UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8918923632

ENVIRONMENTAL MANAGEMENT **0680/42**

Alternative to Coursework **May/June 2012**

1 hour 30 minutes

Candidates answer on the Question Paper

Additional Materials: Ruler

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 a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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.

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Answer **all** the questions.

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World map showing Nigeria



Map of Nigeria



Area of Nigeria: over 900 000 sq km
Population: 150 million
Children per woman: 4.82
Life expectancy: 51.9 years
Currency: Naira (150 Naira =1US$)
Languages: English, Housa, Yoruba, Igbo, Fulani
Climate: Equatorial in the south, savanna in the north
Terrain: Southern lowlands with central hills and plateaus. The coastline around Lagos is dominated by a large lagoon of shallow water, partly fresh and partly salty.
Main exports: Petroleum and oil products.

Nigeria is the twelfth largest producer of petroleum in the world. It has well developed financial services and a rapidly growing telecommunications sector. Manufacturing includes leather, textiles and cars as well as a developing film industry. Only recently has mining begun even to exploit very large deposits of other valuable minerals. However sixty percent of the population still work in agriculture. Half the population live in poverty.

Lagos is located on the edge of a lagoon and has expanded greatly in the last ten years as large numbers of people have migrated from rural villages. Many people have to live in shanty towns with inadequate services.

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1 **(a)** The Benin River flows into the Lagos lagoon. The river has many sawmills on its banks. Trees are cut in the forests in the southern lowlands and floated down to the sawmills. Sawmill waste is dumped in the river. Local fishermen complained that they were finding it hard to make a living now the sawmills have been set up.

A scientist carried out a survey of the river at points 1, 2 and 3. He used a canoe and fishing line. He fished for one hour at each sample station and then took a water sample for analysis. The results are shown in the table.

	Sample points		
	1	**2**	**3**
	20 km upstream from sawmills	**sawmill zone**	**4 km downstream from sawmills**
Number of fish caught	244	110	204
Number of fish species	22	10	19
Phosphate (ppm)	0.65	0.85	0.58
Nitrate (ppm)	0.58	0.49	0.85
Biological oxygen demand (BOD) (milligrams per litre)*	2.8	13.6	2.8
pH of water	7.3	6.6	7.3

*BOD shows the amount of oxygen used by bacteria in the water.

(i) Describe the biological processes that have brought about the changes, shown in the table, in the river.

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..... [5]

(ii) Does the data suggest sawmill waste is having an effect on the river? Use information from the table to support your answer.

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..... [3]

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(b) Many people have migrated to Lagos from rural areas but are forced to live in shanty towns without services. State one reason why people might migrate from rural villages to Lagos.

.....[1]

(c) Some people are forced to build their houses on stilts in the lagoon which is densely populated. They reach the mainland by canoe. An unemployed man living over the lagoon decided to make some money from selling fish. He built a small pen to grow fish. When the fish had grown he planned to smoke them and sell them at a local market.

- He built a small pen 3×3m (cost 300 Naira).
- He bought 100 small tilapia fish (cost 250 Naira).
- He fed them every day with kitchen waste.
- After twelve weeks he caught 75 fish and cooked and smoked them using wood chips from the sawmill waste.
- He sold all the fish for 1100 Naira.

(i) What % profit did he make?

.....[1]

(ii) Why are fish an important food to keep people healthy?

.....[1]

(d) A researcher wanted to find out how well the fish grow in lagoon pens compared to pens built in river water. She kept some factors the same between the two locations:

- Natural water temperature 26°C
- Size of pen 3×3 m
- 100 newly hatched fish added at day 1
- All the same species of fish

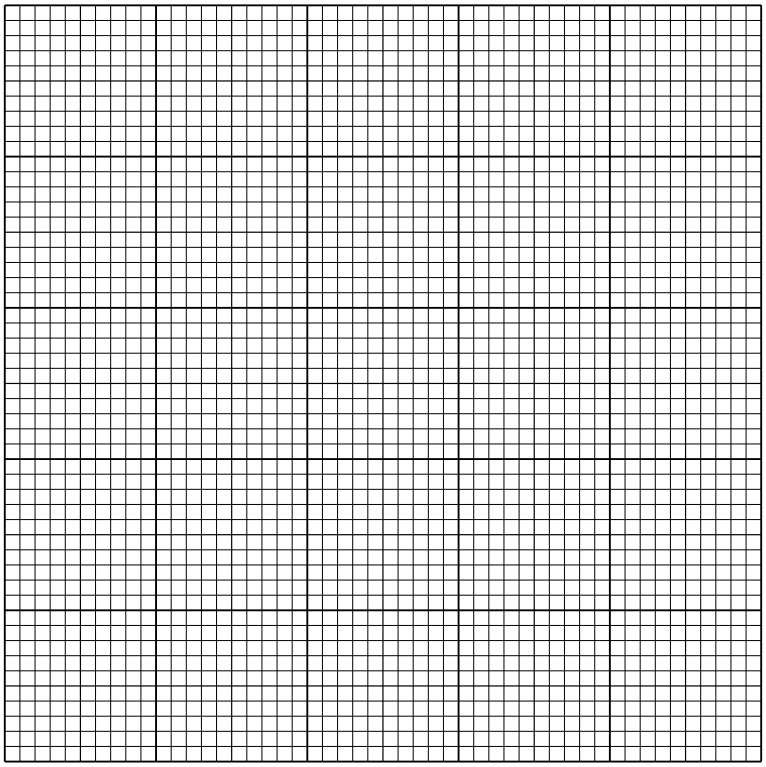
She selected 5 fish at random every 10 days to record their weight. Then she calculated the average weight. The results are shown in the table.

	Days from start	**10**	**20**	**30**	**40**	**50**
Average weight per fish (g)	River water	20	50	85	115	140
	Lagoon water	10	25	40	55	70

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(i) Plot a graph to show the data.

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[4]

(ii) What is the difference in weight between fish grown in the two types of water at 50 days?

.....[1]

(iii) What is similar and different about the pattern shown by the data for the two types of water?

similarity .....

difference..... [2]

(iv) Suggest one reason for the difference in fish growth in lagoon water compared with river water.

.....

.....[1]

(e) Some people think that eating fish produced from this lagoon is dangerous.

Suggest a reason why they think this.

.....

.....[1]

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2 **(a)** There is a great demand for building materials in Lagos because the city is growing rapidly. Building blocks are made from sharp river sand and cement. Cement imports are banned and cement production in Nigeria has recently doubled.

To obtain river sand young men take wooden boats with sails made from rice sacks out into the lagoon early in the morning. They dive into the lagoon and fill the boat with sand one bucket at a time. At midday they return to Lagos and sell the sand. A bucket holds 10 kg of sand and is worth 25 Naira.

(i) The sand collected on one day sold for 2000 Naira. Calculate how many buckets had been collected. Show your working.

.....

..... [2]

(ii) Explain why collecting sand by hand is likely to be a sustainable activity.

.....

.....

..... [2]

(iii) The government wants to make collecting sand by this method illegal. Suggest reasons why.

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..... [2]

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(b) Many small scale factories make concrete blocks from sharp sand and cement. Using a moulding machine and a supply of water many blocks can be made each day. The blocks need to dry for three days before being moved. If rain hits them within three hours of being made, they break down. Workers are paid by the number of blocks they make each day.

The traditional method of building with blocks involves using a mortar of sand and cement to bind the blocks together. To reduce costs a small factory started making hollow blocks and adding some waste rice husks from nearby farms so less cement is used. These blocks take longer to dry out.

(i) Look at the climate data for this area in the table.

Month	Average minimum temperature °C	Average maximum temperature °C	Total rainfall (mm)	Number of wet days per month
January	23	31	28	3
February	25	32	46	3
March	26	32	102	7
April	25	32	150	10
May	24	31	269	16
June	23	29	460	20
July	23	28	279	16
August	23	28	64	10
September	23	28	140	14
October	23	29	206	16
November	24	31	69	7
December	24	31	25	2

Which months are best and worst for block making? Give a brief reason for each.

best .....

worst .....[2]

(ii) Many of the small factory owners would like to increase production when weather conditions are ideal. Suggest reasons why they are unable to do this.

.....

.....

.....[2]

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[Turn over

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(iii) Explain the environmental and economic advantage of the blocks being

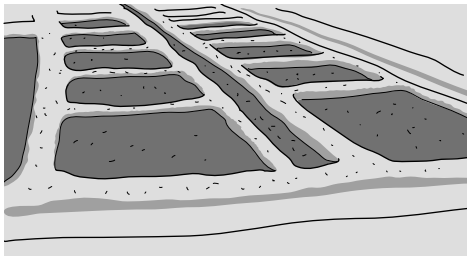
hollow, ...

.....

made with some waste rice husks. .....

..... [3]

(c) Rice is grown in fields that are surrounded by low earth banks. Rice husks can be used to make compost, as animal fodder or to make building blocks.



(i) Looking at the sketch describe what has been done to enable irrigation to take place.

..... [1]

(ii) Describe how composting rice husks could benefit the farmers.

.....

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.....[2]

(iii) Explain why rice farmers often suffer from malaria in this area.

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.....[3]

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3 **(a)** To the north of Lagos lagoon is an agricultural region with two cement factories. Most of the food grown is sold in Lagos. Some farmers complained to the government that the cement dust was affecting their crops. A researcher was asked to carry out a survey of farming villages to find out more about crop yields using a questionnaire. Complete the questionnaire by writing three further questions to find out more in the region from the farmers.

Distance from cement factory?

Less than 1 km ☐ more than 5 km ☐

1. How large is your farm?

Less than 1 Ha ☐ 1-3 Ha ☐ more than 3 Ha ☐

2.....

.....

3.....

.....

4.....

..... [4]

(b) The researcher used the questionnaire in 30 villages. Of these, 15 were less than 1 km from a cement factory and 15 more than 5 km away. Some of the results are shown in the table.

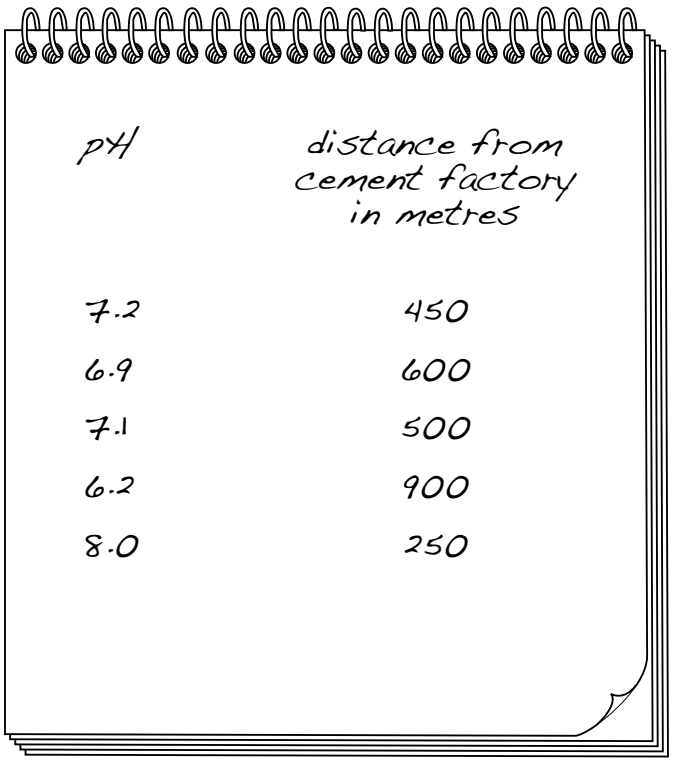
Average value of profit per farm

	Villages at least 5 km from cement factory	Villages near a cement factory	difference
Profit from selling crops (Naira)	272 000	190 610	
Profit for labour costing 1 Naira	4.70	2.10	

(i) Calculate the difference and complete the table. [2]

(ii) After the rice is harvested from the fields a crop of Lagos spinach is grown without irrigation. It is in high demand all year and is most expensive in the dry season. A student suspected that changes in soil pH altered the growth of Lagos spinach. She decided to take soil samples from different locations and test the pH. She followed the easy paths to the sample sites and recorded her findings in the order shown in the notebook.

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pH	distance from cement factory in metres
7.2	450
6.9	600
7.1	500
6.2	900
8.0	250

In the space below rearrange the data in a better way for analysis.

[3]

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(iii) Describe what the data shows.

.....

..... [1]

(c) The student decided to grow some Lagos spinach in two containers. One container had cement dust added, the other did not. The following method was used.

- 50 seeds were planted in each container.
- Both containers had the same volume and type of soil.
- The same volume of water was added to each container.
- 5 leaves were measured every five days.

3 g of cement dust was added to one container every 3 days.

The experiment ended after 35 days. The results are shown in the table.

Average length of leaves (cm)

days from planting	no cement dust	cement dust added every 3 days
5	5	3
10	7	5
15	10	8
20	11	9
25	13	11
30	14	12
35	15	13

(i) Suggest one other factor the student should have kept the same during the experiment.

..... [1]

(ii) Do the results suggest that cement dust alters the growth of Lagos spinach? Explain your answer.

.....

.....

..... [2]

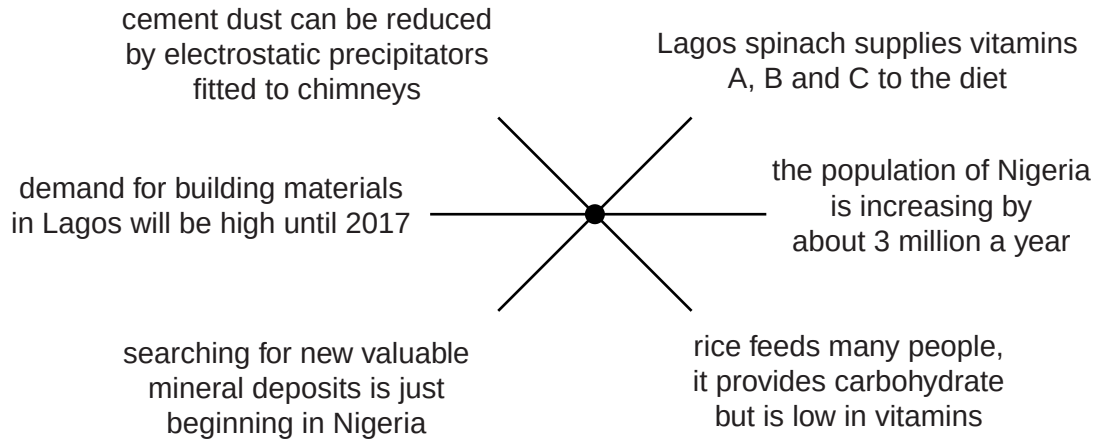
(iii) State another measure of plant growth the student could have recorded.

..... [1]

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(d) The diagram shows some of the factors that will affect the quality of life in the future in this farming region north of Lagos.

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Use your knowledge and the information given to suggest a development plan for the next 5 years for the farming region north of Lagos.

Allowed developments:

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Restrictions or bans:

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.....[7]

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