

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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General Certificate of Secondary Education
June 2006

ENVIRONMENTAL SCIENCE
Written Paper
Foundation Tier

3441/F
F



Wednesday 21 June 2006 9.00 am to 11.00 am

For this paper you must have:

- a ruler

You may use a calculator.

Time allowed: 2 hours

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

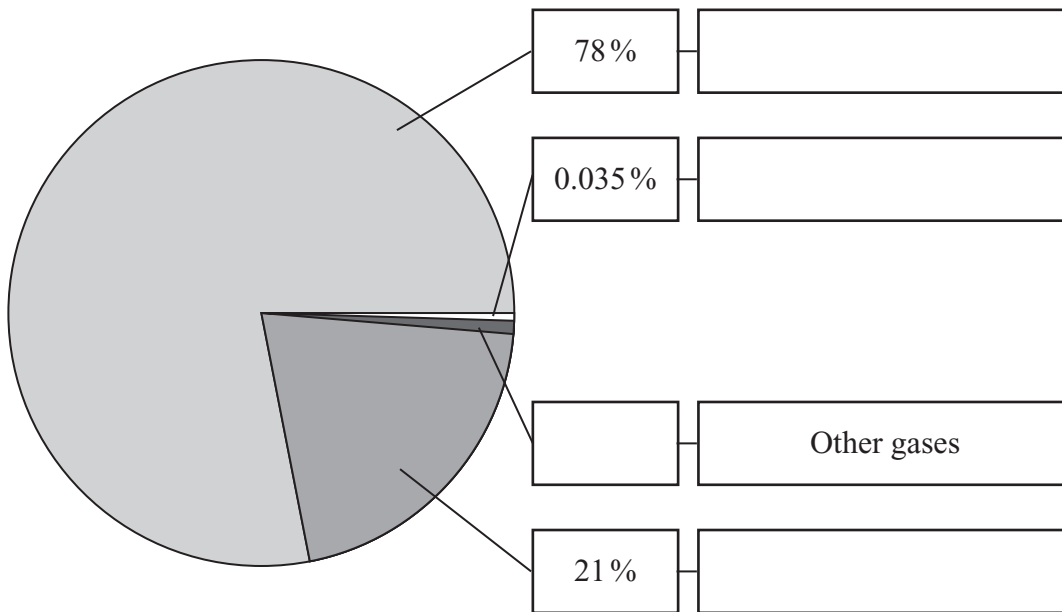
Information

- The maximum mark for this paper is 120.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers. Questions 4(b)(ii) and 7(b)(i) should be answered in continuous prose. Quality of Written Communication will be assessed in these answers.

For Examiner's Use			
Number	Mark	Number	Mark
1		6	
2		7	
3		8	
4		9	
5		10	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

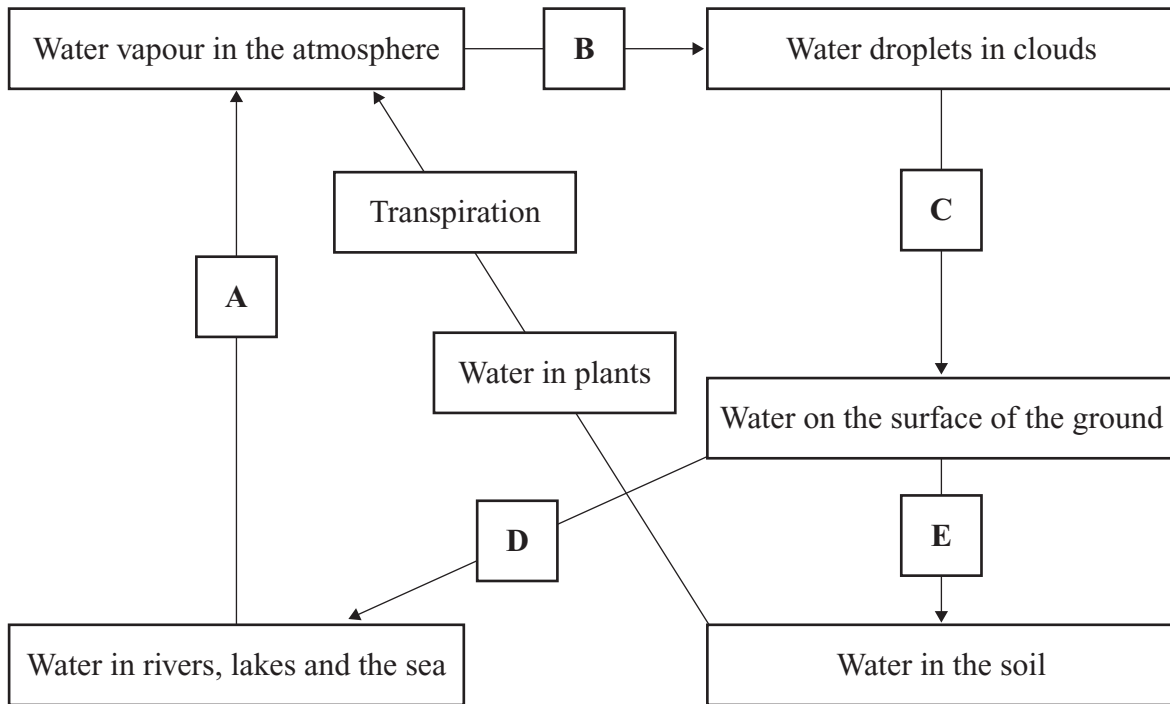
- 1 (a) The pie chart shows the composition of the Earth's atmosphere.



argon	carbon dioxide	nitrogen	oxygen
--------------	-----------------------	-----------------	---------------

- (i) Choose the correct words from the box to add the names of the gases to the diagram. Write your answers in the spaces provided. (3 marks)
- (ii) Calculate the percentage of 'other gases' in the atmosphere. Write your answer in the space provided. (1 mark)
- (iii) Complete the following sentences by writing the names of the correct gases in the spaces provided.
- Bacteria living in nodules on the roots of leguminous plants can convert into compounds which plants can use.
 - is given off when all fossil fuels are burnt.
 - Without the process of photosynthesis there would be little or no in the Earth's atmosphere. (3 marks)

(b) The diagram shows some of the stores and processes in the water cycle.



(i) Complete the key by writing the correct letters from the diagram in the spaces in the table below. One has been done for you.

B	Condensation
	Evaporation
	Infiltration
	Precipitation
	Run-off

(4 marks)

(ii) Complete the following sentences using words from the table above.

1. can happen as rain, sleet, snow or hail.
2. is the process which would happen most quickly on a warm and windy day.
3. is a process which can cause soil erosion.

(3 marks)

- 2 The box contains information about a quarry which a company had planned to set up on the Scottish island of Harris.

- In April 2004 Friends of the Earth in Scotland ended their longest-running campaign.
- This was because the Lafarge Aggregates company announced that it was no longer trying to set up a huge quarry on the island of Harris.
- The quarry would have been the largest in Britain.
- The company had planned to remove 10 million tonnes of rock every year for 60 years.
- In 1995 a survey found that 67.7 % of the people living in Harris were against the plan to set up the quarry.

- (a) (i) Calculate the total amount of rock which the company planned to extract during the sixty-year lifetime of the quarry.

..... tonnes. (1 mark)

- (ii) What does the information about the survey in 1995 tell you about the percentage of people who were in favour of the plan?

Tick the best statement and give **one** reason for your choice.

67.7 % of people living on Harris were in favour of the plan.

32.3 % of people living on Harris were in favour of the plan.

From the information in the box it is impossible to tell what percentage of people living on Harris were in favour of the plan.

Reason.....

..... (2 marks)

(iii) Suggest **two** reasons why some people may have been in favour of the plan.

1.....
.....

2.....
.....

(2 marks)

(iv) Suggest **one** piece of information which you would need about the survey before you could rely on its results. Give **one** reason for your answer.

Information needed.....
.....

Reason.....
.....

(2 marks)

(b) Suggest **three** problems which quarries can cause for people living nearby. Suggest **one** method which a quarry company could use to reduce **each** problem.

1. Problem.....
.....

Method of reducing problem.....
.....

2. Problem.....
.....

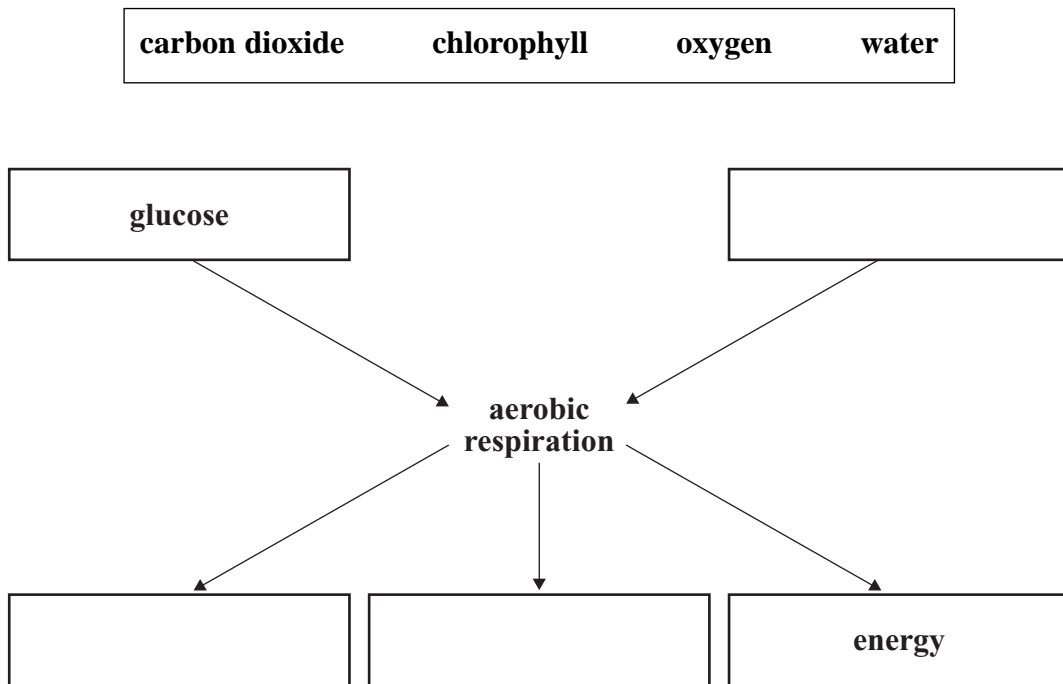
Method of reducing problem.....
.....

3. Problem.....
.....

Method of reducing problem.....
.....

(6 marks)

- 3 (a) (i) Use words from the box to complete the diagram, which shows the process of aerobic respiration.



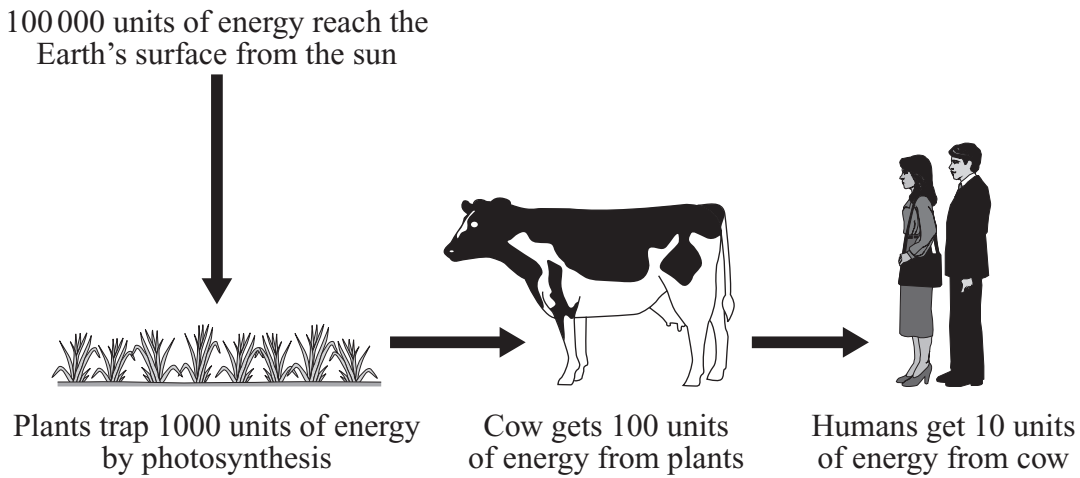
(3 marks)

- (ii) Tick the correct boxes to show **two** statements which are true in the following list.

- Plants do not respire, they only carry out photosynthesis.
- Plants respire and carry out photosynthesis.
- Aerobic respiration happens where there is no oxygen.
- Some organisms can respire without oxygen.

(2 marks)

(b) The diagram shows the flow of energy along a food chain.



- (i) The plants trap 1000 units of energy.
Calculate the percentage of this energy which is passed on to the cow.

..... % (1 mark)

- (ii) The cow gets 100 units of energy from plants it eats.
Suggest **one** reason why only 10 units of this energy are passed on to the humans.

.....
.....
(1 mark)

- (iii) Some people think that we could feed the Earth's population more efficiently.
They think that people should eat less meat and more food from plants.
Explain how the food chain diagram could be used to argue in favour of this idea.

.....
.....
.....
.....
(2 marks)

Question 3 continues on the next page

Turn over ►

- (iv) Farmers can often make more profit if they keep animals inside buildings, rather than outside in the fields.
Explain **one** reason for this.

.....

.....

.....

.....

(2 marks)

11

Turn over for the next question

Turn over ►

- 4 (a) **Photograph A** shows ploughing being done in an old-fashioned way, using horses and a single-furrow plough.

Photograph B shows the same job being done in a modern way, using a tractor and a six-furrow plough.

Photograph A



Photograph B



Sources: LES CARTER, www.freespace.virgin.net/l.carter/plough
www.tayforth.co.uk/PLOUGH.HTM

- (i) Choose the word from the box which best completes the sentence below.

desertification	fertilisation	mechanisation	optimisation
------------------------	----------------------	----------------------	---------------------

The change in farming methods shown by these photographs is an example of (1 mark)

- (ii) Explain **one** advantage to the farmer of the change in method shown by the photographs.

.....

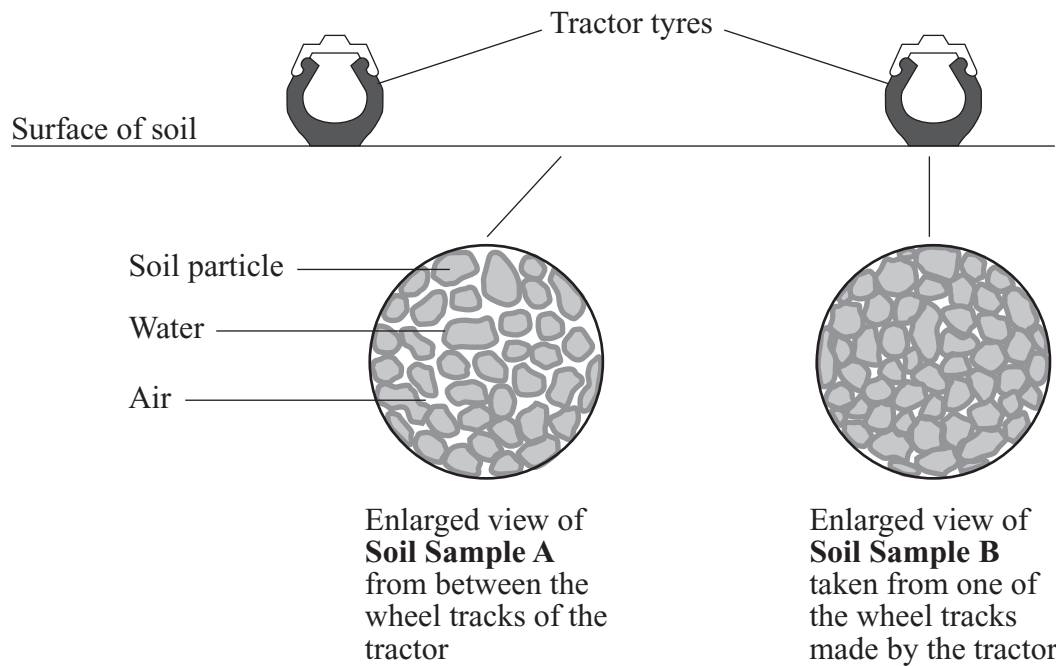
 (2 marks)

- (iii) Explain how the change in farming methods shown by the photographs may have affected the number of hedgerows in the countryside.

.....

 (2 marks)

(b) Using heavy machines can cause soil compaction. The diagram shows what can happen to the soil when a heavy tractor is driven over it.



(i) State **two** differences between **Soil Sample A** and **Soil Sample B** shown in the enlarged views.

1.....

 2.....

(2 marks)

Question 4 continues on the next page

Turn over ►

- (ii) The photograph shows a field where a tractor has been working. It rained after the work was finished.
Explain why the wheel tracks of the tractor show up as lines of water lying on the surface of the soil.

The photograph is not reproduced here due to third-party copyright restraints. Printed copies of this paper can be obtained by ordering 3441/F from AQA Publications. Tel: 0161 953 1170

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

.....

.....

.....

.....

.....

(3 marks)

(c) As part of a piece of coursework a student decided to find out if a new tractor was causing soil compaction on his parents' farm. The box gives details of how the student planned to carry out this investigation.



- I will use this instrument, which is called a penetrometer.
- It measures the pressure which is needed to push a metal rod into the ground to a standard depth.
- If the soil has been compacted it will be harder to push the rod into it and so the reading on the penetrometer will be higher.
- Once the tractor has finished work in a field I will take readings from three different places and work out an average.

Source of photograph: York Survey Supply Centre Ltd.

The student's teacher said "You are planning to use the right piece of equipment but there are still some problems with your method."

State and explain **two** things which the student could do to improve his method.

1

.....

.....

.....

.....

2

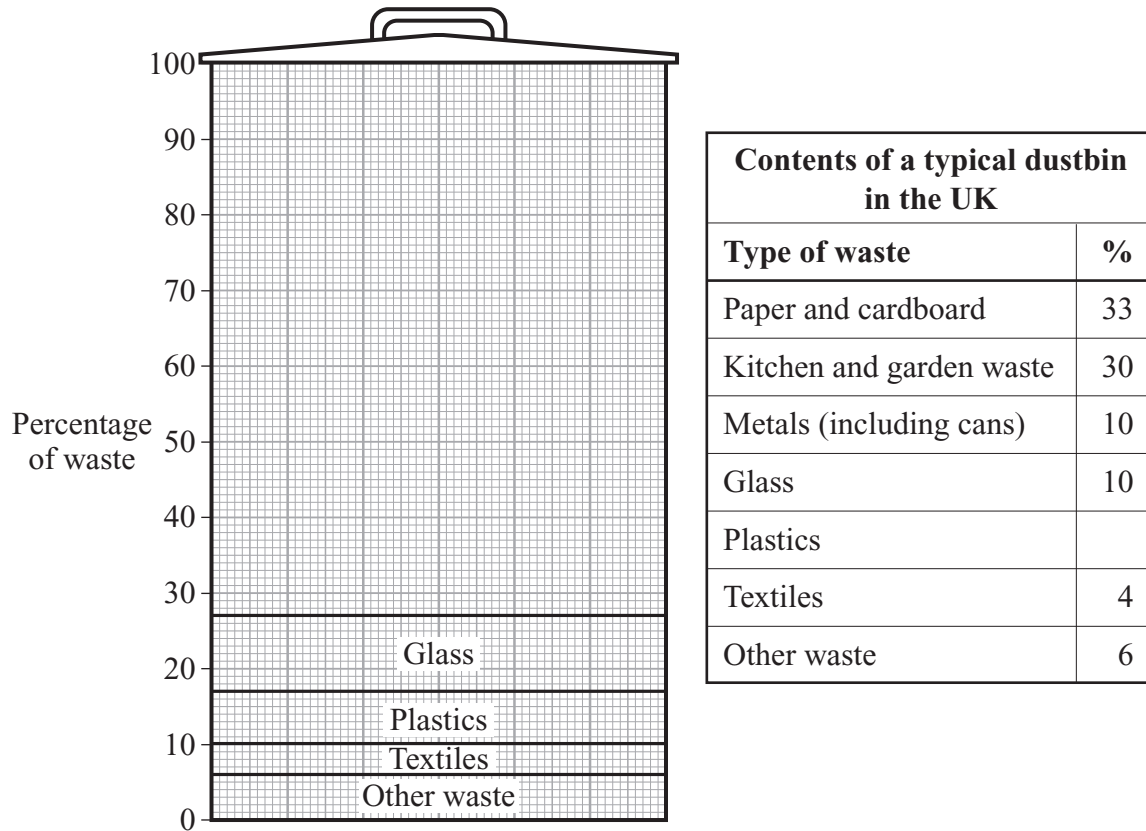
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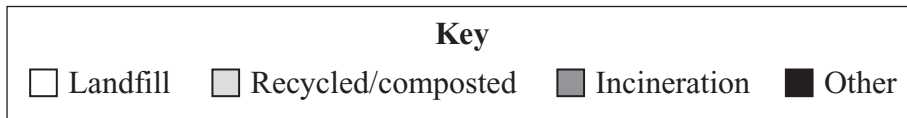
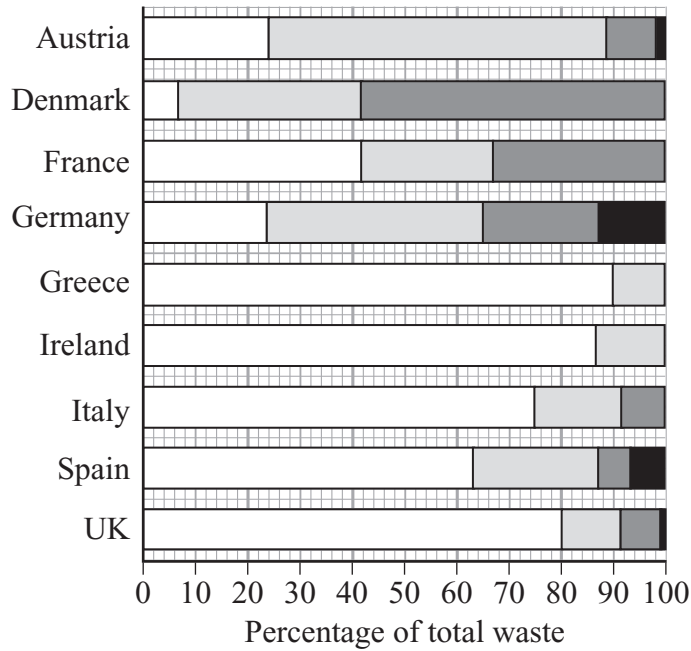
(4 marks)

- 5 (a) The partially-completed diagram and the table show the percentages of different kinds of waste in a typical dustbin in the United Kingdom.



- (i) Complete the missing percentage in the table. (1 mark)
- (ii) Use information from the table to complete the diagram. (2 marks)

- (b) The chart shows the ways in which some of the countries in the European Union disposed of municipal waste in 2003. (Municipal waste is the rubbish collected from houses and businesses, mainly in dustbins.)



- (i) What percentage of the United Kingdom’s municipal waste is recycled or composted?

..... (1 mark)

- (ii) Name **one** country which disposes of more of its municipal waste in landfill sites than the UK does.

..... (1 mark)

- (iii) Name **one** country which recycles or composts more than half of its municipal waste.

..... (1 mark)

Question 5 continues on the next page

Turn over ►

- (c) (i) State **one** advantage and **one** disadvantage of disposing of municipal waste in landfill sites.

Advantage

.....

Disadvantage

.....

(2 marks)

- (ii) State **one** advantage and **one** disadvantage of disposing of municipal waste by incinerating it.

Advantage

.....

Disadvantage

.....

(2 marks)

- (d) 5.3 billion aluminium drinks cans were used in the United Kingdom in 2001 and 42 % of these were recycled.

- (i) Calculate the number of cans recycled in the UK in 2001.

.....billion cans.

(1 mark)

(ii) The statements below are from an advertisement about recycling aluminium cans. Complete the sentences to explain **each** of the ways that recycling helps the environment.

1. Making a can from recycled aluminium uses 95 % less energy than making one from raw materials.

This helps the environment because

.....

.....

2. Bauxite is the ore (rock) from which aluminium is obtained. Recycling 1 kg of aluminium saves 8 kg of bauxite.

This helps the environment because

.....

.....

3. If all the aluminium cans used in the UK were recycled this would mean there would be 15.4 million fewer full dustbins.

This would help the environment because

.....

.....

(3 marks)

14

Turn over for the next question

Turn over ►

6 The extract contains information about a planned water management scheme in Spain.

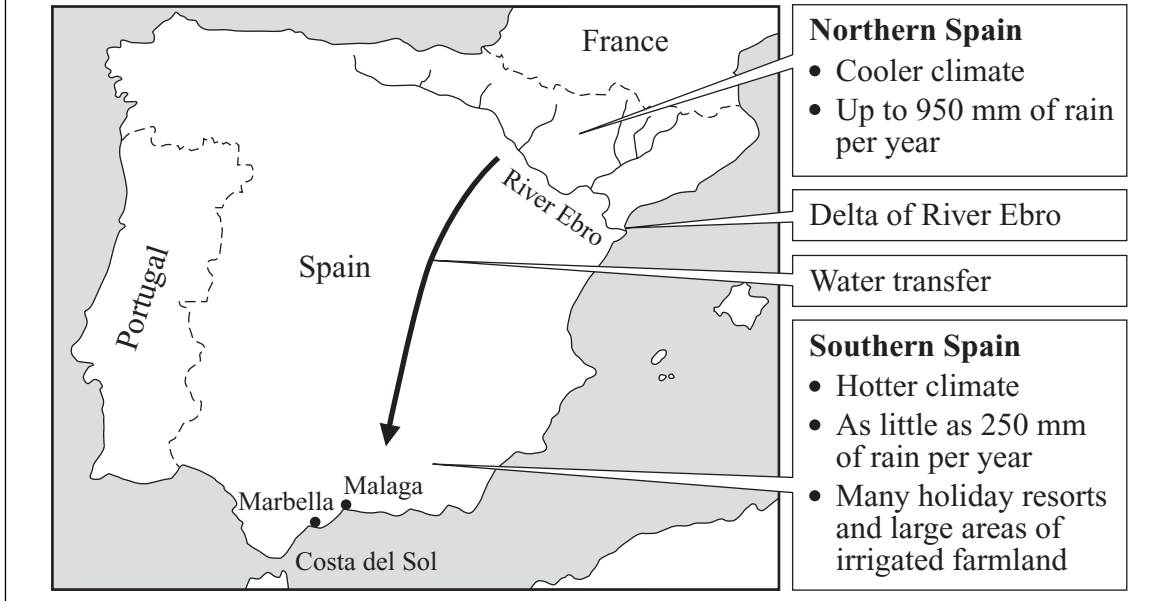
The Ebro Water Transfer Scheme

In 2001 the government of Spain gave permission for a plan to build dams along the River Ebro in the north of the country. The water would be sent to southern Spain through pipelines and canals.

The Ebro Delta is an area of marshes and lakes where the River Ebro enters the sea. It is very important as a habitat for many species of birds. Huge numbers of about 300 different species, including flamingos, have been seen there.

The Ebro Delta is built up from silt carried by the river. A continuous supply is needed to replace silt removed by the action of the sea. The River Ebro also provides large amounts of fresh water. This is vital for the plant life and the birds which live there.

In 2004 a new Spanish government announced that the Ebro Water Transfer Scheme would not go ahead after all.



(a) The people who planned the scheme believed that the region around the River Ebro had surplus water.

State **two** reasons why they may have thought this.

- 1
-
- 2
-

(2 marks)

(b) Using information from the extract state and explain **two** reasons why southern Spain suffers from water shortages.

1

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.....

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2

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.....

.....

(4 marks)

(c) Explain why environmental campaigners believed that the Ebro Water Transfer Scheme would damage wildlife habitats.

.....

.....

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(4 marks)

(d) To reduce the problem of water shortage, people in southern Spain are being asked to use less water.
Suggest **two** ways in which they could do this.

1

2

(2 marks)

- 7 The shrub layer in woodland is made up of bushes and shrubs growing below the taller trees. Blue Tits and Pied Flycatchers are two species of birds which live in woodlands. The chart shows how changing the percentage cover of the shrub layer can affect the numbers of these birds.

The chart is not reproduced here due to third-party copyright restraints. Printed copies of this paper can be obtained by ordering 3441/F from AQA Publications. Tel: 0161 953 1170

- (a) (i) State what happens to the number of Pied Flycatchers as the percentage of the ground covered by the shrub layer increases.

.....
(1 mark)

- (ii) State what happens to the number of Blue Tits as the percentage of the ground covered by the shrub layer increases.

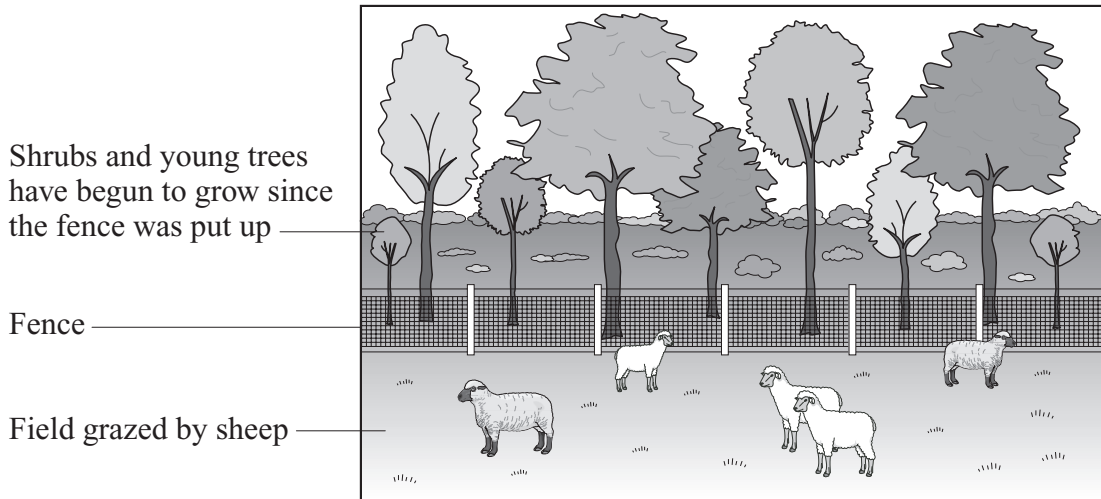
.....
(1 mark)

- (iii) A survey of an area of woodland found 50 % of the ground covered by the shrub layer and 46 Pied Flycatchers breeding. How many Blue Tits would you expect to find in the same area?

.....
(1 mark)

- (b) Many woods in Wales have only a small percentage of the ground covered by bushes and shrubs. This is because sheep graze under the trees. The sheep eat young shrubs before they can grow. They can also eat young tree seedlings.

The sketch shows a field and an area of woodland in a nature reserve where Pied Flycatchers are a protected species. A fence has been put up to stop sheep from getting into the woodland.



- (i) Explain **one** possible advantage and **one** possible disadvantage for nature conservation if the fence is kept in place permanently.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

Advantage

.....

.....

Disadvantage

.....

.....

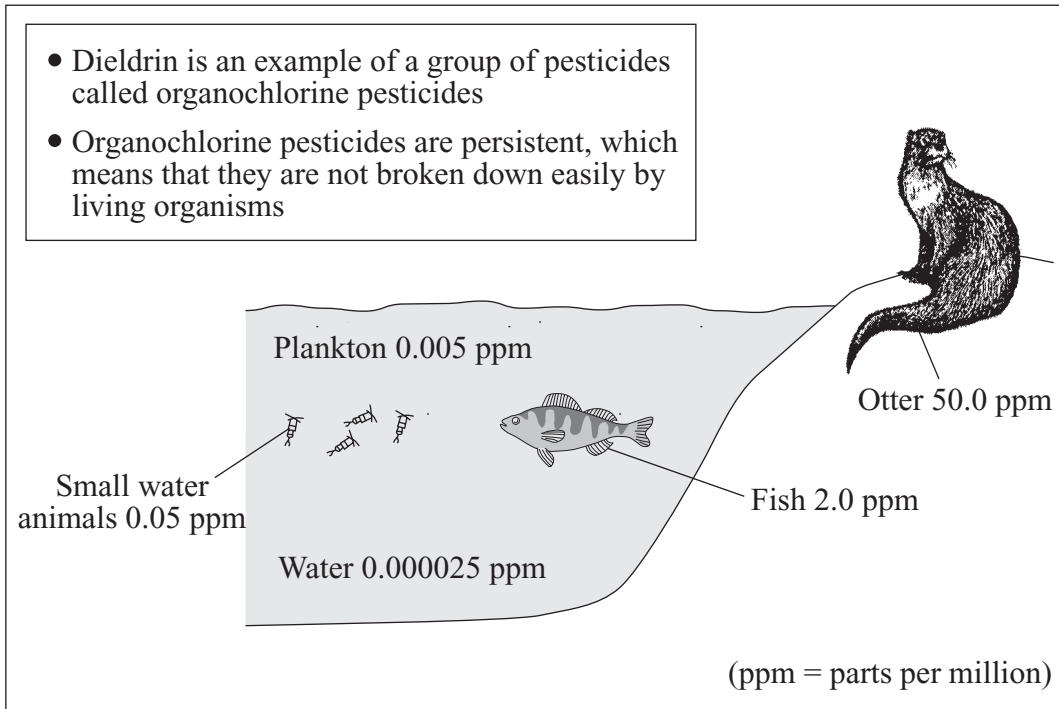
(5 marks)

- (ii) An area which is important for nature conservation is likely to be an SSSI. What do the letters SSSI stand for?

.....

(1 mark)

- 8 (a) In the 1950s and 1960s large amounts of the pesticide Dieldrin entered rivers and lakes in the United Kingdom. The diagram gives information about Dieldrin and the concentrations of the substance in water and in different organisms in a lake.



- (i) Use information from the diagram to complete the food chain.

Plankton → Small water animals → →
(1 mark)

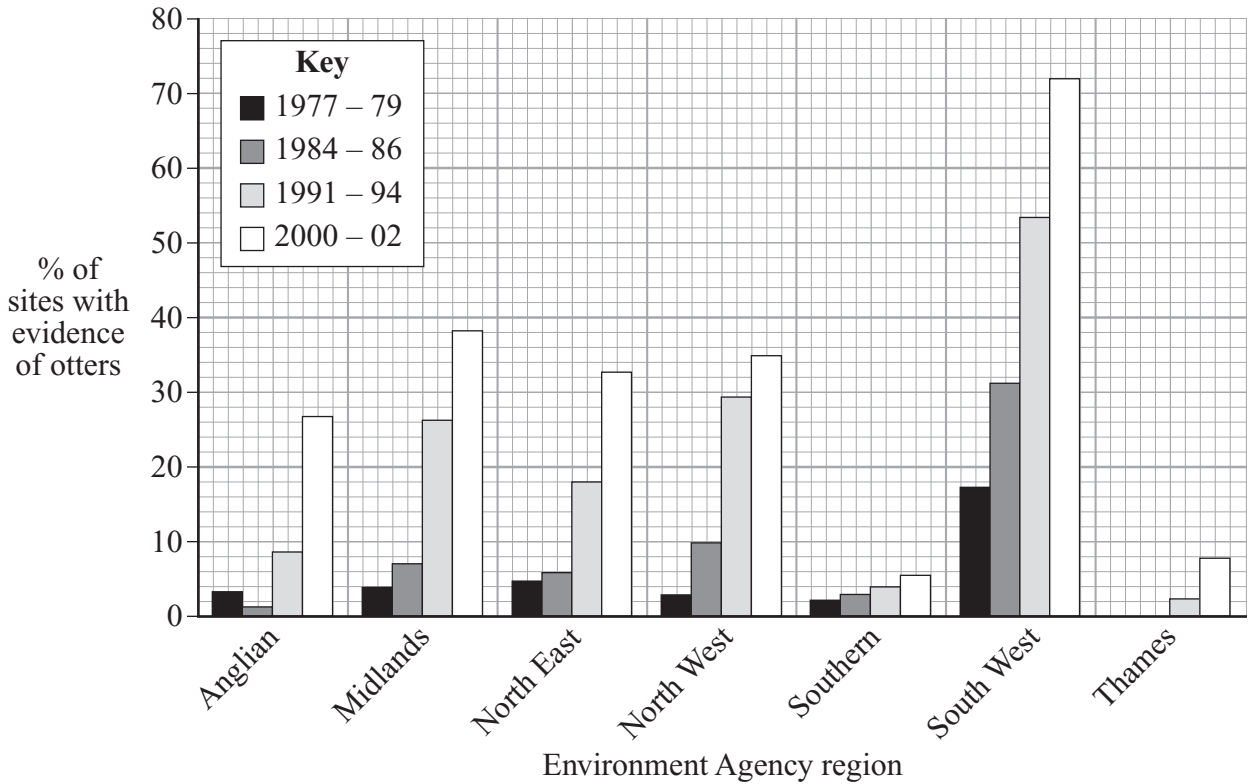
- (ii) In the 1950s otters were common in the United Kingdom. By 1970 they had disappeared from most places.
Suggest **one** reason why the otters had disappeared.

.....
.....
(1 mark)

- (iii) Explain why Dieldrin was found at a much higher concentration in the otter than in the water in the lake.

.....
.....
.....
.....
(2 marks)

(b) The chart shows the results of surveys of the otter population in England.



Source: data from: SIMON BINGHAM www.environment-agency.gov.uk
Copyright © Environment Agency

(i) State the trend shown by the chart.

.....
.....

(1 mark)

(ii) Organochlorine pesticides have been phased out of farming in the United Kingdom. They have mainly been replaced by pesticides which can be broken down in the environment.

Explain how this may have helped to cause the change shown in the chart.

.....
.....
.....
.....

(2 marks)

Question 8 continues on the next page

Turn over ►

- (c) (i) Some people are against the use of chemical pesticides because of the way they harm wildlife.
Suggest **one** other reason why some people are against the use of these pesticides.

.....
(1 mark)

- (ii) Some farmers do not use chemical pesticides or fertilisers on their land. What is this type of farming called?

.....
(1 mark)

- (iii) State and explain **one** method which can be used to control pests without using chemical pesticides.

.....
.....
.....
.....
(2 marks)

Turn over for the next question

Turn over ►

- 9 (a) The following paragraph describes some of the energy transformations in a wind power scheme.

Complete the paragraph by writing the names of **three** different types of energy in the spaces provided.

Energy from the sun is absorbed by the Earth’s surface. energy re-radiated from the Earth causes the air above to rise. This creates moving air currents which have energy. Wind turbines drive generators which convert this energy into energy.

(3 marks)

- (b) State and explain **two** advantages of using wind power.

1

.....

.....

.....

2

.....

.....

.....

(4 marks)

- (c) A group of students decided to test the following hypothesis:- “People who live close to a wind farm are likely to be against wind power.”

- (i) Suggest a method which the students could use to test this hypothesis.

.....

.....

(1 mark)

(ii) Explain **two** things which the students could do to help to make sure that their results are fair and reliable.

1.....
.....
.....
.....
.....

2.....
.....
.....
.....

(4 marks)

12

Turn over for the next question

Turn over ▶

10 The photograph shows oil pollution in the sea near Alaska after an accident involving the ship Selendang Ayu in December 2004.



Source: Unalaska Community Broadcasting/Michael Edenfield via Associated Press

(a) (i) Shipping accidents can cause oil pollution of the sea.
State **two** other ways in which oil can enter the sea.

1.....

2.....

(2 marks)

(ii) Describe **one** way in which oil spills can harm living organisms.

.....

.....

.....

.....

(2 marks)

(iii) Describe **one** way in which oil spills can damage the economy in the areas where they happen.

.....
.....
.....
.....

(2 marks)

(b) (i) Describe **one** method which can be used to clean up oil which has been spilled into the sea.

.....
.....
.....
.....

(2 marks)

(ii) Describe **one** method which can be used to make oil spills less likely to happen.

.....
.....
.....
.....

(2 marks)

END OF QUESTIONS

10

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