



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
NUMBER

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CANDIDATE
NUMBER

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ENVIRONMENTAL MANAGEMENT

5014/11

Paper 1

October/November 2013

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Ruler
 Protractor

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.

Electronic calculators may be used.

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

Write your answers in the spaces provided on the Question Paper.

All questions in Section A carry 10 marks.

Both questions in Section B carry 40 marks.

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

1	
2	
3	
4	
5	
6	
Total	

This document consists of **23** printed pages and **1** blank page.



For
Examiner's
Use

-
- The graph illustrates the exponential growth of aluminium production over the 20th century. The x-axis represents the year from 1900 to 2009, and the y-axis represents the world production of aluminium in million tonnes per year, ranging from 0 to 40. The production remains very low until the 1930s, after which it begins a steep climb. There are notable fluctuations, particularly in the 1970s and 1980s, but the overall trend is one of rapid increase, reaching a peak of nearly 40 million tonnes per year in 2009.
- | Year | World Production of Aluminium (million tonnes per year) |
|------|---|
| 1900 | 0.1 |
| 1910 | 0.2 |
| 1920 | 0.3 |
| 1930 | 0.5 |
| 1940 | 1.0 |
| 1950 | 1.5 |
| 1960 | 4.5 |
| 1970 | 10.0 |
| 1980 | 15.5 |
| 1990 | 19.5 |
| 2000 | 24.5 |
| 2009 | 39.5 |

.....[3]

- (b) Aluminium is a very useful metal. It is a strong, soft, long-lasting metal and is very light in weight. It does not corrode easily.

For
Examiner's
Use

Suggest which property of aluminium makes it useful in the manufacture of aeroplanes and cars. Explain your choice.

(i) aeroplanes
.....[1]

(ii) drinks cans
.....[1]

- (c) A large amount of energy is needed for refining aluminium ore (bauxite). Refining is often done in mountainous regions.

Name the type of power likely to be used there.
.....[1]

- (d) (i) Metal ores, such as bauxite, need to be conserved. State three ways of doing this.

1
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2
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3
.....[3]

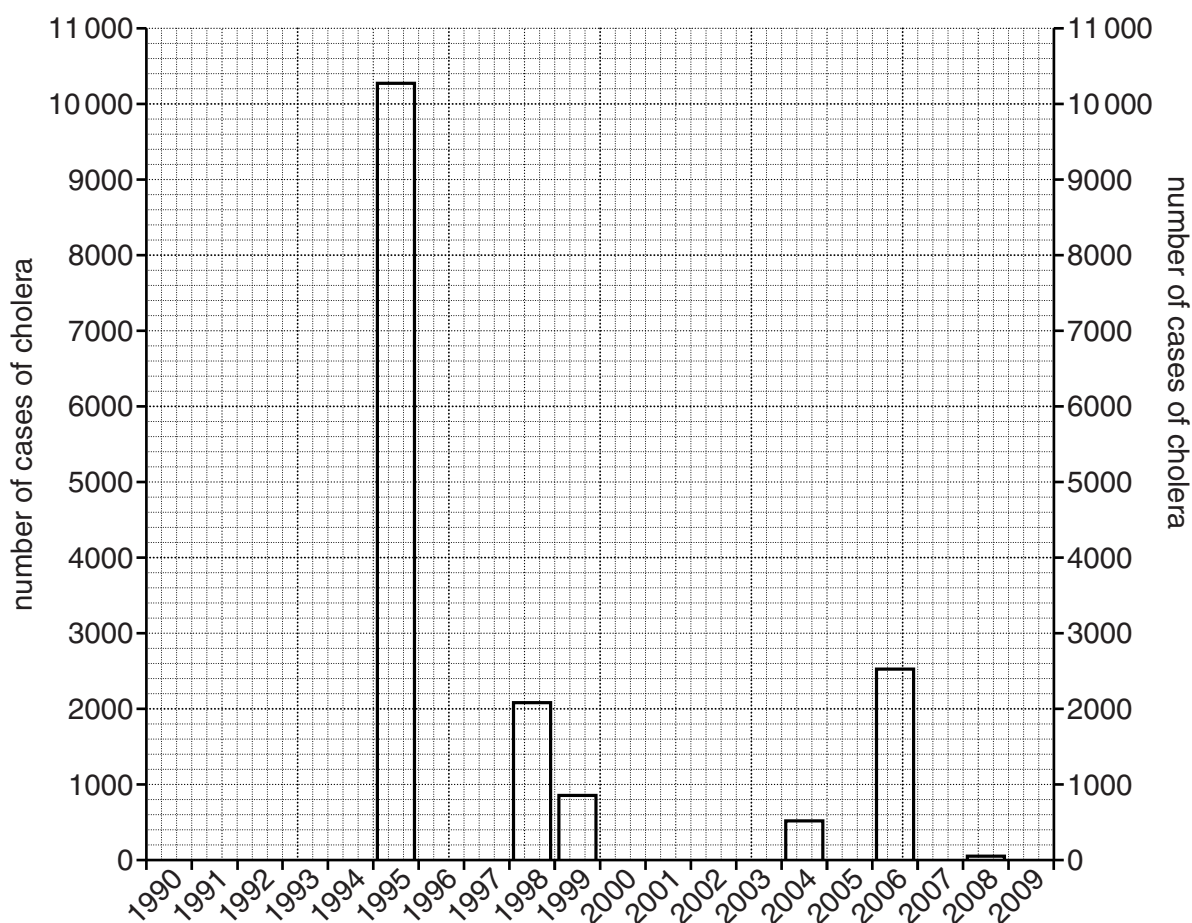
- (ii) The presence of aluminium in soils can increase their acidity. What change would this cause to the pH of the soil?

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

[Total: 10]

- 2 (a) Look at the bar graph which shows the number of cases of cholera during epidemics in Sierra Leone between 1990 and 2009.

For
Examiner's
Use



- (i) Use the information in the table to complete the bar graph.

year	number of cases of cholera
1994	9700
2007	2200

[2]

- (ii) State the highest number of cases and the year in which they occurred.

number year [1]

- (iii) The cholera outbreaks shown on the bar graph were described as epidemics. State **one** characteristic of an epidemic.

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

- (b) (i) Cholera is a water-borne disease. Name one **other** water-borne disease.

.....[1]

- (ii) What is the difference between a water-borne disease and a water-based disease?

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.....[2]

- (c) Explain the likely impact of a cholera epidemic on the economy of a farming area in developing countries like Sierra Leone.

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.....[3]

[Total: 10]

For
Examiner's
Use

- 3 (a) Name and describe an instrument used at a weather station to measure wind speed.

For
Examiner's
Use

name

description

.....

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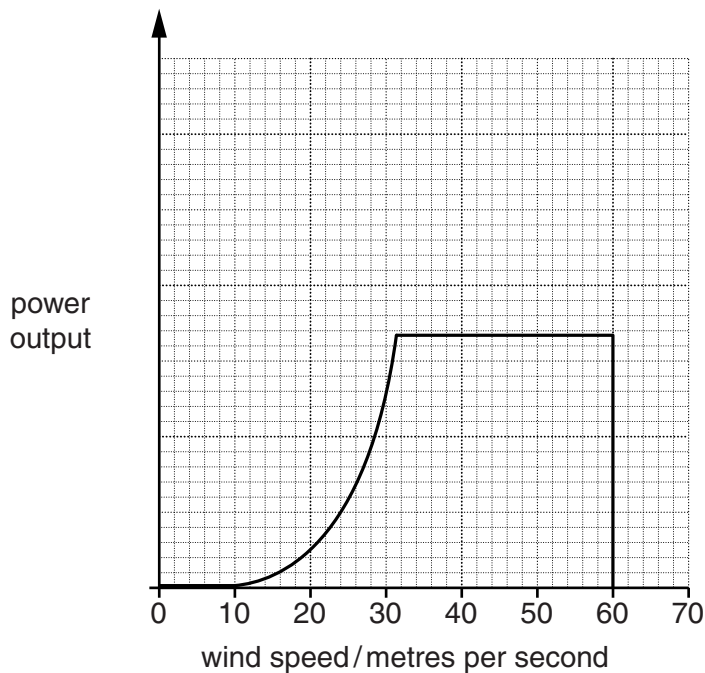
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..... [4]

- (b) Look at the graph which shows how power produced by a wind turbine in the UK varies with wind speed.



- (i) Describe how wind speed affects power output for this wind turbine.

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..... [3]

- (ii) Explain why there is no power output from this wind turbine at certain wind speeds.

For
Examiner's
Use

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.....[2]

- (iii) Wind energy includes an extra cost, known as a standby cost.

Suggest what this is for.

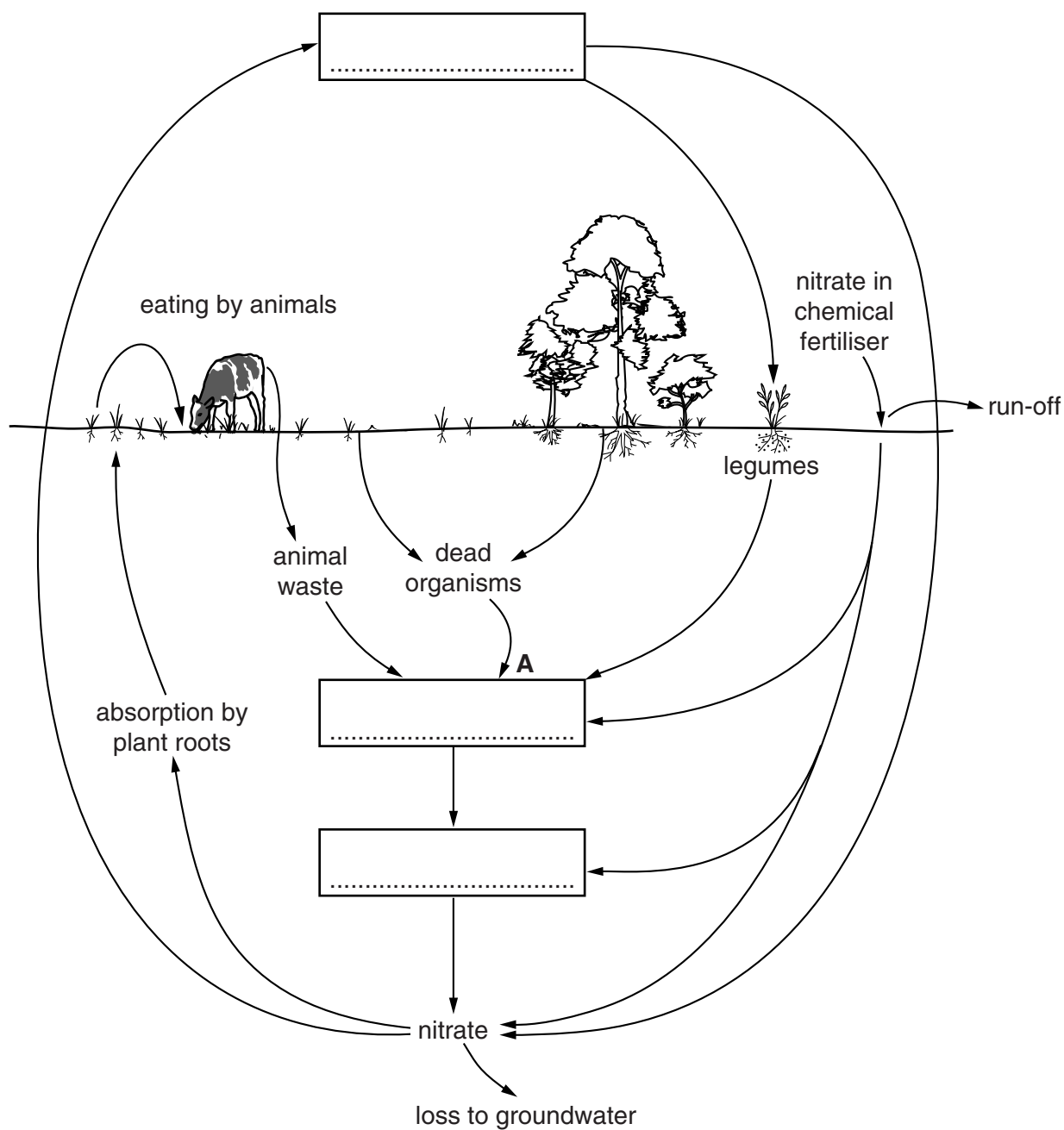
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.....[1]

[Total: 10]

- 4 (a) Look at the diagram of the nitrogen cycle.

For
Examiner's
Use



- (i) Complete the boxes in the diagram using the following words:

ammonia nitrite nitrogen

[2]

- (ii) Using **only** the information on the diagram of the nitrogen cycle, describe two ways in which nitrates can enter water sources.

1

.....

2

..... [2]

- (iii) Describe the process represented by the arrow labelled **A**.

For
Examiner's
Use

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.....[2]

- (b) (i) The roots of legumes, such as peas and beans, have nodules that play an important part in converting nitrogen to a form that plants can use.

What do the nodules contain?

.....[1]

- (ii) Nitrates can be added to the soil in fertiliser or by growing legumes.

What are the advantages of using legumes instead of fertiliser for the farmer **and** for the ecosystem?

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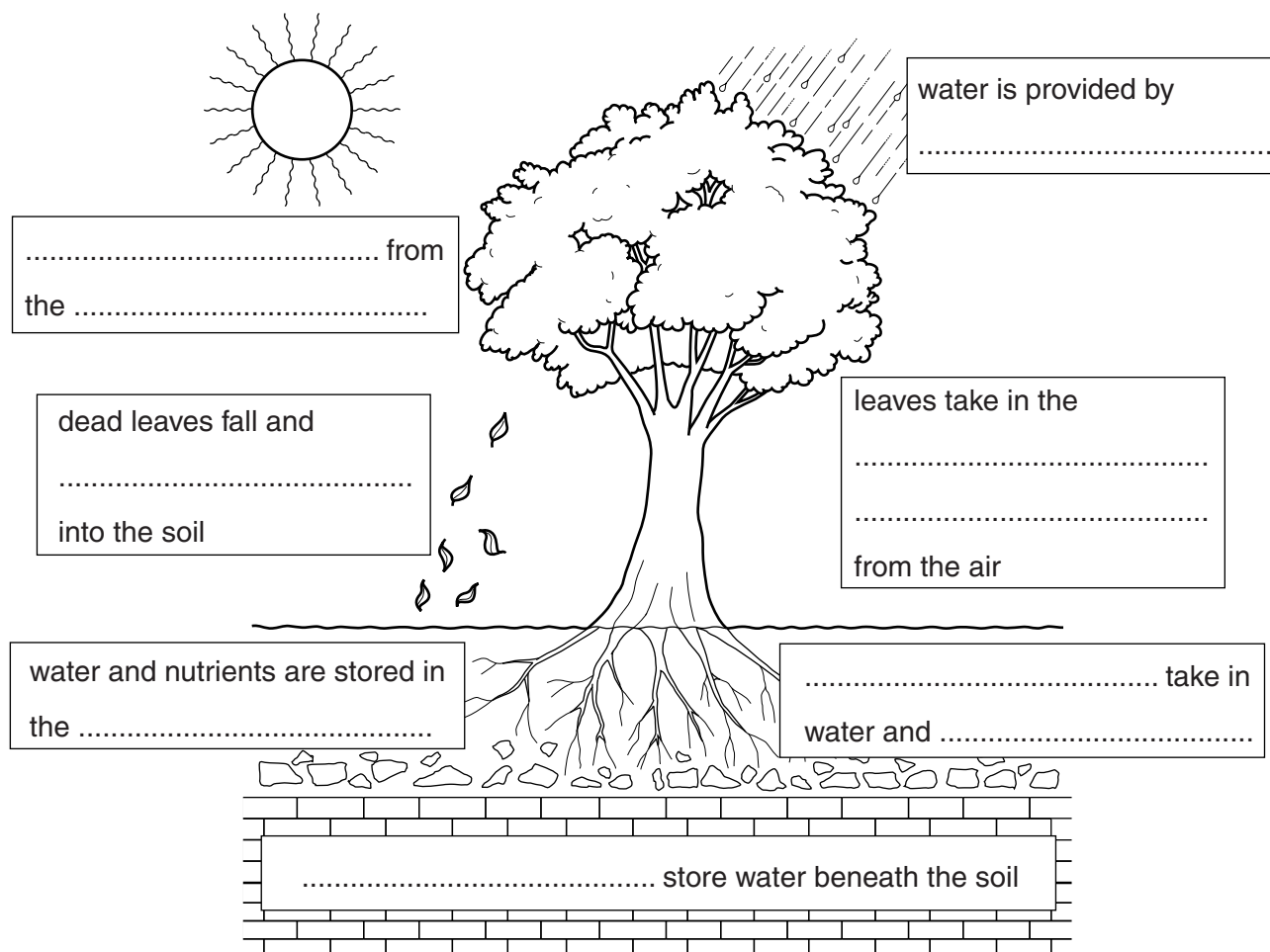
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.....[3]

[Total: 10]

- 5 (a) Look at the diagram of natural energy flows and stores for tree and forest growth.

For
Examiner's
Use



- (i) Fill in the spaces to complete the diagram of energy flows and stores for tree and forest growth.

Write your answers in the spaces on the diagram. [5]

- (ii) How and why are trees and other green plants the Earth's primary producers?

For
Examiner's
Use

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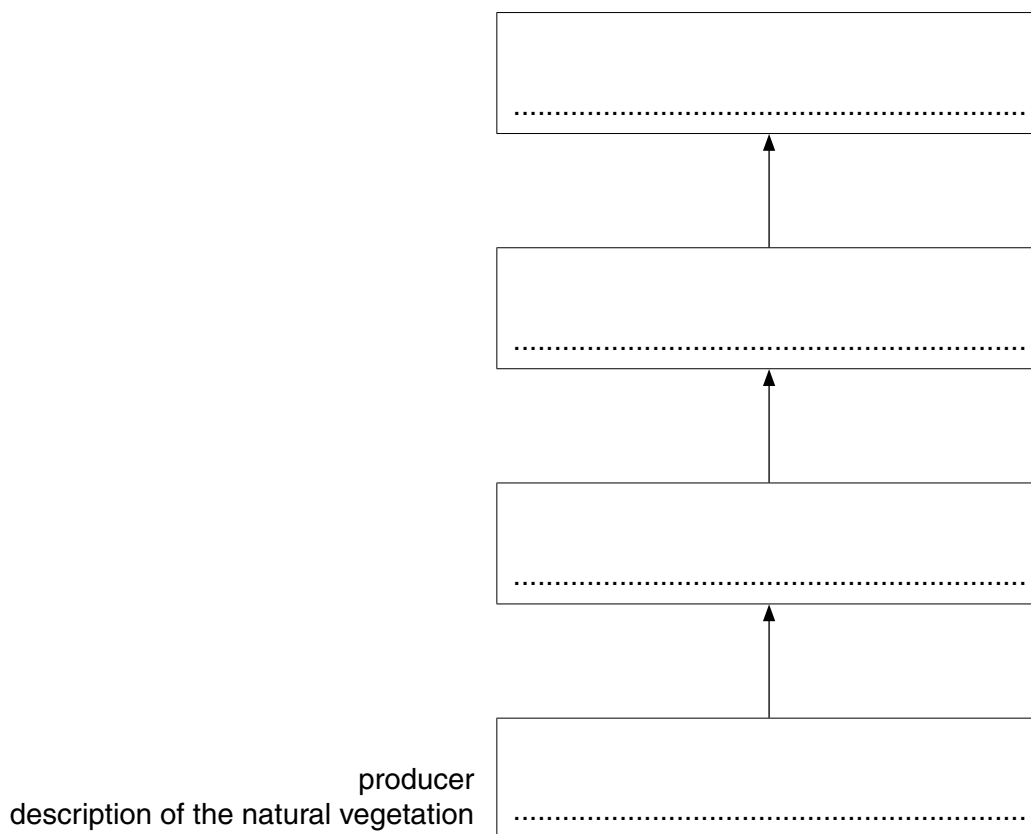
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..... [3]

- (iii) Trees and other green plants support food chains. For a land based ecosystem of your choice, complete the diagram below by naming the organisms in the food chain and describing the natural vegetation.

location of land based ecosystem chosen



[4]

- (iv) What happens to the amount of energy passing along a food chain in a natural ecosystem? Explain why this happens.

For
Examiner's
Use

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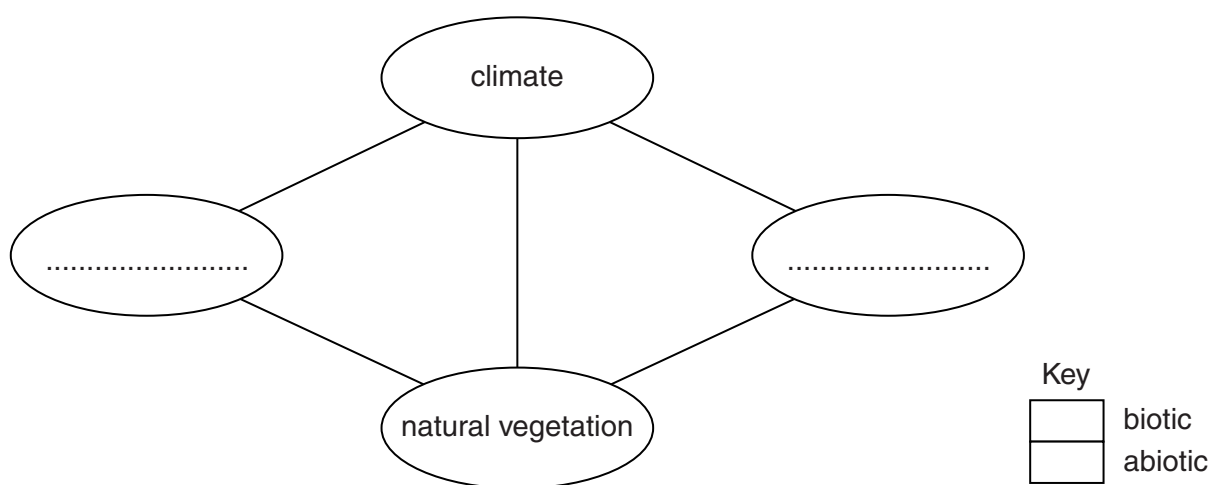
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..... [3]

- (b) Trees grow in living communities in forest ecosystems. The diagram below shows the components of a natural forest ecosystem.



On the diagram:

- (i) name two other components of the ecosystem,
- (ii) shade or colour in each of the four components according to whether they are biotic or abiotic. Shade or colour in the key to match.

Put your answers on the diagram. [2]

- (c) Biomes are large scale ecosystems. On a global scale, climate is the most important component of the ecosystem for determining characteristics of the natural vegetation and how they change over the Earth's surface.

Look at the cross section of natural vegetation from the coast of West Africa (latitude 5°N) to the interior (latitude 20°N) on page 5.

- (i) The annual rainfall totals at the points marked **A** to **E** on the section are;
A: 2000mm **B**: 1500mm **C**: 1000mm **D**: 500mm **E**: 250mm.

Plot these rainfall totals as a bar graph on the grid below the section. [2]

- (ii) In the table below the section, describe the natural vegetation between points **B** and **C**, **C** and **D**, and **D** and **E**, in a similar way to what has already been done for **A**. [4]

cross section of natural vegetation from the coast of West Africa to the interior

For
Examiner's
Use

climate type	equatorial		savanna		hot desert	
natural vegetation locations						
		A	B	C	D	E
natural vegetation	mangrove swamps	dense tropical rain forest with tall trees and five forest layers				
						
						
						
						
						
						

temperature of
hottest and coldest
month / °C

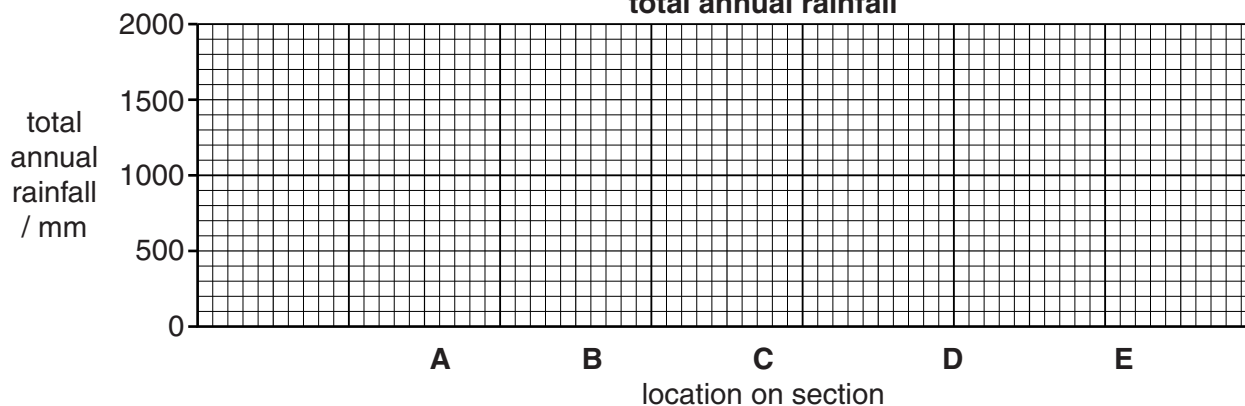
hottest
coldest

A
28
26

C
31
24

E
36
22

total annual rainfall



- (iii) State which of the two climate factors, temperature or rainfall, is more important for explaining changes in natural vegetation between 5° and 20° north of the equator in West Africa. Explain your choice of factor.

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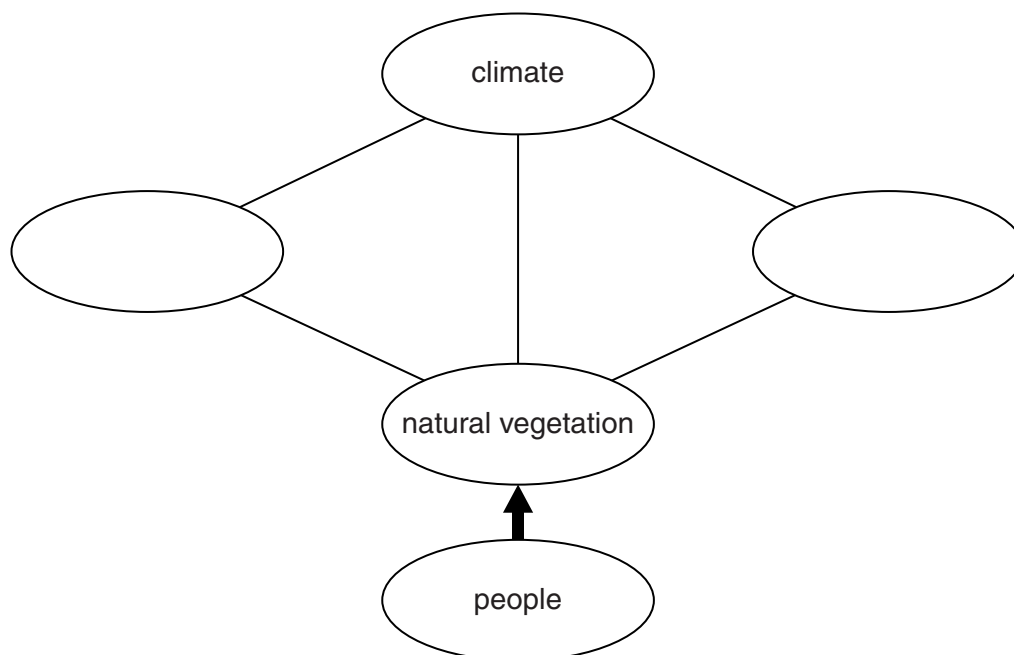
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[4]

- (d) Today people are often added to diagrams of natural ecosystems. The diagram shows a forest ecosystem modified by the addition of people.

For
Examiner's
Use



- (i) How and why is the role of people different from that of the other components which make up an ecosystem?

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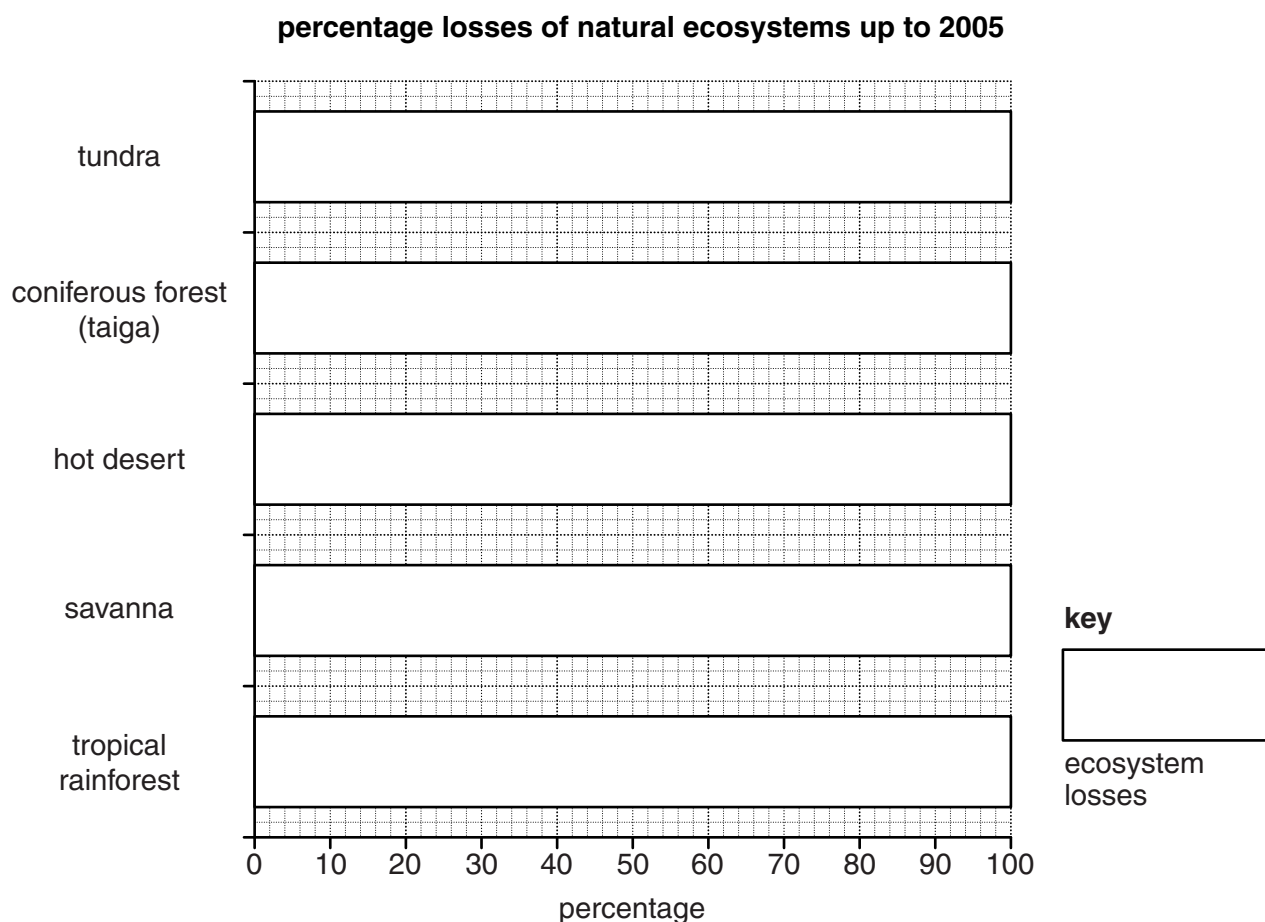
..... [2]

- (ii) The table shows estimates of the percentage losses of the area of five natural ecosystems (biomes) up to 2005.

natural ecosystem (biome)	percentage loss
tundra	2
coniferous forests (taiga)	5
hot deserts	25
savanna	55
tropical rainforest	40

Show these percentages in divided bar graphs in the grid below and complete the key.

For
Examiner's
Use



[2]

(iii) Suggest reasons for:

- variations in the size of percentage losses between the three tropical ecosystems
- the much lower percentage losses in the cold temperate and polar ecosystems.

tropical ecosystems

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polar ecosystems

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[5]

- (e) (i) Describe one sustainable forest management strategy (method) that people can use to obtain supplies of wood from natural forests.

For
Examiner's
Use

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- (ii) Explain why sustainable forest management strategies like this are not used in all forests.

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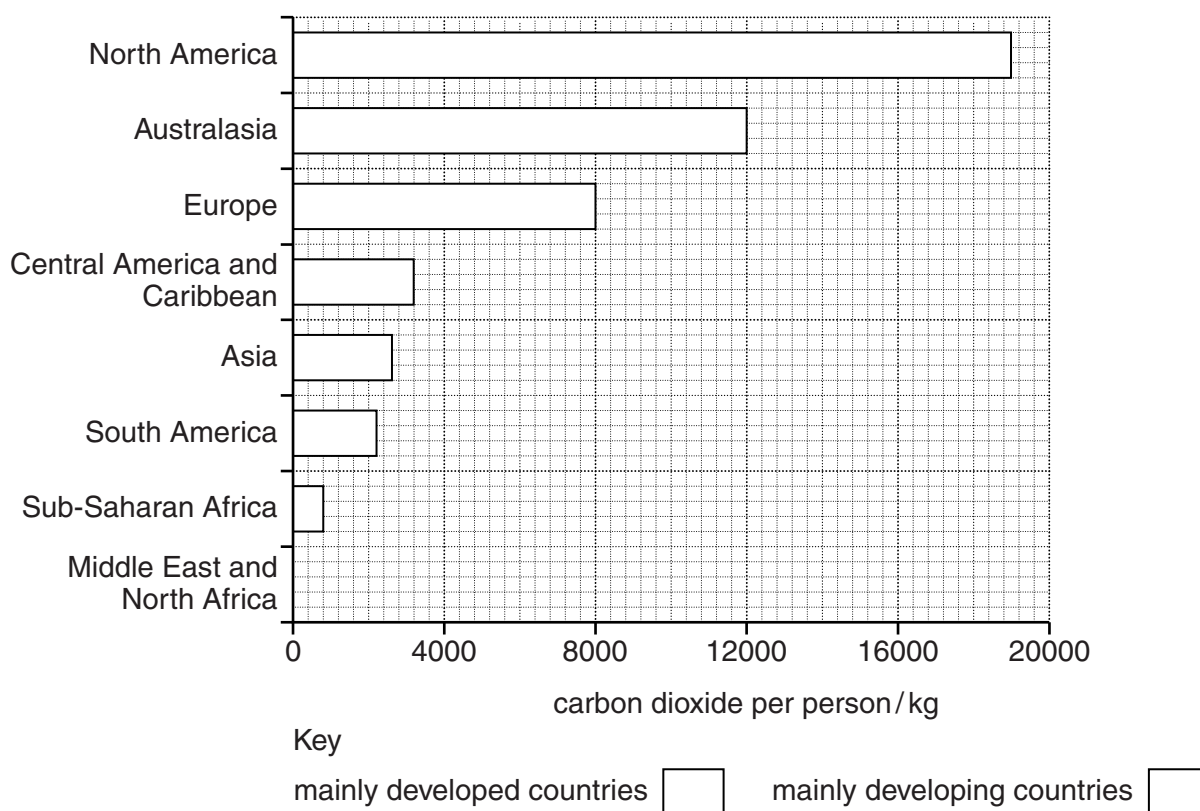
[4]

[Total: 40]

- 6 (a) Look at the partly completed bar graph showing emissions of carbon dioxide per person in major world regions.

For
Examiner's
Use

carbon dioxide emissions per person in 2000 in major world regions in kilograms



- (i) Emissions of carbon dioxide per person in 2000 in the Middle East and North Africa were 3900 kilograms. Add this information in the space left at the bottom of the graph. [1]
- (ii) On the graph, use different shading or colours to show whether the eight regions contain mainly developed or mainly developing countries. Fill in the key. [1]
- (iii) Did you decide that the countries in the Middle East and North Africa are mainly developed or mainly developing?

Explain your choice of answer.

.....

.....

.....

..... [2]

- (iv) How big is the difference in emissions of carbon dioxide per person between North America and Sub-Saharan Africa? State your answer in kilograms.

For
Examiner's
Use

Space for working.

..... [1]

- (v) According to one environmental group, a person living in the USA is responsible for seven times more carbon dioxide emissions in a year than a person in Ethiopia is in a lifetime.

Why are there big differences in carbon dioxide emissions per person between different countries of the world? Explain your answer as fully as you can.

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..... [4]

- (b) Carbon dioxide is one of the greenhouse gases. It is usually considered to be the most important greenhouse gas leading to global climate change.

- (i) Name another important greenhouse gas.

..... [1]

- (ii) Why are they called 'greenhouse gases'?

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..... [3]

(iii) Look at the box below which contains statements about global climate change.

For
Examiner's
Use

global climate change

average world temperatures
1900 14.25°C; 2000 14.85°C

**cutting down forests
for logging, farming and mining**

sea ice thinning and melting,
mountain glaciers retreating

Kyoto climate change conference 1997
targets set for carbon dioxide reductions

higher flood risk in coastal areas
especially in low-lying countries

**more extreme weather events
happening more often and stronger**

less water for irrigation in Asia
from rivers starting in the Himalayas

great use of fossil fuels
for electricity and transport

**rising sea levels
18cm higher than 100 years ago**

Choose **two** statements which give physical evidence suggesting the existence of global warming, and another **two** statements which are effects of global warming on people.

Physical evidence for global warming.

1

2

Effects of global warming on people.

1

2 [2]

- (iv) Explain why some countries are more worried about the effects of global warming than others.

For
Examiner's
Use

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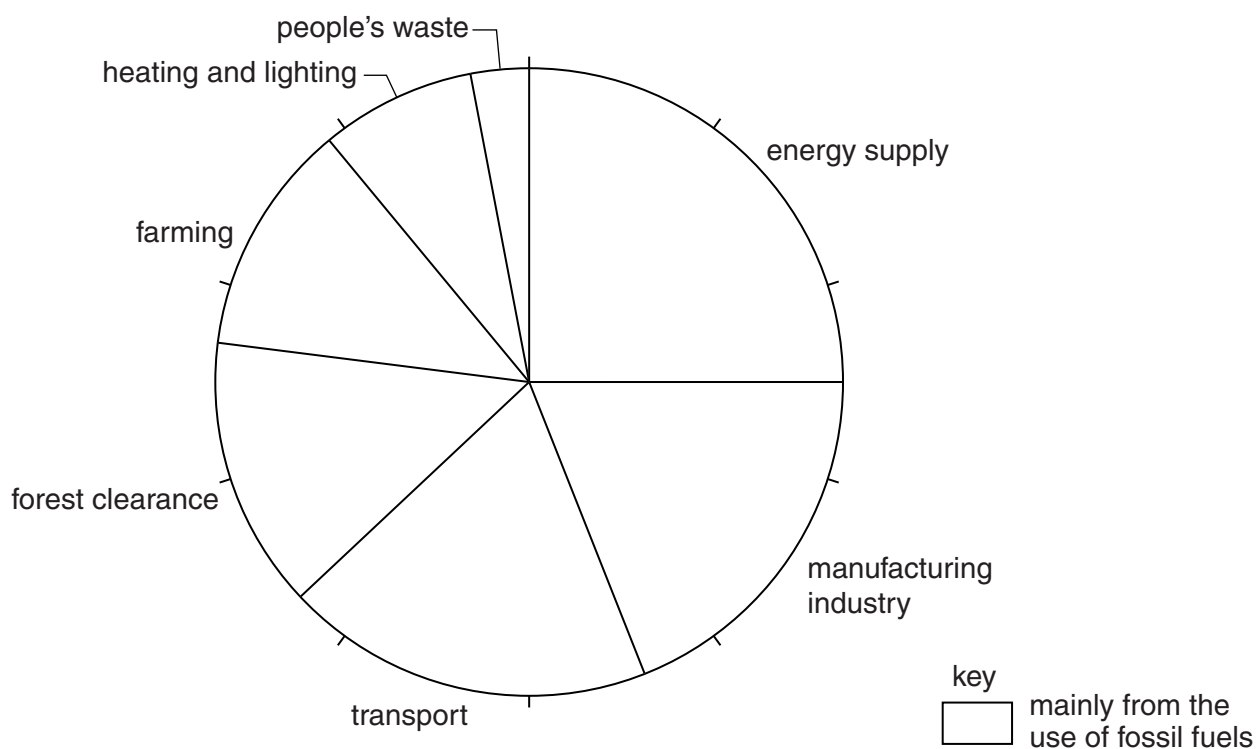
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..... [4]

- (c) Many people believe that burning fossil fuels causes most of the increased greenhouse gas emissions and climate change.

Look at the pie graph showing global greenhouse gas emissions from different sources.



- (i) Show which sources of greenhouse gas emissions are mainly due to burning of fossil fuels by shading or colouring the sectors and the key of the graph. [1]

- (ii) What is the approximate total percentage from the use of fossil fuels?

Show your working.

For
Examiner's
Use

..... [2]

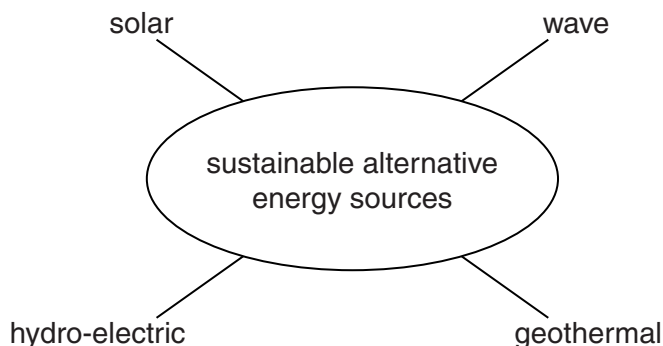
- (iii) Choose one of the sources you have not shaded in the graph. Describe how human activities in this sector contribute to the emission of greenhouse gases.

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..... [2]

- (iv) Explain how well the pie graph supports the view that the use of fossil fuels is most responsible for greenhouse gas emissions and climate change.

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..... [2]

- (d) Many governments are interested in increasing the percentage of energy used from sustainable alternative sources. Some examples of such alternative energy sources are named in the diagram.



- (i) What do all of these examples have in common that makes them sustainable sources of energy?

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..... [2]

- (ii) State **two** different reasons why sustainable alternative energy sources currently contribute less than 10 percent of global energy consumption.

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..... [2]

- (iii) Choose **one** of the alternative energy sources named in the diagram. Give more information about where it is used and how people harness the source to provide energy.

For
Examiner's
Use

chosen alternative source

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..... [4]

- (iv) Suggest and explain how good the chances are of your chosen alternative energy source being more widely used in future years.

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..... [2]

- (v) Suggest and explain your view of the chances of a significant increase in the use of all types of alternative energy sources for world energy supplies during the next 10–20 years.

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..... [4]

[Total: 40]

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Question 2a © *Figures for Sierra Leone*; Global Health Observatory Data Repository; World Health Organisation; <http://apps.who.int/ghodata/>.

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