



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

CANDIDATE  
NAME

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CENTRE  
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**ENVIRONMENTAL MANAGEMENT**

**0680/23**

Paper 2

**May/June 2014**

**1 hour 45 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 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 **both** 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.

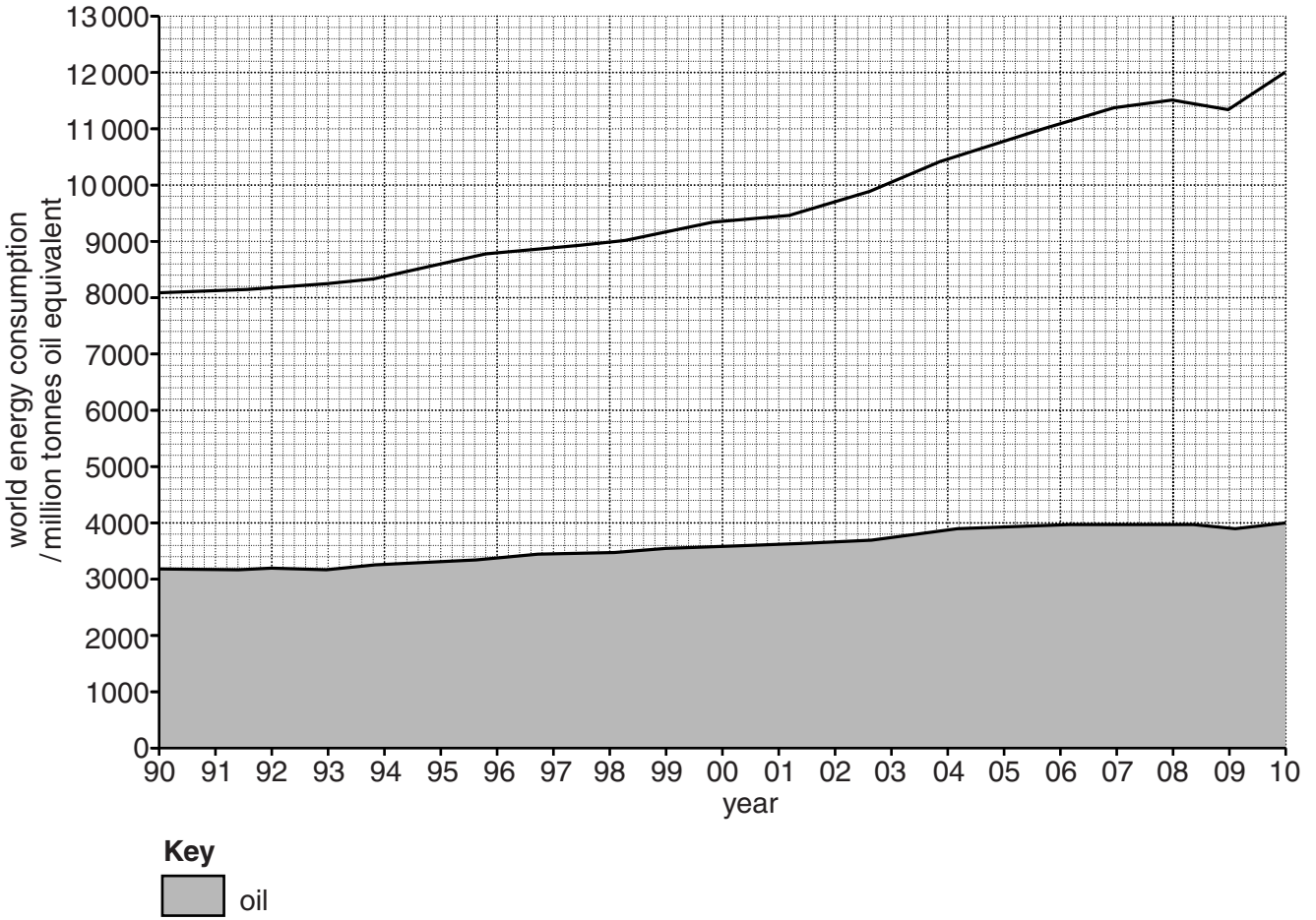
At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **15** printed pages and **1** blank page.

- 1 (a) Look at the graph below showing total world energy consumption between 1990 and 2010. It also shows the amount that oil contributed to the total.

**world energy consumption 1990–2010**



- (i) Using evidence from the graph describe what has happened to total world energy consumption between 1990 and 2010.

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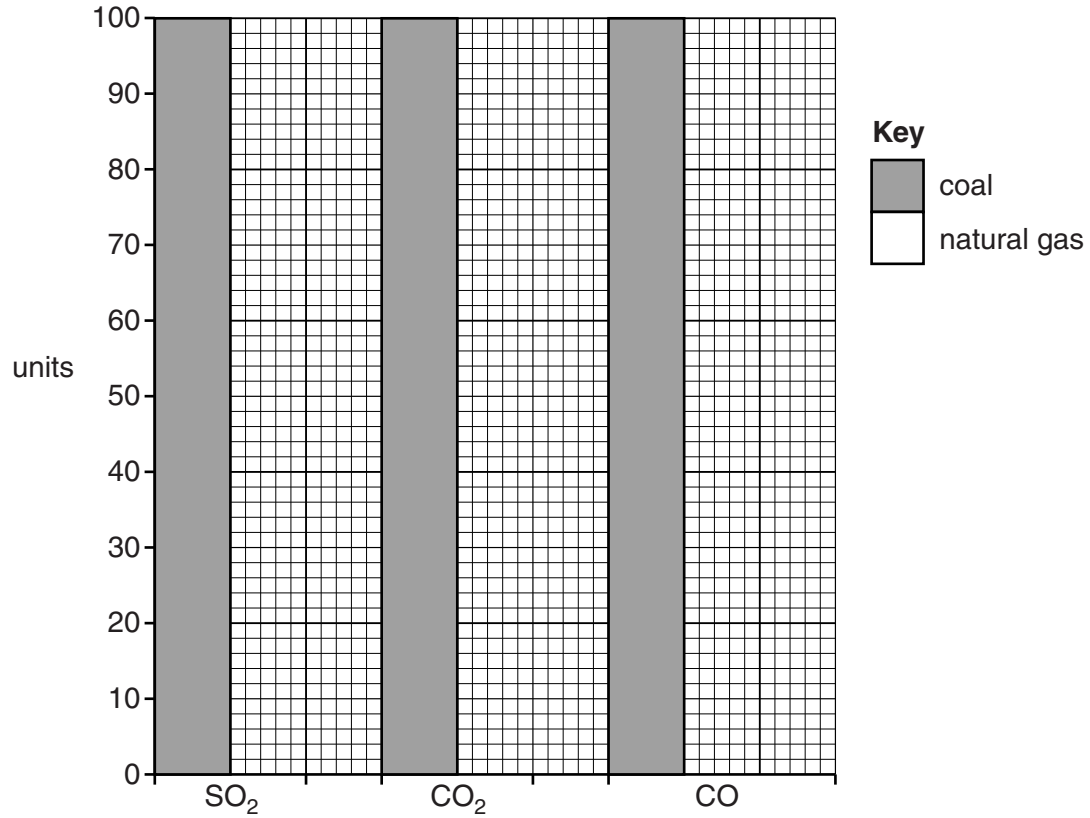
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- (ii) What percentage of total world energy consumption was from oil in 2010?

..... [1]

- (b) The importance of natural gas as a fuel is increasing. In recent years there has been a 'dash for gas'. More natural gas is being used, especially for generating electricity.

Look at the graph below, which compares emissions from burning natural gas with those from burning coal.



- (i) Complete the graph by adding **three** bars to show these units of natural gas emissions.

**natural gas emissions**

SO <sub>2</sub>	1
CO <sub>2</sub>	60
CO	20

[1]

- (ii) For sulfur dioxide (SO<sub>2</sub>) and carbon dioxide (CO<sub>2</sub>), give **different** reasons why lower emissions are important for people and the environment.

SO<sub>2</sub> .....

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CO<sub>2</sub> .....

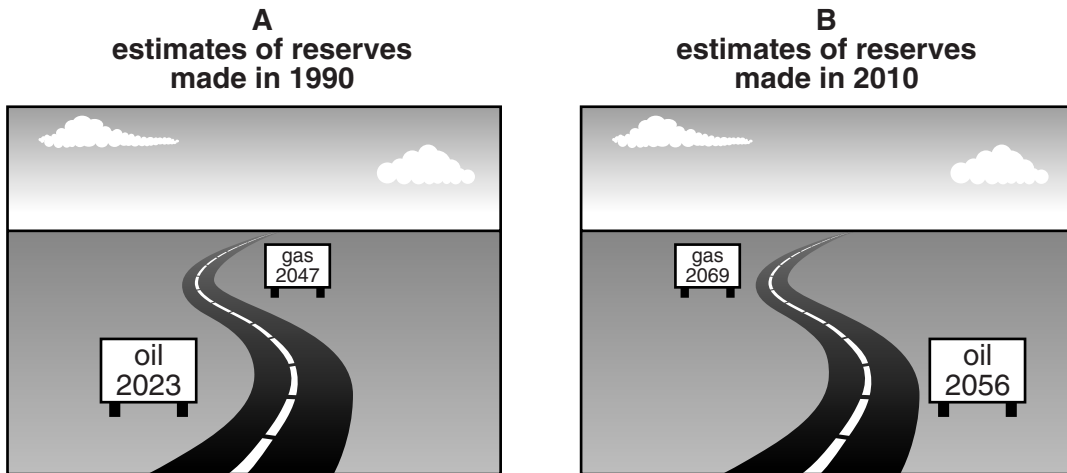
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- (c) Oil and natural gas are fossil fuels; they are non-renewable.

Look at the diagrams which show the number of years that reserves of oil and gas were expected to last in 1990 and 2010.



- (i) Describe what the diagrams show about the accuracy of the estimates made in 1990.

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(ii) Suggest reasons why the estimates made in 2010 were different from those made in 1990.

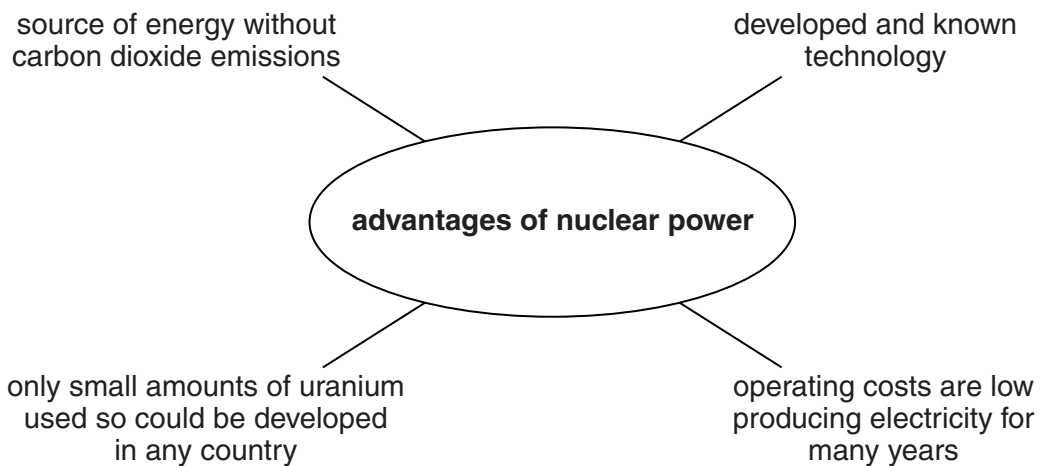
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(iii) Eventually the reserves of oil and natural gas will run out. Explain as fully as you can why this will happen.

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(d) In the 1970s and 1980s nuclear power was seen as a way of reducing world dependence on fossil fuels. It appeared to have many advantages.

Look at the spider diagram.



(i) Describe the advantages of nuclear power compared with:

fossil fuels .....  
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renewable energy sources like solar, wind and wave .....

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- (ii) In 2010 nuclear power provided seven per cent of world energy. Many people expect this percentage to go down in future years.

Give reasons to explain why many people are no longer as hopeful about the future development and use of nuclear power as they used to be.

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- (e) In Japan in 2010, 30 per cent of electricity was generated in nuclear power stations. In March 2011, a nuclear power station was badly damaged by an earthquake and flood. Following this, Japan has greatly reduced the percentage of its energy generated from nuclear power stations.

- (i) What do you think was the main reason that Japan reduced its use of nuclear power stations? Explain your view.

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- (ii) Suggest what Japan's government should consider when deciding how to replace the electricity generated from nuclear power stations.

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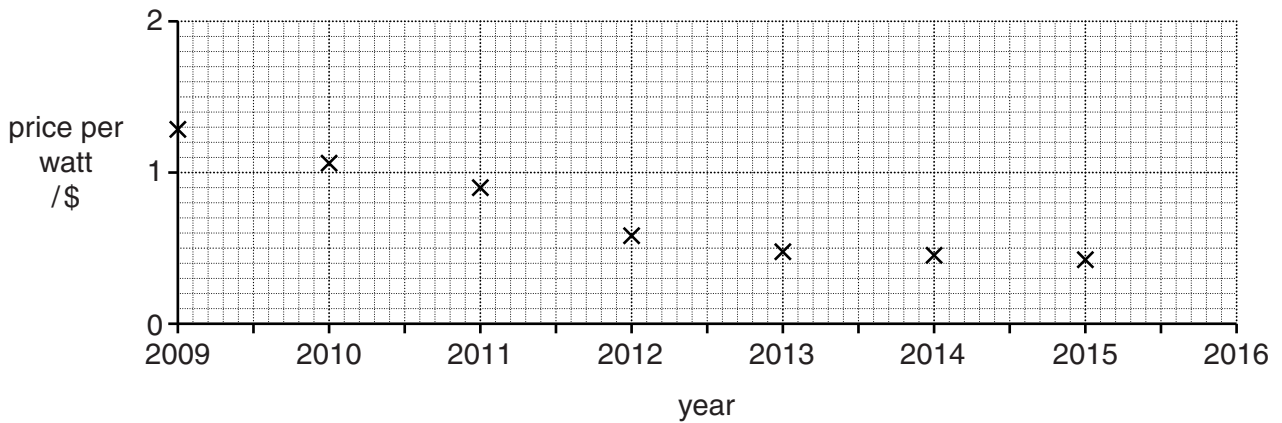
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- (f) By 2015 the price of solar panels will have come down a lot after China significantly increases its production of solar panels. The graph below shows this.



- (i) What is the expected decrease in the cost of solar panels from 2009 to 2015?

Space for your working.

..... \$ per watt [1]

- (ii) Using the graph, estimate the likely cost of solar panels in 2016.

Space for your working.

..... \$ per watt [1]

- (iii) Solar panels contain a number of different materials that are extracted from rare minerals. What impact might this have on the sustainability of solar panels?

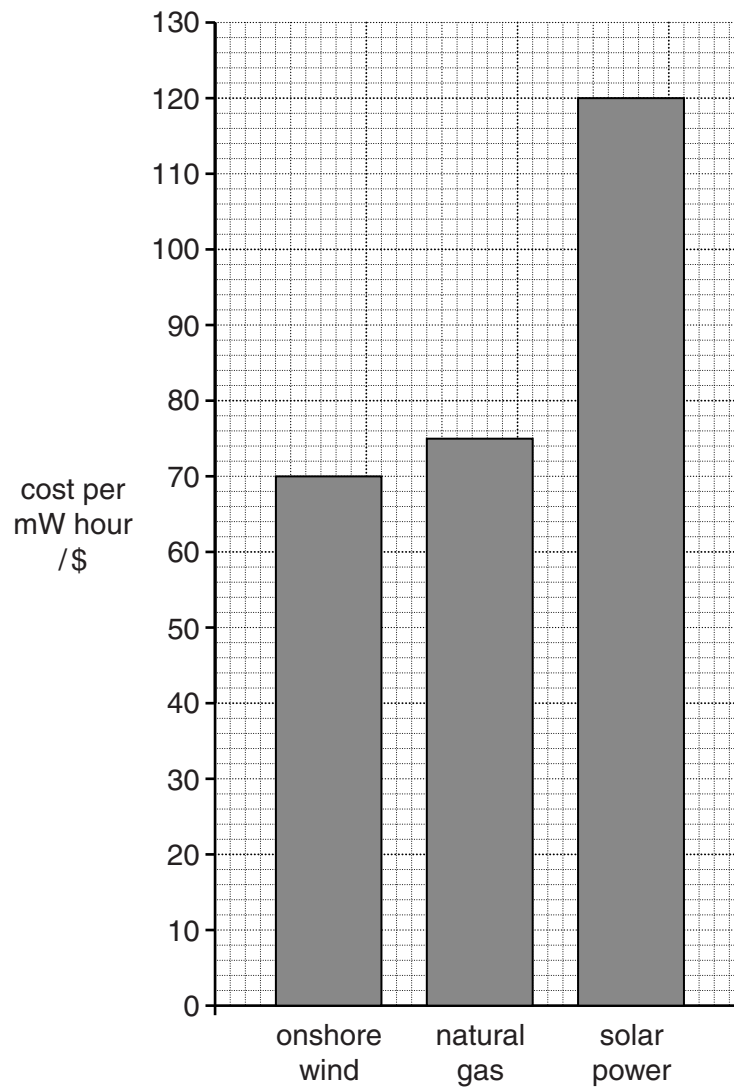
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- (g) The cost of producing electricity from three different energy sources in a developed country in 2011 is shown in the bar graph below. The costs given are for the most modern equipment.





Using the bar graph and your own knowledge, suggest what hope this gives for the greater use of renewable forms of energy in the future. Explain your answer.

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**(h)** In a developing country there is a great need for electricity. The electricity that is generated often comes from fossil fuel power stations using out of date technologies.

Suggest why people in developing countries want access to electricity.

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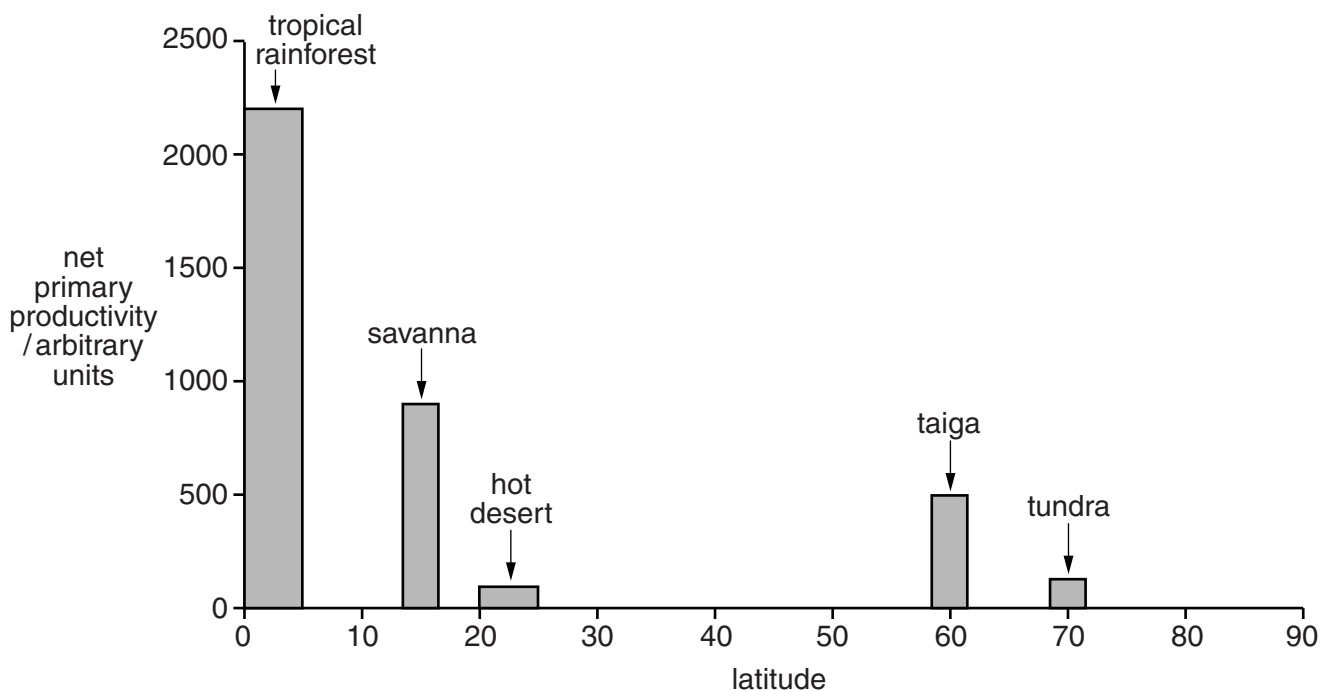
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[Total: 40]

2 (a) There are great differences between the world's biomes in:

- net primary productivity (NPP, growth rate of vegetation per year)
- biomass (total dry mass of plants and animals)



(i) Approximately how many times greater is the NPP of the most productive biome than the least? Circle **one** answer.

- 10                                      25                                      90                                      220

[1]

(ii) Looking at the graph, how true is it to say that the NPP of a biome decreases with increasing distance from the equator? Explain your answer.

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- (b) These differences between biomes in NPP and in the size of the biomass, are due to climate. The table below gives a climatic summary for each of these biomes.

	<b>temperature</b>		<b>precipitation</b> /mm mean annual total
	mean monthly temperature /°C highest	lowest	
<b>tropical biomes</b>			
tropical rainforest	28	26	2000
savanna	29	24	1000
hot desert	31	14	120
<b>cold biomes</b>			
taiga	14	-12	500
tundra	6	-25	110

- (i) Explain why tropical rainforest has the greatest NPP and largest biomass of all the biomes.

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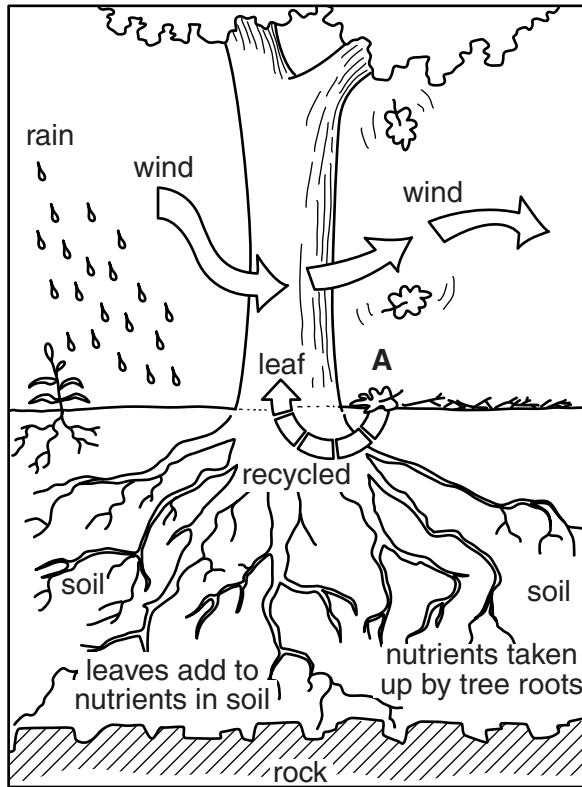
- (ii) Which climatic factor, temperature or precipitation, best explains the differences in NPP between the **three** tropical biomes? Explain your choice.

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- (iii) Which climatic factor, temperature or precipitation, best explains the differences in NPP between the **two** cold biomes? Explain your choice.

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(c) Natural ecosystems are maintained by energy flows and the recycling of nutrients. Look at the diagram showing nutrient recycling in a natural forest ecosystem.



(i) Describe what happens at **A** to recycle plant nutrients.

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(ii) Explain why losses of nutrients from this natural ecosystem are small.

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(d) A few groups of people still live in the rainforests of South America, with little impact on the natural forest ecosystem. The way of life of one of these groups is described below.

The Huape people search for plants and fruits in the forest. While they search they may, if they are lucky, also kill animals such as monkeys with bows and arrows, or a blowpipe with a poisoned tip.

They also depend on the rivers for a good supply of fish and turtles which they catch from a canoe. They make the canoe from a solid log, hollowed out by many hours of hard work.

Each group depends on a large area of forest. The trees that are useful for food are far apart in the forest. Human population numbers remain small.

(i) State what this way of making a living is called.

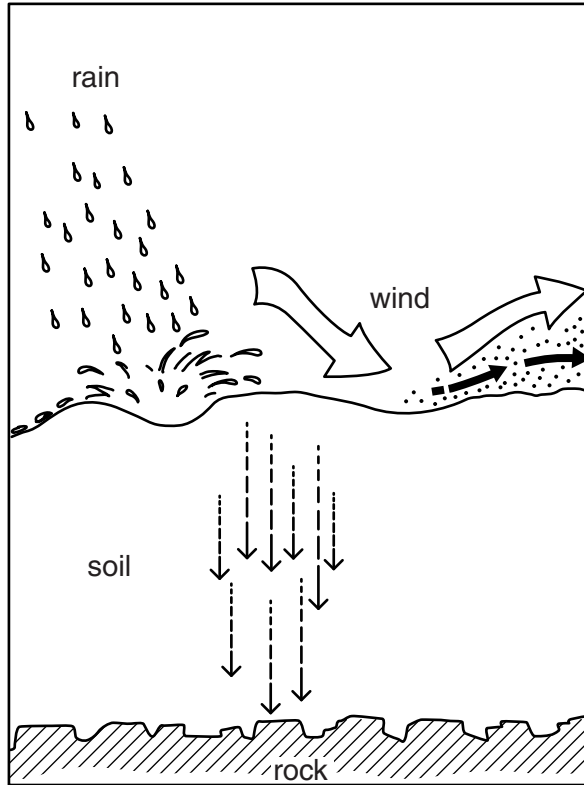
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(ii) State and explain different reasons why the Huape’s way of life is sustainable with little impact on the natural ecosystem.

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- (e) Many tribal groups, like the Huape, have been driven out of their forest homes by rainforest clearances by loggers, farmers and miners.

Look at the diagram below showing what happens to the nutrient cycle shown in part (c), after the forest has been cleared.



- (i) The soil is eroded. Explain how this happens.

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- (ii) The soil also loses its fertility. Explain how this occurs.

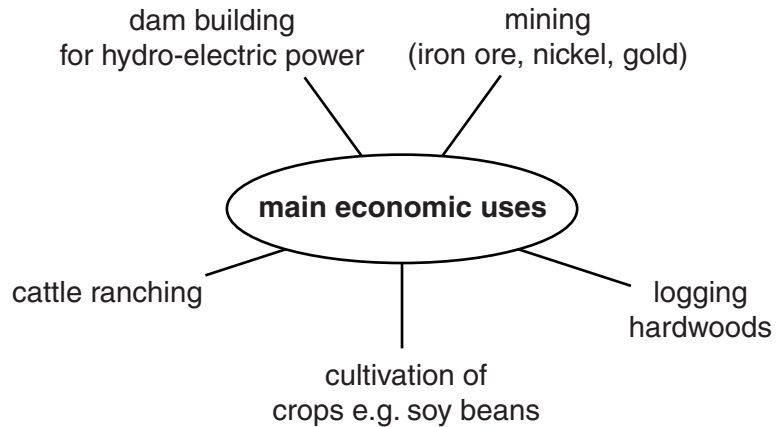
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- (f) Road building in the Amazon Basin of Brazil since the 1960s has led to many areas of rainforest being cleared. Look at the spider diagram, which gives the main economic uses of the land that has been cleared.



- (i) Most of these economic uses would be described as unsustainable. Explain why.

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- (ii) Explain how it is possible to make economic activities such as tourism and forestry, as well as those in the spider diagram, more sustainable and less damaging to the environment.

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[Total: 40]

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