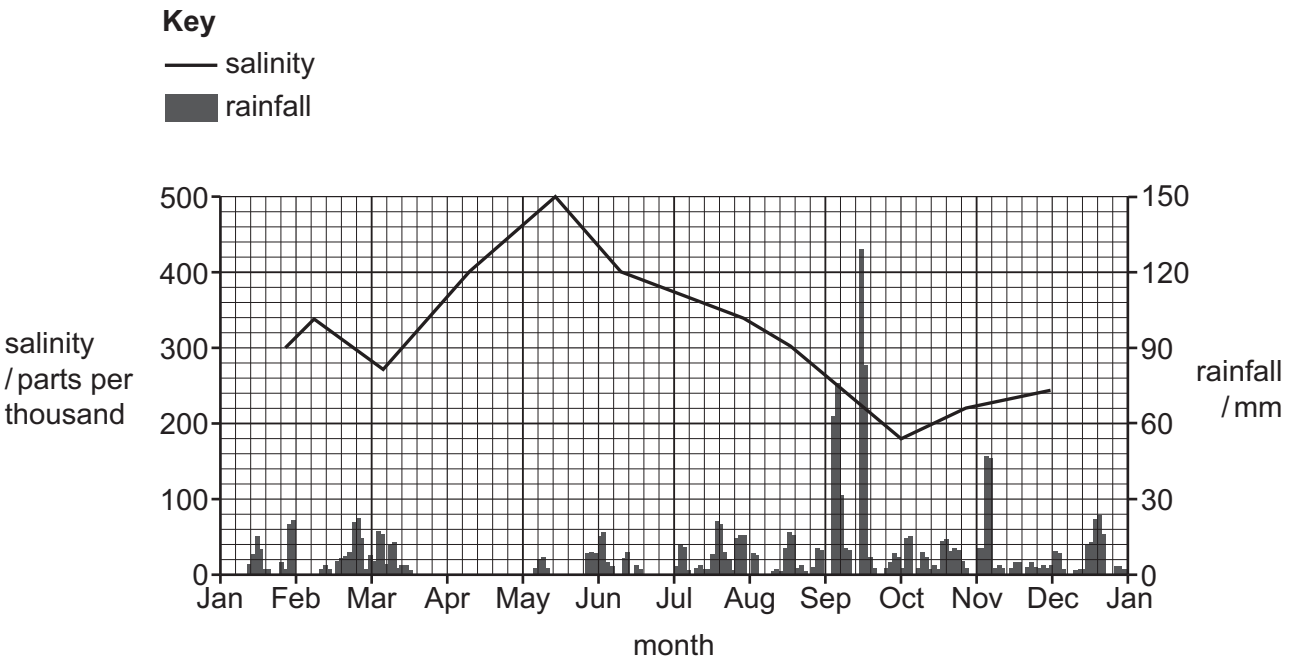
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..... [5]

(c) The flamingos feed in a lake that contains water with a high salt content.

The graph shows the relationship between the salinity of the lake and rainfall over a 12-month period.



(i) Describe the relationship between the salinity of the lake and rainfall over the 12-month period shown on the graph.

.....

.....

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..... [3]

(ii) Suggest how air temperature can affect the salinity of the lake.

Give a reason for your answer.

.....

.....

.....

..... [2]

[Total: 20]

3 The Bahamas processes large amounts of oil. The oil is imported, processed and then exported by ship to countries around the world.

The photograph shows oil storage tanks.



(a) Some people think that oil processing in The Bahamas should not be allowed.

One local person says:

> The oil processing industry is important,
> and it should be encouraged in The Bahamas.

Suggest reasons why the person thinks that oil processing should be encouraged in The Bahamas.

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..... [3]

(b) Oil is a fossil fuel.

(i) Describe the formation of oil.

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.....

..... [3]

(ii) State the name of **one** other fossil fuel.

..... [1]

(c) Most of the oil processed in The Bahamas is exported and then used to generate electricity.

Explain how oil is used to generate electricity.

.....

.....

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.....

.....

..... [3]

(d) The oil processing industry means that The Bahamas' coastal ecosystems are at risk from oil pollution.

(i) Identify **two** possible causes of marine oil pollution in The Bahamas.

1 .....

.....

2 .....

.....

[2]

(ii) Describe the impact of oil pollution on the coral reefs in The Bahamas.

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..... [4]

(iii) State **three** strategies used to minimise the impacts of oil spills.

1 .....

2 .....

3 .....

[3]

(e) The government of The Bahamas wants to know what people living in The Bahamas think about the oil processing industry.

A questionnaire was used to survey 20 people.

	yes	no	do not know
1. Do you know that oil is processed in The Bahamas?	𝍸 𝍸 𝍸 III	II	
2. Are you worried about oil processing in The Bahamas?	𝍸 III	𝍸 IIII	III
3. Would you like oil processing in The Bahamas to stop?	𝍸 IIII	𝍸 II	III

(i) An error was made recording the data in the questionnaire.

Describe the error in the data.

.....

..... [1]

(ii) The government concludes that people in The Bahamas are not concerned about oil processing in The Bahamas.

To what extent do you agree with the conclusion? Justify your answer.

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..... [2]

(iii) Suggest **three** ways that the survey can be improved.

1 .....

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2 .....

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3 .....

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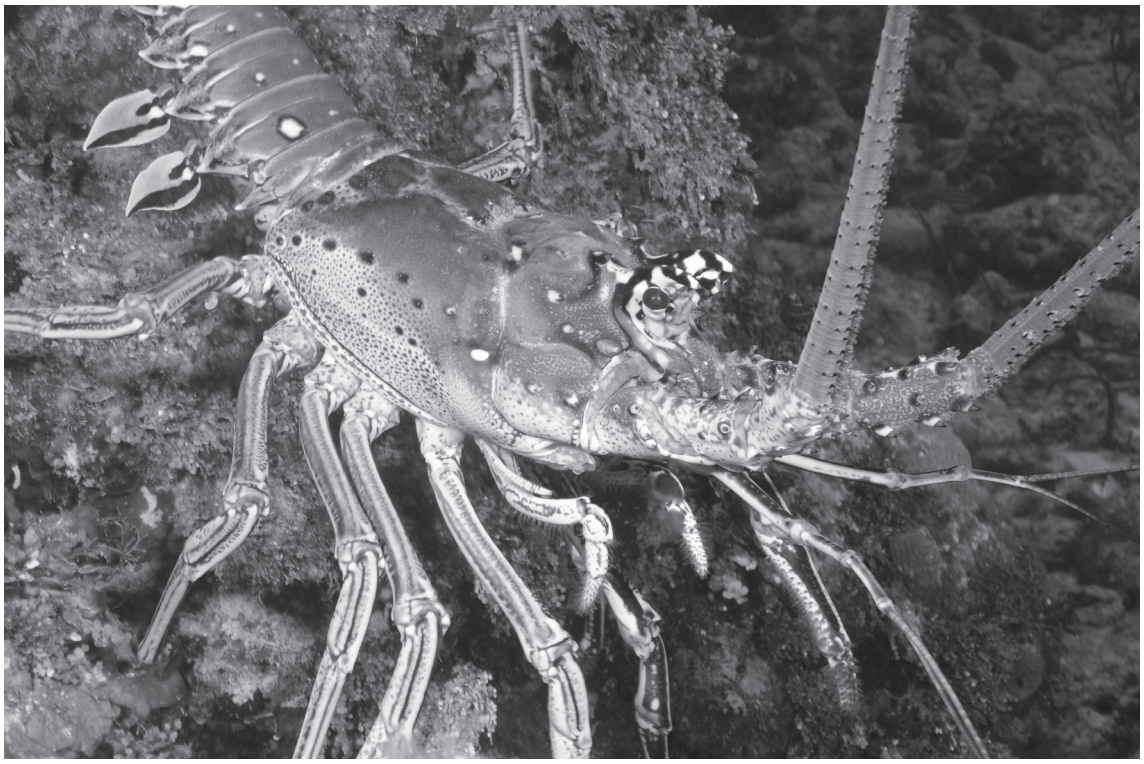
[3]

[Total: 25]

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4 The photograph shows a Caribbean spiny lobster.



Spiny lobsters are a source of food. The government of The Bahamas uses strategies to manage the harvest of spiny lobsters.

One strategy is to only allow spiny lobsters to be harvested by fishermen using a spear, rather than using traps. This limits the harvest because spear fishing is difficult in deep water. Traps can be set in any depth of water and are left for days to catch the spiny lobsters. Nets cannot be used to catch spiny lobsters.

(a) Explain **two** other strategies the government can use to manage the harvest of spiny lobsters.

1 .....

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2 .....

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[4]

(b) The photograph shows a lionfish.



Lionfish eat small fish, shrimp and young spiny lobsters. Lionfish are not native to the Atlantic Ocean.

In 2004, the first lionfish was discovered in The Bahamas. The population of lionfish has increased rapidly since then.

Three areas of coral reef were regularly surveyed in The Bahamas. The results of the survey are shown in the table.

year	number of lionfish per hectare			
	area 1	area 2	area 3	mean (average)
2012	37	27	35	33
2014	175	615	181	178
2016	245	232	236	
2018	305	300	295	300
2020	330	341	332	334

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(i) Calculate the mean (average) number of lionfish per hectare for 2016.

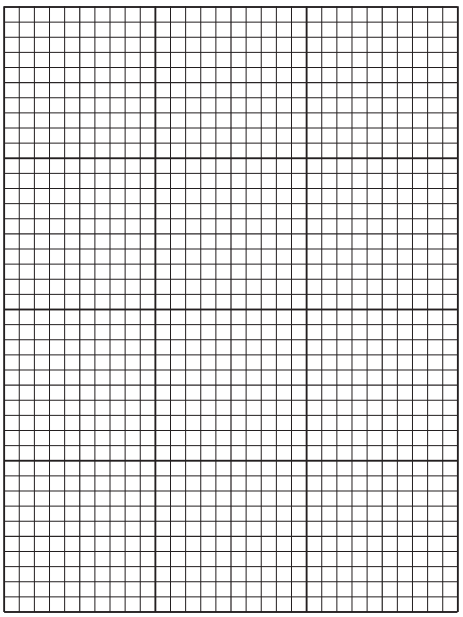
mean (average) number of lionfish per hectare = ... [1]

(ii) Explain why the mean (average) number of lionfish in 2014 is calculated using data for only two of the areas.

.....

..... [1]

(iii) Plot a bar chart to show the mean (average) number of lionfish per hectare between 2012 and 2020.



[4]

(iv) Suggest **two** reasons why scientists do **not** expect the lionfish population to increase greatly after 2020.

1 .....

.....

2 .....

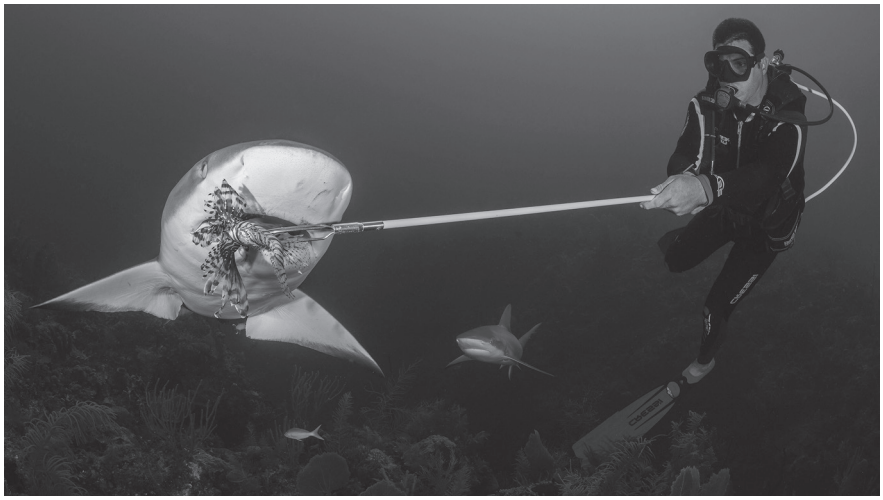
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[2]

(c) Lionfish are not native to The Bahamas. Some people think that the lionfish population should be controlled.

Sharks do not naturally feed on lionfish. Scientists believe that sharks can be trained to prey on lionfish if they are given some to eat.

The photograph shows a diver feeding a lionfish to a shark.



Describe the benefits and limitations of this method for controlling the population of lionfish.

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..... [5]

[Total: 17]

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