Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7429369695

ENVIRONMENTAL MANAGEMENT **0680/43**

Paper 4 **October/November 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.

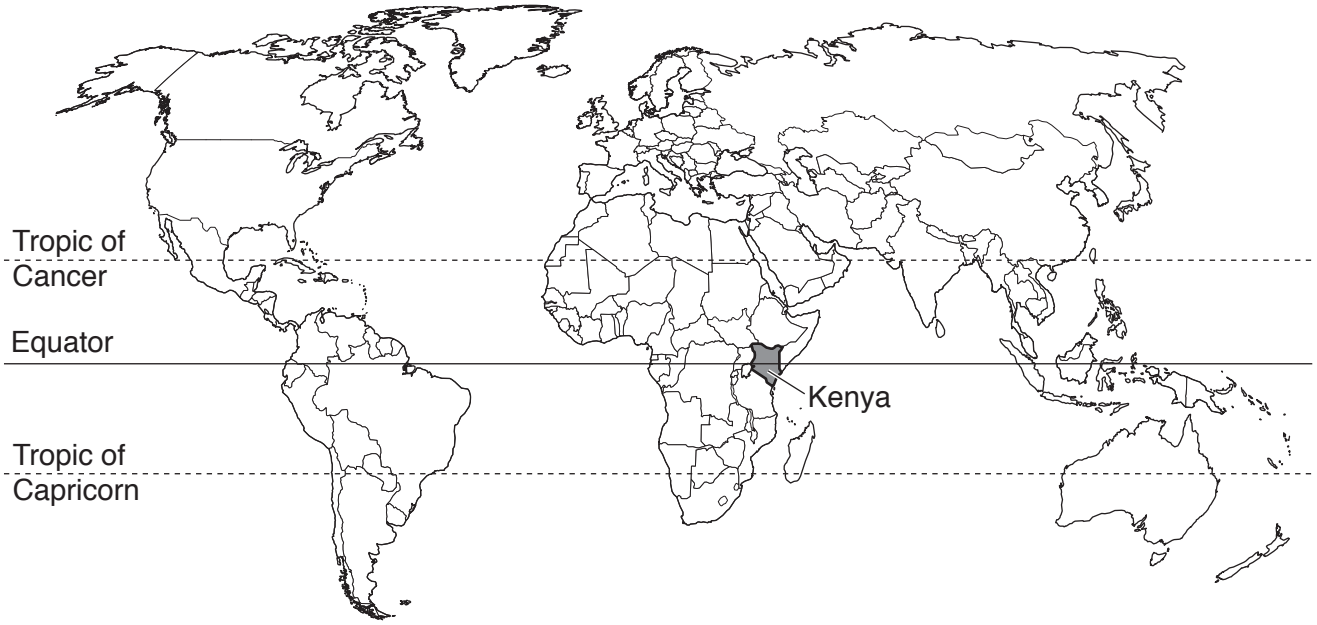
Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

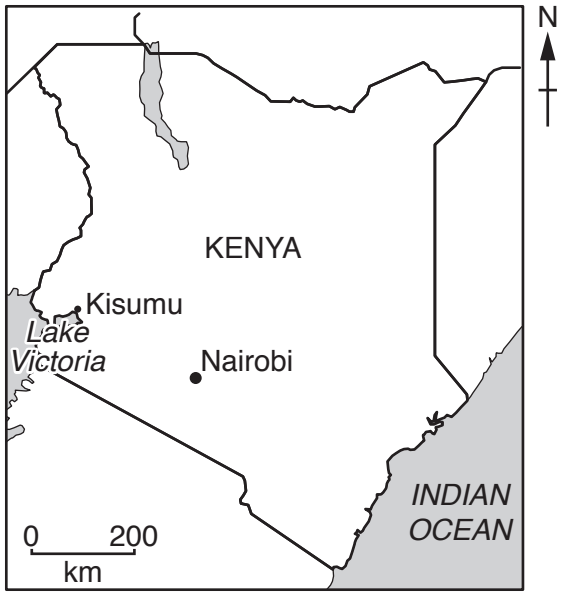
Study the appropriate source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams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

map of the world



map of Kenya



area: 580 370 km^2

population: 46 million

children per woman: 3.54

life expectancy: 63 years

currency: Kenyan Shillings (103 KES = 1 USD)

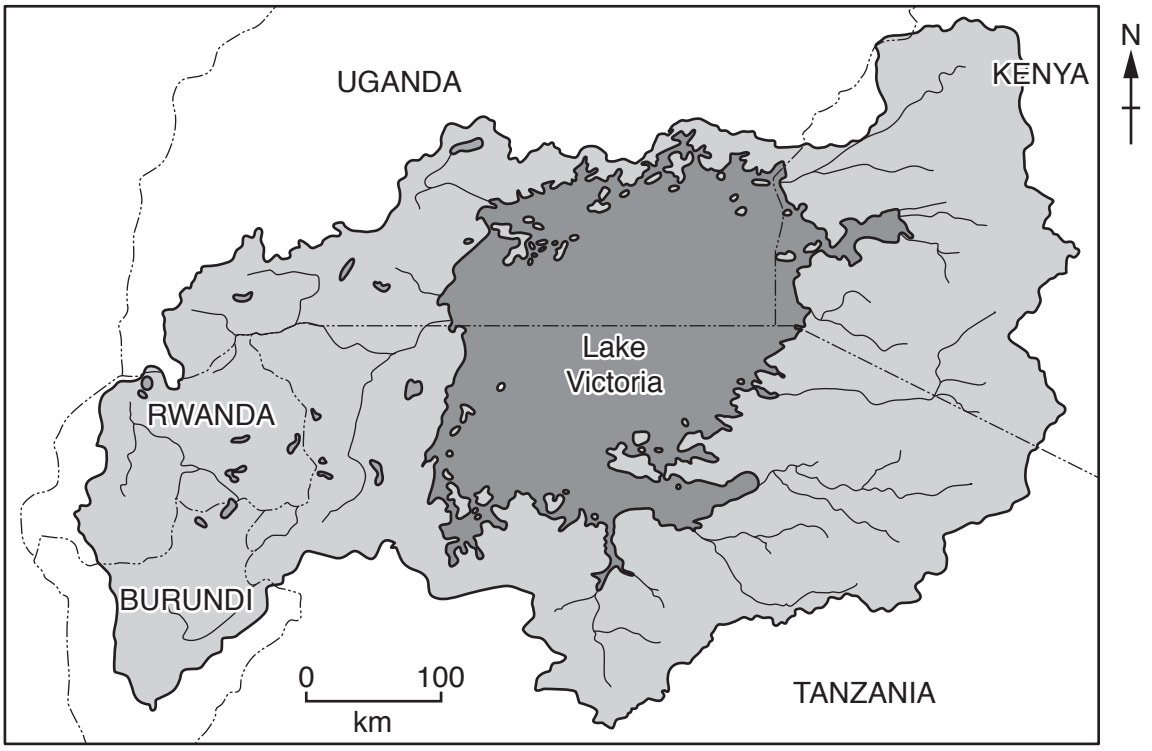
languages: English, Kiswahili, indigenous languages

climate: tropical, cooler in the highlands

terrain: coastal plain, central highlands divided by one branch of the East African Rift Valley

main exports: tea, coffee, fruits, flowers, fish, petroleum products, cement

Lake Victoria basin



Key

international boundary

Lake Victoria

Lake Victoria basin

1 Kenya shares access to Lake Victoria with other countries. The lake is a valuable source of fish. The wetlands surrounding Lake Victoria have high biodiversity and productive farmland. About 75% of the workforce are employed in agriculture. Tourism also makes an important contribution to the economy.

(a) Suggest how tourism can make an important contribution to the economy of Kenya.

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.....[2]

(b) Look at the map of the Lake Victoria basin.

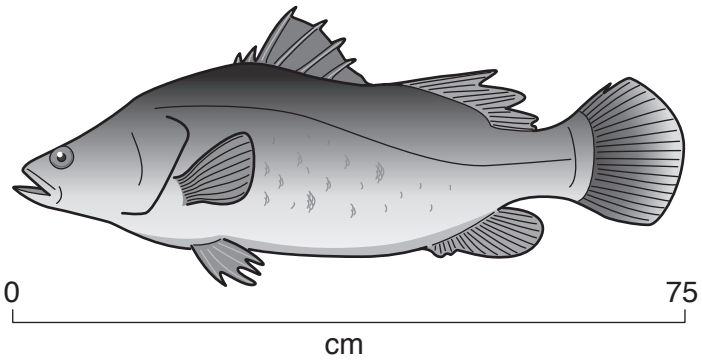
(i) Name the country with the smallest share of Lake Victoria.

..... [1]

(ii) Name the country which is part of the Lake Victoria basin but furthest from the lake.

..... [1]

(c) People living around Lake Victoria have always caught small fish called cichlids using simple fishing nets and canoes. These fish are dried and sold locally. By 1960 the human population had grown and the lake was overfished. To help provide food for the people a new species of carnivorous fish, the Nile perch, was introduced.



Nile perch

The Nile perch has few natural predators and by 1990 most of the fish caught in Lake Victoria were large Nile perch. The fish catch increased so much that the government helped develop an export market.

(i) Suggest how people realised they were overfishing the cichlids by 1960.

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.....[2]

(ii) Suggest what happened to the cichlids between 1960 and 1990.

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.....[2]

(iii) The number of Kenyan fishermen on Lake Victoria increased between 1980 and 1990 from 16 000 to 80 000.

Calculate the percentage increase in fishermen from 1980 to 1990.

Space for working.

.....% [2]

(iv) The total catch by Kenyan fishermen also increased greatly between 1980 and 1990. The government helped to set up a fish-processing factory at Kisumu to develop exports to other African countries, using the Trans-African Highway, and also to Europe.

Suggest different benefits of the fish-processing factory for each of the following:

fishermen, ...

.....

people living around Kisumu, ...

.....

the government. .....

.....
[3]

(d) When the Nile perch was first introduced some scientists thought that because a larger mesh size in the fishing nets could be used to catch Nile perch, fewer small fish, such as cichlids, would be caught.

(i) Suggest why the scientists thought that the number of small fish might increase after the introduction of the Nile perch.

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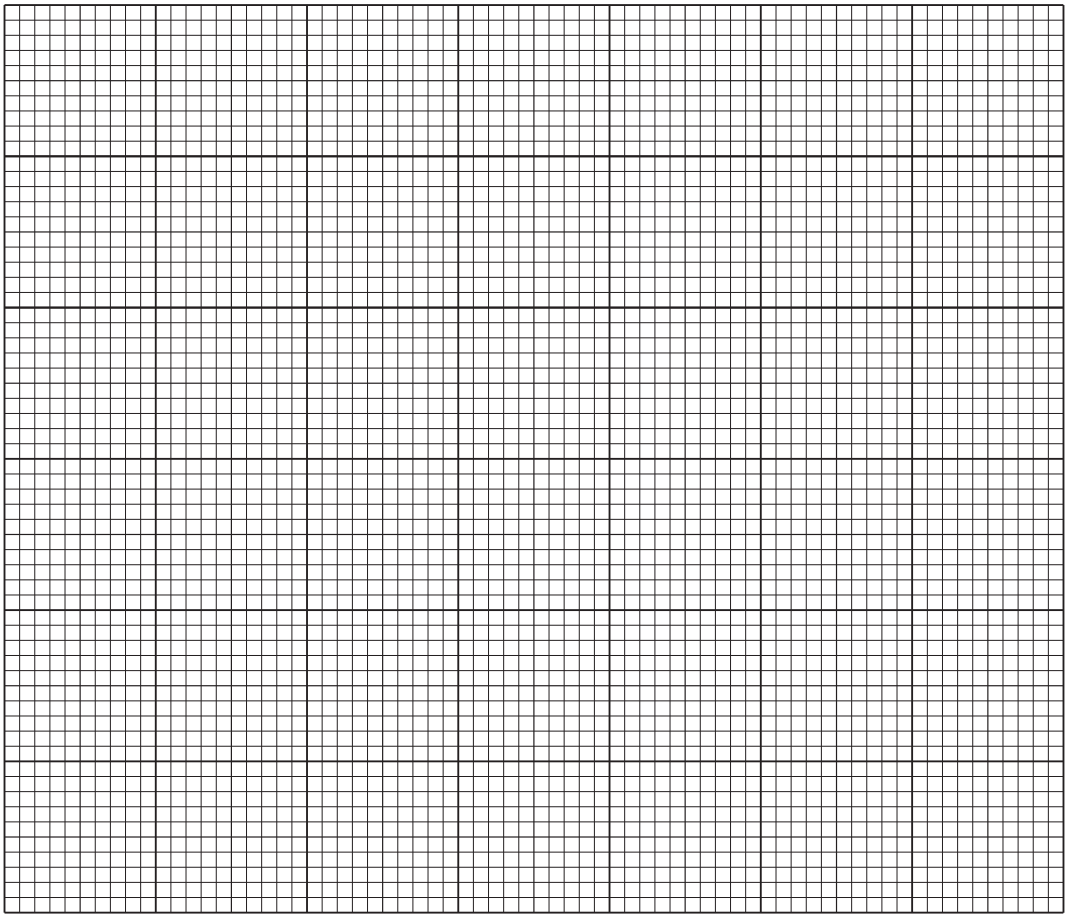
.....[2]

(ii) Scientists took samples of Nile perch catches from the shores of Lake Victoria in Kenya and estimated the total catches of Nile perch by Kenyan fishermen during a thirty-year period.

The results are shown in the table.

year	estimated fish catch / thousand tonnes
1980	25
1985	48
1990	74
1995	100
2000	105
2005	50
2010	26

Draw a bar graph on the grid below to show the information in the table. [4]



(iii) Describe the pattern shown by the graph.

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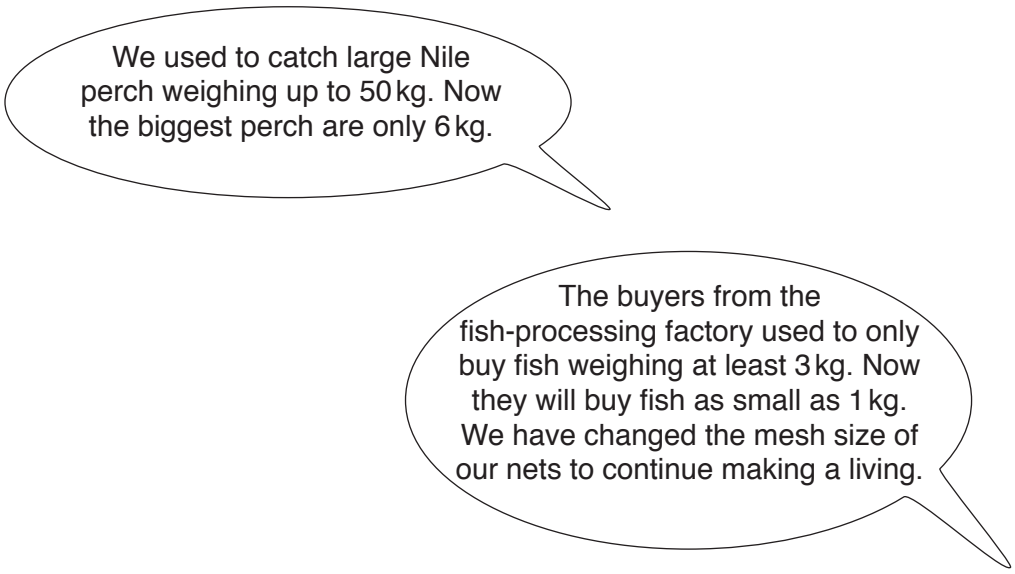
.....[1]

(e) Two fishermen were talking.



(i) Explain why large fish are no longer being caught.

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.....[1]

(ii) State what the fishermen changed about their nets. Explain why this was necessary.

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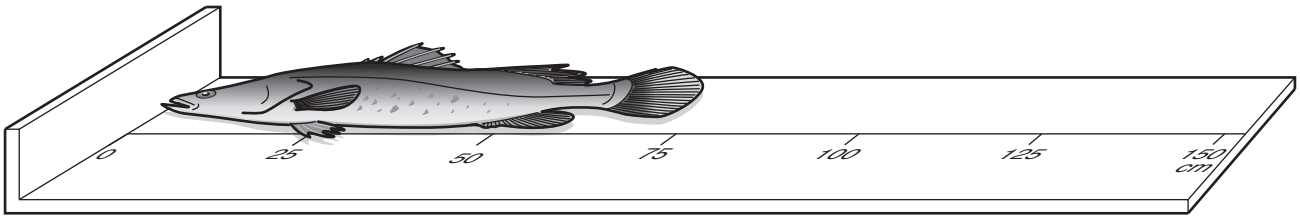
.....[2]

(f) A scientist wanted to find out more about the size of Nile perch caught by the fishermen and those bought by the fish-processing factory. The scientist carried out two surveys, each of 100 randomly selected fish.



The results are shown in the table below.

	caught by fishermen		bought by the fish-processing factory	
class size (fish length) / cm	tally	total number in class	tally	total number in class
0–15	II	2		0
16–20	𝍸 𝍸	10		0
21–30	IIII	4		0
31–40	𝍸 𝍸 𝍸 𝍸 IIII	24	𝍸 𝍸 𝍸 𝍸 𝍸 III	28
41–50	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	35	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	40
51–60	𝍸 𝍸 IIII	.....	𝍸 𝍸 𝍸 𝍸	20
61–70	𝍸 III	8	.....	8
71+	III	3	IIII	4
total		100		100

Key
I = one
𝍸 = five

(i) Complete the table. [2]

(ii) State the class sizes of fish that were **not** bought by the fish-processing factory.

.....[1]

(iii) Suggest **two** possible uses of the Nile perch that were **not** bought by the fish-processing factory.

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.....[2]

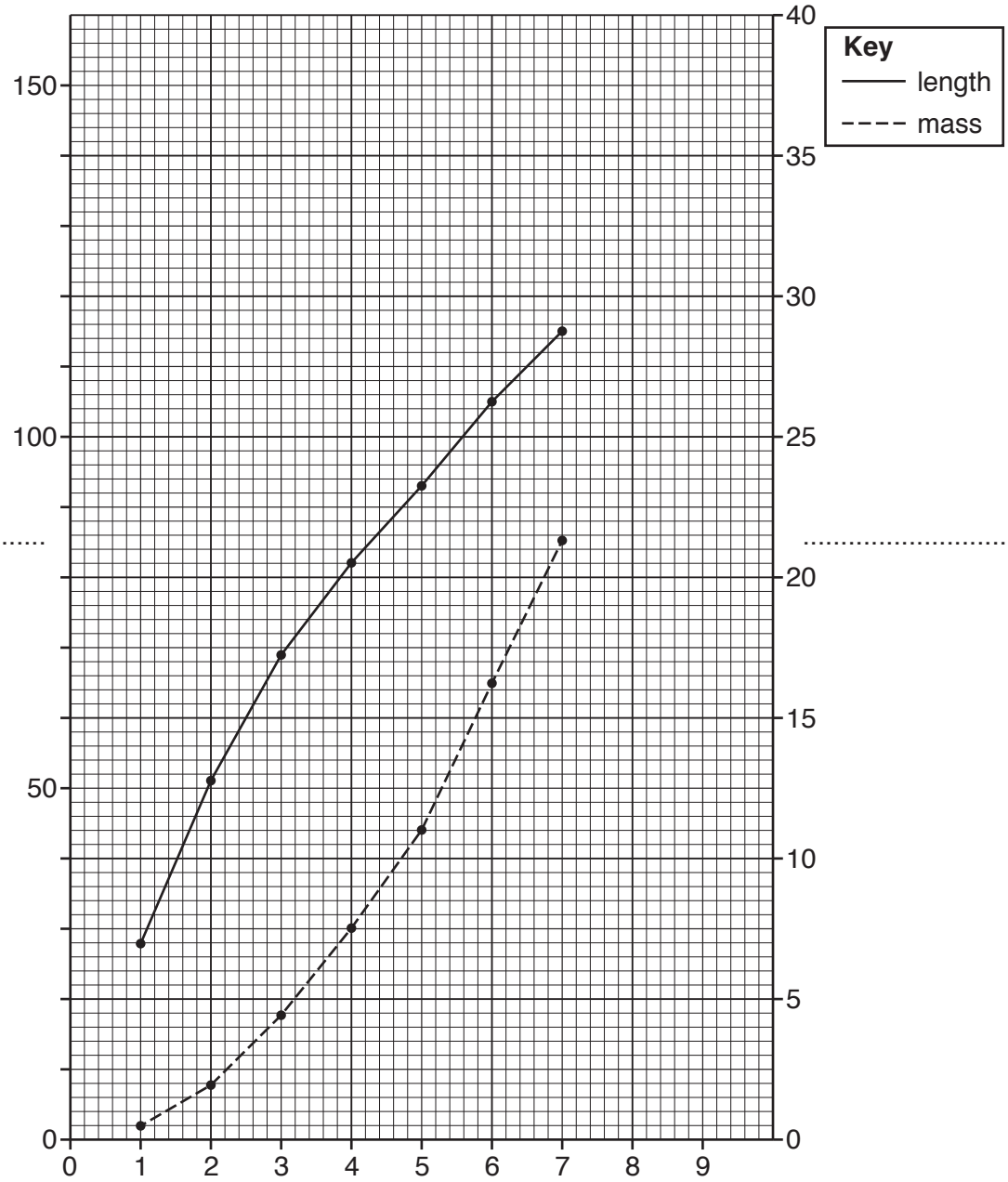
TURN OVER FOR THE REST OF THE QUESTION

(g) The scientist carried out research on the internet and found more information about the age, length and mass of Nile perch. The data is shown in the table below.

age / years	length / cm	mass / kg
1	28	0.5
2	51	1.8
3	69	4.4
4	82	7.5
5	93	11.0
6	105	16.2
7	115	21.5
8	126	28.0
9	136	36.2

(i) Some of the data has been plotted on the grid below.

Complete the graph and label all the axes. [3]



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(ii) Nile perch do not reach sexual maturity until they are at least 55 cm long.

Draw a horizontal line on the grid at 55 cm. [1]

(iii) Use the graph to state how old a Nile perch is when it reaches sexual maturity.

..... years [1]

(h) To make Nile perch fishing sustainable, laws need to be passed that are easy to understand and to enforce.

(i) Suggest **two** laws that could be enforced.

law 1 .....

how enforced .....

.....

law 2 .....

how enforced .....

.....
[4]

(ii) Look again at the map of the Lake Victoria basin. Explain why it is difficult to make fishing a sustainable activity in Lake Victoria.

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.....[3]

2 **(a)** People living in the savanna, 100 km to the east of Kisumu, make a living by keeping livestock. To prevent desertification, *Prosopis* trees were planted in large numbers in the 1980s. These trees provide shade, timber, firewood and leaves to feed livestock. By 1990 the *Prosopis* trees had become widespread in the savanna and wetlands.

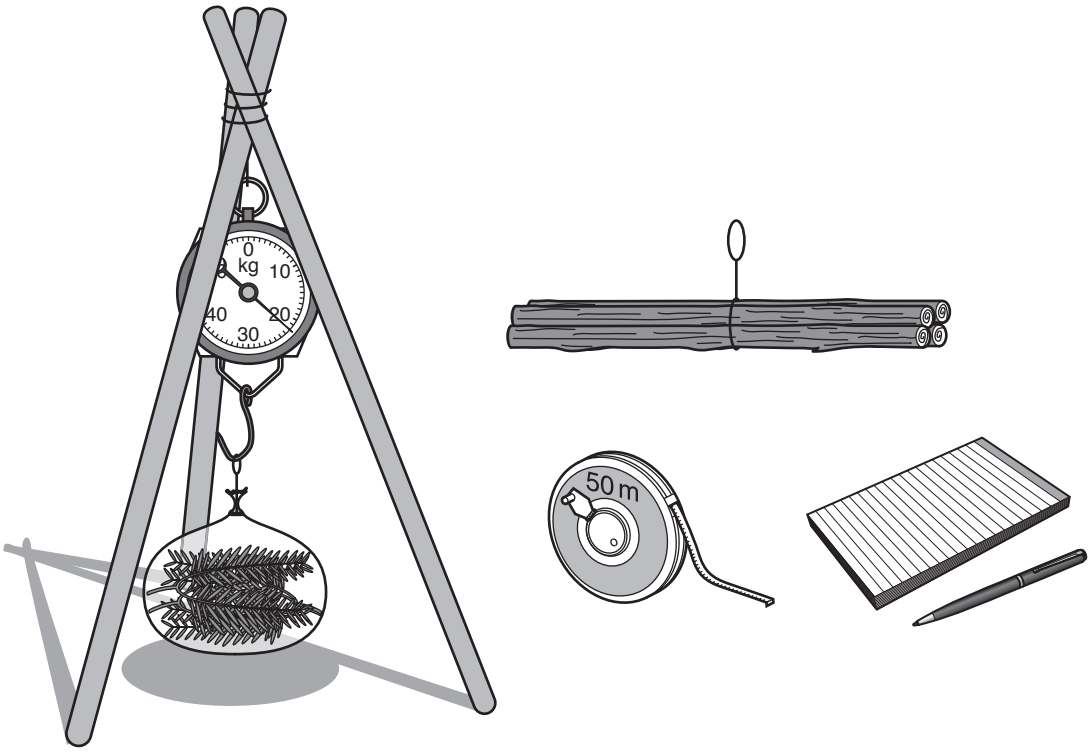
Two farmers were talking about *Prosopis* trees.

My goats cannot control the growth of *Prosopis* trees. The seeds stick to their gums and the goats lose all their teeth. They die of starvation.

I was paid by the government to plant *Prosopis* trees. The thorns are poisonous so I strip the leaves to feed my goats. I have now started cutting down the trees for firewood. I sell some leaves and firewood.

A student wanted to find out the mass of leaves and firewood that could be harvested by a farmer clearing one area of *Prosopis* trees.

The student used the equipment shown in the diagram to weigh each bundle of leaves and each bundle of firewood.



The results are shown in the table below.

mass of leaf bundle /kg	mass of firewood bundle /kg
21	35
18	45
22	40
19	38
	37
	46
	39
total 80	total 280

The leaves sold at 2.0 KES per kg and the firewood sold at 6.0 KES per kg.

(i) Calculate the value of all of the leaves and the value of all of the firewood shown in the table.

Space for working.

leaves ..... KES

firewood ..... KES
[2]

(ii) The student found out that the area cleared of *Prosopis* trees measured five metres by six metres using the 50 metre tape.

Calculate the number of kg / m^2 of firewood harvested by the farmer.

Space for working.

..... kg / m^2 [2]

(b) The *Prosopis* trees produce a large number of seeds. These survive for up to 10 years in the soil. The seeds grow after adequate rainfall. A weather station in this savanna area recorded the rainfall for one year. The results are shown in the table.

month	J	F	M	A	M	J	J	A	S	O	N	D	total
rainfall /mm	34	40	70	55	75	42	28	27	28	29	43	51	522

(i) State the **four** months in which the rainfall is likely to be too low for *Prosopis* seeds to grow.

.....[1]

(ii) After *Prosopis* trees were cleared the farmer waited for grasses to grow again. To stop the *Prosopis* seedlings growing into trees some goats were grazed on the land instead of using a strong herbicide spray to kill the seedlings.

Suggest the advantages of using goats for controlling *Prosopis* seedlings rather than using a strong herbicide spray.

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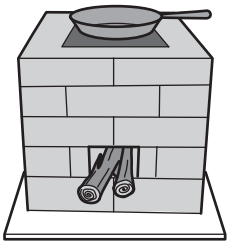
.....[3]

(c) Most people have to buy firewood each week to cook food. The government have been encouraging people to invest in new rocket stoves to replace the traditional three-stone fires.

three-stone fire



new rocket stove

The student carried out a survey of 20 households in one village to find out if the new rocket stoves were more efficient than the traditional three-stone fires.

A summary of the results is shown in the table below.

cooking method	cost of firewood used each week/KES
three-stone fire	2000
new rocket stove	500

(i) Suggest how the student selected the 20 households for this survey.

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.....[2]

[Turn over

(ii) Suggest **two** pieces of information the student needed from each household to write a balanced conclusion.

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.....[2]

(iii) Suggest how the widespread use of the new rocket stove is reducing Kenya's contribution to the greenhouse effect.

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.....[2]

(iv) As well as reducing Kenya's contribution to the greenhouse effect, buying a new rocket stove will have other benefits to a household.

Suggest **three** of these benefits.

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(v) Explain the advantages of using firewood for cooking instead of a fossil fuel.

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