Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
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10	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2014

Environmental Science 44401F

Unit 1 Topics in Environmental Science

Thursday 5 June 2014 9.00 am to 11.00 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 2 hours

A

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 (a) Alternative energy sources have become more important in recent years.

Figure 1 shows one way in which we use an alternative energy source.

Figure 1

Here are descriptions of four alternative energy sources.

A Light hits different layers of silica. This makes electrons move, producing an electric current.

B Rocks deep under the ground give out heat. This heat is used to make steam.

C The air in the Earth's atmosphere moves. The moving air is used to turn turbines.

D The pull of the moon makes large areas of water move. This moving water is used to turn turbines.

1 (a) (i) Write the correct letter for the description, **A**, **B**, **C** or **D**, in the box.

[3 marks]

Geothermal ☐

Solar ☐

Tidal ☐

Wind ☐

1 (a) (ii) Suggest which **one** of these energy sources can be used directly in the home.

[1 mark]

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1 (a) (iii) Describe how **this energy source** might be used in a home.

[2 marks]

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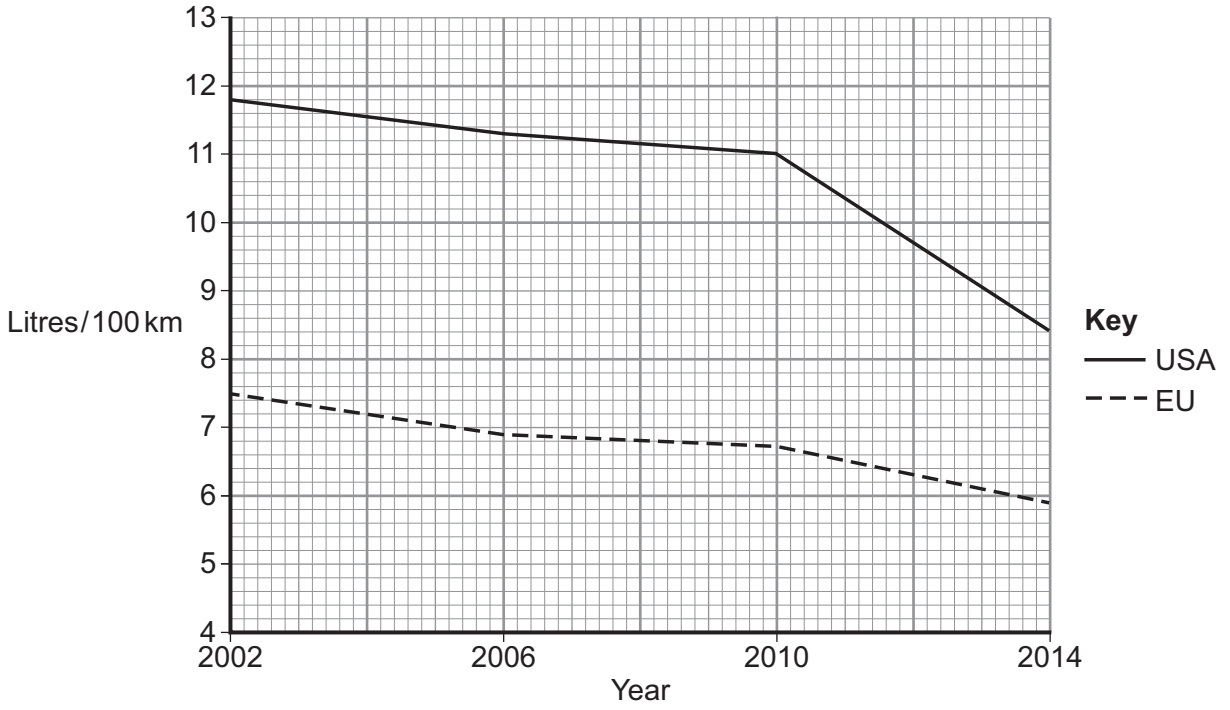
Question 1 continues on the next page

1 (b) The graph in **Figure 2** shows how the average fuel consumption of cars has changed since 2002.

Figure 2



1 (b) (i) Describe **two** differences in the average fuel consumption of cars shown in **Figure 2**.

[2 marks]

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1 (b) (ii) Suggest **three** reasons for the changes in the average fuel consumption of cars.

[3 marks]

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1 (b) (iii) Suggest **three** ways using cars affects the environment.

[3 marks]

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1 (b) (iv) Suggest **two** alternative fuels that can be used in cars.

[2 marks]

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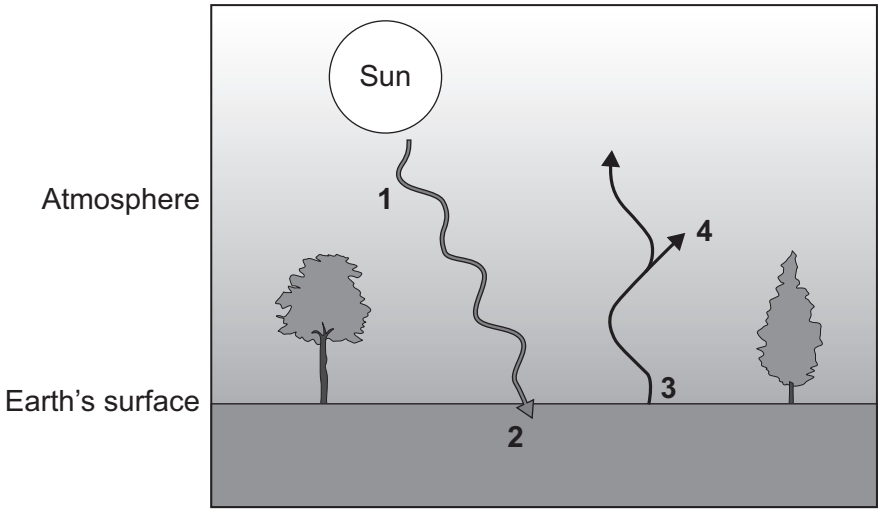
16

2 **Figure 3** shows the natural greenhouse effect.

Figure 3



2 (a) Write the correct number from **Figure 3** next to the description of what is happening at each place.

[3 marks]

Longwave radiation is absorbed by greenhouse gases and warms the atmosphere. ☐

Shortwave radiation is absorbed and warms the Earth's surface. ☐

Shortwave radiation from the Sun passes through the atmosphere. ☐

Some energy is re-radiated as longwave radiation. ☐

2 (b) Draw **one** line from each greenhouse gas to its source.

[4 marks]

Greenhouse Gas	Source
CFCs	Oceans
Methane	Solar cells
Nitrogen oxides	Landfill
Water vapour	Refrigerators and aerosol sprays
	Lightning

2 (c) Suggest **three** ways that global warming might affect British wildlife.

[3 marks]

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Question 2 continues on the next page

2 (d) Companies often use carbon off-setting to reduce their carbon footprint.

Which **one** of the following is an example of carbon off-setting?

Tick (✓) **one** box.

[1 mark]

Paying taxes for the amount of carbon dioxide they produce ☐

Planting trees to absorb carbon dioxide ☐

Reducing the amount of fossil fuels they use ☐

2 (e) Which of the following is **not** a carbon store?

Draw a ring around the correct answer.

[1 mark]

atmosphere **granite** **peat**

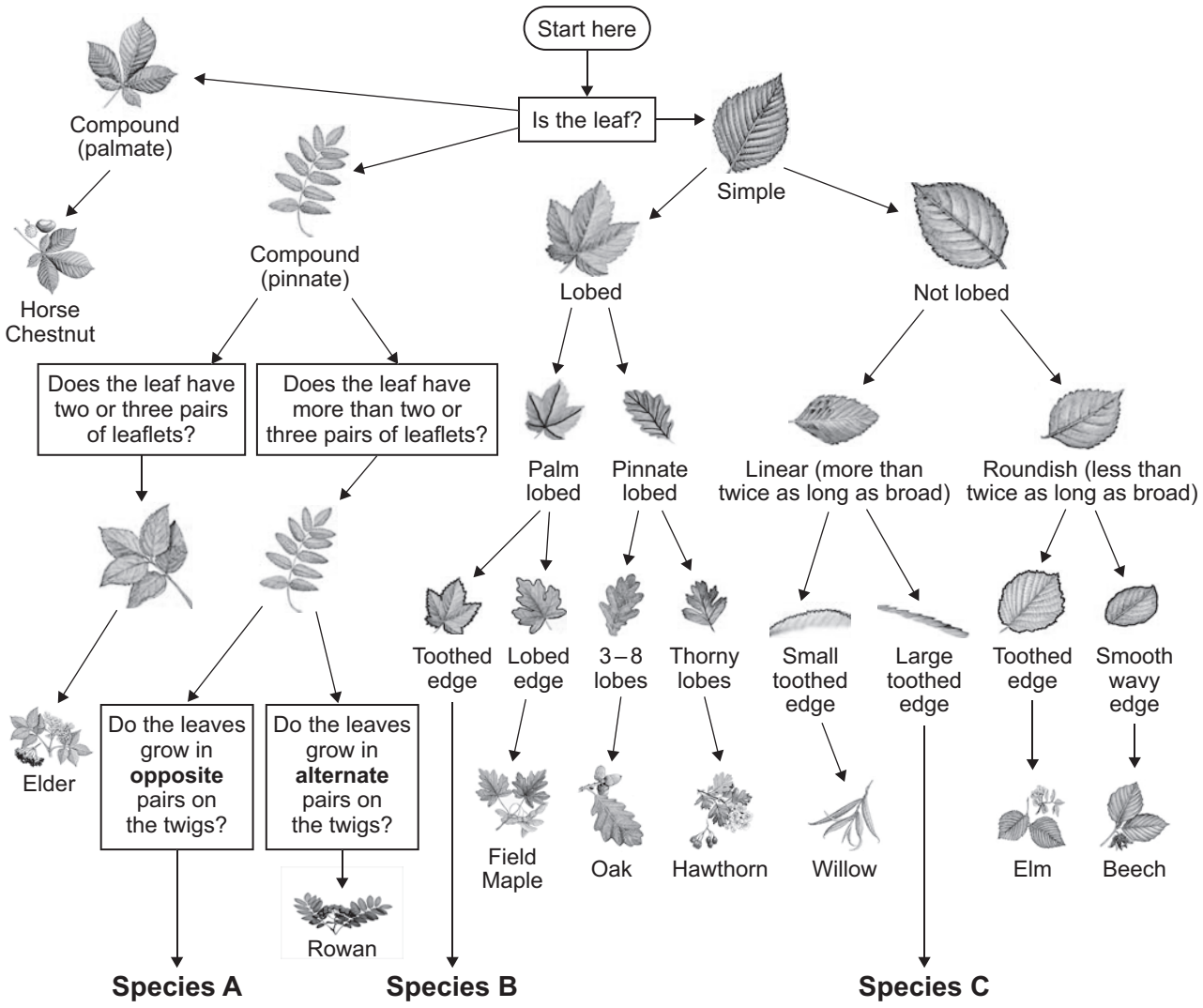
12

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

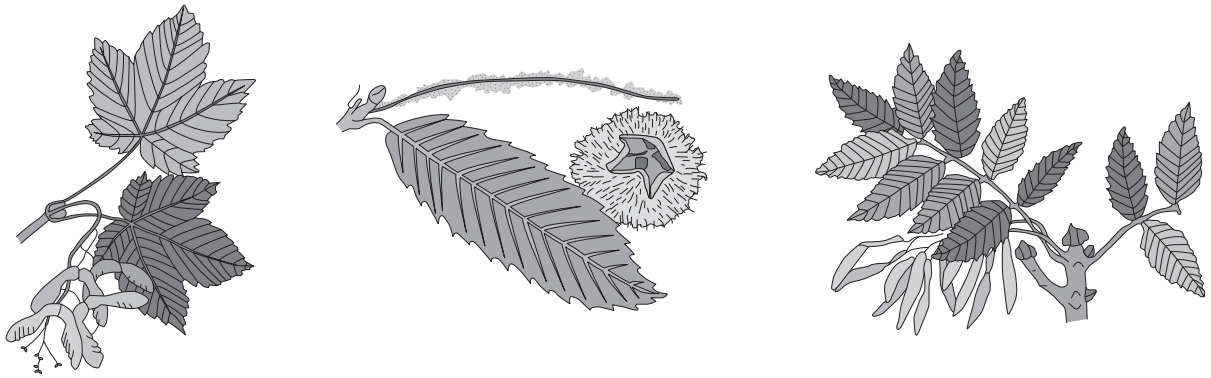
3 (a) **Figure 4** shows a broadleaf tree identification key.

Figure 4



Use **Figure 4** to correctly identify the following species.

Sycamore **Sweet Chestnut** **Ash**



Write **one** letter, **A**, **B** or **C**, in each box in the table.

[3 marks]

Name of species	Letter
Sycamore	
Sweet Chestnut	
Ash	

Question 3 continues on the next page

3 (b) Some students did a quadrat survey of the school field.

Table 1 shows the results of this quadrat survey.

Table 1

	Percentage cover of each species					
Quadrat Number	**Grass**	**Dandelion**	**Daisy**	**Plantain**	**Mouse-ear**	**Clover**
1	70	9	2	4	1	14
2	85	4	1	3	2	5
3	.....	10	0	4	1	12
4	69	12	0	4	3	12
5	82	5	3	2	2	6
6	68	14	2	0	1	15
7	75	11	1	2	0	11
8	81	7	4	0	0	8
9	73	10	2	3	0	12
10	90	1	4	1	1	3

3 (b) (i) Calculate the percentage of grass in quadrat 3.

Write your answer in the table.

[1 mark]

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3 (b) (ii) After grass, which species has the highest percentage cover?

[1 mark]

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3 (c) How would you do a quadrat survey of a school field?

Describe what you would do.

[4 marks]

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3 (d) Why are seed banks used to conserve vulnerable species?

[1 mark]

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3 (e) Which of the following organisations looks after National Parks?

Tick (✓) **one** box.

[1 mark]

Environment Agency ☐

Natural England ☐

RSPB ☐

3 (f) Which of the following are protected by the Ramsar Agreement?

Tick (✓) **one** box.

[1 mark]

Fish stocks ☐

Wetlands ☐

Woodlands ☐

3 (g) Conservation workers manage nature reserves for wildlife.

Suggest **four** ways they do this.

[4 marks]

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3 (h) One large nature reserve might be better for wildlife than many small ones with the same total area.

Give **two** reasons why.

[2 marks]

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3 (i) What kind of species are protected by CITES?

Tick (✓) **one** box.

[1 mark]

Economic ☐

Endangered ☐

Extinct ☐

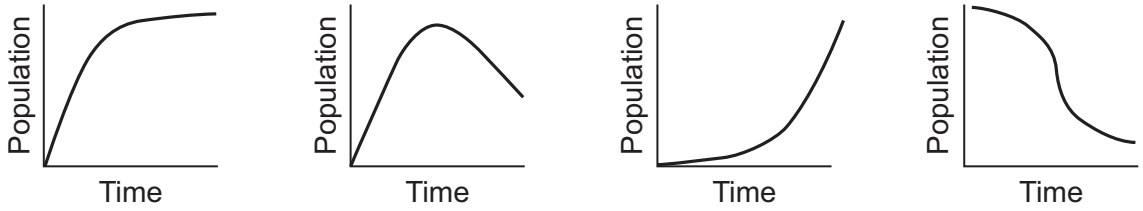
19

Turn over for the next question

4 (a) Which of the following graphs shows the change in population of a developing country?

Draw a ring around the correct answer.

[1 mark]



4 (b) Suggest **three** reasons why it is important for governments to be able to predict changes in population size.

[3 marks]

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4 (c) Suggest **three** ways some countries have managed to reduce their population growth rates.

[3 marks]

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4 (d) Food is one **basic** need of a population.

Name **two** others.

[2 marks]

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4 (e) The Brundtland Report (1987) described sustainable development as:

A Development that does not pollute or harm the environment now or in the future.

B Development that does not use non-renewable resources so that they are still available for future generations.

C Development that meets present needs without compromising the ability of future generations to achieve their needs and aspirations.

Write the correct letter, **A**, **B** or **C**, in the box. ☐

[1 mark]

Question 4 continues on the next page

4 (f) Suggest **one** way each of the following can contribute to our ecological footprint.

You must give a **different** reason for each answer.

[3 marks]

Food production .....

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Manufacture of computers .....

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Use of computers .....

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4 (g) Suggest **two** ways that recycling saves resources.

[2 marks]

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4 (h) Suggest **one** way that recycling uses resources.

[1 mark]

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16

5 (a) Water for drinking can be taken from different sources.

Table 2 shows some information about the water from three different sources.

Table 2

	Water source		
	A	**B**	**C**
Dissolved solids in mg/l	12	10	30
Suspended solids in mg/l	75	20	0.5

Write the correct letter, **A**, **B** or **C**, in each box to show which of the sources the water comes from.

[2 marks]

An aquifer ☐

A reservoir ☐

A river ☐

5 (b) Use the correct answer from the box to complete each sentence.

[4 marks]

aeration	**clarification**	**disinfection**	**filtration**	**screening**

The first stage in drinking water treatment is ..... , which removes large objects such as leaves and twigs from the water.

Chemicals are added to the water, causing smaller particles to stick together and settle out; this is called ..... .

The finest particles are removed by sand ..... .

Finally, ... is used to kill bacteria in the water.

5 (c) Suggest **three** other uses of a reservoir apart from as a source of drinking water.

[3 marks]

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5 (d) People with water meters in their homes use less water.

Explain why having a water meter reduces water use.

[2 marks]

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5 (e) Suggest **two** ways a family might use 'grey water'.

[2 marks]

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13

Turn over for the next question

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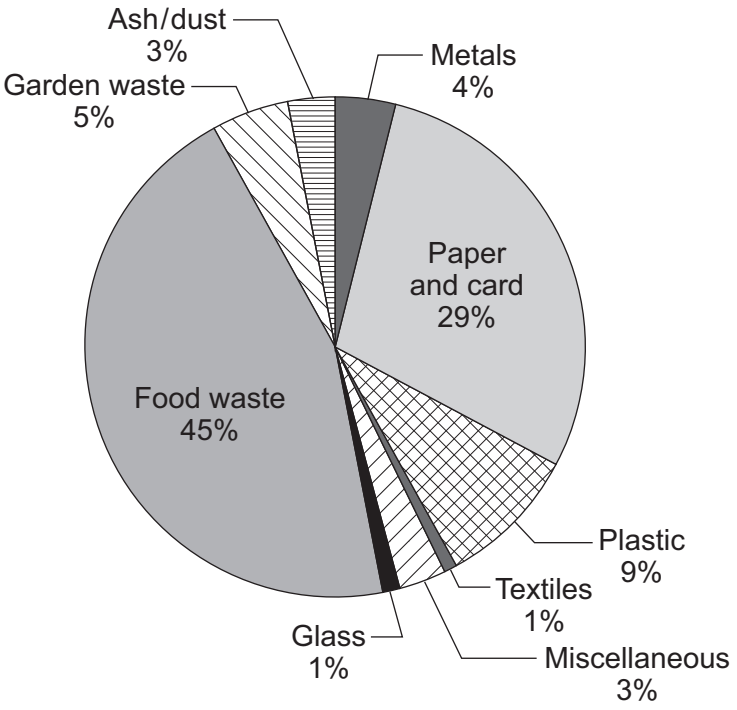
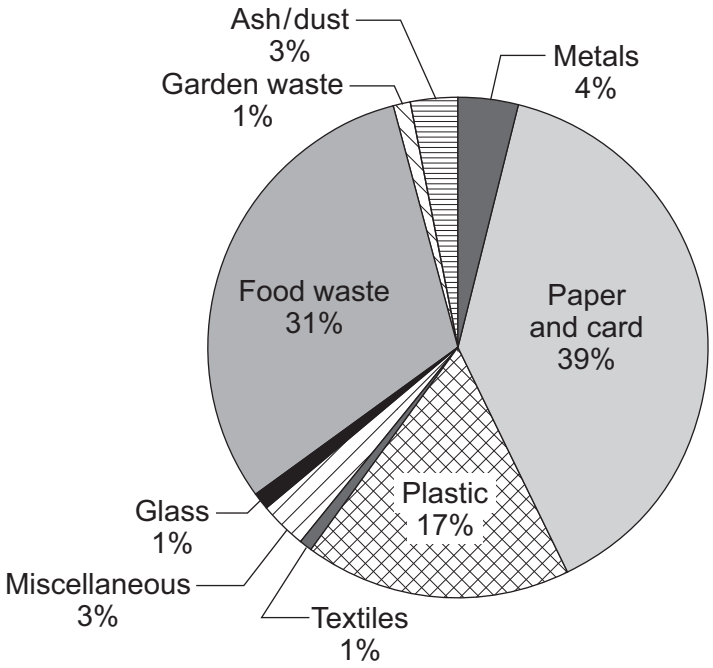
6 The charts in **Figure 5** show the proportions of different types of waste produced in our schools.

Figure 5

Waste produced by primary schools in percentage by mass



Waste produced by secondary schools in percentage by mass



6 (a) State **two** differences in the percentages of waste produced by primary and secondary schools.

[2 marks]

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6 (b) Use the information in **Table 3** to calculate the total waste produced by secondary schools. Write your answer in the space in the table.

[1 mark]

Table 3

	Number of pupils	**Average waste per pupil in tonnes**	**Total waste produced in tonnes**	**Percentage recycled**
Primary schools	4 148 950	0.045	186 703	13%
Secondary schools	3 306 780	0.022	.....	20%

6 (c) (i) What mass of food waste is produced by primary schools?

Use **Figure 5** and **Table 3** to help you answer this question.

[2 marks]

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6 (c) (ii) How could the food and garden waste be recycled by the schools?

[1 mark]

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6 (d) How could the waste made in schools be used as an energy source?

Suggest **one** way.

[1 mark]

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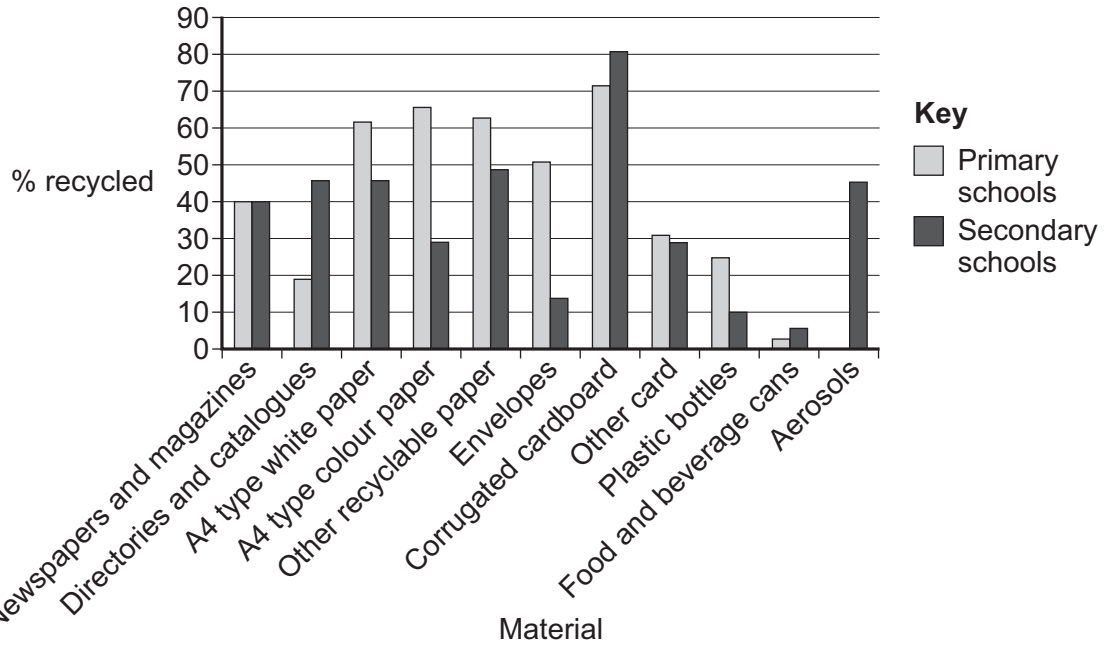
6 (e) The graph in **Figure 6** shows the percentages of each material recycled by both primary and secondary schools.

Figure 6



6 (e) (i) Name **two** materials that are recycled in higher percentages by secondary schools.

[2 marks]

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6 (e) (ii) For **one** of these materials, suggest a reason why more is recycled by secondary schools.

[1 mark]

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Turn over for the next question

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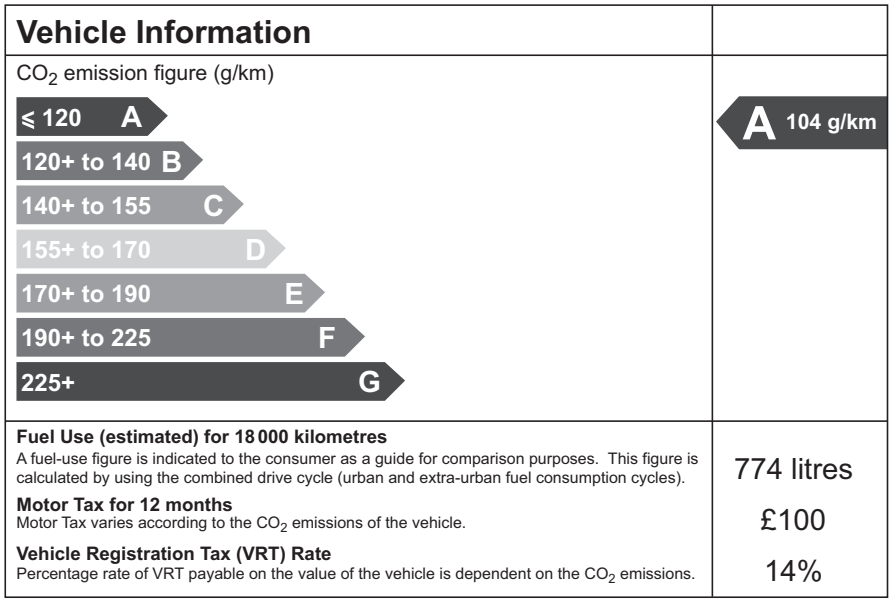
7 (a) **Figure 7** shows part of the environmental information that must now be shown on all new cars that are for sale.

Figure 7



7 (a) (i) Suggest **two** ways how this information displayed on cars benefits the environment.

[2 marks]

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7 (a) (ii) The amount of motor tax paid is based on the amount of carbon dioxide (CO_2) that cars emit.

Suggest how this could affect how people choose their cars.

[1 mark]

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7 (b) **Table 4** shows information about the fuel consumption of a car.

Table 4

Where driven	Fuel consumption in litres per 100 km
Urban (in town)	5.0
Extra-urban (out of town)	4.2
Combined (both)	4.3

The way a car is driven can change its fuel consumption.

Suggest **two** examples how, using information in **Table 4** or your own knowledge.

[2 marks]

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7 (c) You want to compare the fuel consumption of three cars.

Outline the main steps of a practical investigation to give a fair comparison of the three cars.

[4 marks]

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8 (a) **A**, **B**, **C** and **D** are four of the stages in eutrophication.

A Break down of organic waste by aerobic bacteria

B Loss of oxygen from the water

C Death of aquatic plants

D Increased growth of aquatic plants

Write **one** letter in each box so the stages are in the correct order.

[2 marks]

Pollution by nutrients

☐

☐

☐

☐

Death of aquatic animals

8 (b) Which of the following would **not** cause eutrophication?

Tick (✓) **one** box.

[1 mark]

Detergents containing phosphate ☐

Lime ☐

Nitrate fertiliser ☐

Run-off from a manure heap ☐

8 (c) Describe how nutrients put on a field might get into aquifer water.

[3 marks]

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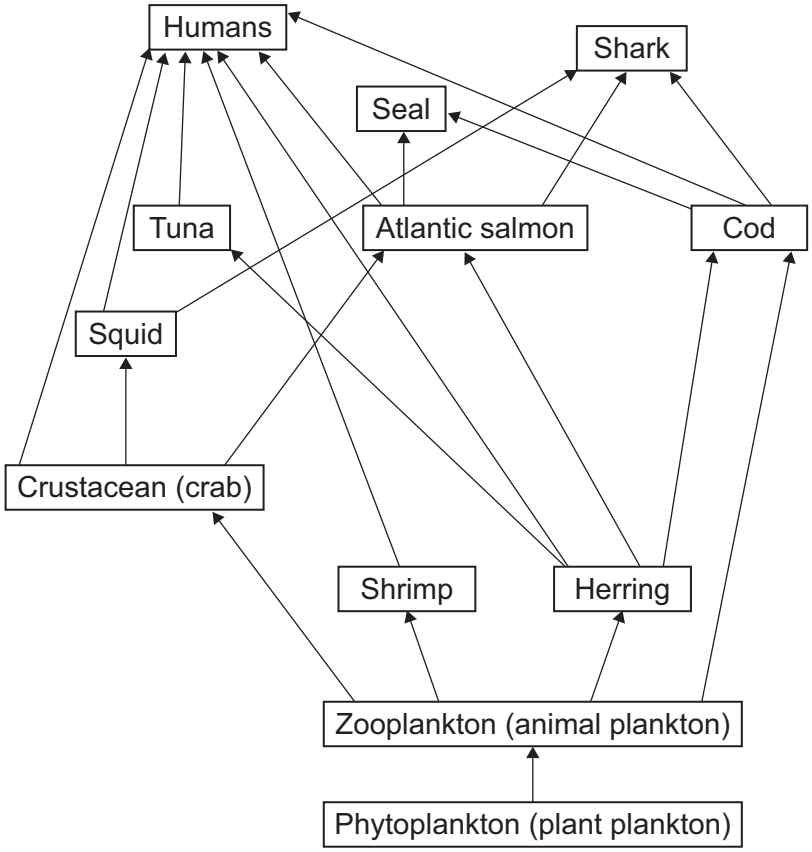
Turn over for the next question

9 **Figure 8** shows a food web from the North Atlantic Ocean.

Figure 8



9 (a) Describe the impact on the other species shown in the web if cod became extinct.

[3 marks]

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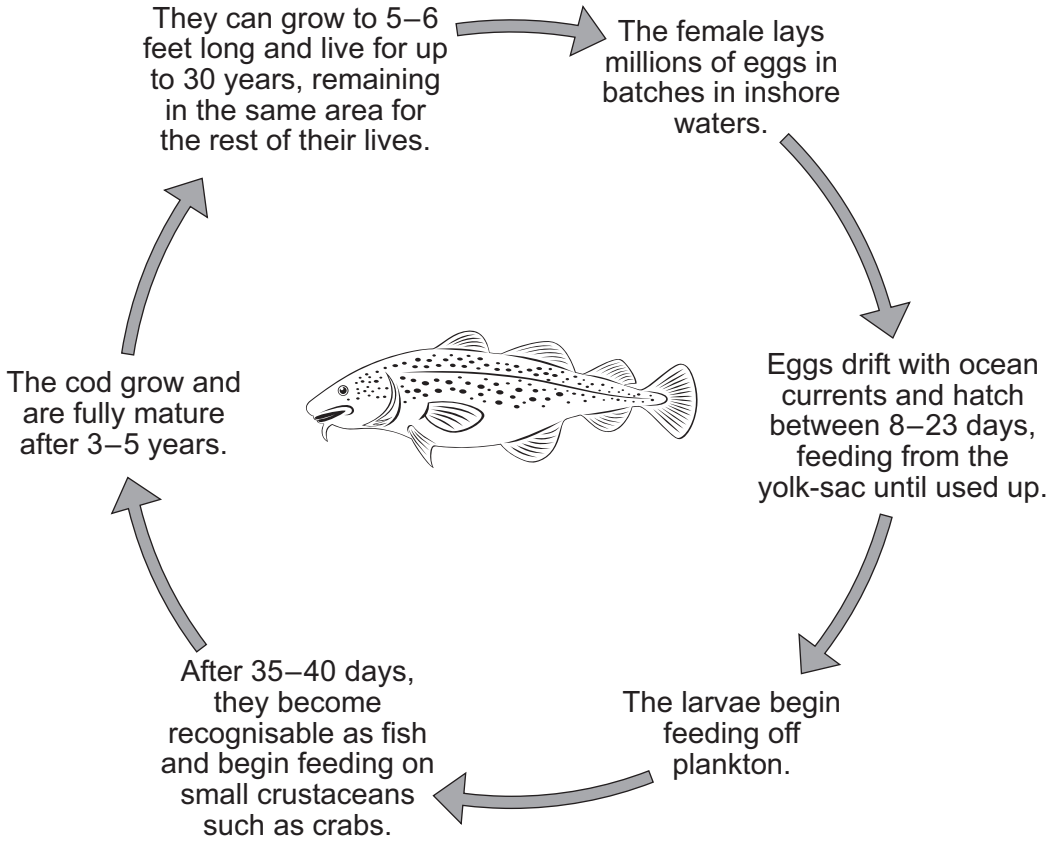
9 (b) **Figure 9** shows the breeding cycle of cod.

Figure 9



Use the information in the breeding cycle and your own knowledge to suggest how cod can be protected for future generations.

[3 marks]

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9 (c) The EU Common Fisheries Policy sets fishing quotas.

Which of the following best describes fishing quotas?

Tick (✓) **one** box.

[1 mark]

A limit on the . . .

areas of the sea in which you are allowed to fish. ☐

numbers of a particular species that you are allowed to catch. ☐

total number of all species of fish caught. ☐

size of fish that you are allowed to catch. ☐

9 (d) Suggest **three** other ways to make cod fishing more sustainable.

[3 marks]

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10 **Figure 10** shows large-scale crop production.

Figure 10

10 (a) As world population increases, farmers are having to produce more food on less land.

Suggest **three** reasons why there is less land available to produce food.

[3 marks]

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10 (b) Which of the following **cannot** be produced by selective breeding?

Tick (✓) **one** box.

[1 mark]

A more uniform crop ☐

A higher yielding crop ☐

A crop with a greater environmental tolerance ☐

A crop with genes not present in its parents ☐

10 (c) What is **transgenic** genetic modification?

[1 mark]

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10 (d) Agricultural scientists think that the 'Green Revolution' helped food production meet the needs of a growing world population.

Describe and explain how changes in agricultural methods increased crop yields.

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

[4 marks]

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END OF QUESTIONS

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