



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
NUMBER

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ENVIRONMENTAL MANAGEMENT

**0680/04
5014/02**

October/November 2007

Alternative to Coursework

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

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This document consists of **18** printed pages and **2** blank pages.



2

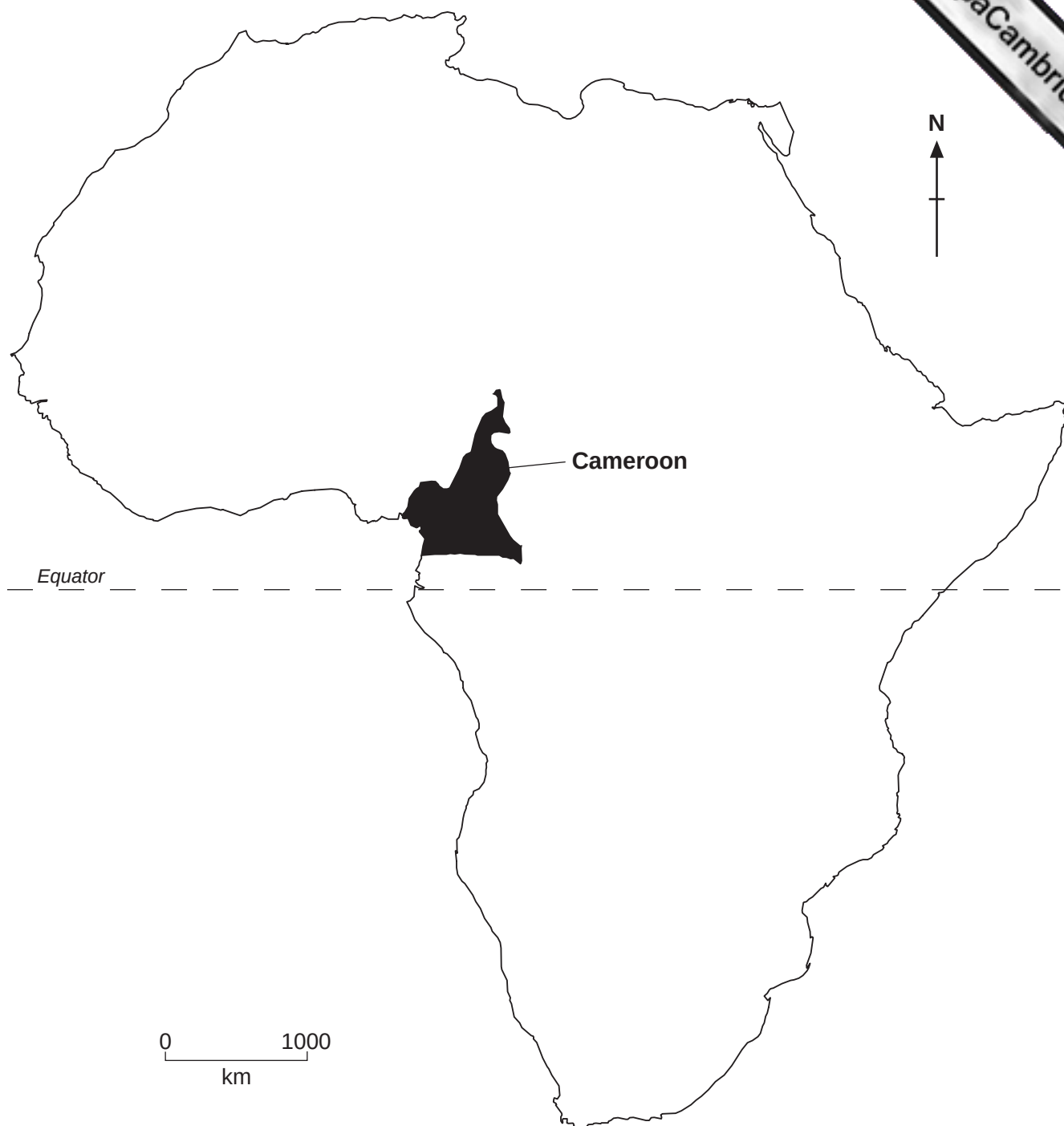


Fig. 1 Map of Africa

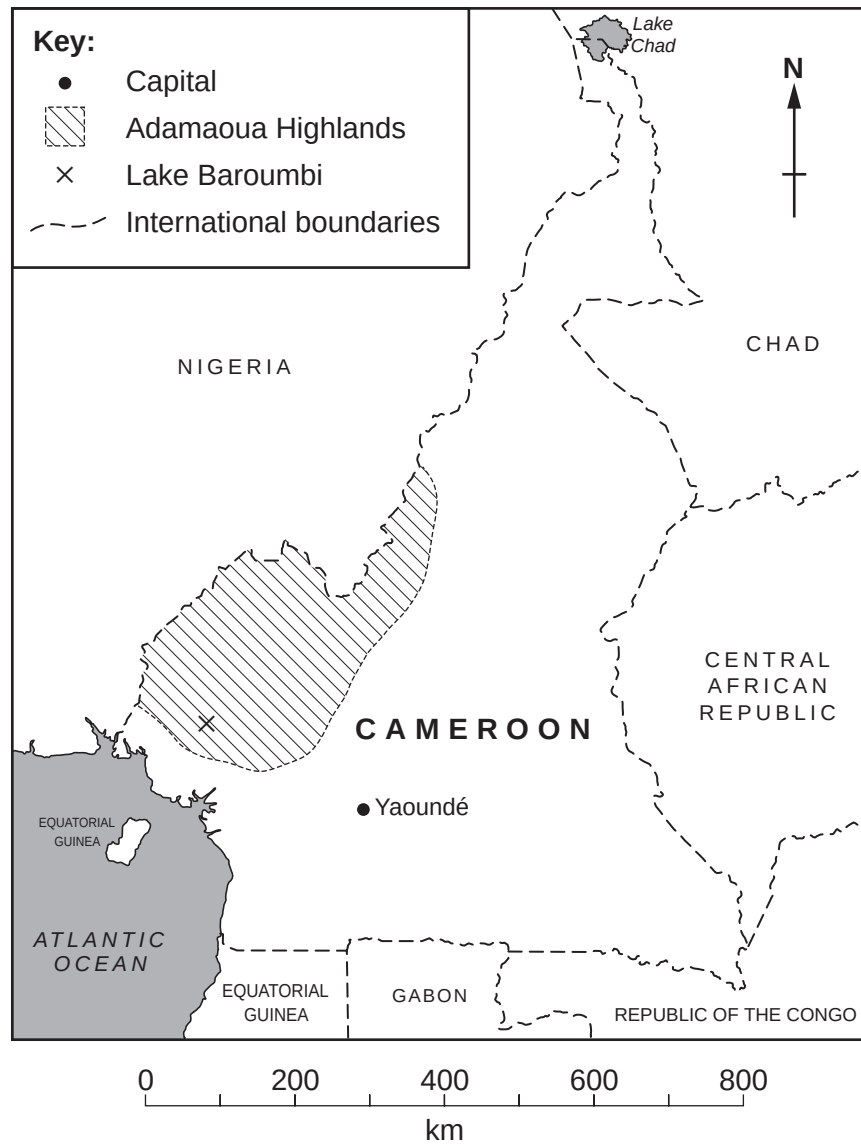


Fig. 2 Map of Cameroon

Cameroon has good natural resources, 70% of the population are involved in farming. However, nearly half the population live below the poverty line.

- Area: 475 440 sq km
- Climate: equatorial in the south and savanna in the north
- Population: 16 500 000
- Population growth rate: 1.93%
- Children per woman: 3.5
- Languages: English (official), French (official), 24 African languages
- Currency: African franc, 530 franc – 1 US dollar
- Exports: crude oil, timber, cocoa beans, aluminium and coffee
- Imports: electrical equipment and machinery
- Agricultural products: coffee, cocoa, cotton, bananas, livestock and timber

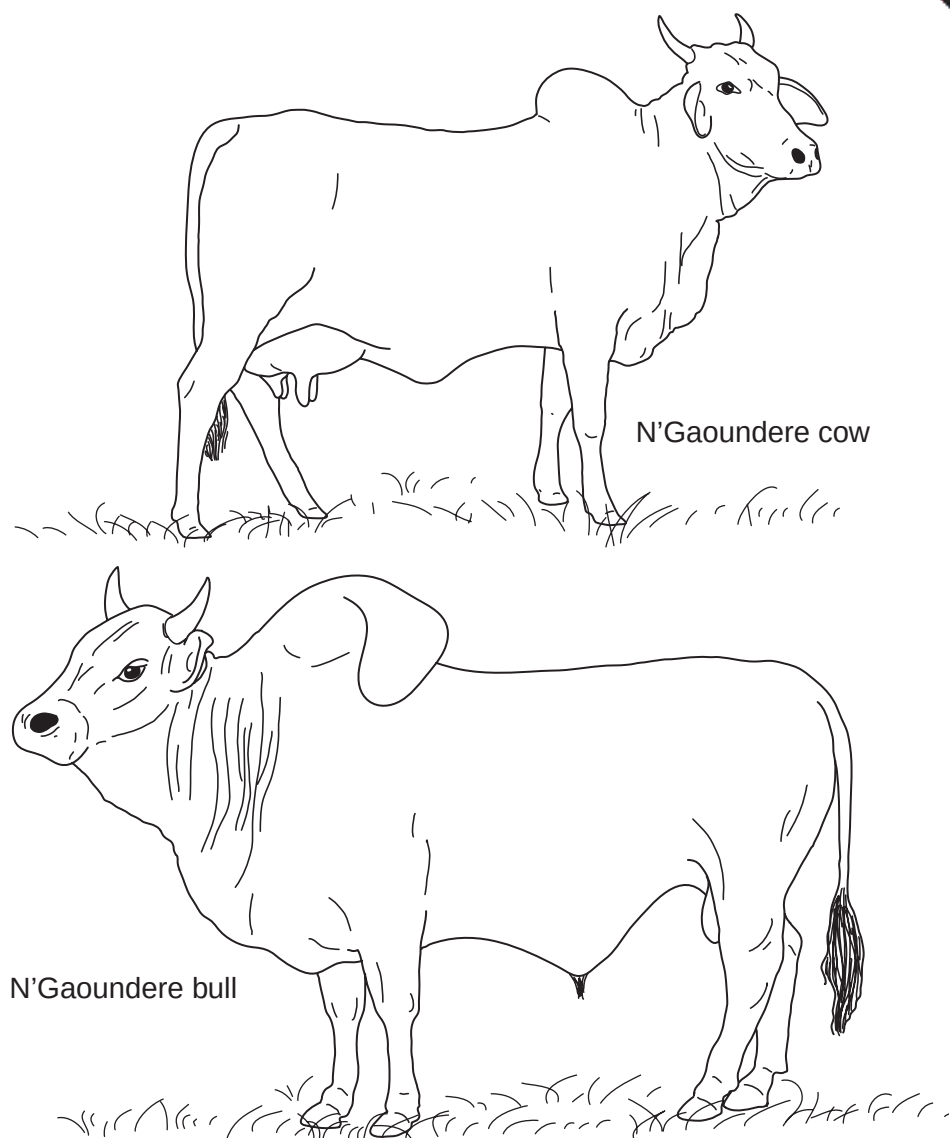


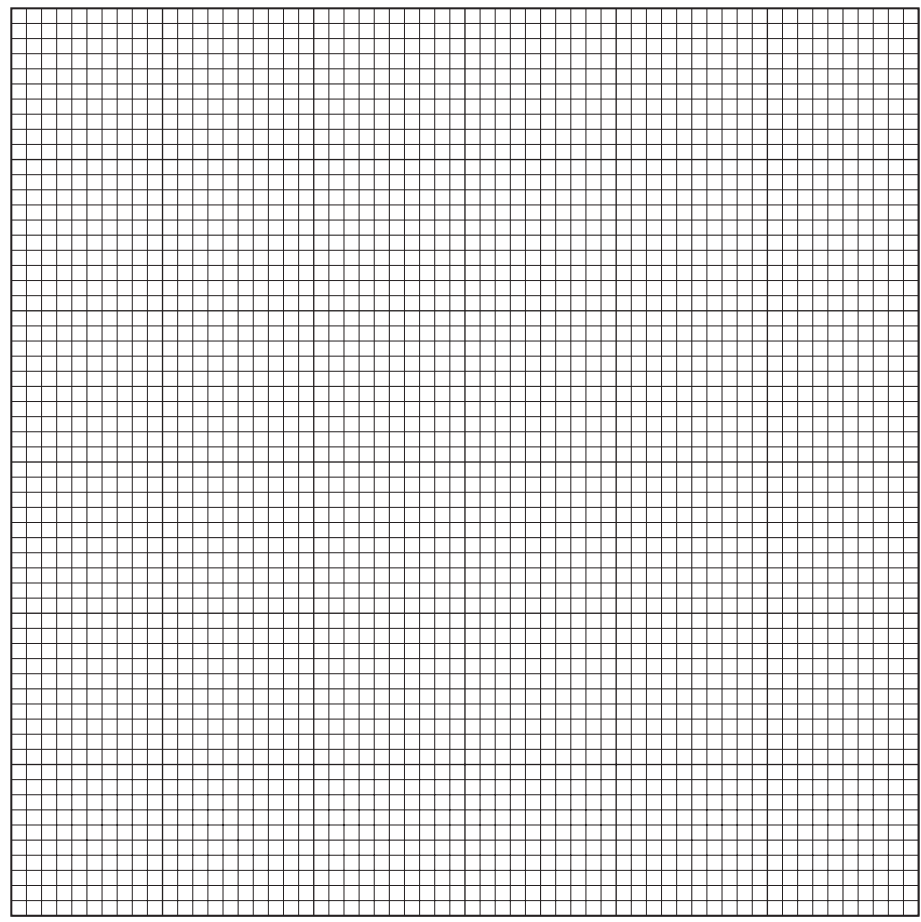
Fig. 3

- (a) Many farmers on the savanna keep herds of N'Gaoundere cattle, a breed of zebu cattle. They give milk and meat and are adapted to survive the difficult local conditions. The table below shows the average milk yield over nine months from N'Gaoundere cattle.

Month	Milk yield per cow (litres)
March	90
April	85
May	80
June	70
July	70
August	65
September	60
October	50
November	45
Total	

Fig. 4

(i) Plot the data on a graph.



[4]

(ii) In which month was the milk yield highest?

..... [1]

(iii) At what time of year was the milk yield constant?

..... [1]

(iv) Calculate the average milk yield per month over the nine month period.

.....

..... [2]

- (b) Milk is an important part of people's diet and the local population is increasing. A new breed, the Bororo, yields more milk. The farmers have crossed the new Bororo with their own cattle and the new hybrid cows are beginning to give milk.

- (i) Suggest how each farmer could measure how much milk was collected each day.

.....

.....[1]

- (ii) In the space below draw a table the farmers could use to record their milk yield for one month.

[3]

Profile of part of the Adamaoua Highlands

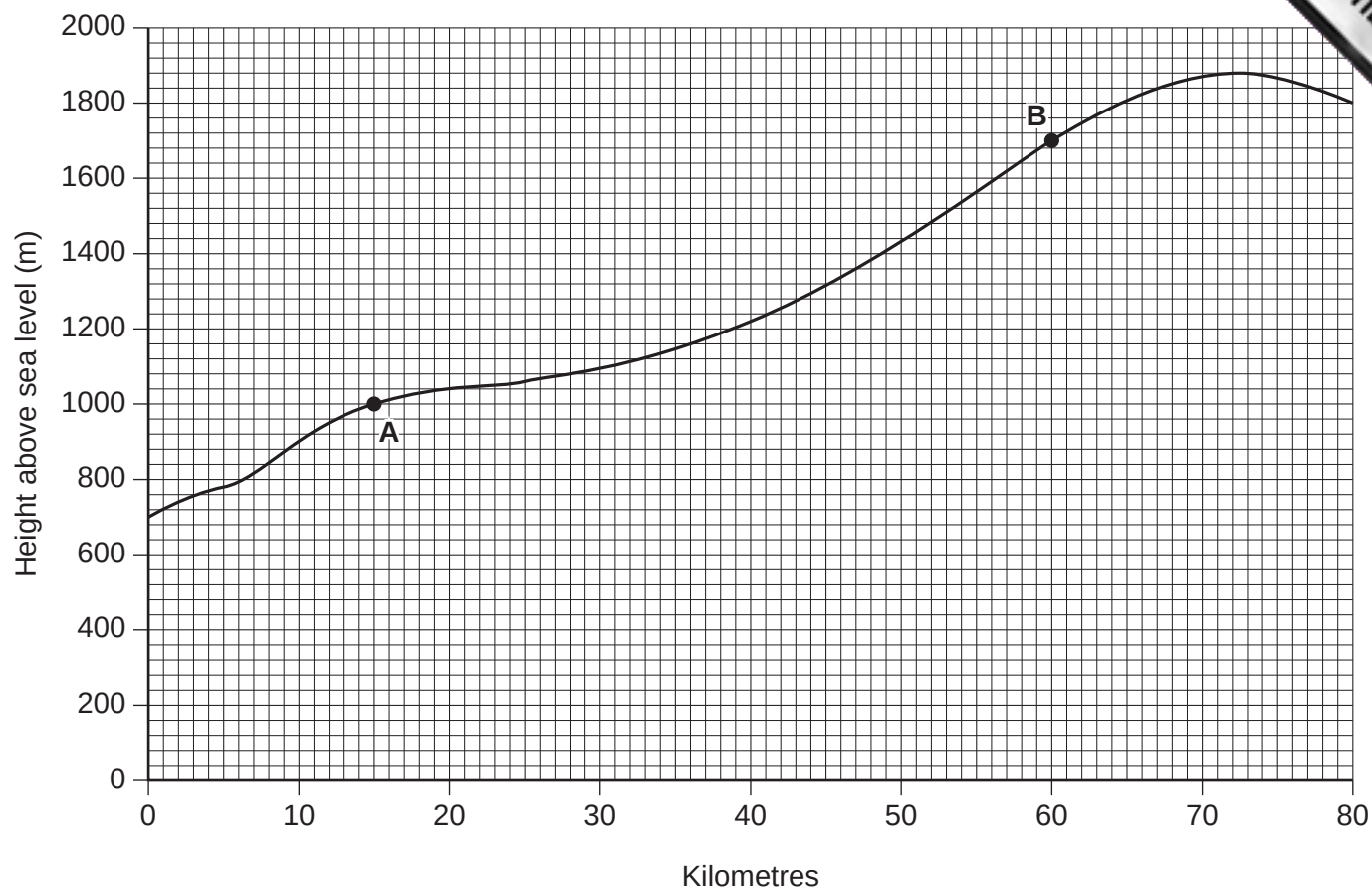


Fig. 5

- (c) The tsetse fly causes the death of cattle by infesting them with parasites. The fly does not survive at heights above 1200 metres.

(i) Shade Fig. 5 to show where cattle should **not** be kept. [1]

- (ii) As height above sea level increases the temperature decreases. The average decrease of temperature with height is 0.6°C per 100 m.

Calculate the temperature at point **B** if the temperature is 30°C at point **A**.

.....
 [2]

- (d) When cattle are taken to the well they need to drink 20 litres of water to allow them to grow and produce milk. A single herdsman can look after 50 cattle and draw water from a well using a rope and bucket. Each animal is given water separately so the herdsman knows when they have had enough water. This takes five hours of continuous work.

Herdsman watering cattle individually

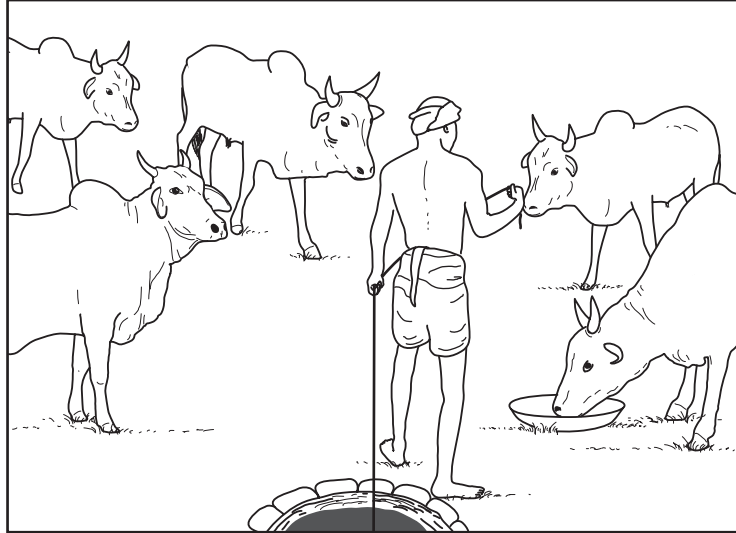


Fig. 6

- (i) How many litres can the herdsman take from the well in one hour?

.....[1]

Larger herds can only be given enough water if simple machinery powered by a bullock is used. This system must be operated by two people. The water is poured into troughs for several animals to drink at the same time.

Well machinery powered by a bullock

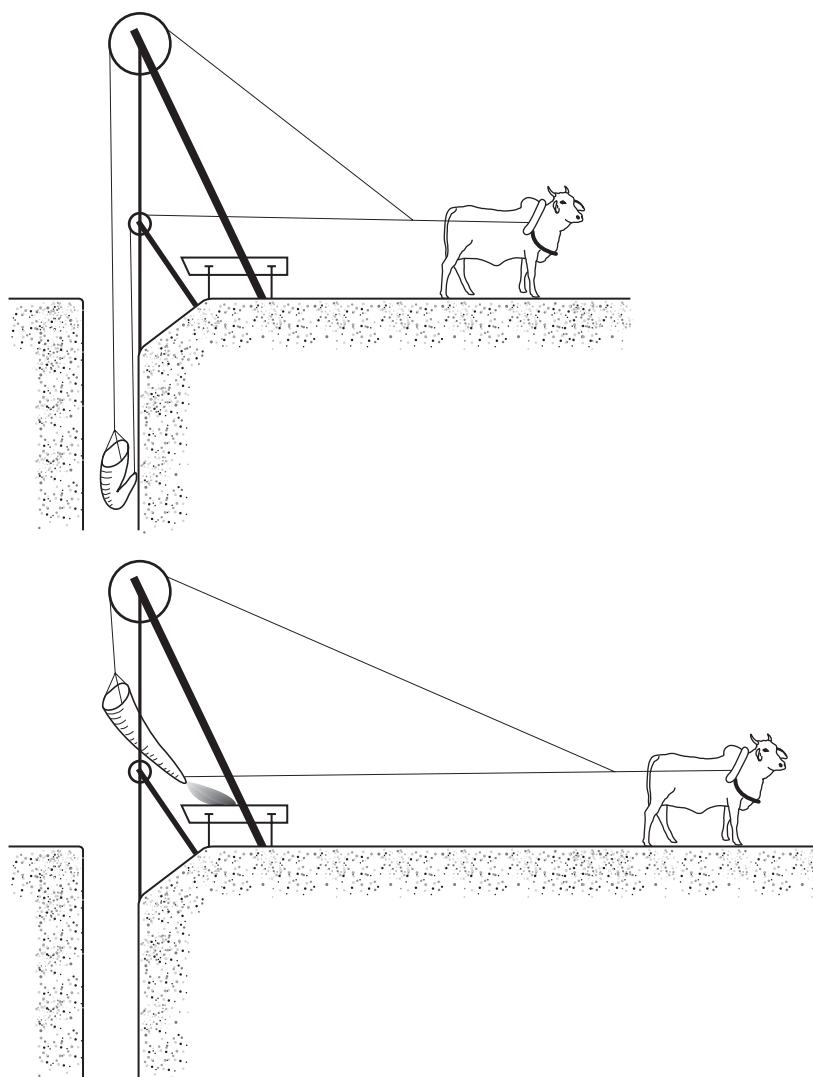


Fig. 7

A student recorded the time for one bucket to be filled and emptied.

- To raise bucket 60 seconds
 - To handle bucket on surface 200 seconds
 - To lower bucket 40 seconds
 - To fill bucket at well bottom 60 seconds
- Total time = 6 minutes

(ii) Why are the drinking troughs kept away from the well?

..... [1]

- (iii) Suggest some advantages and disadvantages of using this method of providing water for cattle.

Advantages

.....

.....

Disadvantages

.....

.....[4]

- 2 (a) Cacao is an important crop for export. The cacao trees grow in the hot, humid conditions of southern Cameroon. Black pod disease is a fungus that can cause up to 80% of the crop to be lost. Copper-based fungicides are widely used to control this disease. The farmers make no profit when the cacao price is low.
- A student wanted to find out if this toxic fungicide was reducing the decomposition of leaves under the cacao trees.
- The student decided to measure the biodegradation (decomposition) of leaves. The student carried out the following experiment in one field on one farm, using a random sampling method.

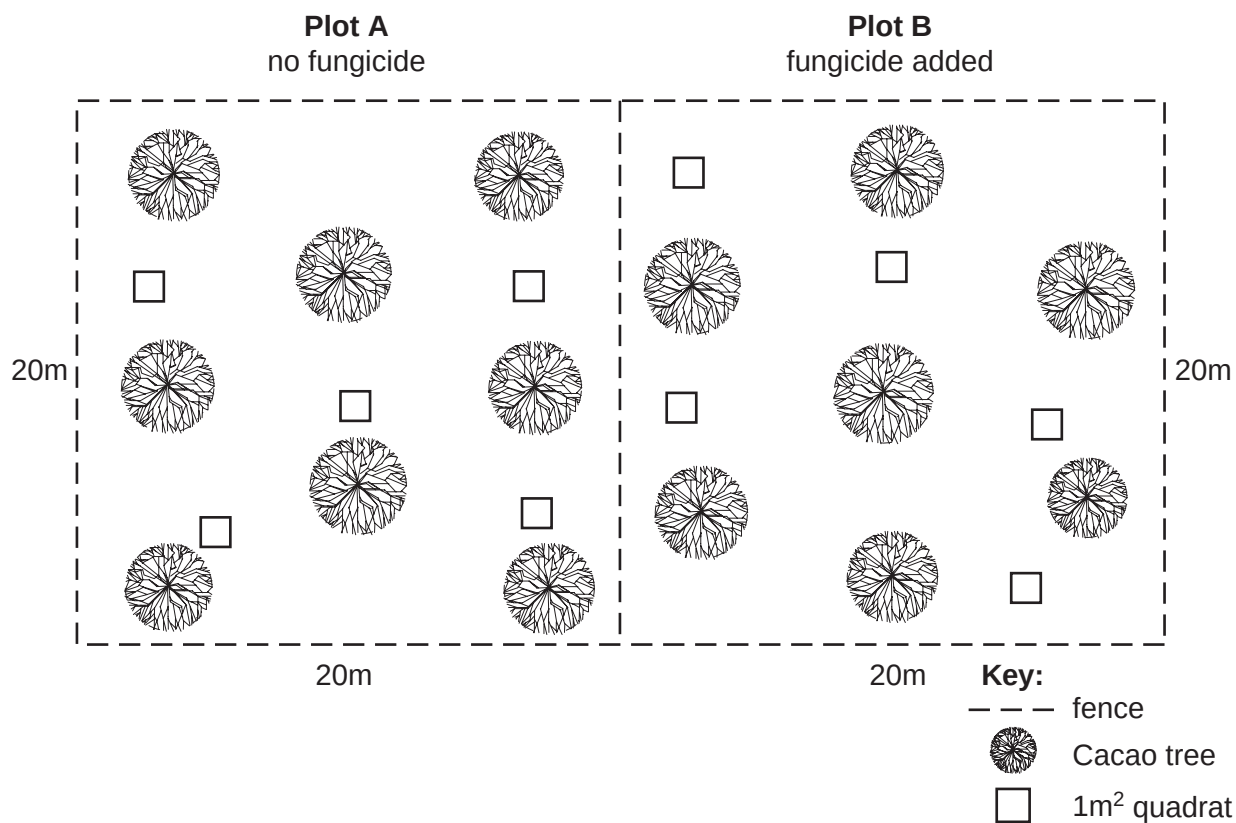


Fig. 8

- (i) The student divided one field into two experimental plots **A** and **B**. Suggest why the plots were next to each other.

.....

 [2]

- (ii) Explain why the student chose random sampling for this experiment.

.....
 [1]

- (iii) Describe how the student could have placed the quadrats **randomly**.

.....

The student decided that there were too many leaves to count but noticed that earthworms come out of the soil and eat the leaves a cast of soil (small heap) is left behind.

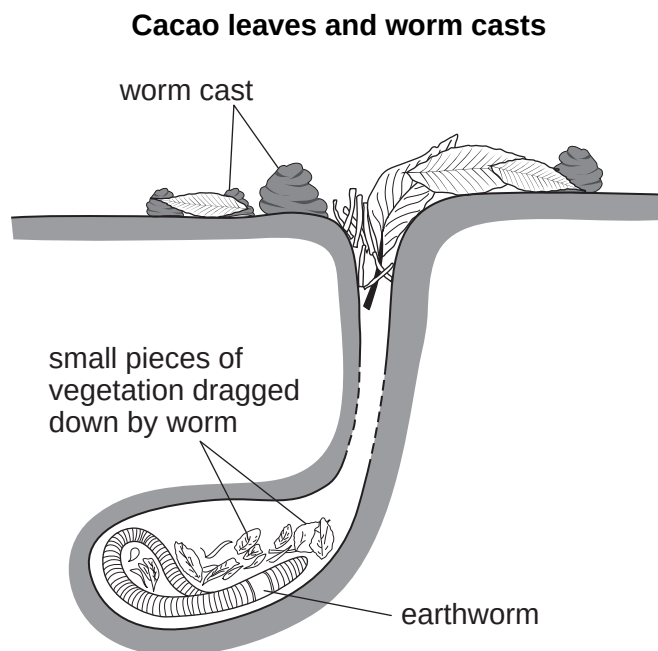


Fig. 9

(iv) Explain how the activities of earthworms help plants grow.

.....

.....

..... [2]

The student counted the number of casts in each quadrat at the end of each week. The data is shown in the table.

Week	Plot A average number of earthworm casts per quadrat	Plot B average number of earthworm casts per quadrat
1	23	15
2	20	16
3	28	15
4	32	17
5	34	16
6	35	17

Fig. 10

(v) What conclusions did the student come to?

.....
.....
..... [2]

(vi) A scientist was very interested in the student's work but suggested that more work was needed before any recommendations could be made to farmers. The farmers are planting their next crop in three months.
Complete the plan for more experiments by filling in the gaps below.

- Use the same size experimental area ($20\text{m} \times 20\text{m}$)
- Use farms

Reason
.....

- Use experimental areas on each farm

Reason
.....

- Take measurements for weeks

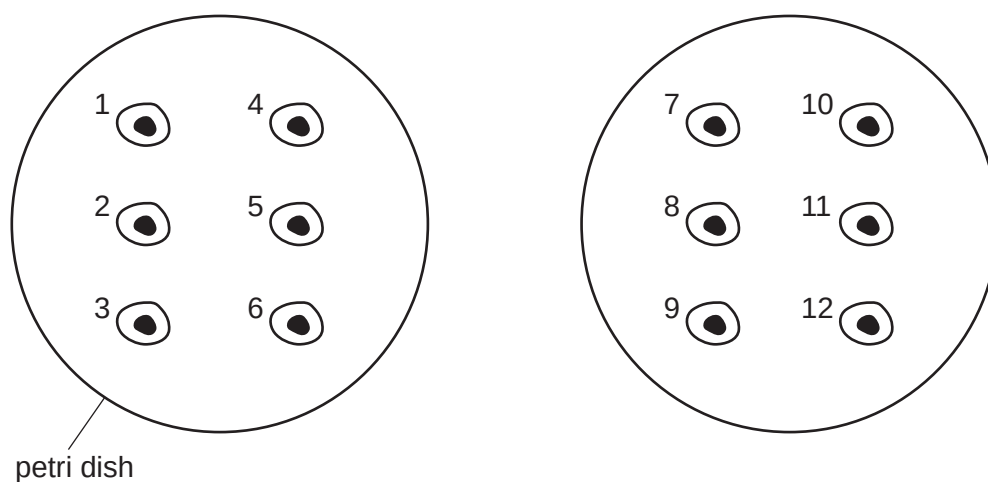
Reason
..... [3]

- (b) Another group of students tried to find a native fungus that could compete with black pod disease. They collected fungal spores from the native forests and infected each sample with a different native fungus.

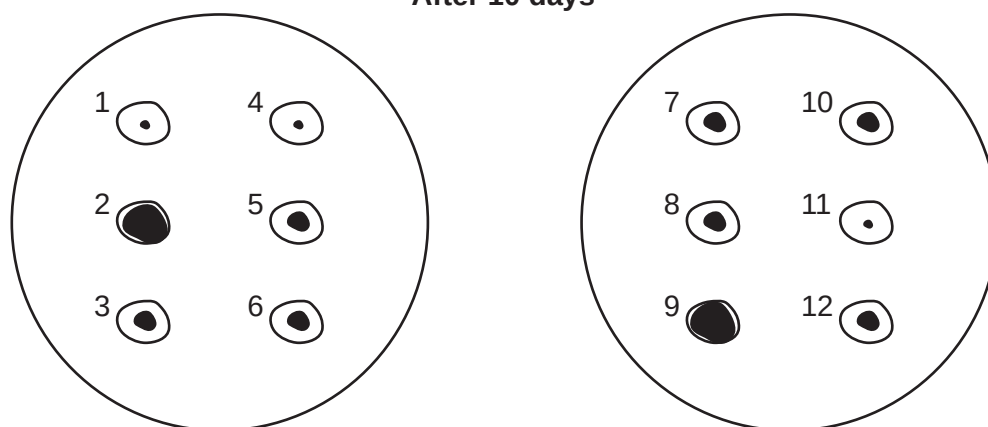
The results are shown below.

**Fungal samples growing on cacao leaves
infected with black pod disease**

Start of trial



After 10 days



Key:  leaf sample with black pod disease
 black pod disease

Fig. 11

State the numbers of the fungal samples which

- (i) spread black pod disease,

..... [1]

- (ii) might help control black pod disease.

..... [1]

The students proposed plans for a field trial of a liquid, which was water containing fungal spores that the students found had reduced black pod disease. The students found a farmer willing to let them use a field.

Plan A

Spray three cacao trees with the liquid and three with water. See which trees develop black pod disease.

Plan B

Spray one cacao tree with liquid and another tree with water. See which tree develops black pod disease first.

Plan C

Spray one cacao tree with liquid and see if black pod disease develops.

(c) Which plan should be carried out? Give reasons for your choice.

Plan

Reasons

.....

.....

..... [3]

(d) One student suggested counting the number of leaves and cacao pods with black pod disease. Their results are shown in the table below.

Cacao tree	Leaves infested with fungus	Pods infected with fungus	Total pods
Treated with the liquid	47	10	23
Untreated	63	15	20

Fig. 12

The farmer looked at this data and asked the students to do more experiments.

(i) Explain why the farmer was not satisfied with the results.

.....

.....

(ii) Suggest **two** further investigations the students could carry out.

.....

.....

.....

..... [4]

- 3 (a)** Lake Baroumbi has many fish species that are found nowhere else in the world (endemic species). People living around the lake catch fish as an important part of their diet.

The old people in the villages are worried about the future because they have noticed

- the cichlid *Stromatepia pindu* is only caught once or twice a year
- most fish caught are smaller than in the past
- the number of boats has increased from 30 to 50
- the boats now go further out into the lake to catch fish
- villagers say the weight of fish catches is getting lower
- more people now live in the villages

- (i)** Explain why these facts are worrying the old people in the villages.

.....[5]

- (ii)** Why is fish an important part of villagers' diet?

.....[1]

- (iii)** Explain how living near the lake increases the risk of ill health.

.....

.....

.....[2]

- (b) The villagers held a meeting to discuss their future food supplies. Three different proposals were discussed.

Proposal 1

Some villagers said it was important to start measuring and recording the fish catch.

Proposal 2

Others said that the memories of the old people were strong enough evidence for starting to control fishing activity.

Proposal 3

Another group said the villagers should rely less on fish and learn how to keep goats and chickens.

- (i) Describe how the villagers could accurately carry out proposal 1.

.....
.....
..... [2]

- (ii) Suggest how proposal 2 could be carried out.

.....
.....
..... [2]

- (iii) Suggest why some villagers do not want to start farming goats and chickens.

.....
.....
..... [2]

- (c) The villagers held another meeting to discuss the proposals and decided to ask for help and advice so they could carry out all three proposals at the same time.

Explain why this is more likely to lead to sustainable food supplies.

.....
.....
..... [2]

- (d) When some scientists visited the village they were given four *Stromatepia pinnata*. The fish were taken to a zoo and used to start a captive breeding programme.

Suggest how captive breeding programmes could help to maintain biodiversity.

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..... [3]

