Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2013

Environmental Science 44401F

Unit 1 Topics in Environmental Science

Thursday 16 May 2013 9.00 am to 11.00 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 2 hours

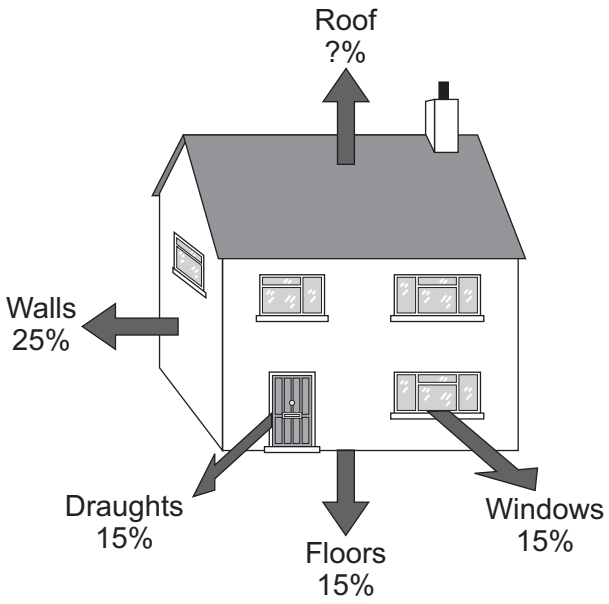
Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 120.
- You are expected to use a calculator where appropriate.
- In some questions you will be assessed on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

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

1 The diagram shows the percentage heat loss from different parts of a typical house.



1 (a) For **each** of the following sources of heat loss, suggest **one** way of reducing the amount of heat that escapes.

Source of heat loss	Method to reduce the loss
Floors	
Walls	
Roof	

(3 marks)

1 (b) Calculate the percentage heat loss through the roof.

……%

(1 mark)

1 (c) Explain why double glazing reduces heat loss.

.....

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.....

.....

(2 marks)

1 (d) Homeowners can reduce the amount of heat energy lost from their house.

Suggest **two** ways, other than reducing heat loss, that homeowners might reduce their energy bills.

1 .....

.....

2 .....

.....

(2 marks)

1 (e)

- The cost of installing double glazing in this house was £5500.
- The heating bills were an average of £500 per year.
- Double glazing saves 10 % of the energy bills.

1 (e) (i) How much does the homeowner save each year?

.....

(1 mark)

1 (e) (ii) How many years would it take to pay back the cost of the double glazing?

.....

(1 mark)

10

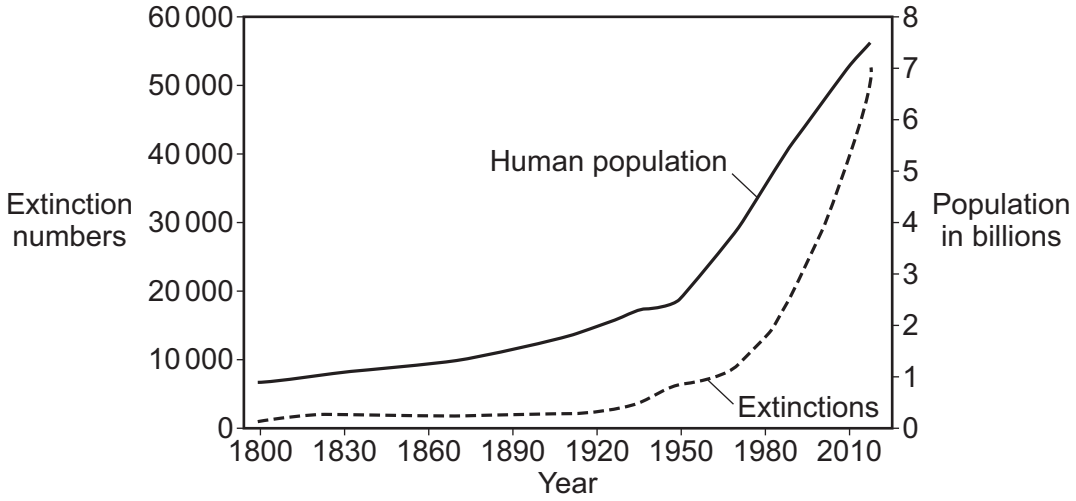
Turn over for the next question

2 Between 1800 and 1930 the world's population doubled, and then doubled again by 1975.

By the end of October 2011 the world's population was more than 7 billion.

The graphs show world population growth and, on a different scale, the numbers of animal extinctions over the same period.

Species extinction and human population



2 (a) (i) What does the graph suggest about the relationship between human population growth and the rate of animal extinctions?

.....

.....

.....

(1 mark)

2 (a) (ii) Suggest **three** reasons for this relationship.

1 .....

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2 .....

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3 .....

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(3 marks)

2 (b) Suggest how **each** of the following has contributed to population growth.

Increased food production .....

.....

Improved sanitation and hygiene .....

.....

Improved medical provision .....

.....

(3 marks)

Question 2 continues on the next page

2 (c) The Brundtland report is about which environmental issue?

Draw a ring around your answer.

- Alternative energy
- Fishing quotas
- Population growth
- Sustainable development

(1 mark)

2 (d) Some Non-Governmental Organisations (NGOs) work to prevent species from becoming extinct.

2 (d) (i) Name an NGO that works in this way.

.....

(1 mark)

2 (d) (ii) Suggest **three** ways in which NGOs work to prevent species from becoming extinct.

1 .....

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2 .....

.....

3 .....

.....

(3 marks)

2 (e) Which of the following is an international agreement which makes trade in endangered species illegal?

Draw a ring around your answer.

- CITES
- IUCN
- RSPCA
- NSPCC

(1 mark)

13

3 There is evidence that an increase in atmospheric greenhouse gases has led to global warming.

3 (a) The table shows one greenhouse gas and the reason for its increase.

Complete the table by identifying **two** more greenhouse gases, and suggest a reason why each gas has increased.

Greenhouse gas	Reason for increase
Carbon dioxide	Combustion of fossil fuels

(4 marks)

3 (b) Not all the carbon dioxide produced remains in the atmosphere.

Suggest **two** ways in which carbon dioxide is removed from the atmosphere.

1 .....

.....

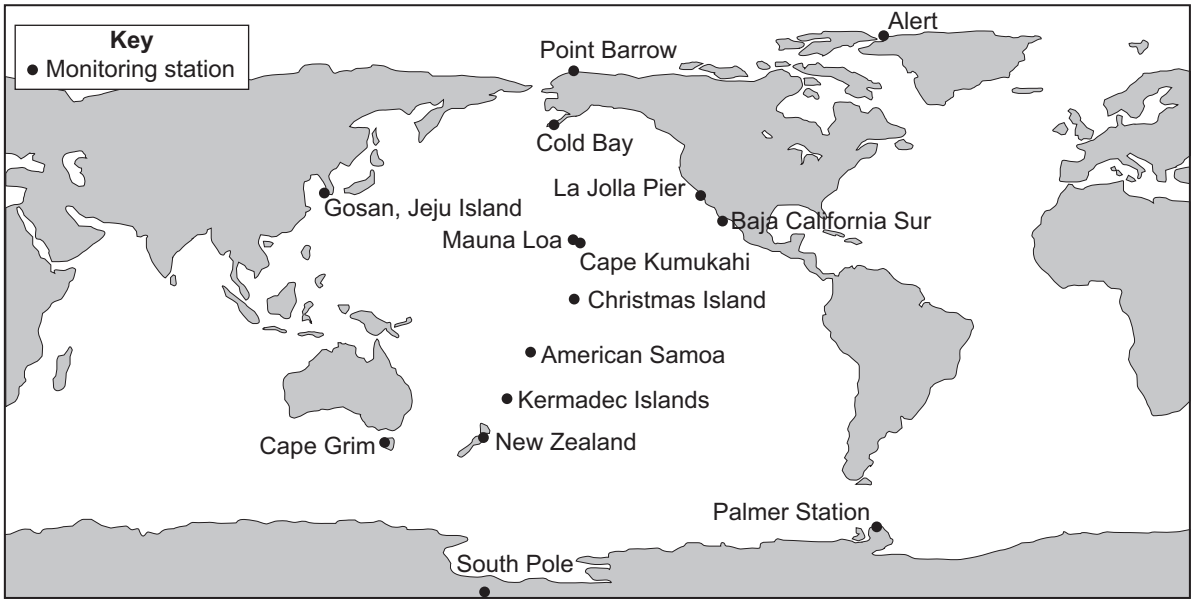
2 .....

.....

(2 marks)

Question 3 continues on the next page

3 (c) The map shows the locations of stations that monitor atmospheric gases.



Suggest a reason why many of the monitoring stations are on islands in the middle of the Pacific Ocean.

.....

.....

(1 mark)

3 (d) Action needs to be taken to slow down the increase in greenhouse gases.

Give an example of how **each** of the following may be used to reduce greenhouse gas emissions.

Legislation .....

.....

Scientific developments .....

.....

Personal action .....

.....

(3 marks)

3 (e) Suggest **four** ways in which global warming might lead to food shortages in the future.

1 .....

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2 .....

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3 .....

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4 .....

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(4 marks)

3 (f) Give **one** reason why increased carbon dioxide levels might result in **increased** crop production.

.....

.....

(1 mark)

3 (g) Name **one** international protocol which aimed to cut global carbon dioxide emissions.

.....

(1 mark)

16

Turn over for the next question

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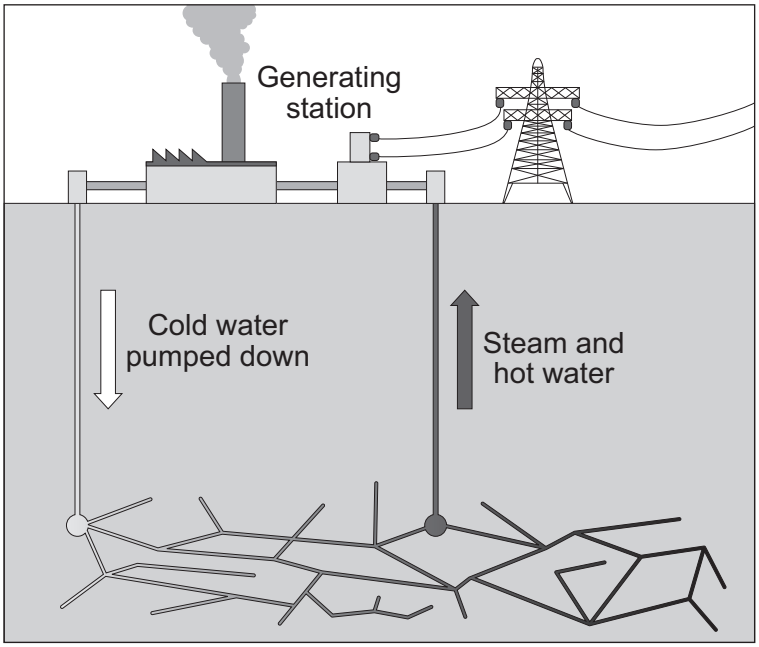
4 The diagram shows a typical geothermal plant used in the UK.



Source: www.bbc.co.uk/bitesize

4 (a) Why are the rocks deep within the crust hotter than those at the surface?

.....

.....

(1 mark)

4 (b) What are the advantages and disadvantages of using geothermal energy in the UK?

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

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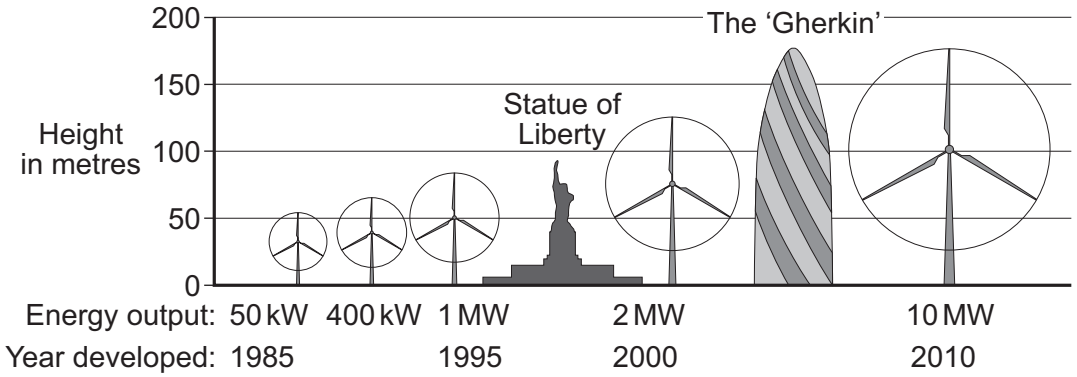
(4 marks)

Turn over ▶

4 (c) Wind generation has been developed as an alternative source of energy.

Figure 1 shows the trend in maximum rotor size and energy output of wind generators since 1985.

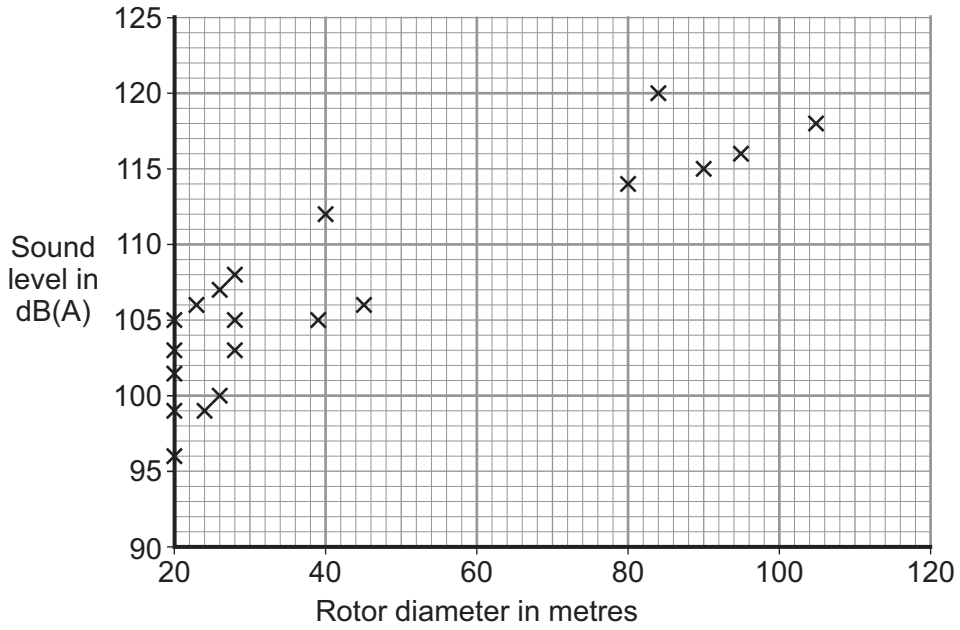
Figure 1



Source: adapted from Guardian News & Media Ltd 2010 (contributor, Paddy Allen)

Figure 2 shows the average noise levels produced by wind turbines with different rotor diameters.

Figure 2



4 (c) (i) Draw a line of best fit to show the trend in the scatter graph.

(1 mark)

4 (c) (ii) What do **Figure 1** and **Figure 2** suggest about the development of wind turbines?

.....

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(2 marks)

4 (c) (iii) While wind turbines have environmental benefits over fossil fuel electricity production, some environmentalists oppose their increased use.

Suggest **four** reasons why some environmentalists are opposed to wind turbines.

1 .....

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2 .....

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3 .....

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4 .....

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(4 marks)

Question 4 continues on the next page

4 (d) Locating wind turbines offshore is becoming increasingly popular.

Source: Getty Images

4 (d) (i) Suggest **two** advantages of locating wind turbines offshore.

1 .....

.....

2 .....

.....

(2 marks)

4 (d) (ii) Suggest **two** disadvantages of locating wind turbines offshore.

1 .....

.....

2 .....

.....

(2 marks)

16

Turn over for the next question

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5 Water is one of the UK's most precious resources.

5 (a) Which UK Government organisation is responsible for managing water resources?

.....

(1 mark)

5 (b) Aquifers need to be both porous and permeable.

5 (b) (i) What is meant by the term *porous*?

.....

.....

(1 mark)

5 (b) (ii) What is meant by the term *permeable*?

.....

.....

(1 mark)

5 (c) Name **one** common rock found in the UK that is both porous and permeable.

.....

(1 mark)

5 (d) The list shows sources of drinking water.

aquifer **lowland river** **reservoir** **upland stream**

5 (d) (i) Which source provides water that requires the **most** treatment to meet drinking water standards?

.....

(1 mark)

5 (d) (ii) Which source provides water that requires the **least** treatment to meet drinking water standards?

.....

(1 mark)

5 (d) (iii) Name a treatment process that is needed to make water from any of these sources safe to drink.

.....

(1 mark)

5 (e) Suggest **four** characteristics that would be desirable when choosing a site for an upland reservoir.

1 .....

.....

2 .....

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3 .....

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4 .....

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(4 marks)

5 (f) Suggest **four** ways in which water is used in energy production.

1 .....

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2 .....

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3 .....

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4 .....

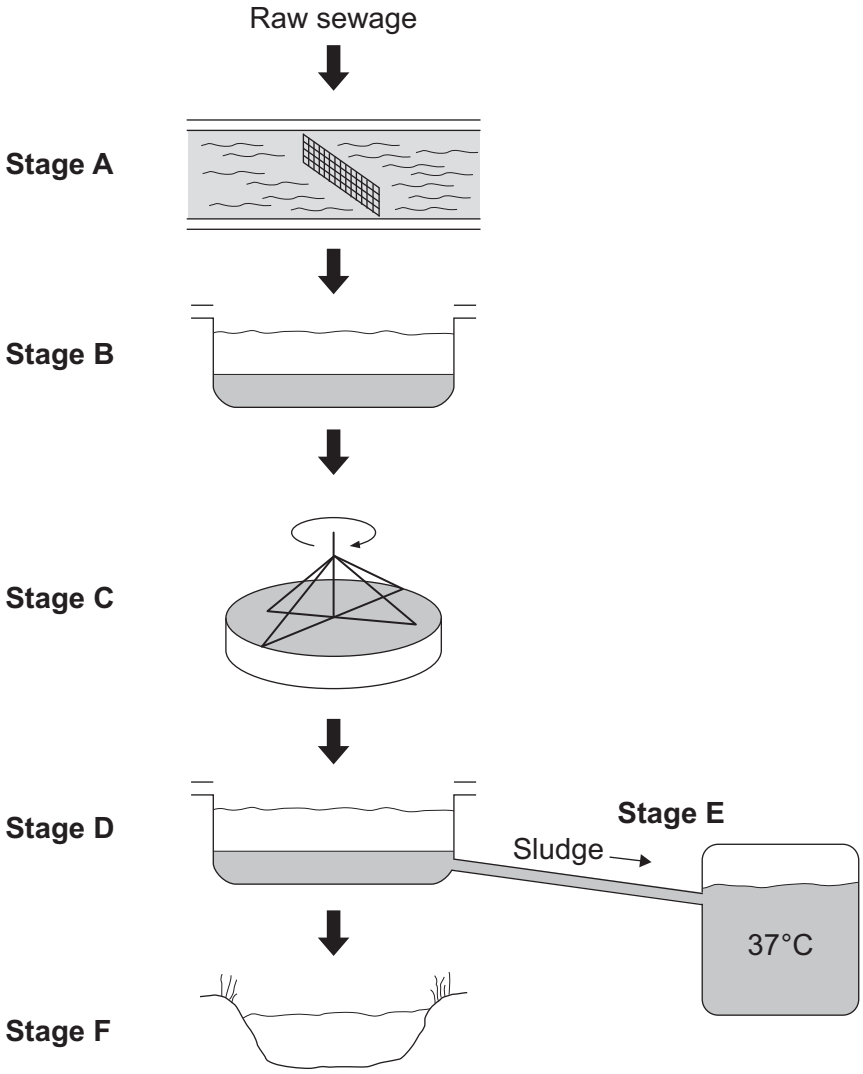
.....

(4 marks)

15

Turn over for the next question

6 The diagram shows the processes involved in the treatment of sewage.



6 (a) Describe what is happening at **each** stage in the treatment process.

Stage A .....

.....

Stage B .....

.....

Stage C .....

.....

Stage D .....

.....

Stage E.....

.....

Stage F.....

.....

(6 marks)

6 (b) Suggest **two** reasons why treated water might still cause pollution.

1 .....

.....

.....

2 .....

.....

.....

(2 marks)

6 (c) Suggest **two** ways of reducing water consumption in the home.

1 .....

.....

2 .....

.....

(2 marks)

10

Turn over for the next question

7 Transport consumes many non-renewable fossil fuel resources.

7 (a) What does *non-renewable* mean?

.....

.....

(1 mark)

7 (b) Why are buses generally considered to be a more environmentally friendly method of transport than cars?

.....

.....

(1 mark)

7 (c) Describe how nitrogen oxides are formed during fossil fuel combustion.

.....

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(2 marks)

7 (d) Explain why using electric cars may not always save fossil fuel resources.

.....

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.....

(2 marks)

7 (e) Vehicles can also be made to run on biofuels.

Draw a line to link **each** of the following biofuels to their correct means of production.

Biofuel	Production
Biodiesel	**Waste product of sewage farms**
Bioethanol	**Produced by the fermentation of sugar-rich crops**
Biogas	**Refined from oil-rich crops such as oilseed rape**

(3 marks)

7 (f) Energy is used in transporting food.

The distance food travels from producer to consumer is called food miles.

Suggest **two** ways in which an individual could reduce the *food miles* for the food they eat.

1 .....

.....

2 .....

.....

(2 marks)

7 (g) Many people choose to travel abroad by aircraft, adding to their carbon footprint.

Some companies are offering their customers the opportunity to take part in carbon offsetting schemes to help to reduce their carbon footprint.

What is meant by *carbon offsetting*?

.....

.....

(1 mark)

12

8 The world's biggest rubbish dump is a mass of plastic located in the middle of the Pacific Ocean.

- Of the 100 billion kg of plastic that people use each year, about 10 % ends up in the ocean.
- Plastic bags, bottle caps, plastic bottles and Styrofoam make up the majority of the waste.
- 30 % of this ends up at the surface sucked into gyres – places where currents meet, forming a whirlpool-like system.
- Of the five gyres worldwide the North Pacific is the biggest, covering an area estimated to be one and a half times the size of the USA.
- Accurate estimates are difficult, as much of the plastic floats just below the surface, and is therefore invisible to satellites.
- It has been estimated that over a million seabirds and 100 000 sea mammals and turtles are killed each year.
- The sun breaks the plastic down into smaller and smaller pieces but can never break it down completely.
- When small enough, the particles are ingested by the plankton eaters.
- Plastics in the water absorb toxic chemicals such as pesticides and insecticides which can enter the food chain when ingested by marine creatures.

8 (a) Approximately what mass of plastic finds its way to the ocean each year?

…… kg
(1 mark)

8 (b) Why does plastic collect in these huge areas in the middle of the ocean?

.....

.....
(1 mark)

8 (c) Suggest **two** ways in which this plastic might have ended up in the ocean.

1 .....

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2 .....

.....
(2 marks)

8 (d) Suggest how plastic might lead to the death of sea creatures.

.....

.....

.....

.....
(2 marks)

8 (e) Most plastic is non-biodegradable.

What does *non-biodegradable* mean?

.....

.....
(1 mark)

8 (f) Explain why small amounts of plastics ingested by plankton might cause problems for organisms further up the food chain.

.....

.....

.....

.....
(2 marks)

Turn over ▶

8 (g) Suggest **two** ways to reduce pollution from plastic waste.

1 .....

.....

2 .....

.....

(2 marks)

11

Turn over for the next question

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9 The environment is controlled to maximise productivity in both intensive animal and intensive plant production systems.

Intensive poultry unit

Intensive glasshouse production

Source: Getty Images

9 (a) (i) Suggest **four** environmental factors that are controlled for animal production.

1 .....

.....

2 .....

.....

3 .....

.....

4 .....

.....

(4 marks)

9 (a) (ii) Suggest **two other** environmental factors that are controlled for plant production. These must be different factors from those you have identified in **9(a)(i)**.

.....

.....

.....

.....

(2 marks)

9 (b) (i) Suggest **one** way in which an intensive animal production system could damage the environment.

.....

.....

(1 mark)

9 (b) (ii) Suggest **one** way in which an intensive plant production system could damage the environment.

.....

.....

(1 mark)

8

10 Conservation is an active process aimed at improving the environment.

Source: Getty Images

10 (a) Describe **three** ways in which woodland could be managed to improve the habitat for native wildlife.

.....

.....

.....

.....

.....

.....

(3 marks)

10 (b) Explain what is meant by *coppicing*.

.....

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(2 marks)

10 (c) Describe how to carry out a quadrat survey to find the diversity of plant species on the woodland floor.

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(4 marks)

9

END OF QUESTIONS

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