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100914597

ENVIRONMENTAL MANAGEMENT **0680/23**

Paper 2 Management in Context **October/November 2023**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages.

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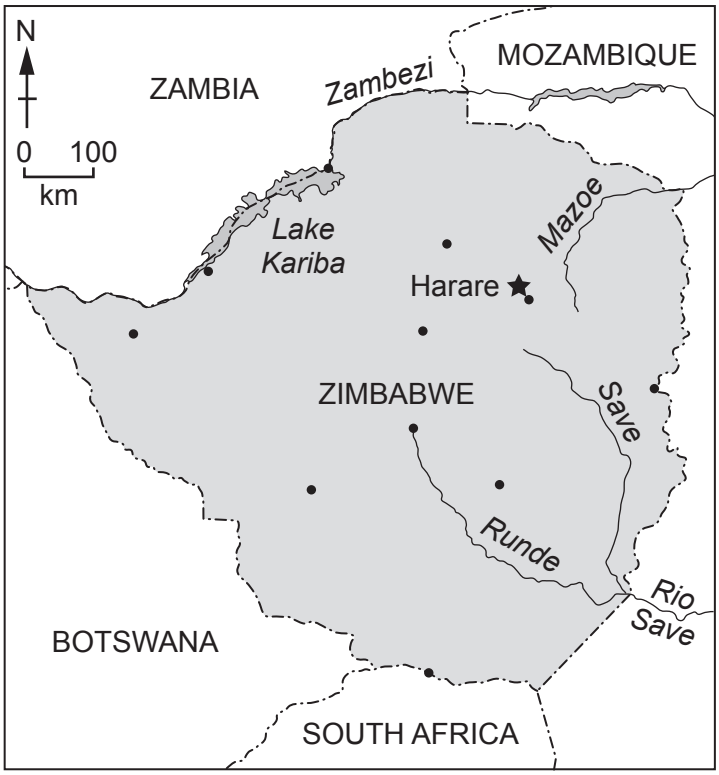
world map showing the location of Zimbabwe



map of Zimbabwe

Key

- international boundary
- river
- ★ capital city
- • other major city



Area of Zimbabwe: 390 757 km^2

Population: 15.1 million (in 2021)

Children per woman: 3.91

Life expectancy: 62.8 years

Currency: Zimbabwean dollar ZWL (1 ZWL = 0.0031 USD)

Languages: Shona, Ndebele, English and indigenous languages

Climate of Zimbabwe: tropical with wet and dry seasons; the wettest regions are the north and the east

Terrain of Zimbabwe: mostly high flat land over 300 m, mountains in the east

Main exports of Zimbabwe: gems, precious metals, tobacco, nickel

Zimbabwe is a less economically developed country (LEDC) in southern Africa. The land is mainly tropical grassland. 33% of the population live in urban areas, including many young people. The majority of people work in agriculture. The rural population is older, consisting of mainly women and children.

1 **(a)** **(i)** Calculate the number of people living in urban areas in Zimbabwe in 2021.

..... million [1]

(ii) Suggest **three** reasons why young people live in urban areas.

1 .....

2 .....

3 .....

[3]

(b) The table shows the percentage of the population with access to facilities in different regions of Zimbabwe.

location	toilet facilities	hand washing facilities
Bulawayo	56	82
Manicaland	37	61
Mashonaland Central	31	68
Mashonaland East	41	75
Mashonaland West	34	51
Matabeleland North	24	58
Matabeleland South	42	60
Midlands	40	55
Masvingo	28	64
Harare	40	71

(i) State the region that has the lowest percentage of the population with access to hand washing facilities.

..... [1]

(ii) State the number of regions where fewer than 35% of the population have access to toilet facilities.

..... [1]

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(c) Many people in Zimbabwe must travel long distances to collect clean water.

Suggest reasons why travelling long distances to collect clean water is one of the causes of poverty.

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..... [3]

(d) Cholera is a water-related disease.

(i) Explain why people become infected with cholera.

.....

.....

.....

..... [2]

(ii) State **two** strategies to control cholera.

1 .....

2 .....
[2]

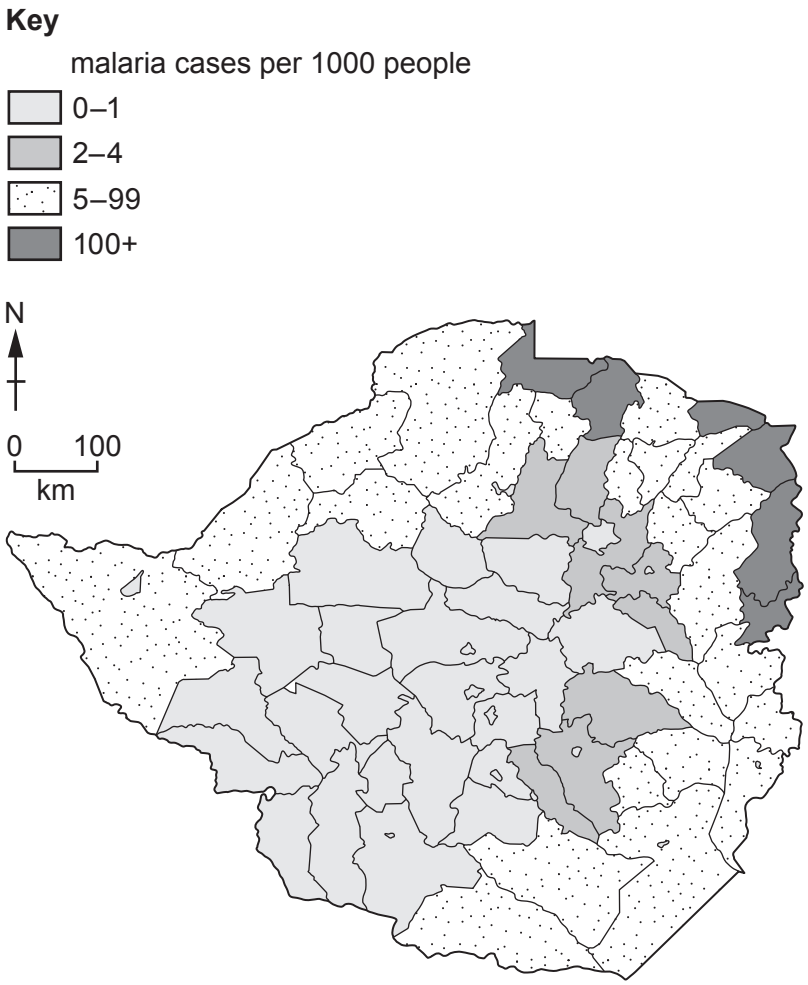
(iii) State **two** other strategies for improving water quality.

1 .....

2 .....
[2]

(e) Malaria is a water-related disease.

The map shows malaria cases per 1000 people for different regions of Zimbabwe in 2019.



(i) Estimate the percentage area of Zimbabwe with 0–1 malaria cases per 1000 people in 2019.

Circle your answer from the list.

10% **25%** **50%** **75%** **100%**

[1]

(ii) A person is planning to visit Zimbabwe.

Suggest limitations of using this map to predict the risk of becoming infected with malaria.

.....

.....

.....

..... [2]

(iii) Two strategies to control malaria are:

- the use of antimalarial drugs
- the use of mosquito nets.

Compare these strategies as methods of controlling malaria in Zimbabwe.

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..... [5]

[Total: 23]

2 A reservoir supplies the population of Harare with fresh water.

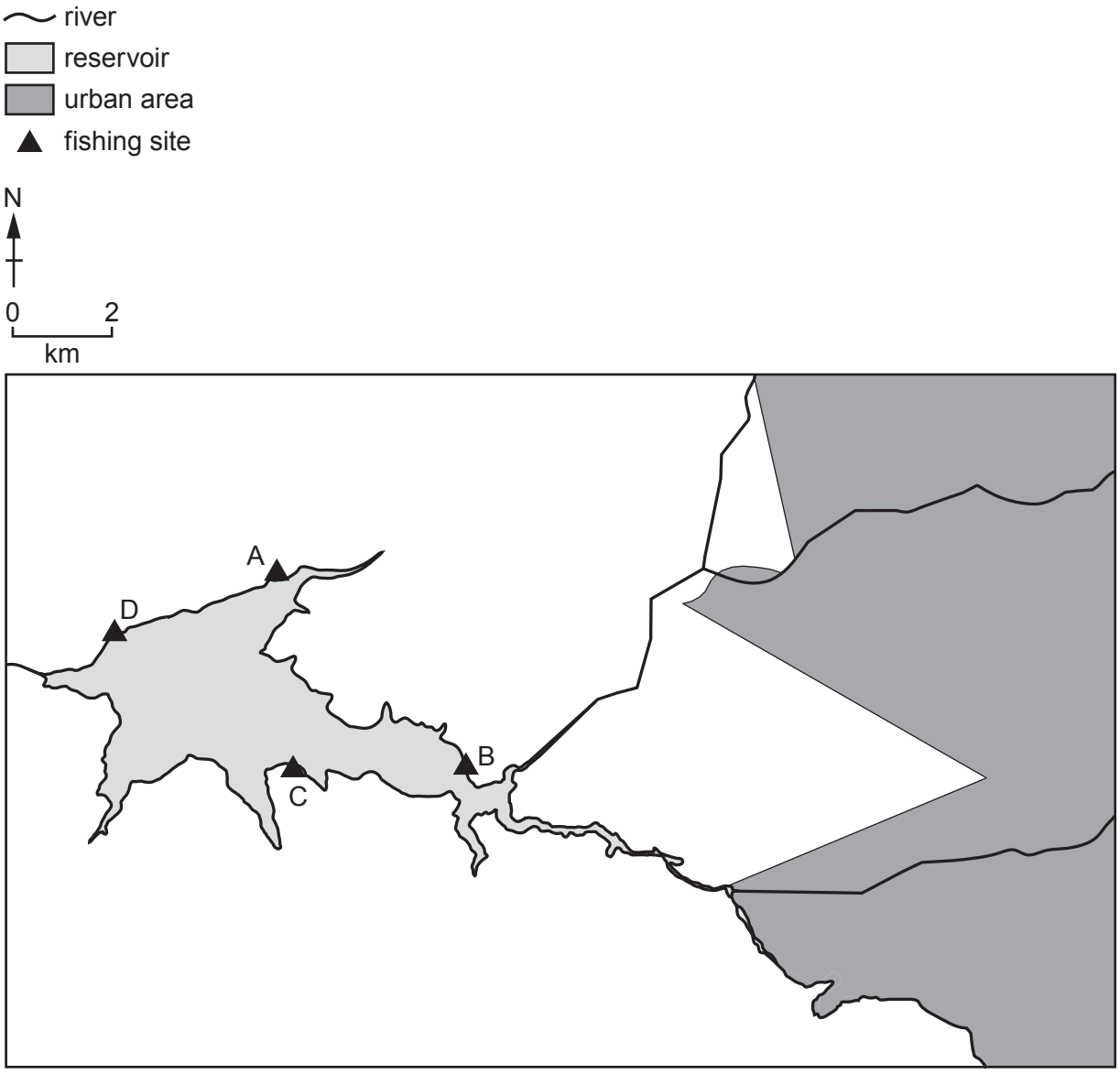
The table shows the average rainfall for January, March and May at the reservoir.

month	Jan	Mar	May
average rainfall / mm	196	117	13

Fish are caught in the reservoir and sold to people in Harare.

Water from factories and urban areas of Harare flows into the reservoir.

The map shows the reservoir and four sites, A–D, where fish are caught.



Mercury is a toxic substance.

A scientist investigates the concentration of mercury in the water and fish of the reservoir at the four sites, A–D.

(a) The scientist considers two plans for collecting samples of water and fish from the reservoir.

Plan 1

- Visit each site, A–D, on one day in January.
- Collect samples of water and fish.

Plan 2

- Visit each site, A–D, on one day in January, one day in March and one day in May.
- Collect samples of water and fish on each day.

The scientist uses Plan 2 to investigate the concentration of mercury found in the water and the fish.

Describe the advantages of using Plan 2 rather than Plan 1.

.....

.....

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.....

.....

..... [3]

(b) The table shows the results of the investigation.

site	average concentration of mercury in water / arbitrary units	average concentration of mercury in fish / arbitrary units
A	8	18
B	7	17
C	9	19
D	8	5

(i) Calculate the range of average concentration of mercury in water.

..... arbitrary units [1]

(ii) The scientist decides that one result in the table is anomalous.

Complete the sentence to identify the anomalous result.

Sample site ..... has an anomalous result of ..... arbitrary units.

[1]

(iii) The maximum safe level of mercury in food and water is 20 arbitrary units.

Suggest what the scientist advises local people about eating fish from the reservoir. Give a reason for your answer.

.....

..... [1]

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(c) The scientist surveys the people living at sites A–D to investigate the mass of fish they eat in one month. The scientist surveys the people in January and then repeats the survey in May.

The results are shown in the tables.

	site	number of people surveyed	average mass of fish eaten / kg per person
Jan	A	22	3.4
	B	17	2.7
	C	19	2.6
	D	18	2.5

	site	number of people surveyed	average mass of fish eaten / kg per person
May	A	20	2.9
	B	19	2.5
	C	7	2.7
	D	18	3.1

(i) State the site where the **greatest** average mass of fish is eaten per person in **January**.

..... [1]

(ii) Suggest **one** reason why the scientist decides to repeat the survey for May at site C.

.....

..... [1]

(d) Reservoirs and lakes are sources of fresh water for people.

State **three** other sources of fresh water for people.

1 .....

2 .....

3 .....

[3]

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(e) A company wants to build a new factory near the reservoir.

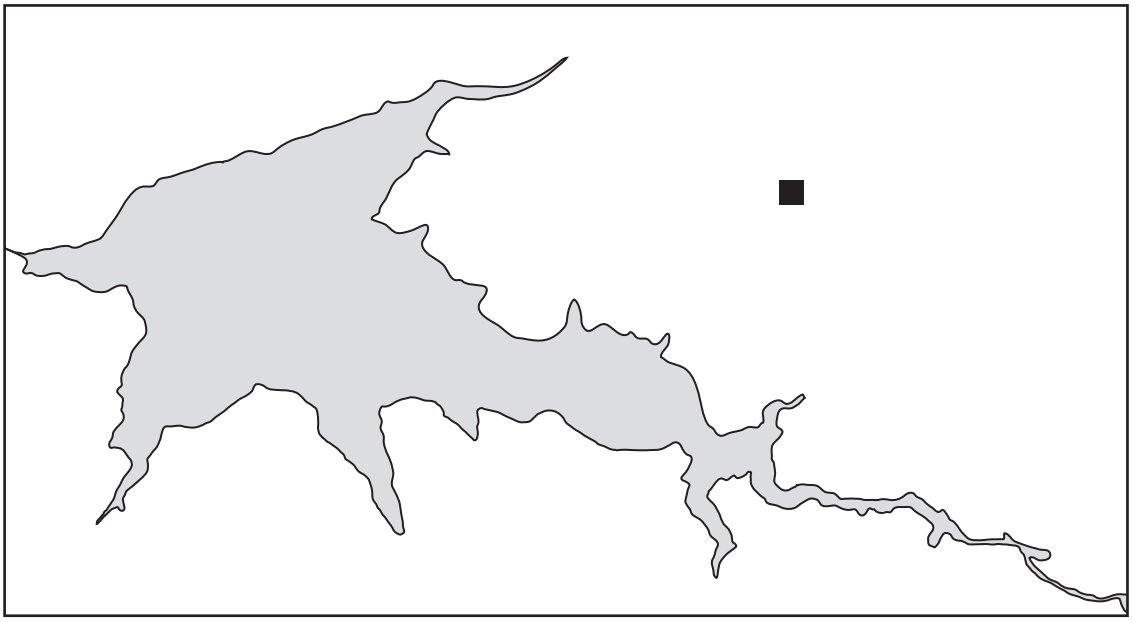
The map shows the suggested location of the factory and the location of the reservoir.

Key

■ suggested location of factory

reservoir

0 1
km



Environmental regulations state that the factory must be more than 2000 m from the reservoir.

Use the map to determine whether the factory can be built at the suggested location. Show how you determined your answer.

.....

[2]

[Total: 13]

3 The supply of electricity in Zimbabwe comes from one hydroelectric power station and four coal-fired power stations.

(a) Suggest **three** problems of using hydroelectric power.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(b) The extraction of coal for power stations causes air pollution.

Describe **two** other ways that the extraction of coal pollutes the environment.

1 .....

.....

2 .....

.....

[2]

(c) One of the problems of using fossil fuels to generate electricity is air pollution such as acid rain.

(i) Describe how acid rain is formed.

.....

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..... [3]

(ii) State **two** negative impacts of acid rain.

1 .....

.....

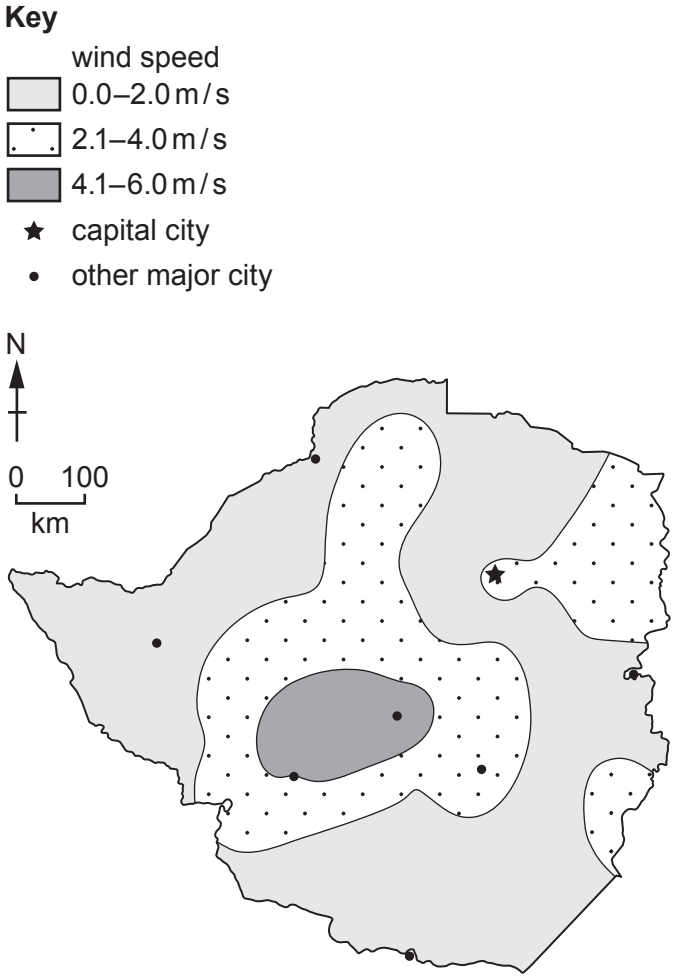
2 .....

.....

[2]

(d) Wind power can be used to generate electricity if the average wind speed is above 4.0 m / s.

The map shows the average annual wind speed in different regions of Zimbabwe.



Use the map to discuss whether wind power can be used to generate electricity for the population of Zimbabwe.

.....

.....

.....

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.....

..... [3]

(e) Zimbabwe has the possibility of generating electricity from other renewable resources.

Zimbabwe has:

- wood waste from its timber industry
- an average of 8.2 hours of sunshine per day.

(i) Suggest how Zimbabwe could use these renewable resources to increase its electricity supply.

.....

.....

.....

.....

.....

..... [3]

(ii) Economic challenges are one reason why Zimbabwe has **not** developed these renewable resources of energy.

Suggest other reasons.

.....

.....

.....

.....

.....

..... [3]

[Total: 19]

4 **(a)** The main crops grown by Zimbabwe's commercial farmers are sugar cane, maize, cassava and vegetables.

(i) State the name of this type of agriculture.

..... [1]

(ii) Agricultural yield can be increased using fertiliser.

State **three** other techniques used to increase agricultural yield.

1 .....

2 .....

3 .....

[3]

(iii) Suggest why soil erosion is more common in a less economically developed country (LEDC) such as Zimbabwe.

.....

.....

.....

.....

.....

..... [3]

(b) Overuse of fertiliser can cause eutrophication.

The statements describe the process of eutrophication. The statements are correct but in the wrong order.

A The fertiliser encourages the rapid growth of algae.

B Dead aquatic plants are decomposed by bacteria, which use up the oxygen.

C Algae block sunlight from entering the water.

D Rain washes fertiliser off the land into streams.

E Aquatic plants die without light.

(i) Complete the boxes to show the correct order of statements for the process of eutrophication.

One has been done for you.

…….	…….	……..	……..	B

[2]

(ii) Explain why a lack of oxygen leads to the death of aquatic organisms.

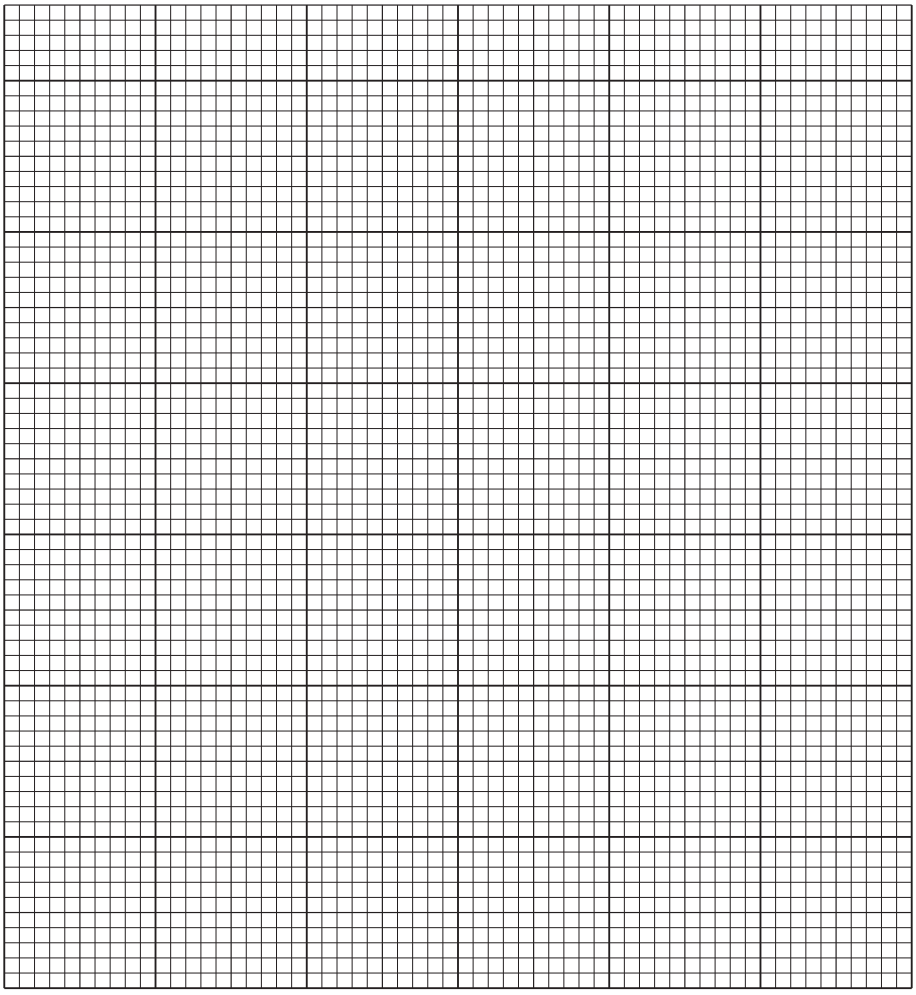
.....

..... [1]

(c) The table shows the yield of some of Zimbabwe's agricultural crops in 2018.

crop	**yield /thousands of tonnes**
cassava	256
vegetables	191
tobacco	132
banana	106
oranges	96

(i) On the grid, plot a bar chart of the data in the table.



[4]

(ii) The crops in the table are all cash crops.

State what is meant by cash crop.

.....

..... [1]

(d) A food chain including a banana plant is shown.

banana plant → weevil → ant

(i) State the name of the producer in this food chain.

..... [1]

(ii) State the number of trophic levels in this food chain.

..... [1]

(iii) Draw a labelled pyramid of biomass for this food chain.

[2]

(iv) Explain the impact on the banana plant if all the ants are removed from the food chain.

.....

.....

.....

..... [2]

(e) Written questionnaires were sent to farmers in one area of Zimbabwe to survey what type of crop they grow.

The table shows the number of farmers in the area, the number of farmers selected for survey and the number of questionnaires returned.

number of farmers in the area	10 703
number of farmers selected for survey	2 012
number of questionnaires returned	1 896

(i) Describe a systematic sampling method for selecting farmers to be surveyed by questionnaire.

.....

..... [1]

(ii) Suggest **three** reasons why the number of questionnaires returned was fewer than the number of farmers selected for survey.

1 .....

2 .....

3 .....

[3]

[Total: 25]

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