Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

2136319234

ENVIRONMENTAL MANAGEMENT **5014/22**

Paper 2 **May/June 2017**

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.

This document consists of **17** printed pages and **3** blank pages.

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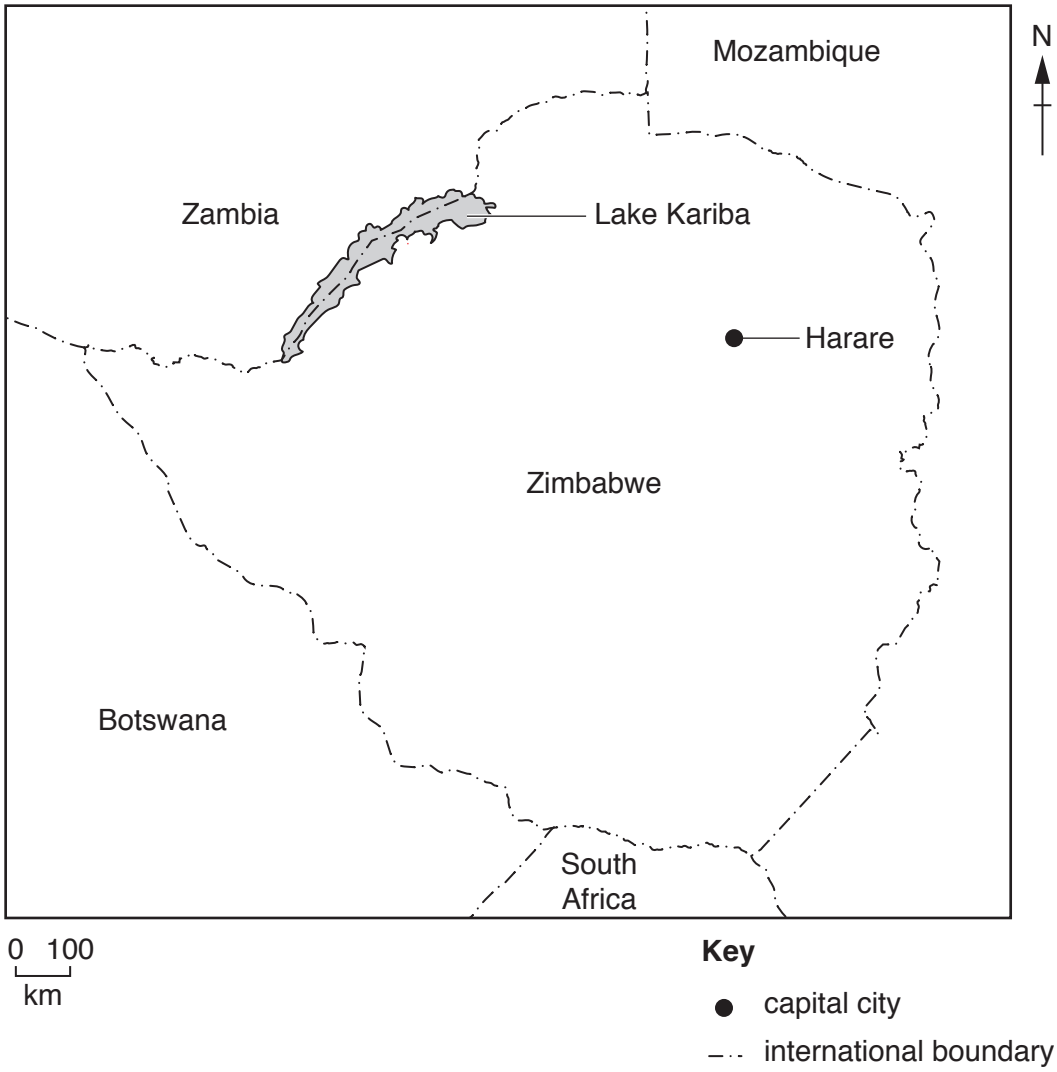
CAMBRIDGE International Examinations

map of the world

map of Zimbabwe



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area: 390 760 km^2

population: 14.2 million (in 2015)

children per woman: 3.53

life expectancy: 57 years

currency: US Dollar (USD) in use in 2015

languages: Shona, English, Ndebele

climate: tropical with wet and dry seasons

terrain: central plateau, mountains in the east

main exports: clothing, cotton, gold, metal alloys, platinum, textiles, tobacco

The economy of Zimbabwe depends on mining and agriculture. Most people live in rural settlements and have a low standard of living because of under-employment. In Harare, the capital city, there are frequent shortages of electricity that affect about 1.5 million people.

1 Some people in Zimbabwe earn money selling building materials beside roads. They buy one load of sand and then sell it in small bags as shown in the photograph.

The table shows information about selling sand in small bags.

mass of one truck load of sand	900 kg
cost of one truck load of sand	45 USD
average mass of one small bag of sand	25.7 kg
selling price of one bag of sand	2 USD

(a) **(i)** Use the information in the table to calculate the average number of small bags that can be sold from one truck load of sand.

Show your working.

.....[1]

(ii) Calculate the profit when all the small bags from one truck load of sand are sold.

Show your working.

..... USD [2]

(iii) Suggest why people selling sand always reuse the small bags.

.....[1]

(iv) Suggest **two** possible risks of selling sand in small bags besides roads.

.....

.....

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.....[2]

(b) Many people living in Harare have garden plots. They buy waste from roadside sellers to help grow vegetables in their garden plots.

Suggest **two** reasons why growing vegetables in garden plots helps to keep people in good health.

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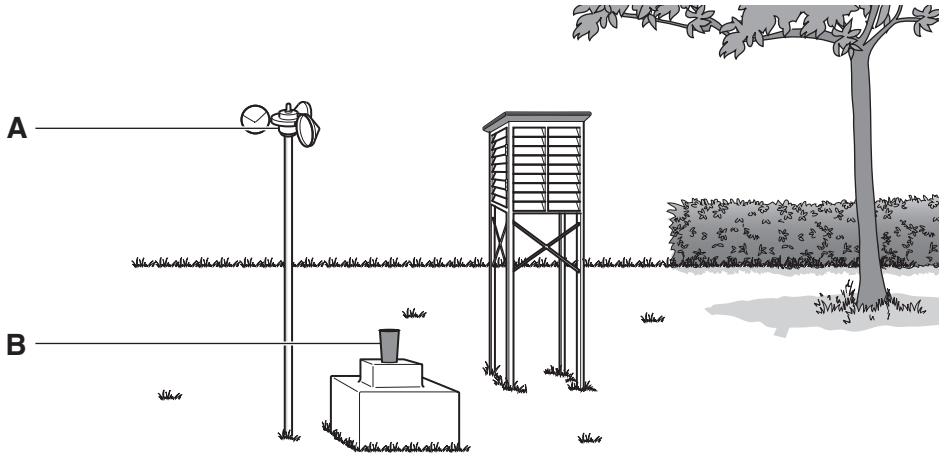
.....[2]

2 The climate in Zimbabwe is recorded by collecting data from weather stations over many years.

A diagram of a weather station is shown.



(a) **(i)** Name the weather instruments **A** and **B**.

A .....

B .....
[2]

(ii) Name **one** other instrument used to record weather conditions.

.....[1]

(iii) Describe a suitable site for a weather station.

.....

.....

.....

.....[2]

The table shows climate data for a weather station in Zimbabwe.

month	J	F	M	A	M	J	J	A	S	O	N	D
average temperature / °C	21	21	20	19	16	14	14	15	18	21	21	21
average rainfall / mm	196	178	120	28	15	3	0	3	5	28	96	164

(iv) Calculate the annual temperature range for this weather station.

.....[1]

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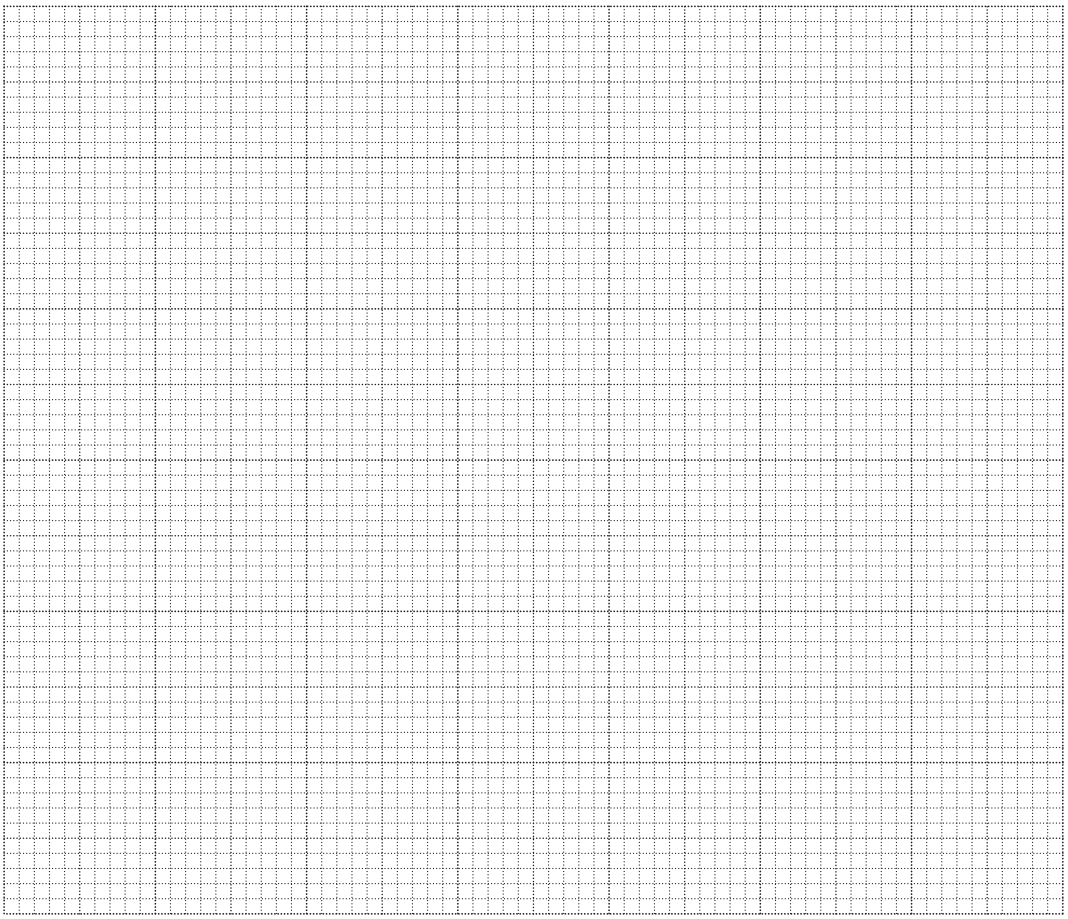
(v) Plot a graph to show the average rainfall data for this weather station on the grid.



[4]

(vi) To collect water to irrigate crops, farmers in Zimbabwe build small dams.

Using the climate data, suggest in which months the farmers need most of the water.

.....[1]

(vii) Suggest **two** advantages of building many small dams instead of one large dam.

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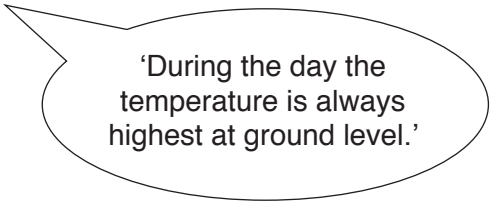
.....[2]

(viii) Using the climate data, explain why crops can be grown throughout the year in Zimbabwe.

.....

.....[1]

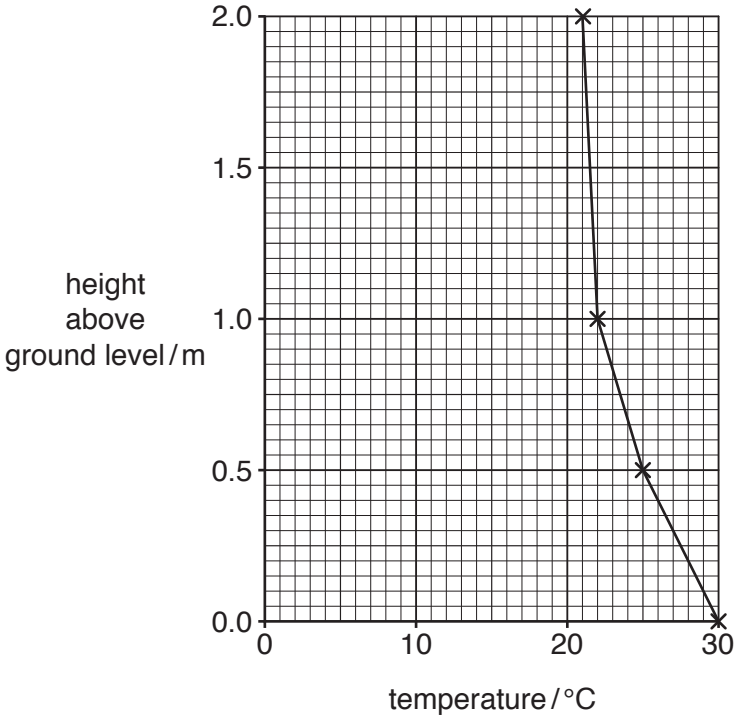
(b) A student said



To find out if this statement was correct the following method was used.

- place a thermometer on the ground and wait for 60 seconds, record the temperature
- repeat this at 0.5 m above ground level holding the thermometer away from the body
- wait 60 seconds, then record the temperature
- repeat this procedure at 1.0 m and 2.0 m above ground level
- plot the recorded temperatures

The graph shows a temperature profile at 12 p.m., noon.



(i) Explain why the highest temperature was recorded at ground level.

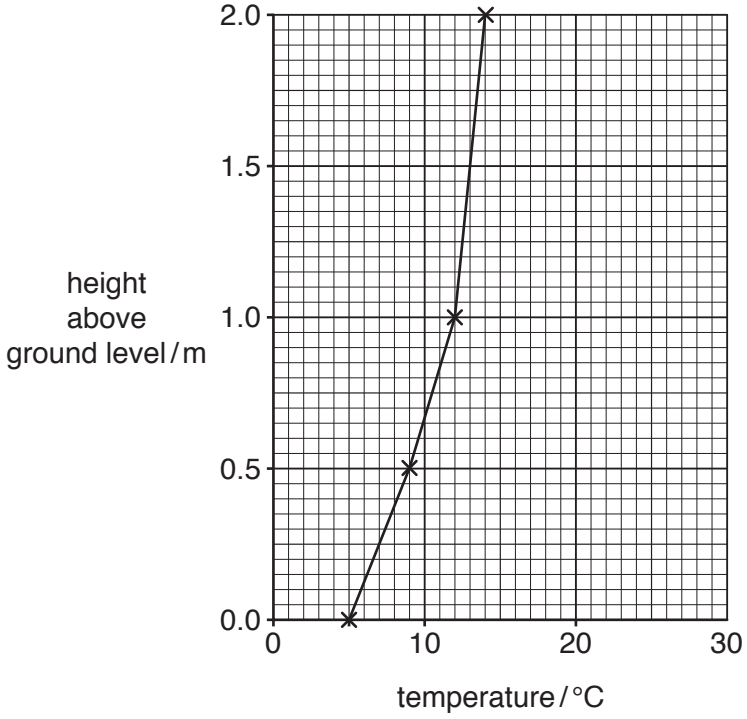
.....

.....[1]

(ii) Identify the heights between which there is the greatest rate of change in temperature.

.....[1]

(iii) The student followed the same method at 12 a.m., midnight. The graph shows the results.



Suggest why the shape of the temperature profile at midnight is different from the temperature profile at noon.

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.....[1]

(iv) Explain how changes of temperature can affect the growth of plants in Zimbabwe.

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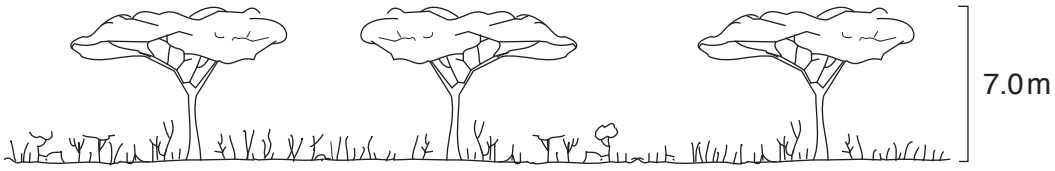
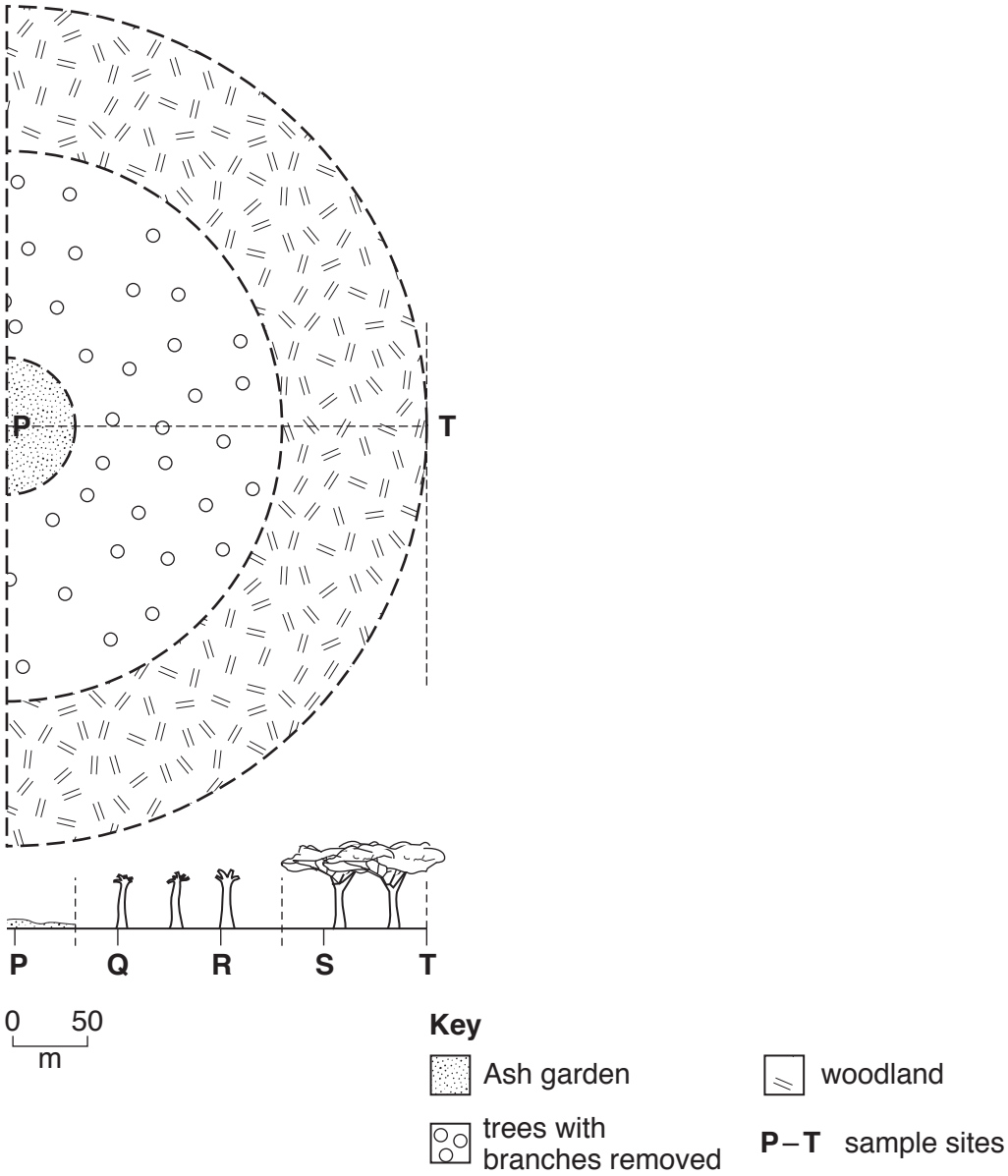
.....[3]

(c) Zimbabwe has large areas covered by woodland. Trees are present and grasses grow between the trees.



People living in villages are subsistence farmers. They use a form of shifting cultivation to grow crops. A large circular area is selected in the woodland and branches of trees in the area are cut off and stacked in the centre. The branches are burned in October and an ash garden is created. Crops are planted without ploughing. After three years the ash garden is abandoned.

The diagram shows a transect from an ash garden to woodland.



The table shows changes in nitrate available to plants from an ash garden to woodland.

sample site	**P**	**Q**	**R**	**S**	**T**
nitrate availability after first year of cultivation / ppm	12	10	8	6	5
nitrate availability after three years of cultivation / ppm	4	5	5	5	5

(i) Describe the changes in nitrate availability between sample sites **P** to **T** after the first year of cultivation and after three years of cultivation.

after first year of cultivation .....

.....

after three years of cultivation .....

.....
[2]

The ash gardens used to be abandoned for about 25 years. Now villagers abandon ash gardens for only 10 years before using it to grow crops again.

(ii) Suggest why ash gardens are now used again after only 10 years.

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.....[2]

(iii) Explain why growing crops in the same ash garden after only 10 years may lead to crop failure.

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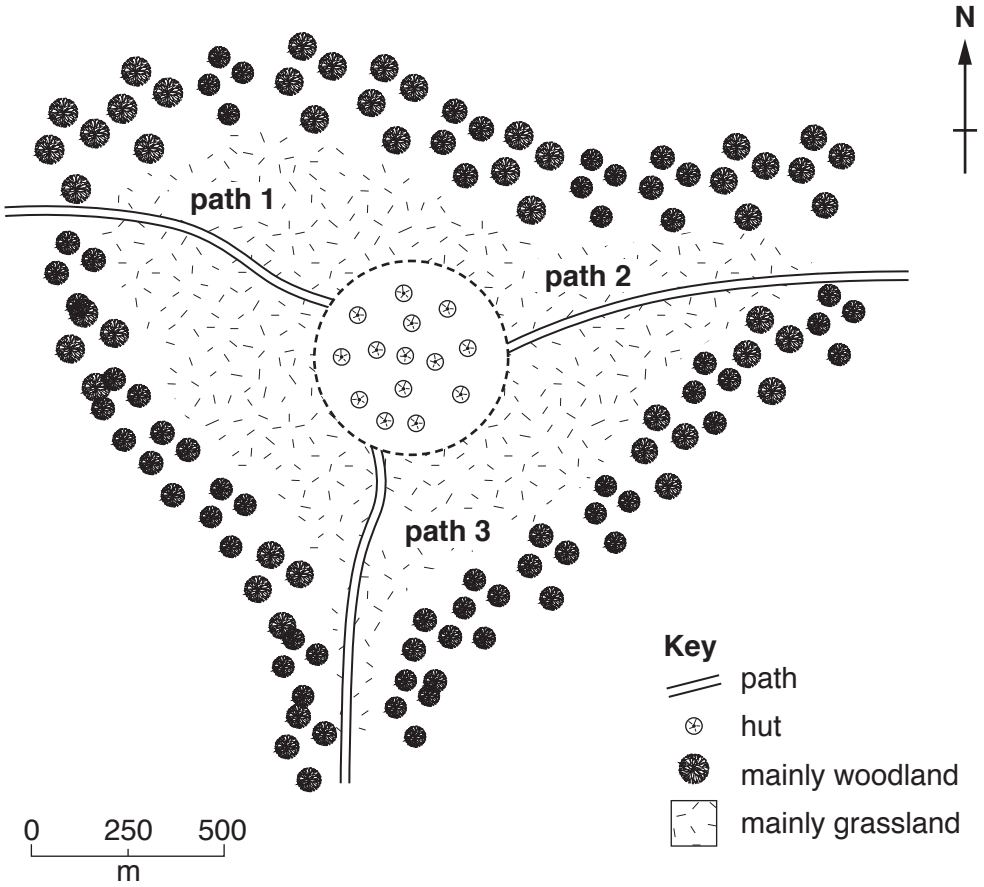
.....[2]

(d) People living in a village use wood to cook food and keep warm. Some wood is turned to charcoal and is sold along with bundles of wood in local markets.

Some villagers think that local supplies of wood will run out in a few years.



A student decided to find out how much wood was entering the village each week. The student proposed the following survey method.

'I will stand by **path 1** for three hours and count how many people carry a bundle of wood into the village. I will do this twice a week for two weeks.'

(i) Draw a table that can be used to record the findings of the survey.

[3]

(ii) Explain why the proposed survey method is **not** likely to find out how much wood is entering the village each week.

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.....[3]

(iii) Describe how the proposed survey method could be improved.

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.....[3]

(e) The villagers use an open fire to cook food.

open fire

Unless the fire is constantly fed with small sticks of dry wood, the fire gives off smoke and does not heat the cooking pot quickly.

Suggest **two** risks to human health of using an open fire to cook food.

.....

.....

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.....[2]

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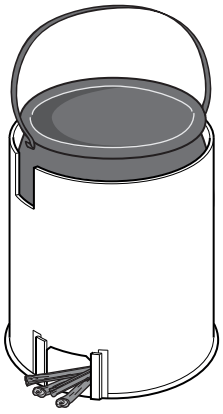
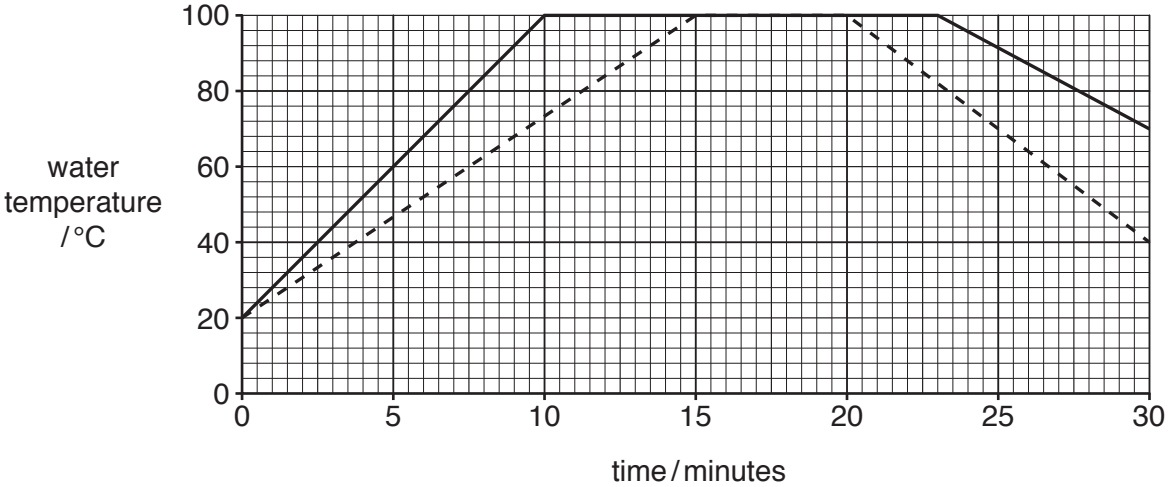
(f) The villagers were shown how to use a new type of stove instead of an open fire. It is claimed that the new type of stove cooks food faster and uses less wood.



new type of stove

An open fire and a new type of stove were set up with the same amount of dry wood and with cooking pots containing the same volume of water. The fuel was lit and the temperature inside each cooking pot was taken at one minute intervals. The results are shown on the graph.



Key

——— new type of stove

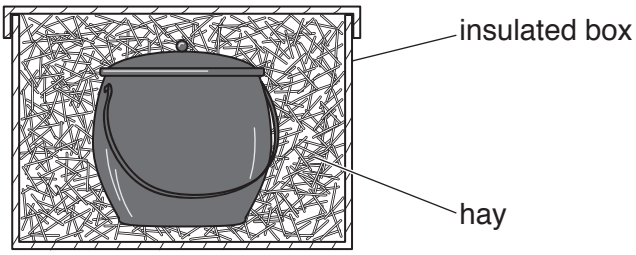
- - - - - open fire

(i) Use information from the graph to complete the table.

	open fire	new type of stove
time to reach 50 °C / minutes	.....	.....
time to reach 100 °C / minutes	.....	.....
time kept at 100 °C / minutes	.....	.....

[3]

If a pot of food is boiled at 100 °C for 10 minutes it can then be kept in an insulated box to complete the cooking process.



A student carried out an experiment with five trials to find out the mass of wood used to cook beans using two different methods. The results are shown in the table.

	method	
trial	mass of wood used with the new type of stove / g	mass of wood used with the new type of stove and an insulated box / g
1	295	255
2	310	265
3	298	250
4	288	249
5	299	261
average	298	.....

(ii) Complete the table. [1]

(iii) State **two** factors the student must keep the same in this experiment.

.....

.....[2]

(iv) Calculate the average percentage difference in wood burnt when using the new type of stove with an insulated box.

Show your working.

.....% [2]

(g) **(i)** Explain why using the new type of stove with insulated boxes is likely to be a sustainable strategy.

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.....[3]

(ii) Explain why a bundle of sticks costs more to buy in Harare than in rural areas.

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.....[2]

(iii) Suggest reasons, other than the cost of wood, why many people living in Harare use the new type of stove with an insulated box.

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.....[2]

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