Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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|---|---|---|---|---|---|---|---|---|---|
| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | | |

*0810268137*

**ENVIRONMENTAL MANAGEMENT** **0680/42**

Alternative to Coursework **February/March 2016**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
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.

Study the appropriate source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

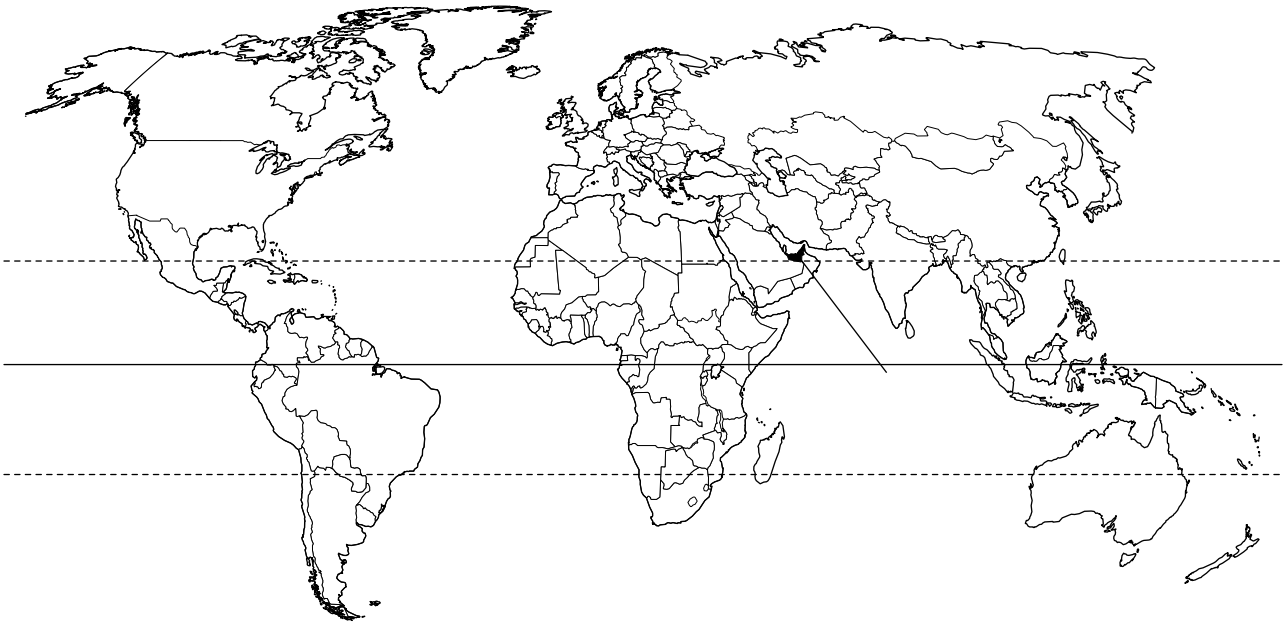
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **12** printed pages and **4** blank pages.

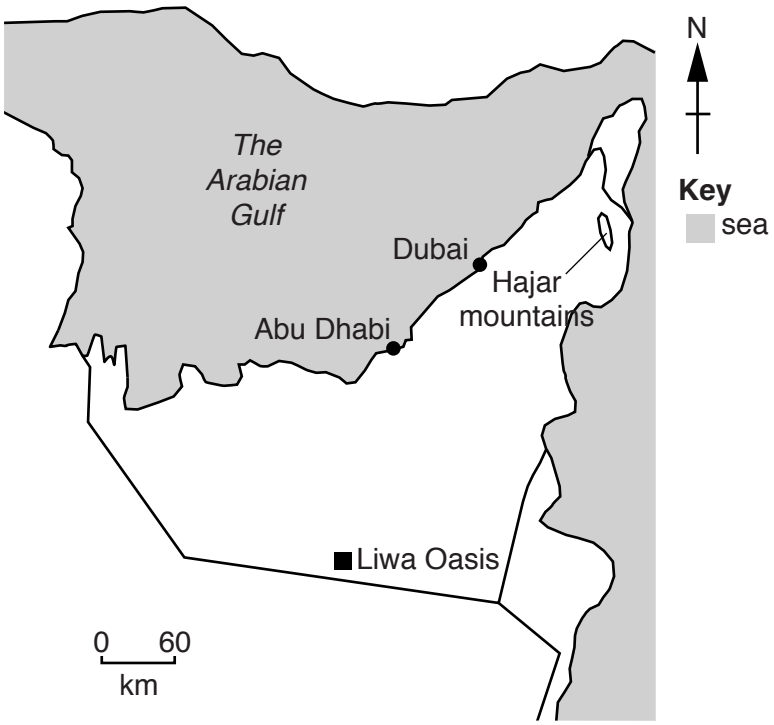

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CAMBRIDGE International Examinations

**map of the world**



**map of the United Arab Emirates (UAE)**



**area of the United Arab Emirates:** 83 600 $km^2$

**population:** 9.5 million

**children per woman:** 2.36

**life expectancy:** 77 years

**currency:** Emirati Dirham (3.7 AED = 1 USD)

**languages:** Arabic, Persian, English, Hindi, Urdu

**climate:** hot and arid, cooler in the eastern mountains

**terrain:** flat coastal plain merging into mountains in the east

**main exports:** crude oil, aluminium, natural gas, dried fish, dates

**1** **(a)** Seven states joined together to form the United Arab Emirates (UAE) in 1971. The economy developed because of oil exports. Industries now include oil refining, production of aluminium, cement and fertilisers, as well as ship repairs and textiles. Unemployment and inflation are low. The city of Dubai now has one of the largest international airports in the world.

**(i)** Suggest the benefits to the UAE of having one of the largest international airports.

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**(ii)** There has been investment in the oil refining industry in the UAE.

Suggest why the UAE has also invested in other industries.

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**(b)** In 2010 the World Wide Fund for Nature (WWF) calculated that the UAE had the biggest ecological footprint of any country in the world. This measures the use of natural resources, including energy, per person. It is expressed as a unit called a global hectare (gha).

Houses require a lot of energy in the UAE. Experts have proposed methods to reduce energy use. Some of these methods have been carried out. This has resulted in the ecological footprint per person falling from 9.5 gha in 2010 to 8.4 gha per person in 2012.

**(i)** Calculate the percentage reduction in the ecological footprint between 2010 and 2012.

Space for working.

..... % [2]

**(ii)** The UAE plans to have reduced the release of carbon dioxide by 40 percent by the year 2030.

Suggest **two** ways this reduction could be achieved.

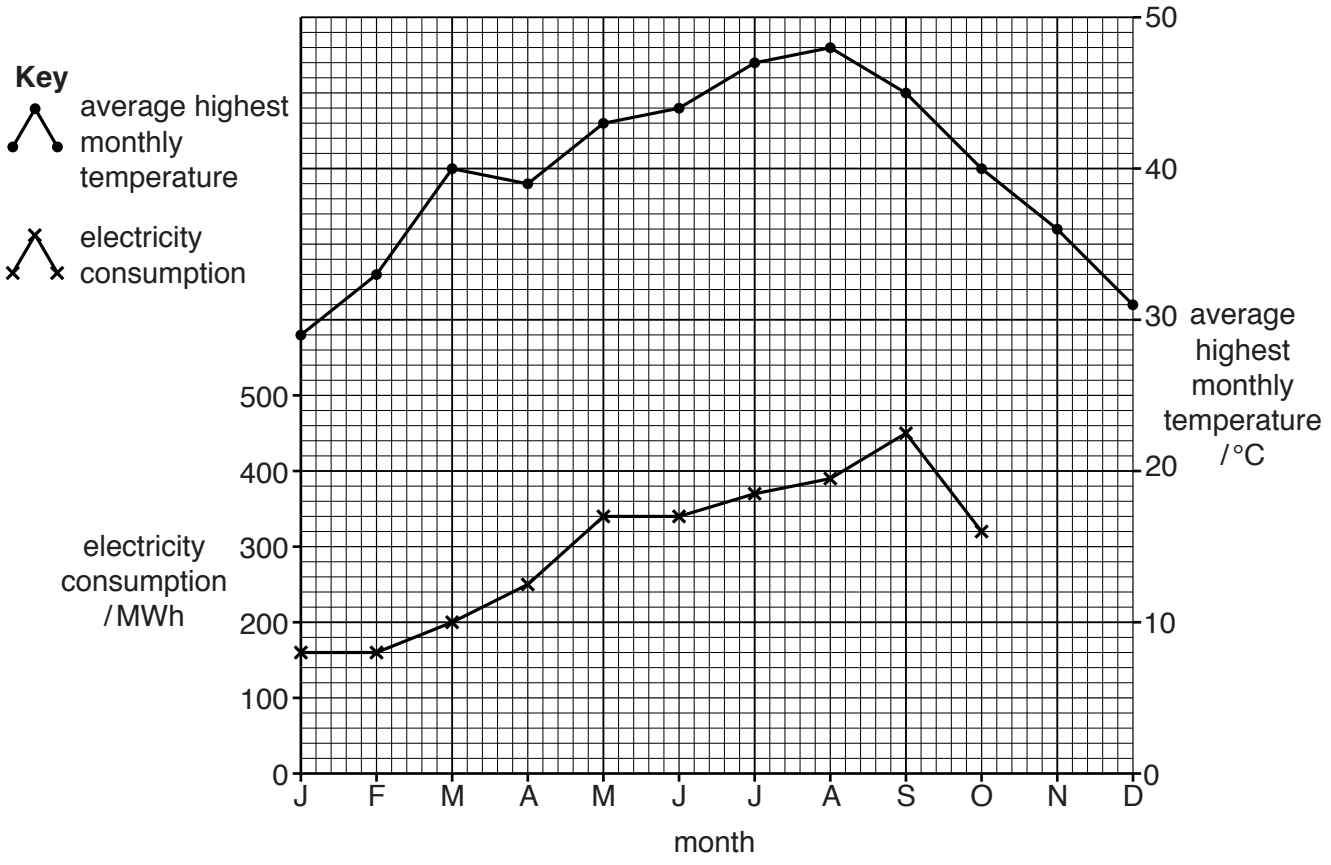
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**(c)** The graph shows average highest monthly temperatures and electricity consumption for Dubai.



**(i)** Complete the graph by plotting the electricity consumption for November and December from the table below. [1]

| month | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| electricity consumption /MWh | 160 | 160 | 200 | 250 | 340 | 340 | 370 | 390 | 450 | 320 | 240 | 200 |

**(ii)** Describe the relationship between average highest monthly temperature and electricity consumption shown on the graph.

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.....[2]

**(iii)** Suggest why electricity consumption changes during the year.

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**(d)** There is a shortage of clean fresh water for drinking and farming in the UAE. Power stations along the coast generate electricity. The excess heat produced evaporates sea-water. This produces water vapour, which is cooled producing clean fresh water.

More clean fresh water is made in some months than is needed. This water is stored behind dams and allowed to drain down through riverbeds, to increase groundwater. Groundwater is pumped up bore-holes to irrigate crops.

**(i)** A water engineer started to list the information needed to decide if this system of water use is sustainable. Complete the list. The first one has been done for you. [3]

- quantity of water extracted
- .....
- .....
- .....

**(ii)** There are more than 200 of these dams in the UAE.

Suggest **two** further advantages of dams other than water storage.

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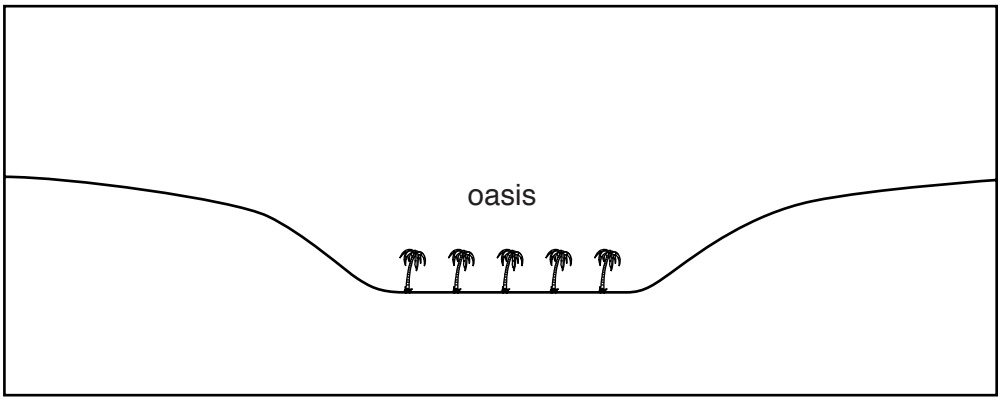
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**(iii)** An oasis is a place in a desert where water is found at or near the surface. The sketch below shows the Liwa Oasis.

Shade the area where water is stored. Complete the key. [2]




**Key**



**(e)** The government encourages farming by providing the following incentives:

- irrigation water is free
- bore-holes are drilled, irrigation equipment is sold and maintained at 50 percent of cost
- free visits to farms by water engineers
- dams are built and paid for by the government
- fertilisers are sold to farmers at 50 percent of cost.

**(i)** Describe the advantages of incentives such as these to farmers.

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.....[3]

**(ii)** Suggest the benefits to the government of providing incentives to farmers.

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**(iii)** Describe the possible risks to the environment of farmers being able to buy fertilisers at 50 percent of cost.

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**2** **(a)** Economic development and the increase in human population have led to several animal species becoming extinct in the UAE. One species of fish, *Garra barreimiae*, is only found in the rivers flowing down the Hajar mountain valleys. These fish feed on algae. The fish are now on the IUCN (International Union for Conservation of Nature) red list. Water only flows down the rivers for a short time each year. The fish are then trapped in pools during dry months.



**(i)** Complete the table below. [2]

| organism | name of trophic level |
|---|---|
| algae | ..... |
| *Garra barreimiae* | ..... |

The climate data for a place in the Hajar mountains is shown below.

| month | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| average temperature / °C | 16 | 17 | 19 | 19 | 22 | 26 | 28 | 30 | 29 | 26 | 22 | 18 |
| average rainfall / mm | 51 | 64 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 44 | 50 |

**(ii)** State in which months you would expect fish to be trapped in pools.

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.....[1]

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**(iii)** State the month that would have the highest rate of evaporation from the pools. Explain your answer.

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**(iv)** Suggest how being included on the IUCN red list could help prevent this fish from becoming extinct.

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.....[2]

**(b)** The water in the pools becomes more saline as the water evaporates. A student decided to measure physical factors in six pools. The results are shown below.

| pool | temperature /°C | pH | dissolved oxygen /mg per litre | salinity /arbitrary units |
|---|---|---|---|---|
| one | 22.6 | 7.6 | 5.9 | 80 |
| two | 22.8 | 7.7 | 5.8 | 92 |
| three | 23.4 | 7.8 | 5.2 | 125 |
| four | 22.0 | 7.5 | 6.0 | 107 |
| five | 23.4 | 7.9 | 6.2 | 130 |
| six | 22.6 | 7.8 | 6.1 | 144 |
| average | 22.8 | 7.7 | ..... | ..... |

**(i)** Complete the table. [2]

**(ii)** The student decided to investigate the possible effect of salinity on the fish.

Explain why the student chose salinity rather than the other physical factors.

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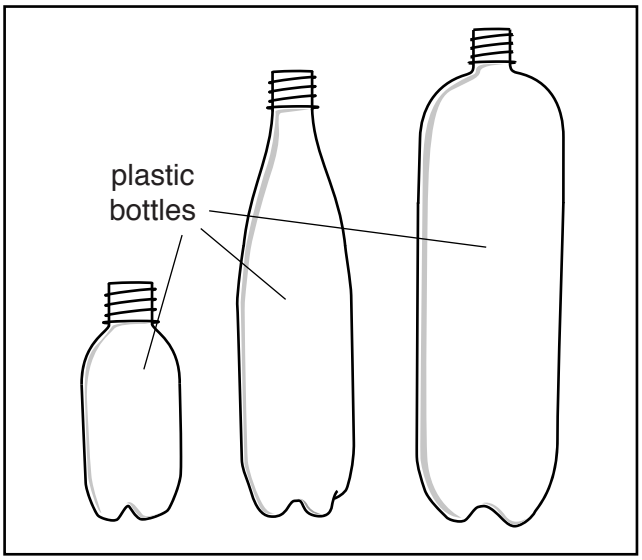
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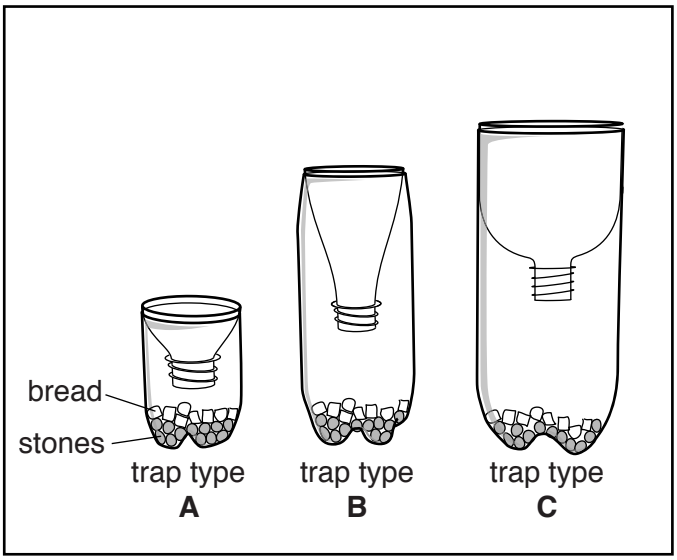
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**(c)** When taking measurements from the pools the student noticed that the *Garra barreimiae* were smaller in some of the pools.

To measure the size of these fish the student made some fish traps from plastic bottles as shown in the diagrams.




The student wanted to find which trap works best. Each trap was filled with water and a few stones. Some bread was put in each trap to attract the fish. After two hours the traps were removed. The fish in each trap were counted and their length measured. The fish were returned to the pool.

The results are shown below.

| trap type | number of fish | longest fish in trap/mm |
|---|---|---|
| **A** | 8 | 41 |
| **B** | 17 | 53 |
| **C** | 26 | 65 |

**(i)** Give **two** reasons why the student decided to use trap type **C** to investigate the six pools for the study.

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**(ii)** Suggest how the student could have measured the length of the fish.

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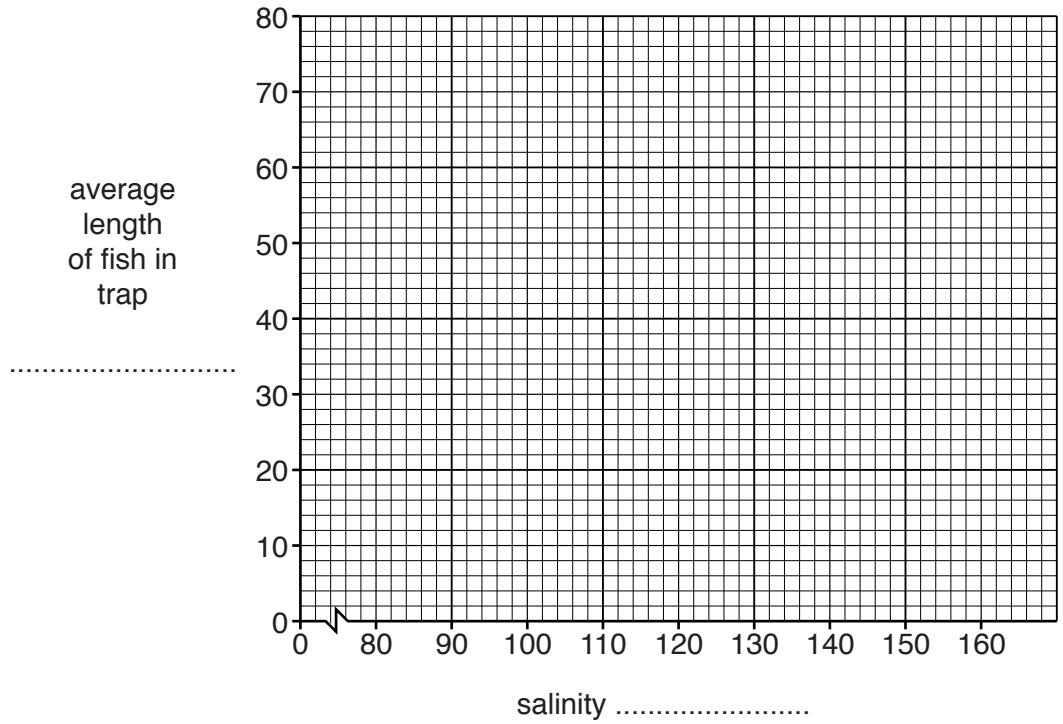
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**(d)** The student placed a type **C** trap in each of the six pools for two hours. The traps were removed and five fish from each trap were selected at random and their length measured.

The results are shown in the table below.

| salinity / arbitrary units | average length of fish in trap / mm |
|---|---|
| 80 | 72 |
| 92 | 60 |
| 125 | 52 |
| 107 | 50 |
| 130 | 45 |
| 144 | 46 |

**(i)** Complete the axis labels and plot the data on the grid below. [4]




**(ii)** Use your graph to predict the average length of fish in a pool with a salinity of 100 arbitrary units.

.....[1]

**(iii)** Circle any anomalous results on your graph. [1]

**(iv)** Describe the pattern shown by the graph.

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**(v)** Do you think the student has found evidence that the growth of these fish is affected by salinity? Explain your answer.

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**(vi)** Describe how the student could confirm the findings of the investigation.

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**(e)** The government has recently created national parks to try to protect wildlife. There has been an increase in tourism in recent years to the UAE.

Describe how national parks can help to protect wildlife as well as encourage tourism.

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