



Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE
NAME

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CENTRE
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ENVIRONMENTAL MANAGEMENT

5014/21

Alternative to Coursework

May/June 2014

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 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.

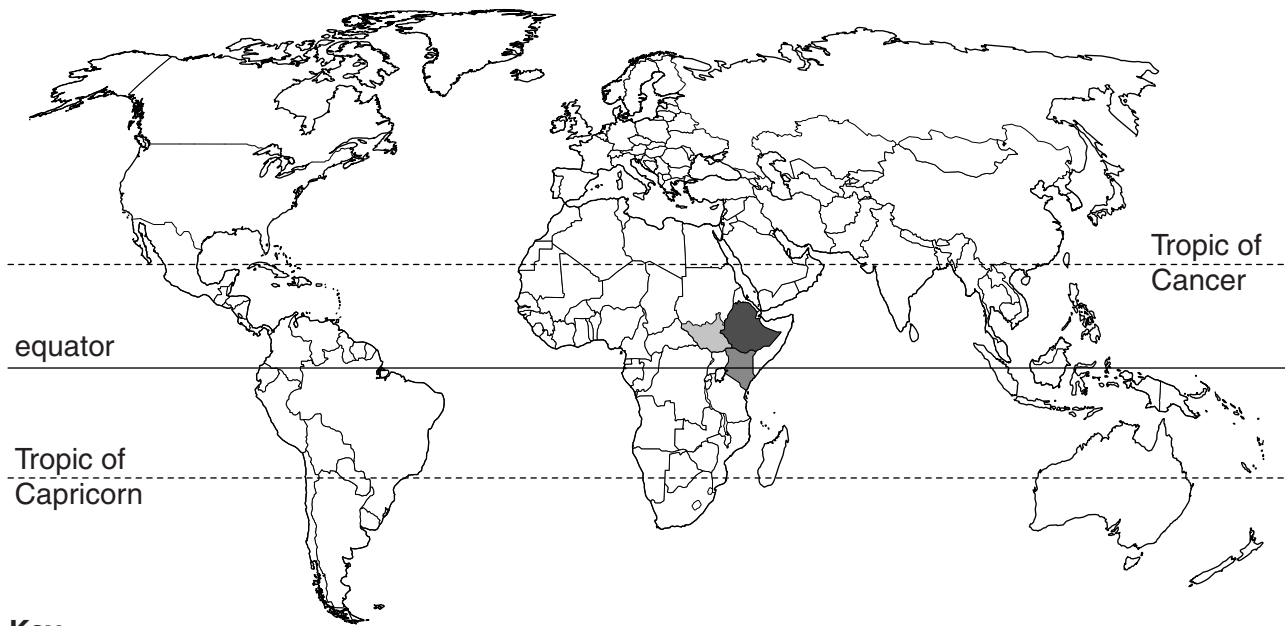
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

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 **15** printed pages and **1** blank page.

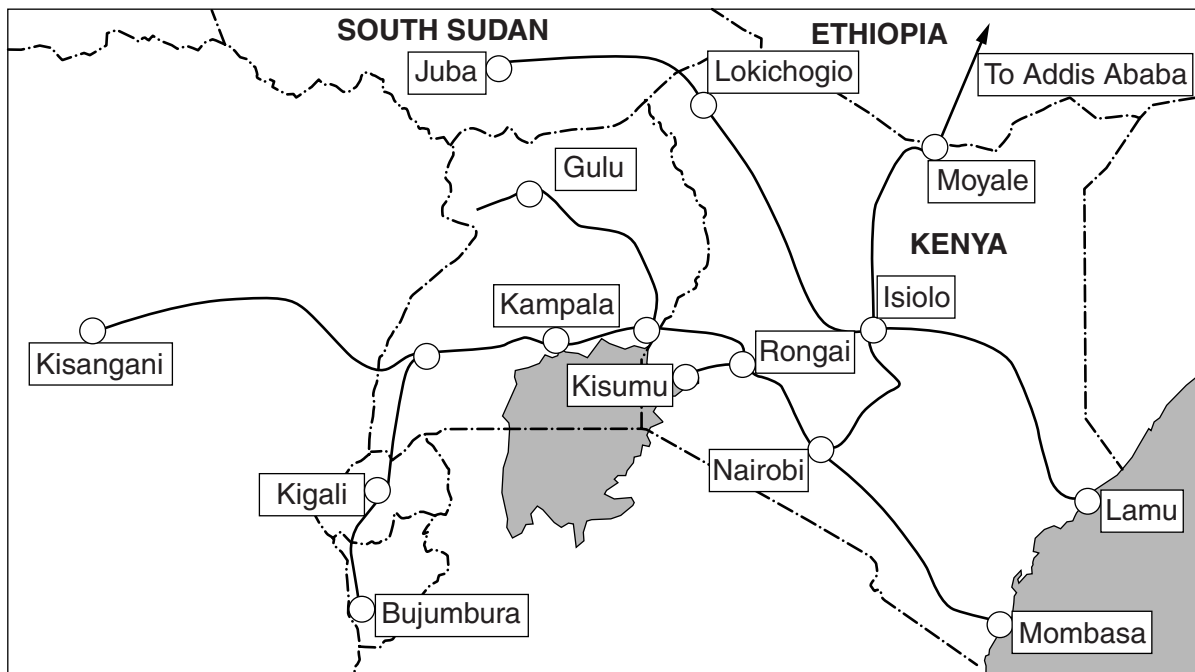
world map



Key

- Ethiopia
- Kenya
- South Sudan

proposed transport links for Ethiopia, Kenya and South Sudan



Key

- transport link
- international border

	Ethiopia	Kenya	South Sudan
area/km ²	1 100 000	580 000	644 000
population/millions	94	43	16
children per woman	5.97	3.98	4.17
life expectancy/years	56	63	62

	area/km ²	estimated population in 2014/millions	population density/people per km ²
Ethiopia	1 100 000	94	
Kenya	580 000	43	74.1
South Sudan	644 000	11	

1 (a) (i) Complete the table above for population density. [2]

(ii) The population of all three countries is likely to increase in the next 20 years. Which country would you expect to show the biggest increase in population density? Give reasons for your answer.

.....

 [2]

(iii) Ethiopia, Kenya and South Sudan are starting a project to connect road, railways and a pipeline to a new large deep-water port on the Kenyan coast. This project was first suggested forty years ago. Construction finally started in 2013.

Suggest reasons why this project took so long to get started.

.....

 [3]

- (iv) The project aims to increase the GDP of each country. Suggest how the project could increase the standard of living of many people in each country.

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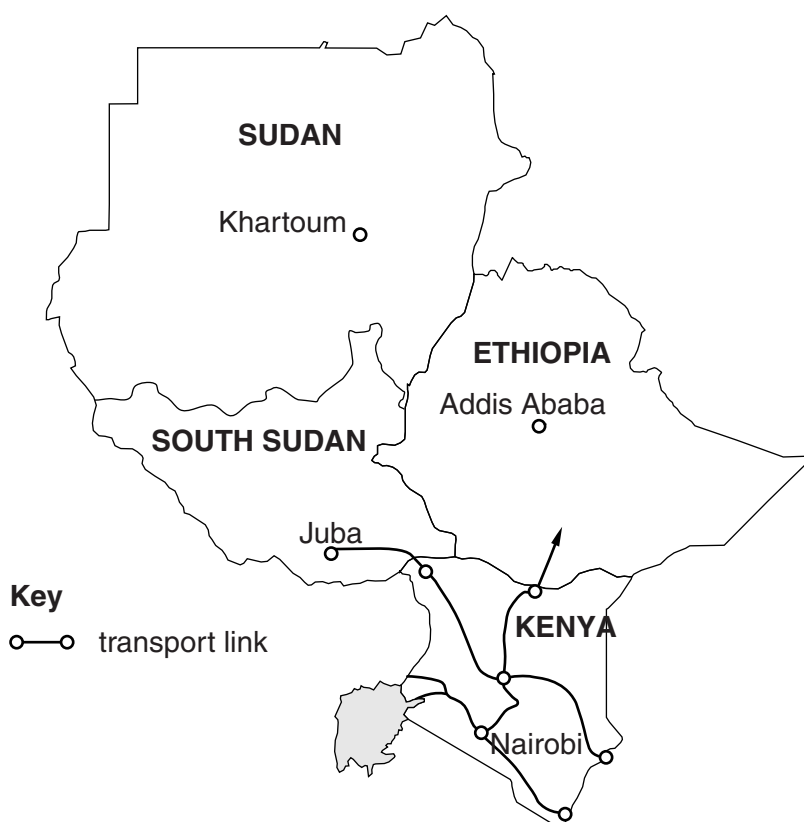
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..... [3]

- (v) The project aims to bring the transport links closer together. Many people will have to move from their lands as the project is built.



What are the advantages of building the transport links in this way?

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..... [2]

- (vi) Suggest how environmental damage can be reduced during construction of the transport links and in the future.

during construction.....

.....

in the future

..... [3]

- (b) The project has to have a new deep-water port built on Lamu Island. At least 400ha of land will be needed. The government will have to carry out an environmental impact assessment before building can start.

- (i) Do you think the new port will be built? Give reasons for your answer.

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..... [3]

- (ii) A very large coalfield has been discovered in Kenya. The government wants to build a railway from the coalfield that links to the transport project.

Explain why the government wants to start mining the coalfield.

.....

.....

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..... [2]

- 2 The government of Kenya has identified a new problem of electrical waste. Some of this waste is being imported from developed countries. Some people make a living collecting wires and burning the plastic insulation to recover the copper inside. The plastic releases dioxins when burnt at low temperatures.

pictures of wire burning



- (a) What are the possible risks to health shown in the pictures?

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..... [3]

- (b) A student collected samples of electrical wire from a waste dump. He used the following method to help decide which type of wire to collect.

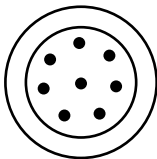
- A weigh the wire
- B separate the plastic from the copper wire
- C cut wire into 1 m lengths
- D weigh the copper wire
- E weigh the plastic

- (i) The student has not written their method in the correct order. Complete the table to show the correct order.

.....				E
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[1]

(ii) The student recorded their results in the table for 1 m lengths of wire.

type of wire	heavy duty	medium duty	light duty
			
weight of copper / g	50	25	20
weight of plastic / g	40	25	80
percentage of plastic / %	44.4		
number of metres needed to give 1 kg of copper	20		

Key

- copper wire

Complete the table.

[2]

(iii) Which type of wire would you collect? Give a reason for your answer.

.....

..... [1]

- (c) Another student decided that only analysing three samples was not enough as some types of wire might be more common than others. The student proposed three plans.

PLAN A

Walk over one electrical waste dump and pick up some pieces of wire for 5 minutes. Weigh the wire.

PLAN B

Walk over two electrical dumps and pick up some pieces of all the different types of wire for 15 minutes. Weigh all the wire.

PLAN C

Walk over three electrical dumps and pick up as much wire as possible in 15 minutes. Sort it into types and weigh each type.

- (i) Why will plan A give the **least** reliable results? Give a reason for your answer.

.....
..... [1]

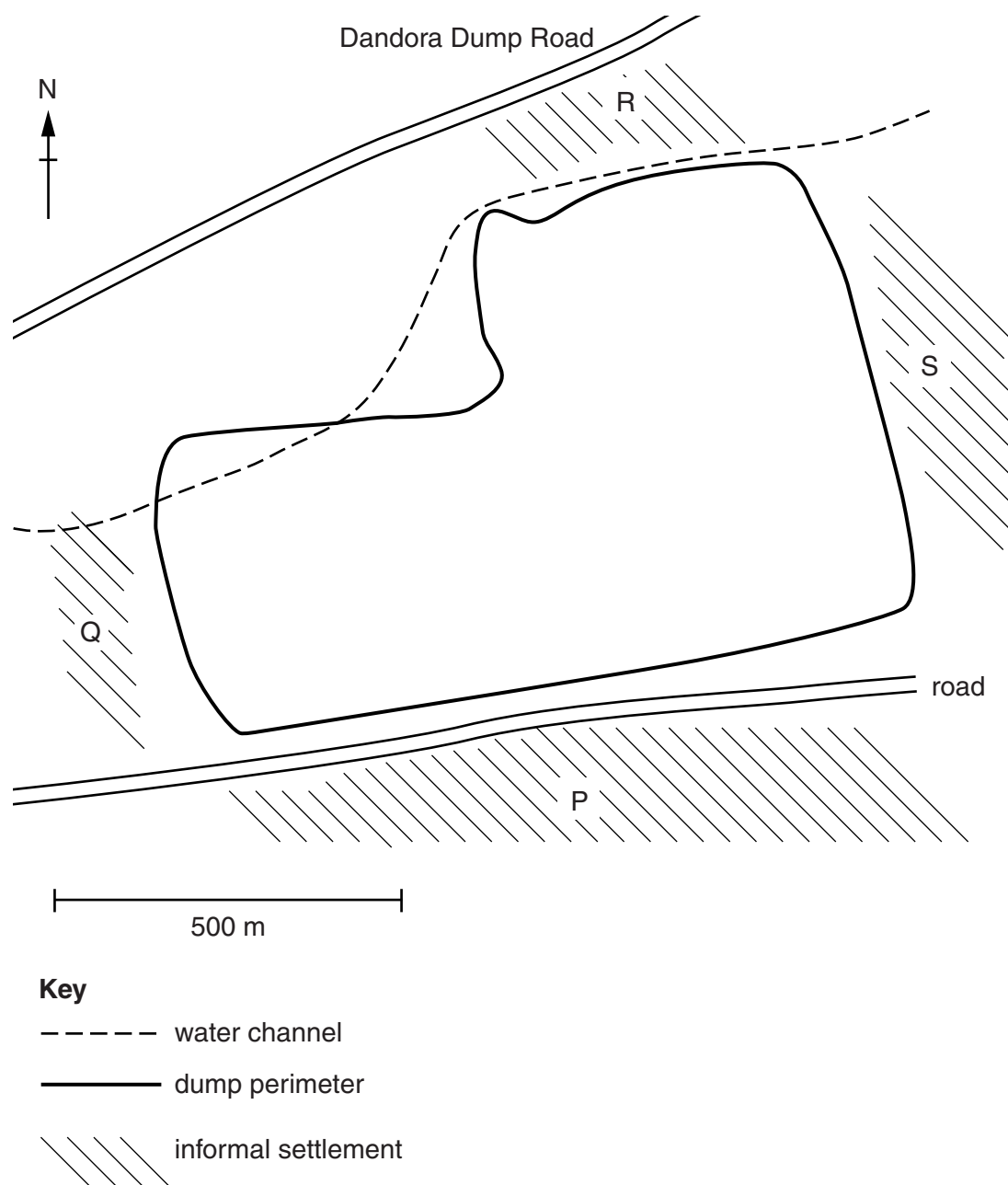
- (ii) Explain why Plan B is an improvement on plan A.

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..... [2]

- (iii) Give reasons why plan C is better than plans A or B.

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..... [2]

- (d) The Dandora dump located on the eastern side of Nairobi is the largest in Kenya. It has been declared one of the most polluted sites in the world. A medical researcher wanted to find out about the effects on health of local people living around the dump in informal settlements (shanty towns).



The medical researcher visited the four informal settlements P, Q, R and S in February. He used the following method at each settlement.

Select 20 households at random.

Ask the head of each household if they will take part in a health survey.

Ask the same questions and record the answers.

Gather all the data in a table.

question	% of yes responses			
	P	Q	R	S
Do any of your children suffer from breathing difficulties or asthma?	13	19	11	8
Has any adult died from respiratory disease in the last 5 years?	15	20	12	16
Have any children less than one year old died in the last 5 years?	16	20	9	12
Do any members of your household suffer from the same illness at least three times a year?	25	28	26	27

- (i) Suggest **two** other questions the researcher could have asked.

.....

 [2]

- (ii) Look at the data in the table above. Which informal settlement P, Q, R or S is most likely to be affected by pollution? Give a reason for your answer.

..... [1]

- (iii) The medical researcher could not see any important differences in the four settlements. However, when he looked at information about the prevailing wind direction in Nairobi a possible reason was seen.

Which direction is the prevailing wind in Nairobi? How can this help to explain the differences in the findings?

wind direction

explanation

..... [2]

- (e) The researcher decided to repeat the survey in April and August. He only recorded the number of cases of diarrhoea and malaria.

month	average maximum temperature / °C	average monthly rainfall / mm	average number of wet days
J	25	38	6
F	26	64	6
M	25	125	11
A	24	211	16
M	22	158	17
J	21	46	9
J	21	15	5
A	21	23	7
S	24	31	6
O	24	53	8
N	23	99	14
D	23	86	10

	P	Q	R	S
cases of diarrhoea in April	22	43	37	18
cases of diarrhoea in August	14	16	15	17
cases of malaria in April	5	11	10	6
cases of malaria in August	2	3	4	3

Which settlements showed the greatest change between April and August? How does the location of the settlements help to explain the differences?

settlement

explanation

.....

..... [2]

- (f) To help reduce air pollution and reduce the dumping of electrical waste, an entrepreneur wants to import wire stripping machines to make more money from the waste. They can strip the plastic from hundreds of metres of wire each hour.

- (i) Suggest the advantages and disadvantages of this idea.

advantages.....

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disadvantages

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[3]

- (ii) Many developed countries have made it illegal to burn electrical wire. Suggest why it is not yet illegal in Kenya.

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..... [2]

- 3 (a) Many farmers use small plots of land around Nairobi to grow cassava. They sometimes make a loss or only a small profit.

fact sheet: CASSAVA

slow growing
can be intercropped
grows in poor soils and is drought resistant
roots can be harvested all year
highest prices paid in May
can be made into flour

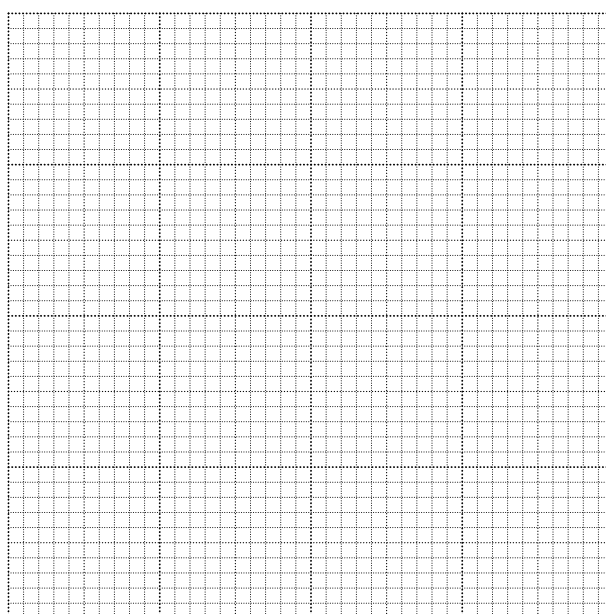
fact sheet: COWPEAS

fast growing
can be intercropped
can feed animals or humans
are a leguminous plant

An agricultural advisor carried out a small trial growing cassava only and cassava with different quantities of cowpeas. Each plot of land was the same size.

	plant height at harvest/cm	number of roots collected
cassava only	162	150
cassava + 2 cowpeas / m ²	166	154
cassava + 4 cowpeas / m ²	169	190
cassava + 6 cowpeas / m ²	172	168
cassava + 8 cowpeas / m ²	155	167

- (i) Plot the data as a graph on the grid below.



[4]

- (ii) Describe the pattern of results for:

plant height.....

.....

number of roots

..... [3]

- (iii) What planting density of cowpeas would you suggest farmers use? Explain your answer.

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..... [2]

- (iv) One farmer said, 'growing cassava with cowpeas will give me an income every year. I do not need to buy fertiliser. I can feed my family all year'.

A second farmer said, 'I cannot afford to buy the cowpeas or pay for the extra labour needed for planting or weeding. I would rather spend my money on inorganic fertiliser'.

Explain why the first farmer does not need to buy fertiliser.

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..... [1]

- (v) Explain why the second farmer is not farming in a sustainable way.

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.....[3]

- (b) To try to persuade more farmers to change their methods of growing cassava, the advisor decided to repeat the trial the following year on five plots. Each plot was on a different farm around Nairobi. In each case he planted at the rate of 5 cowpeas per square metre.

The results are shown in the table.

plot	cassava only/kg per ha	cassava and cowpeas/kg per ha
1	31.0	39.0
2	32.5	41.0
3	30.5	40.6
4	32.8	37.4
5	31.2	33.0
average		

- (i) Complete the table. [1]
- (ii) Explain how the advisor can use this information to persuade farmers to change to the new method.

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..... [2]

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