UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5369229977 9

ENVIRONMENTAL MANAGEMENT **5014/23**

Alternative to Coursework **October/November 2010**

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.

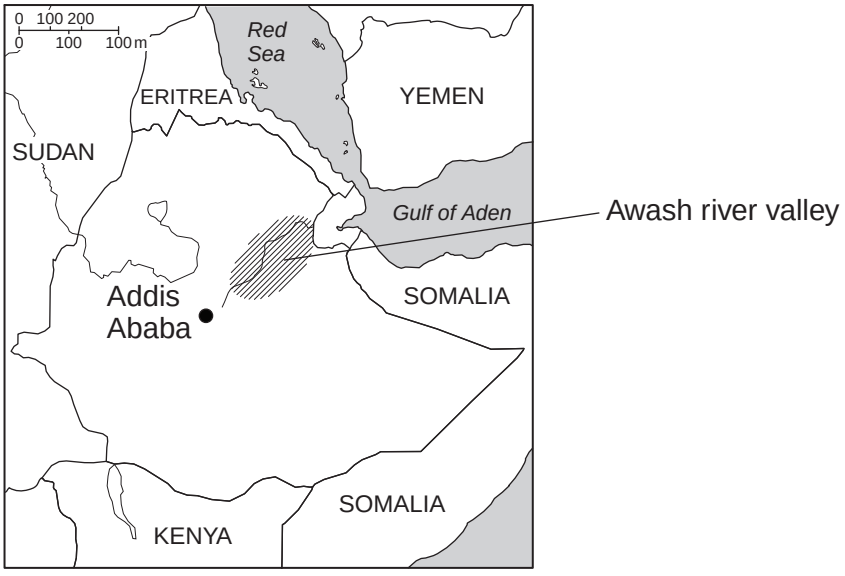
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

This document consists of **13** printed pages and **3** blank pages.

World map showing the location of Ethiopia

Map of Ethiopia



Area of Ethiopia: 1 127 127 sq km
Population: 86 000 000
Children per woman: 6.12
Life expectancy at birth: 55 yrs
Currency: birr (10.3 birr = 1 US dollar)
Languages: local languages, English
Climate: varies from desert in the west to tropical monsoon in the east with wide variations according to relief
Terrain: high plateau with central mountain range divided by the Great Rift Valley
Main exports: coffee, gold, leather products, live animals, oilseeds

Ethiopia has an economy based on agriculture employing about 80% of the working population. Drought and poor cultivation practices have reduced output. Coffee is the single largest export but a drop in world prices has encouraged farmers to grow alternative crops. There are only small reserves of gold, platinum, copper and natural gas. Poverty is a major social problem, other problems include shortage of clean drinking water, deforestation and desertification.

[Turn over

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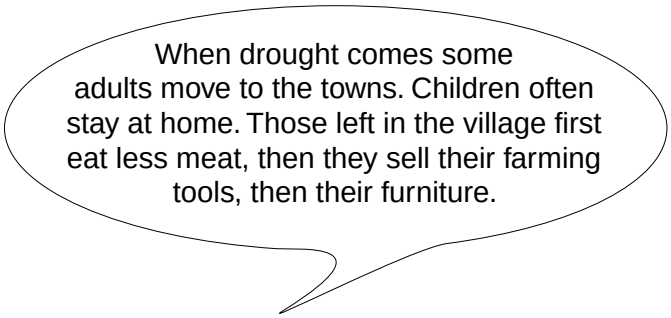
1 **(a)** Many families have only small plots of land of between 0.5 and 1.0 hectare. These do not always produce enough to feed a whole family for a year. In drought years famine is widespread.

One farmer made this comment:



(i) Why do adults leave the village during drought?

.....

..... [1]

(ii) Why is there less meat to eat in a drought?

.....

..... [1]

(iii) Explain why selling farm tools is a bad idea.

.....

..... [1]

(b) After a major drought in 1984 the government set up credit schemes to help small family farms. The farmers are now given money instead of food aid if they help train other farmers for five days a month.

Another farmer made this comment:

Some of the farmer's changes are:

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1. using a living fence of thorny plants to control livestock
2. keeping bees
3. using dried dung as fuel
4. building a toilet with a thatched roof.

(i) Explain how change **1** helps to make farming more sustainable.

.....

..... [1]

(ii) State **one** advantage and **one** disadvantage of change **3**.

.....

.....

..... [2]

(iii) Suggest two advantages of keeping bees.

.....

.....

..... [2]

(iv) Explain why you would encourage farmers to build a toilet.

.....

.....

..... [2]

(c) World demand for honey is increasing at the same time as bee colonies have been failing in regions of intense agriculture.

The farmer collected 10 kg of honey and sold it for 40 birr per kg of honey (10.3 birr = 1 USD).
How much, in US dollars, was the honey worth?

.....

..... [2]

(d) The farmer used the money from selling honey to buy a motor pump to supply a field with irrigation water.

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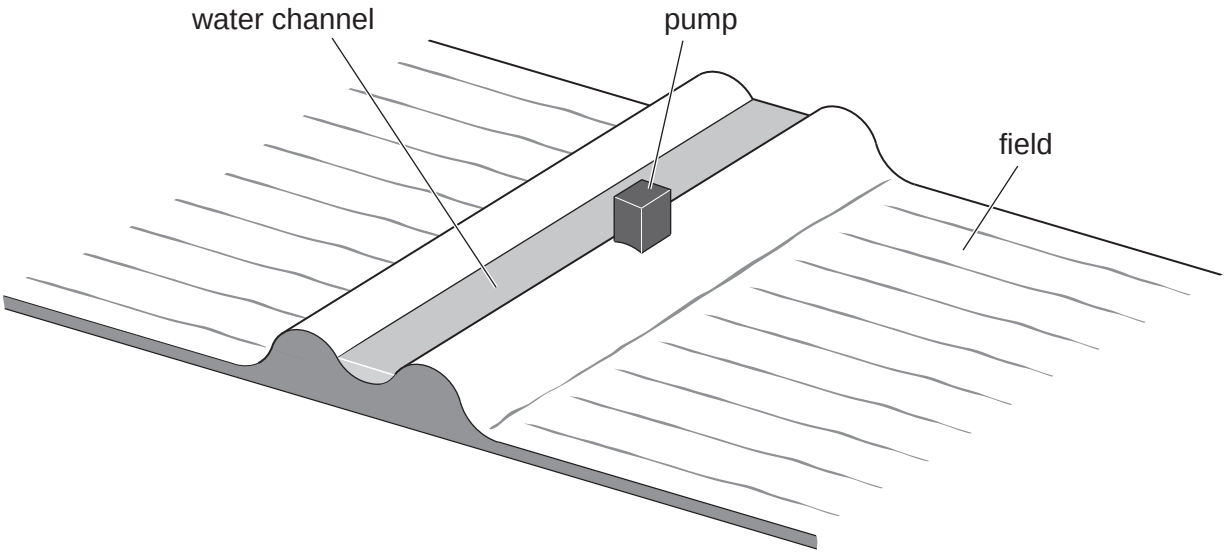

Fig. 1.1

(i) Complete **Fig. 1.1** to show a method for irrigating crops in the field. [2]

(ii) On irrigated land any yields decrease with time. Explain why.

.....

.....

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.....[3]

(iii) The farmer made this comment:

Since I have been irrigating my field the family has been suffering from malaria more often.

Table 1.1 shows the number of cases of malaria before and after irrigation.

For Examiner's Use

Table 1.1

	cases of malaria per year	
	before irrigation	after irrigation
adults	9	12
children	11	58

Explain why the farmer's family may suffer malaria more often.

.....

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.....[2]

(iv) Suggest how the irrigation could be carried out without increasing the risk of malaria.

.....

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.....[2]

(v) How can cases of malaria be reduced?

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.....

.....[2]

(e) Farmers are being trained to rotate wheat with fava beans. This can increase wheat yield by 50%. Fava beans can be used as a source of protein instead of eating meat.

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(i) Why is protein important in the human diet?

.....

..... [1]

(ii) Draw a table that a farmer could use to record crop yield in kilograms for three fields over two years.

Field A has beans only.
Field B has wheat only.
Field C has beans in year one and wheat in year two.

[3]

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Question 2 starts on page 10.

2 **(a)** The Awash river valley is a fertile region that has been home to the Afar people for centuries. They are nomadic pastoralists who keep camels, cattle, sheep and goats. These animals rely entirely on natural vegetation for food.

(i) Briefly describe the way of life of nomadic pastoralists.

.....

.....

.....[2]

(ii) Explain why their way of life has been sustainable for centuries.

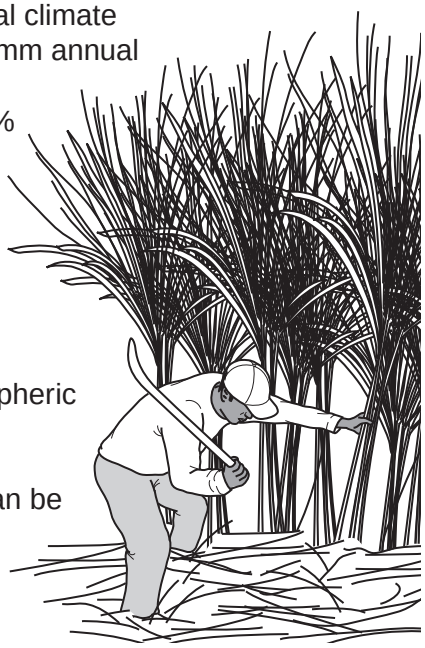
.....

.....[2]

(b) In 2005 the government decided to develop 14 000 hectares of the Awash valley into sugar cane fields. They also plan to build a sugar extraction factory. The government hope to earn foreign exchange by exporting the sugar.

Sugar Cane

- grows 2–6 metres in height
- grows in a tropical climate with at least 600 mm annual rainfall
- converts up to 2% solar energy into biomas.



Some sugar cane varieties fix atmospheric nitrogen.

Waste cellulose can be made into paper.

The land is being cleared and planted. Many concrete irrigation channels are needed, as well as houses for the workers.

(i) Suggest **two** reasons why the Afar people objected to this development.

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.....

.....[2]

(ii) This development will need thousands of kilograms of cement to construct. A local cement factory has been given the contract to supply all the cement. A large amount of energy is needed to heat the ingredients to make cement. For every 1.0 kg of cement 0.5 kg of carbon dioxide is released.

Some scientists think cement production causes serious environmental problems. Describe **two** of them.

.....

.....

.....[2]

(iii) For this particular project other scientists think cement is not going to add to environmental problems. Explain their view.

.....

.....

.....[2]

(iv) After sugar extraction the sugar cane waste can be used in three ways. Suggest the advantage of each way.

1. burning sugar cane waste

.....

.....

2. fermenting to produce ethanol

.....

.....

3. feeding to livestock (cattle)

.....

.....[4]

(c) Sugar cane is harvested each year. A farmer starts to irrigate some of his sugar cane fields. Table 2.1 shows data from sugar cane samples taken from the non-irrigated fields and the irrigated fields.

Table 2.1

field	height of sugar cane plants (m)	mean height (m)	yield of sugar (tonnes per hectare)
non-irrigated	2.7 2.8 2.8 2.7 2.6	2.7	9.5
irrigated	3.1 3.2 3.2 3.1 3.0	3.1	11.1

(i) Calculate the percentage increase in mean height of the sugar cane plants when the farmer starts to irrigate the fields.

.....

..... [2]

(ii) The value of each kilogram of sugar extracted is 6.0 birr.
The extra cost of irrigation for each kilogram of sugar extracted is 0.5 birr.
Is the government investment in irrigation worthwhile?
Explain your answer.

.....

.....

..... [2]

(d) The total yield of sugar from a field was recorded for five years. Fertiliser was not used on this field during this time. The results are shown in Table 2.2.

Table 2.2

	year 1	year 2	year 3	year 4	year 5	year 6
yield of sugar (tonnes per hectare)	9.1	10.7	9.0	7.6	7.2	?

(i) Plot the data on a suitable graph.

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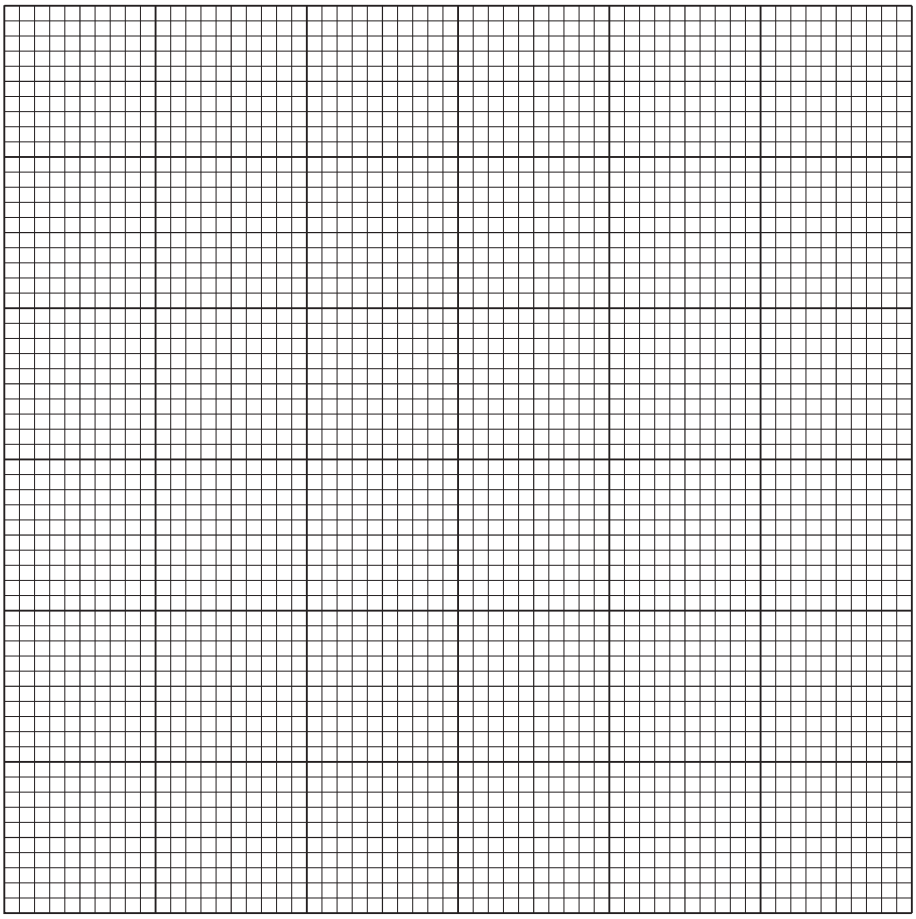

[4]

(ii) Suggest a reason for the increase in yield from year 1 to year 2 even though fertiliser has not been used.

.....

.....[2]

(iii) What yield would you expect from the harvest in year 6?

.....[1]

(iv) Potassium fertiliser can be added to increase the yield of sugar cane. When would you start to add fertiliser?

.....[1]

(e) The sugar cane grub infects sugar cane and reduces yields. A pesticide called Confidor can be used to kill the grub.

For Examiner's Use

Confidor Information Sheet
• may cause irritation by skin contact • irritates eyes • toxic to fish, aquatic insects, algae, bacteria and birds • not expected to leach into soils

(i) Write **three** guidelines for sugar cane workers using Confidor.

guideline 1 .....

.....

guideline 2 .....

.....

guideline 3 .....

.....[3]

(ii) The manager of the sugar cane plantation decided that any field with a yield of less than 70 tonnes per hectare should be cleared and replanted with new sugar cane plants. Explain the commercial and environmental advantages of this decision.

commercial advantages

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environmental advantages

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.....[4]

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