Biodiversity + Effect Humans on Ecosystems

These practice questions can be used by students and teachers and is suitable for GCSE AQA Biology topic Questions 8641

Level: GCSE AQA Biology 8641

Subject: Biology

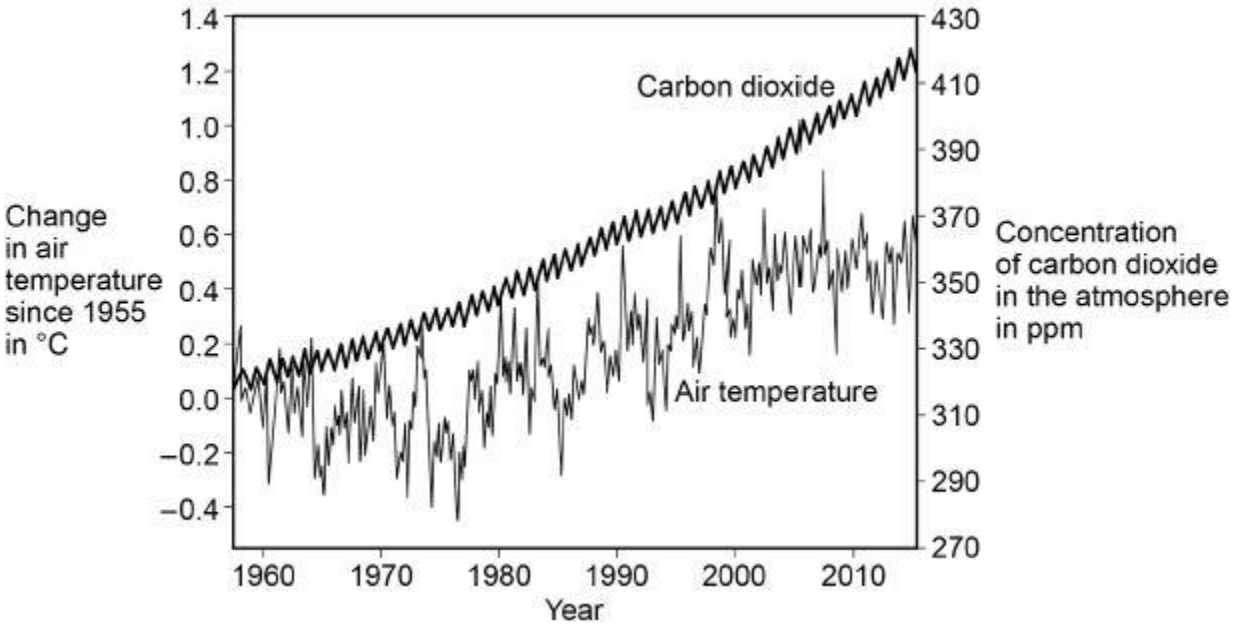
Exam board: GCSE AQA

Topic: Biodiversity + Effect Humans on Ecosystems

Q1.

Many scientists think that global air temperature is related to the concentration of carbon dioxide in the atmosphere.

The graph below shows changes in global air temperature and changes in the concentration of carbon dioxide in the atmosphere.



(a) Complete the table below.

Use information from the graph above.

Choose answers from the box.

You may use each answer once, more than once or not at all.

constant	decreasing	increasing

	1960 − 1977	1977 − 2003	2003 − 2015
Trend in carbon dioxide concentration	Increasing		
Trend in air temperature			

(2)

Many scientists think that an increase in carbon dioxide concentration in the

atmosphere causes an increase in air temperature.

(b) How would an increase in the concentration of carbon dioxide in the atmosphere cause an increase in air temperature?

(1)

(c) Evaluate evidence for and against the theory that an increase in the concentration of carbon dioxide in the atmosphere causes an increase in air temperature.

Use data from the graph above and your own knowledge.

(4)

In each year, the concentration of carbon dioxide in the atmosphere is higher in the winter than in the summer.

(d) Give **one** human activity that could cause the higher concentration of carbon dioxide in the winter.

(1)

(e) Give **one** biological process that could cause the lower concentration of carbon dioxide in the summer.

(1)

(f) Give **two** possible effects of an increase in global air temperature on living organisms.

1.

2.

___

_____

_____

(2)

(Total 11 marks)

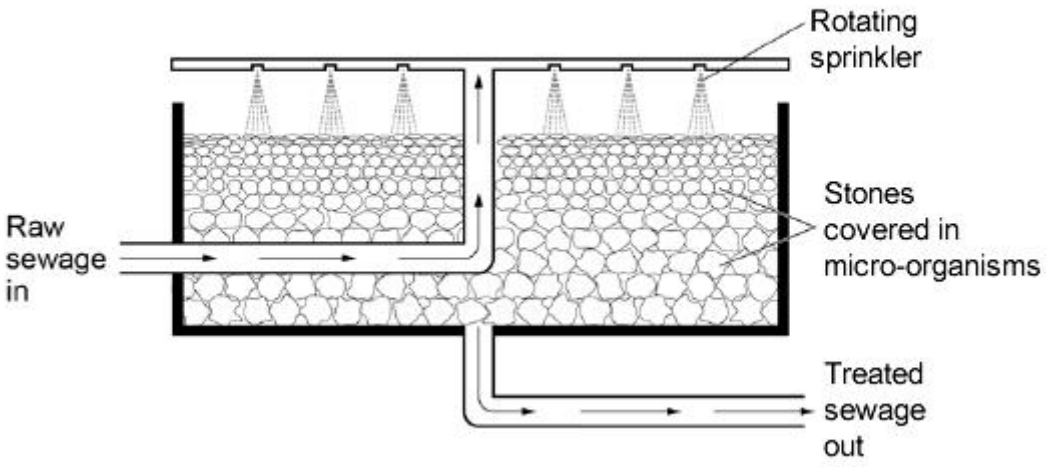
Q2.

Pollution of rivers with untreated sewage can kill plants and animals.

Figure 1 shows a sprinkler bed at a sewage works.

The sewage trickles slowly downwards over the surfaces of the stones.

Figure 1



Some of the microorganisms on the stones feed on organic matter in the sewage.

The treated sewage is safe enough to pass into a river.

(a) Most of the microorganisms in the sprinkler bed respire aerobically.

Describe **two** features of the sprinkler bed that encourage **aerobic** respiration.

Use information from **Figure 1**.

1.

_____

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_____

_____

2.

_____

_____

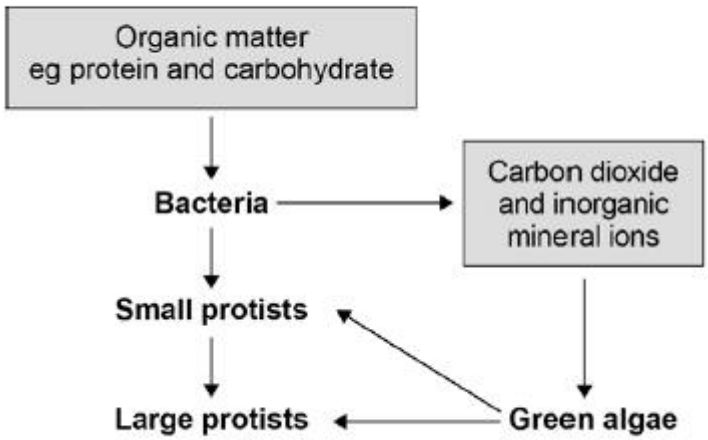
_____

_____

(2)

Figure 2 shows the feeding relationships between the microorganisms in the sprinkler bed.

Figure 2



(b) Which organisms in **Figure 2** are producers?

Tick **one** box.

Bacteria ☐

Green algae ☐

Large protists ☐

Small protists ☐

(1)

(c) Name **one** organism in **Figure 2** which is both a primary and a secondary consumer.

_____

(1)

(d) The bacteria are decomposers.

Figure 2 shows that the bacteria change organic matter into carbon dioxide and inorganic mineral ions.

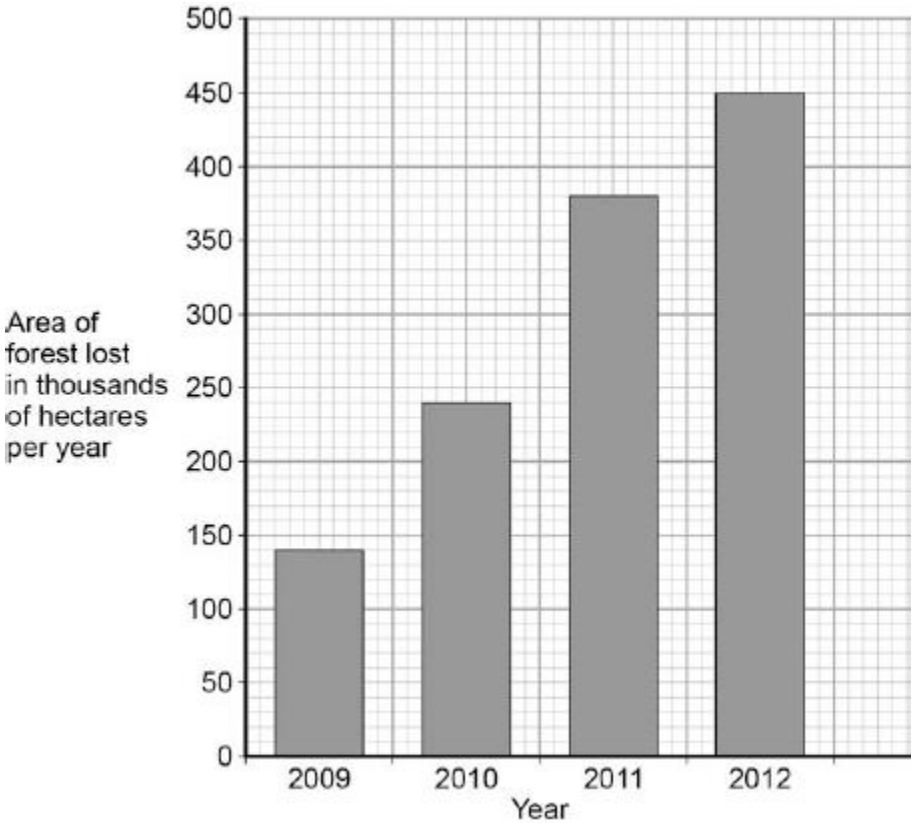
Describe how the bacteria do this.

(4)

(Total 8 marks)

Q3.

The graph below shows the area of forest lost in Madagascar from 2009 to 2012.



(a) The area of forest lost each year in Madagascar increased between 2009 and 2012.

Determine the total area of forest lost from the start of 2009 to the end of 2012.

_____

_____

_____

_____

Total area of forest lost = _____ thousand hectares

(1)

(b) What are the possible reasons for the change in the area of forest lost per year between 2009 and 2012?

Tick **two** boxes.

The local people stop growing rice ☐

Fewer new houses are needed for the population ☐

The local people decided to farm cattle ☐

More trees have been planted ☐

A company starts growing plants for biofuels ☐

(2)

(c) More forest was lost in 2012 than in 2009.

Use words from the box to complete the sentences.

carbon dioxide	**excretion**	**nitrogen**
oxygen	**photosynthesis**	**respiration**

The increase in the area of forest lost has caused an increase in the gas

_____

The increase of this gas has been caused because less of the gas is being absorbed by plants for the process of _____ .

(2)

(d) Deforestation can have negative effects on our ecosystems.

What are the negative effects of deforestation?

Tick **two** boxes.

Animals and birds migrate because there is less food ☐

More habitats are destroyed ☐

There is less acid rain ☐

There is more biodiversity ☐

The global temperature decreases ☐

(2)

(e) Scientists try to reduce the negative effects of human activity on our ecosystems.

One way is to protect rare habitats.

Give **one other** way of reducing the negative effects of human activity on our ecosystems.

_____

_____

_____

_____

(1)

(Total 8 marks)

Q4.

A gardener wants to add compost to the soil to increase his yield of strawberries.

The gardener wants to make his own compost.

(a) An airtight compost heap causes anaerobic decay.

Explain why the gardener might be against producing compost using this method.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(b) The gardener finds this research on the Internet:

'A carbon to nitrogen ratio of 25:1 will produce fertile compost.'

Look at the table below.

Type of material to	Mass of carbon in	Mass of nitrogen	Carbon:nitrogen ratio

compost	sample in g	in sample in g	
Chicken manure	8.75	1.25	7:1
Horse manure	10.00	0.50	20:1
Peat moss	9.80	0.20	**X**

Determine the ratio **X** in the table above.

Ratio _____

(1)

(c) Which type of material in the table above would be **best** for the gardener to use to make his compost?

Justify your answer.

(1)

(d) Some of the leaves from the gardener's strawberry plant die.

The dead leaves fall off the strawberry plant onto the ground.

The carbon in the dead leaves is recycled through the carbon cycle.

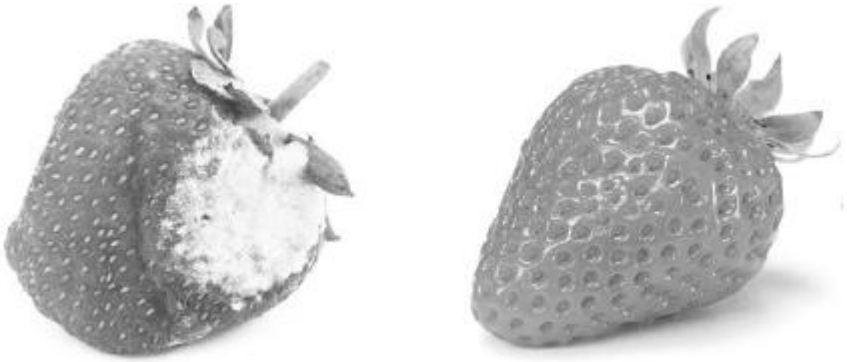
Explain how the carbon is recycled into the growth of new leaves.

(6)

(e) The diagram below shows two strawberries.

- Both strawberries were picked from the same strawberry plant.
- Both strawberries were picked 3 days ago.
- The strawberries were stored in different conditions.

Strawberry A **Strawberry B**



A © sarahdoow/iStock/Thinkstock, B © Mariusz Vlack/iStock/Thinkstock

Give **three** possible reasons that may have caused strawberry **A** to decay.

1.

2.

_____

_____

3.

_____

_____

_____

_____

(3)

(Total 13 marks)

Q5.

Human activity affects ecosystems.

(a) Draw **one** line from each human activity to the effect on ecosystems.

Human activity	Effect on ecosystems
Increase in rice fields	Increases the amount of methane in the atmosphere
Destruction of peat bogs	Increases the amount of carbon dioxide that is released into the atmosphere
	Reduces the rate at which carbon dioxide is locked up as wood

(2)

(b) (i) Deforestation also affects the atmosphere.

Give **two** reasons why deforestation takes place.

1.

_____

_____

_____

_____

2.

_____

___

_____

_____

(2)

(ii) Changes in the gases in our atmosphere can cause global warming.

Give **two** possible effects of a rise in the Earth's temperature.

1.

_____

___

_____

_____

2.

_____

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_____

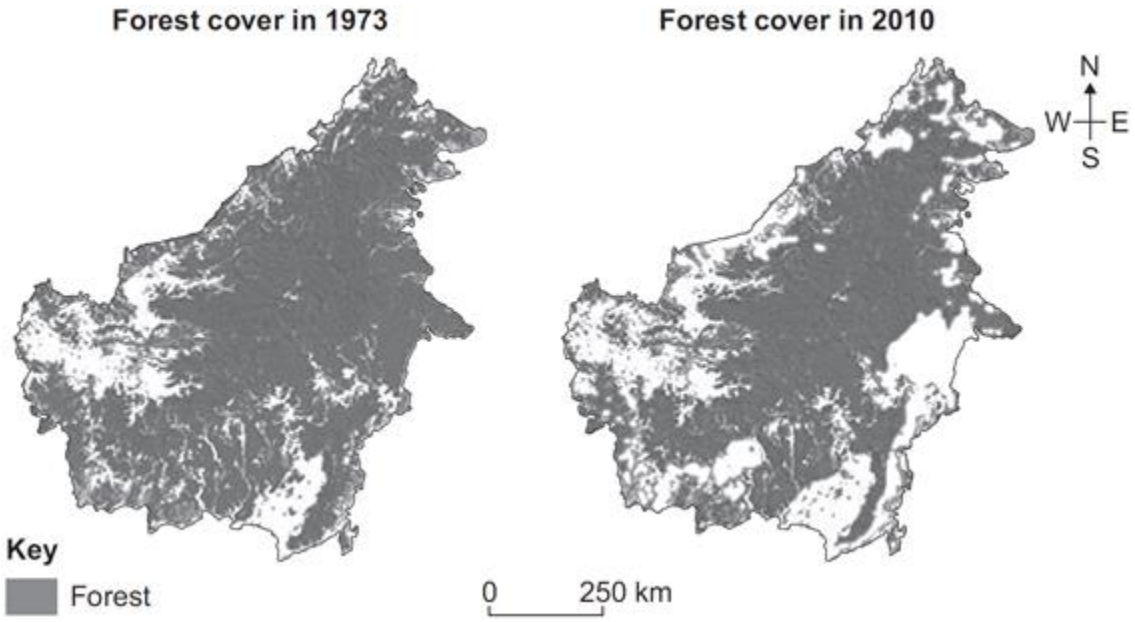
_____

(2)

(Total 6 marks)

Q6.

The figure below shows the amount of forest cover on an island in Asia, in 1973 and in 2010.



(a) (i) Deforestation has decreased the amount of forest cover on the island.

Describe the change in the pattern of forest cover on the island.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(ii) Give **two** possible reasons why the amount of forest has decreased between 1973 and 2010.

1.

_____

_____

_____

_____

2.

_____

_____

_____

_____

(2)

(b) Scientists are concerned about the effects of a decrease in forest cover on ecosystems.

Give **two** possible negative effects of the decrease in forest cover on ecosystems.

1.

_____

_____

_____

_____

2.

_____

_____

_____

_____

_____

_____

(2)

(Total 6 marks)

Q7.

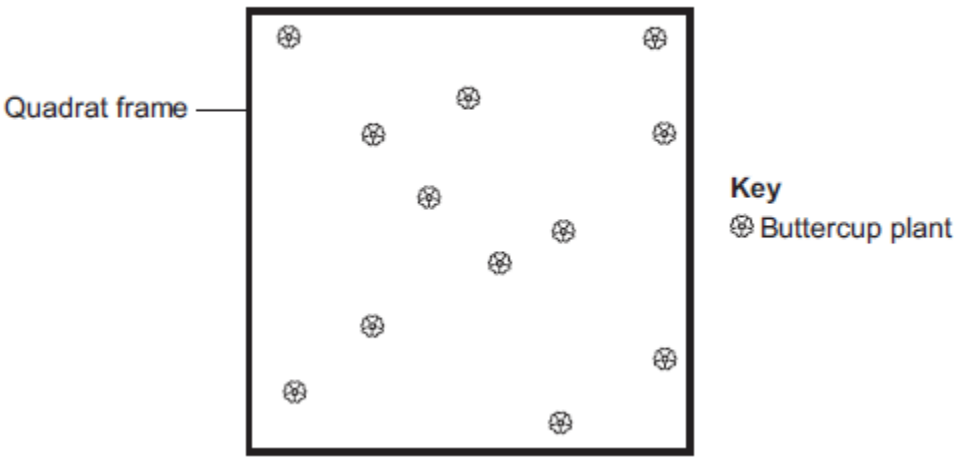
A grassy field on a farm measured 120 metres by 80 metres.

A student wanted to estimate the number of buttercup plants growing in the field.

The student found an area where buttercup plants were growing and placed a 1 m × 1 m quadrat in one position in that area.

Figure 1 shows the buttercup plants in the quadrat.

Figure 1



The student said, 'This result shows that there are 115 200 buttercup plants in the field.'

(a) (i) How did the student calculate that there were 115 200 buttercup plants in the field?

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(ii) The student's estimate of the number of buttercup plants in the field is probably not accurate. This is because the buttercup plants are not distributed evenly.

How would you improve the student's method to give a more accurate estimate?

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(b) Sunlight is one environmental factor that might affect the distribution of the buttercup plants.

(i) Give **three other** environmental factors that might affect the distribution of the buttercup plants.

1. _____

2. _____

3. _____

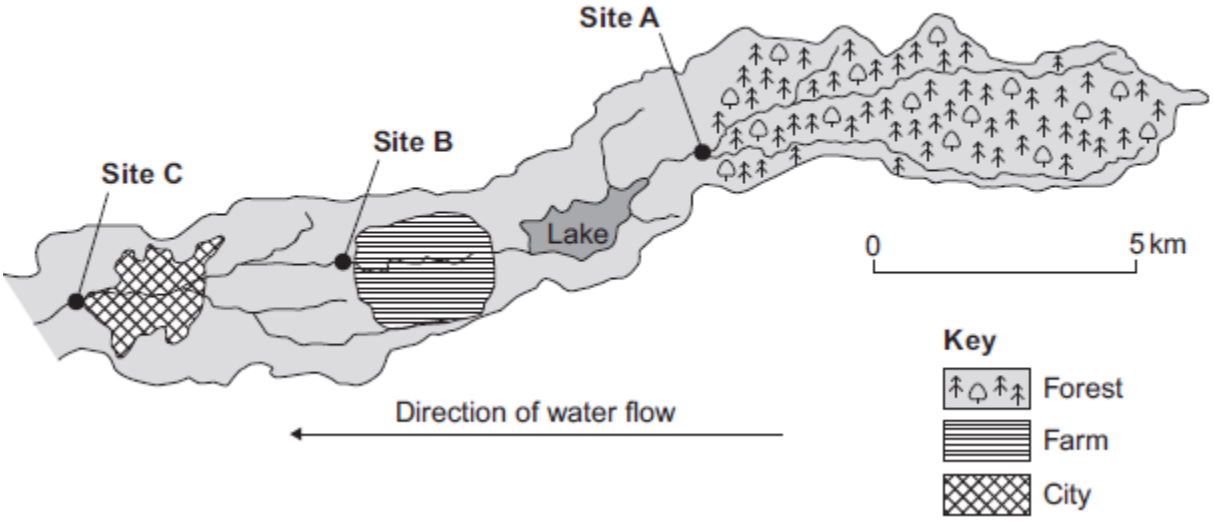
(3)

(ii) Explain how the amount of sunlight could affect the distribution of the buttercup plants.

(3)

(c) **Figure 2** is a map showing the position of the farm and a river which flows through it.

Figure 2



Every year, the farmer puts fertiliser containing mineral ions on some of his fields.When there is a lot of rain, some of the fertiliser is washed into the river.

(i) When fertiliser goes into the river, the concentration of oxygen dissolved in the water decreases.

Explain why the concentration of oxygen decreases.

_____

_____

_____

_____

(5)

(ii) There is a city 4 km downstream from the farm.

Apart from fertiliser, give **one** other form of pollution that might go into the river as it flows through the city.

_____

_____

(1)

(d) Three sites, **A**, **B** and **C**, are shown in **Figure 2**.

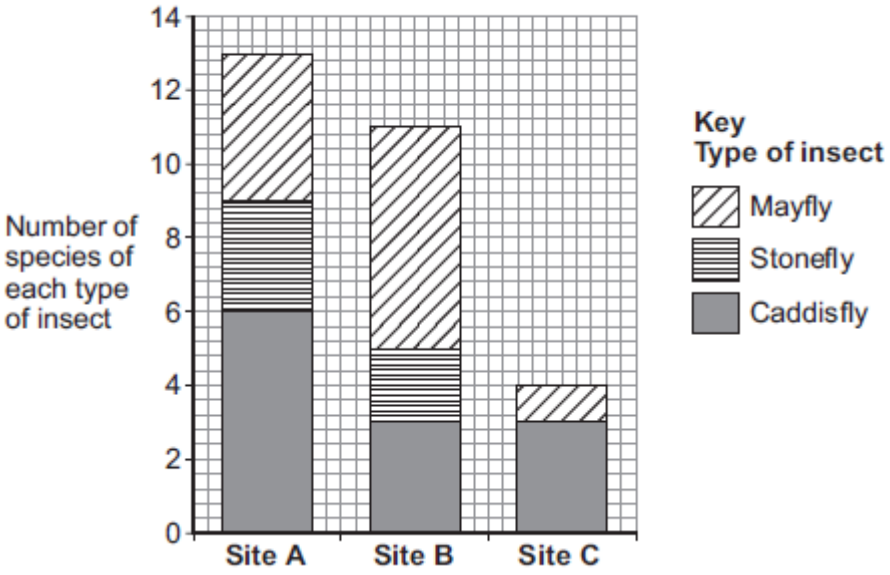
Scientists took many samples of river water from these sites.

The scientists found larvae of three types of insect in the water: mayfly, stonefly and caddisfly. For each type of insect the scientists found several different species.

The scientists counted the number of different species of the larvae of each of the three types of insect.

Figure 3 shows the scientists' results.

Figure 3



(i) How many more species of mayfly were there at Site **B** than at Site **A**?

_____

(1)

(ii) Suggest what caused this increase in the number of species of mayfly.

_____

_____

_____

_____

(1)

(iii) The scientists stated that the number of species of stonefly was the best indicator of the amount of oxygen dissolved in the water.

Use information from **Figure 3** to suggest why.

(1)

(Total 19 marks)

Q8.

The human population is increasing and more household waste is being produced.

(a) Give **one** way in which an increase in household waste affects our environment.

_____

_____

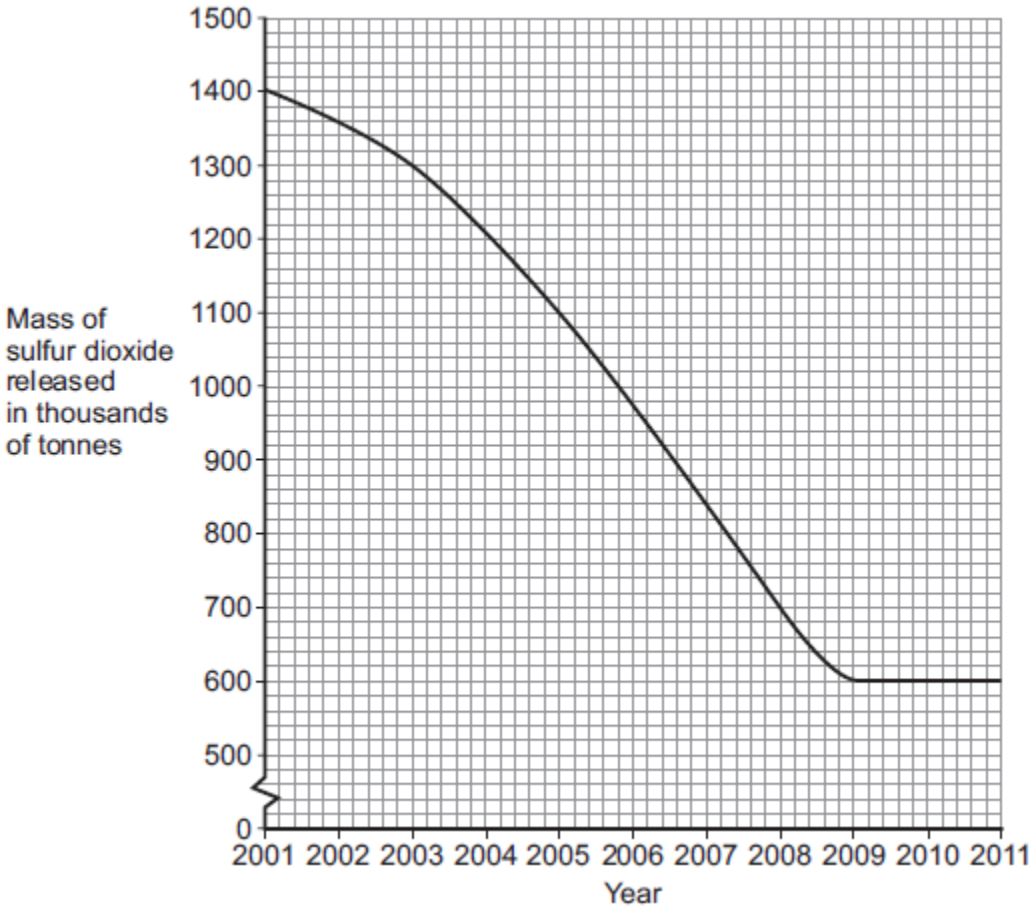
_____

_____

(1)

(b) The release of sulfur dioxide affects our environment.

The graph shows how the mass of sulfur dioxide released in the UK has changed from 2001 to 2011.



(i) Describe the pattern shown in the graph.

_____

_____

_____

_____

(2)

(ii) In 2001, 1400 thousand tonnes of sulfur dioxide were released.

By which year had the amount of sulfur dioxide released reduced to half of this amount?

_____

_____

_____

_____

_____

Year = _____

(2)

(iii) Give **one** problem caused when sulfur dioxide gas is in the air.

_____

_____

_____

_____

(1)

(c) Carbon dioxide is another gas that affects the environment.

Which **two** of the following help to reduce the levels of carbon dioxide in the atmosphere by storing carbon dioxide?

Tick (✓) **two** boxes.

Animals respiring	☐
Carbon dioxide being absorbed in oceans and lakes	☐
Photosynthesis by trees	☐
The production of biogas	☐

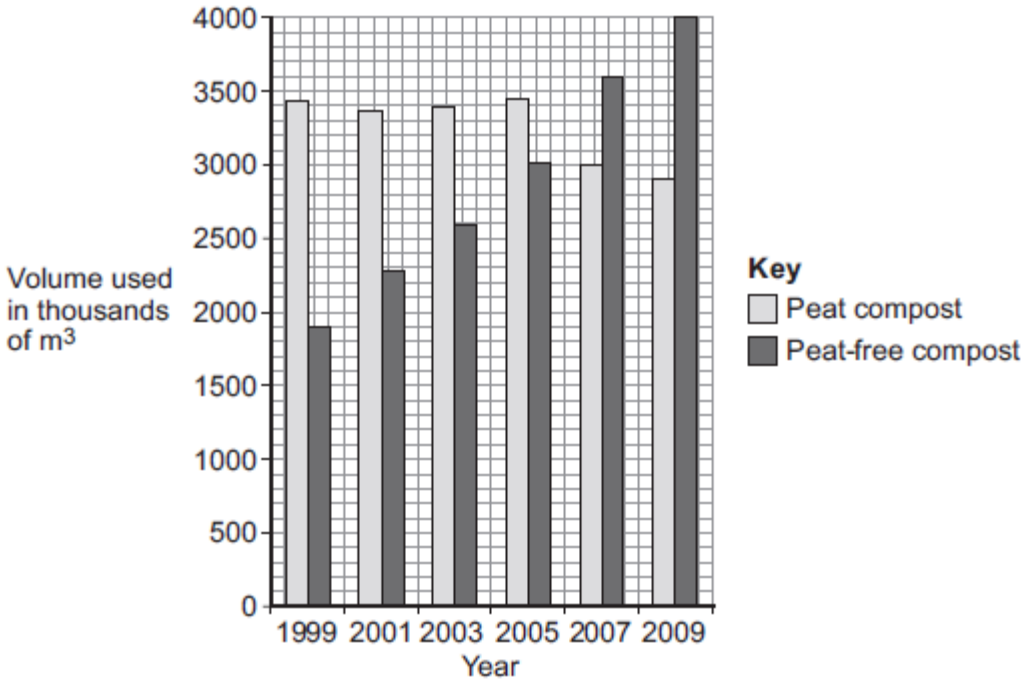
(2)

(Total 8 marks)

Q9.

Human activities have many effects on our ecosystem.

The graph shows the volume of peat compost and peat-free compost used in gardening from 1999 to 2009.



(a) Describe the trends shown in the graph.

(2)

(b) What effect does the destruction of peat bogs have on the gases in the atmosphere?

(1)

(c) Deforestation is also damaging ecosystems.

Describe **one** effect of deforestation on ecosystems.

_____

_____

_____

_____

(1)

(Total 4 marks)

Q10.

In many areas of the world the mass of household waste produced each year is increasing.

(a) Give **two** reasons why the mass of household waste is increasing each year.

1.

_____

_____

_____

2.

_____

_____

_____

_____

(2)

(b) The table below shows how the mass of household waste in the UK has changed from 2004 to 2012.

Year	Total mass of household waste in thousands of tonnes (including total household recycling)	Total mass of household recycling in thousands of tonnes	Percentage of household waste recycled
2004	25 658	5785	22.5
2006	25 775	7976	30.9
2008	24 334	9398	38.6
2010	23 454	9733	

2012	22 643	9782	43.2

(i) Calculate the percentage of household waste recycled in 2010.

_____ %

(2)

(ii) The UK government has been encouraging a ‘zero waste economy’.

In a ‘zero waste economy’, we reduce, reuse and recycle as much waste as possible.

A newspaper concluded that: **‘The government’s ‘zero waste economy’ has been successful.’**

Use information from the table to describe the reasons for and against the newspaper’s conclusion.

_____

_____

(4)

(c) (i) Some waste releases carbon dioxide and methane into the atmosphere. An increase in carbon dioxide and methane contributes to global warming.

Global warming can cause sea levels to rise.

Describe **two** other possible effects of global warming on our environment.

1.

_____

_____

_____

2.

_____

_____

_____

_____

(2)

(ii) Storing the carbon dioxide helps to prevent more global warming. Carbon dioxide can be stored (sequestered) in trees when they photosynthesise.

Give **one** different way in which carbon dioxide is sequestered in our environment.

_____

_____

_____

_____

(1)

(Total 11 marks)

Q11.

Freshwater streams may have different levels of pollution. The level of pollution affects which species of invertebrate will live in the water.

Table 1 shows the biomass of different invertebrate species found in two different streams, **X** and **Y**.

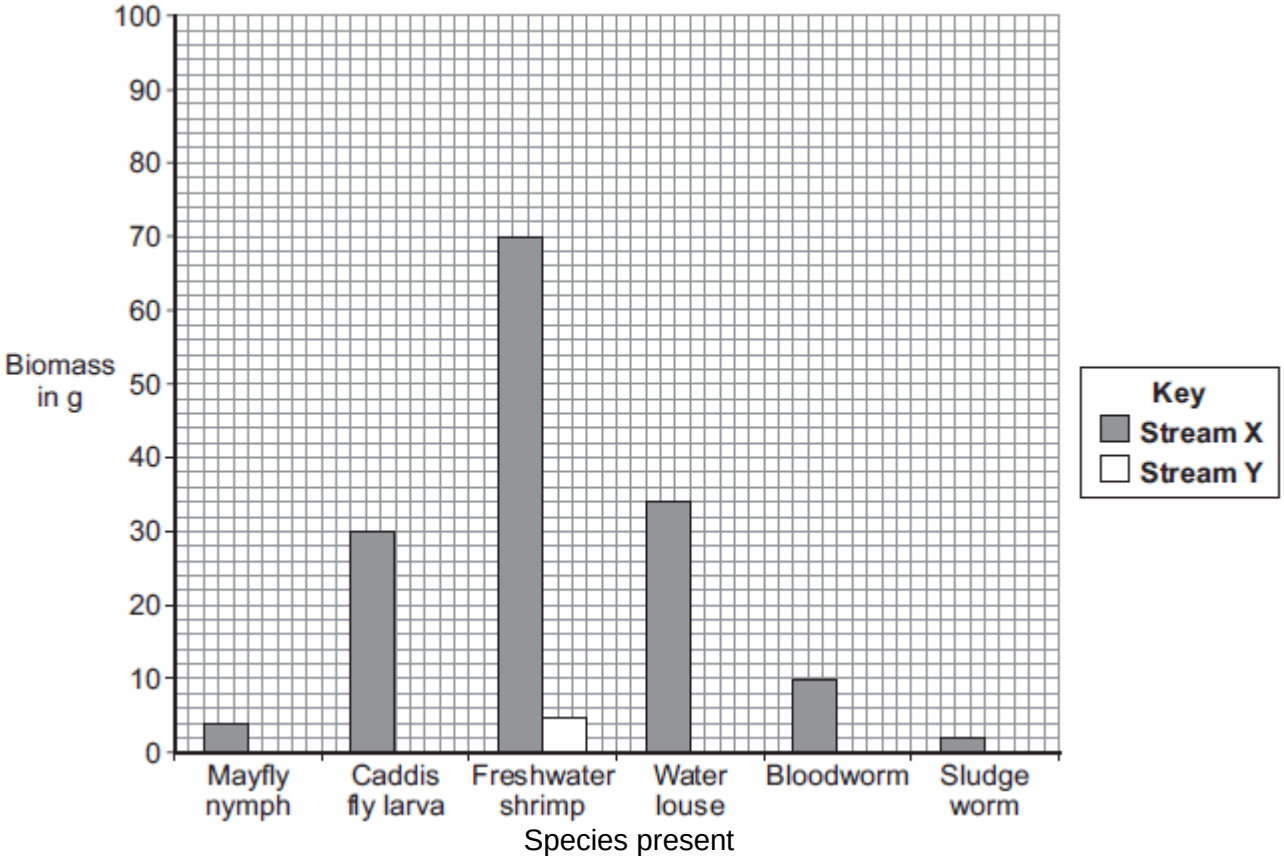
Table 1

	Biomass in g	
Invertebrate species	**Stream X**	**Stream Y**
Mayfly nymph	4	0
Caddis fly larva	30	0
Freshwater shrimp	70	5
Water louse	34	10
Bloodworm	10	45
Sludge worm	2	90
Total	**150**	**150**

(a) The bar chart below shows the biomass of invertebrate species found in **Stream X**.

(i) Complete the bar chart by drawing the bars for water louse, bloodworm and sludge worm in **Stream Y**.

Use the data in **Table 1**.



(2)

(ii) **Table 2** shows which invertebrates can live in different levels of water pollution.

Table 2

Pollution level	Invertebrate species likely to be present
Clean water	Mayfly nymph
Low pollution	Caddis fly larva, Freshwater shrimp
Medium pollution	Water louse, Bloodworm
High pollution	Sludge worm

Which stream, **X** or **Y**, is more polluted?
Use the information from **Table 1** and **Table 2** to justify your answer.

_____

_____

_____

_____

_____

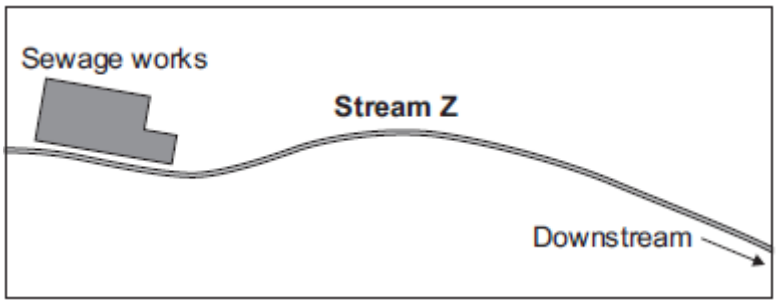
_____

_____

_____

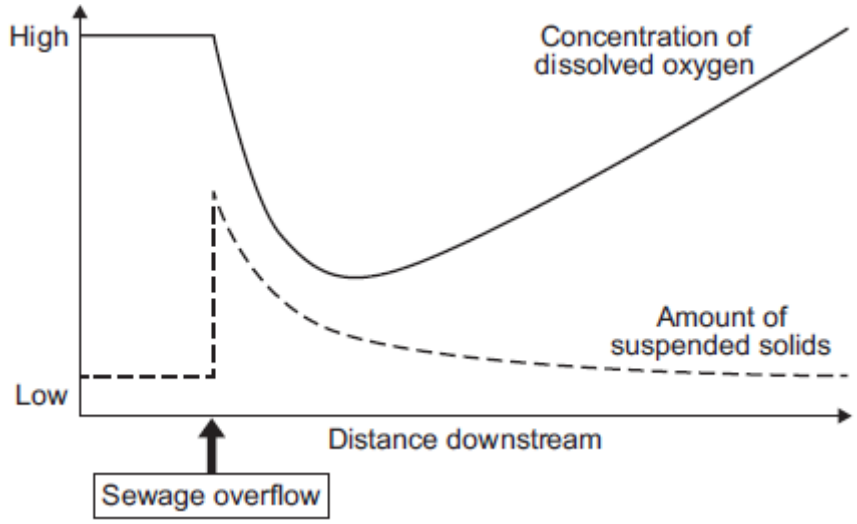
(2)

(b) There is a sewage works near another stream, **Z**.

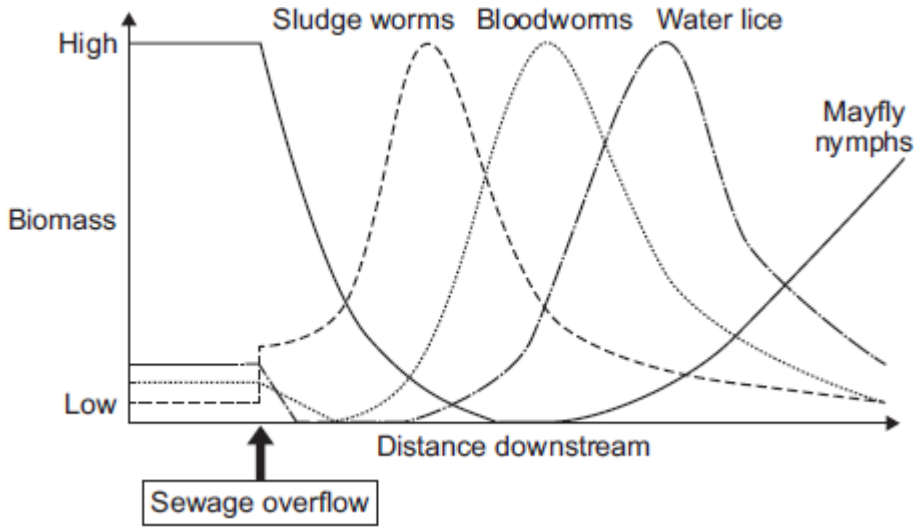


An accident caused sewage to overflow into **Stream Z**.
Two weeks later scientists took samples of water and invertebrates from the stream.
They took samples at different distances downstream from where the sewage overflowed.
The scientists plotted the results shown in **Graphs P** and **Q**.

Graph P: change in water quality downstream of sewage overflow



Graph Q: change in invertebrates found downstream of sewage overflow



(i) Describe the patterns shown in **Graph P**.

(4)

(ii) Describe the relationship between dissolved oxygen and the survival of mayfly nymphs in **Stream Z**. Suggest a reason for the pattern you have described.

(3)

(c) Many microorganisms are present in the sewage overflow.

Explain why microorganisms cause the level of oxygen in the water to decrease.

(2)

(Total 13 marks)

Q12.

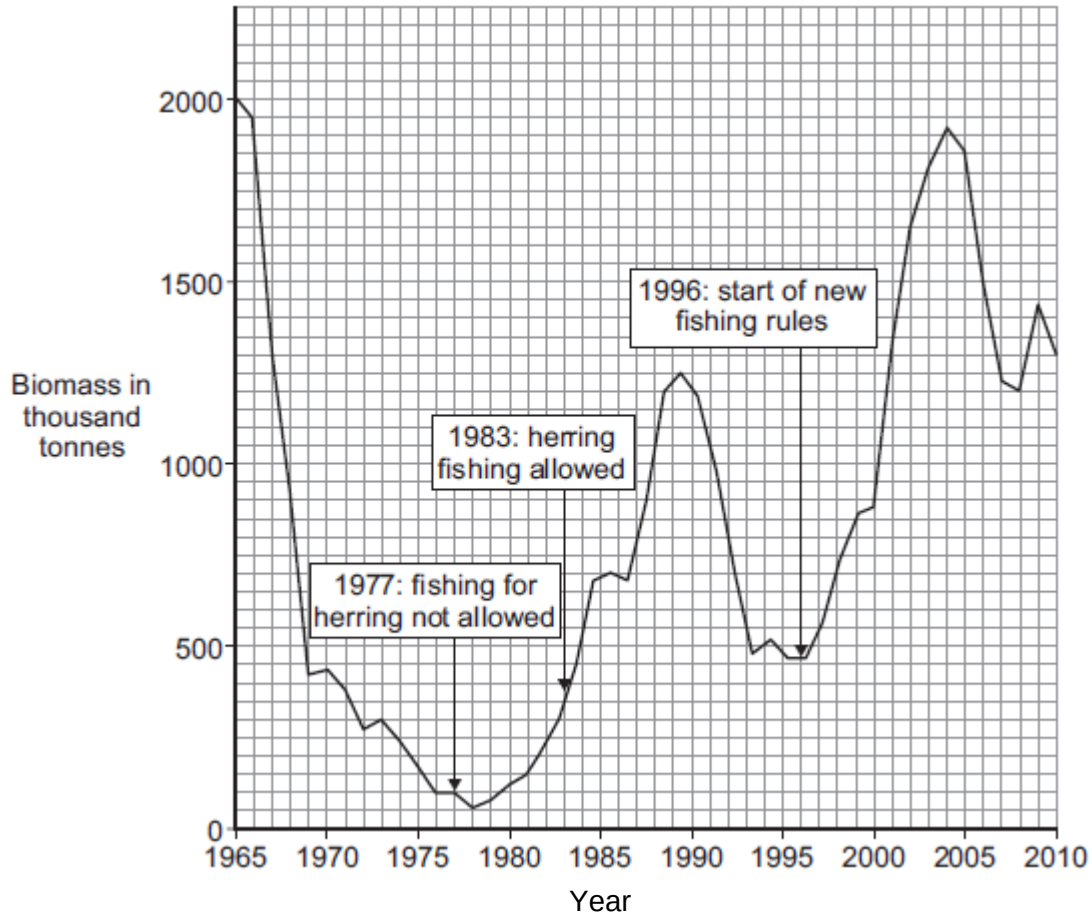
Herring are a type of fish found in the North Sea. Herring are caught using nets which are pulled by large boats.

The photographs show a fishing boat and some herring.

By Atle Grimsby from Utsira, Norway (Herring Catch at Utsira) [CC-BY-2.0 (http://creativecommons.org/licenses/by/2.0)], via Wikimedia Commons.

The herring population in the North Sea has changed a lot in recent years.

The graph shows the estimated biomass of herring in the North Sea between 1965 and 2010.



(a) Suggest why the biomass can only be estimated.

Tick (✓) **one** box.

Scientists are not properly trained. ☐

There are too many different types of fish in the sea. ☐

It is impossible to weigh all the herring in the sea. ☐

(1)

(b) (i) Describe the pattern shown in the graph from 1978 to 1983.

_____

_____

_____

_____

(1)

(ii) Suggest a reason for the pattern you have described in part **(b) (i)**.

_____

_____

_____

_____

(1)

(c) In 1996 the Government brought in strict rules to help to conserve fish stocks.

(i) State **two** rules that would help to conserve fish stocks.

1. _____

_____

_____

_____

2. _____

_____

_____

_____

(2)

(ii) Were the Government's rules effective?

Use data from the graph to support your answer.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(iii) Why should fish stocks be kept above a certain minimum level?

_____

_____

_____

_____

(1)

(iv) The Government did not introduce rules about the amount of herring caught until 1977.

This was in response to a dramatic decrease in herring stocks.

What was the percentage decrease in herring stocks between 1965 and 1977?

_____

_____

_____

_____

Percentage decrease = _____

(2)

(d) Herring migrate to feed and spawn (lay eggs).

The eggs normally take about 3 weeks to hatch at 12 °C.

If the temperature of the water is higher the eggs will hatch more quickly.

But, if the temperature of the water is above 19 °C, the eggs will die.

Other fish, such as cod, feed on herring.

Suggest how climate change could affect North Sea fish.

_____

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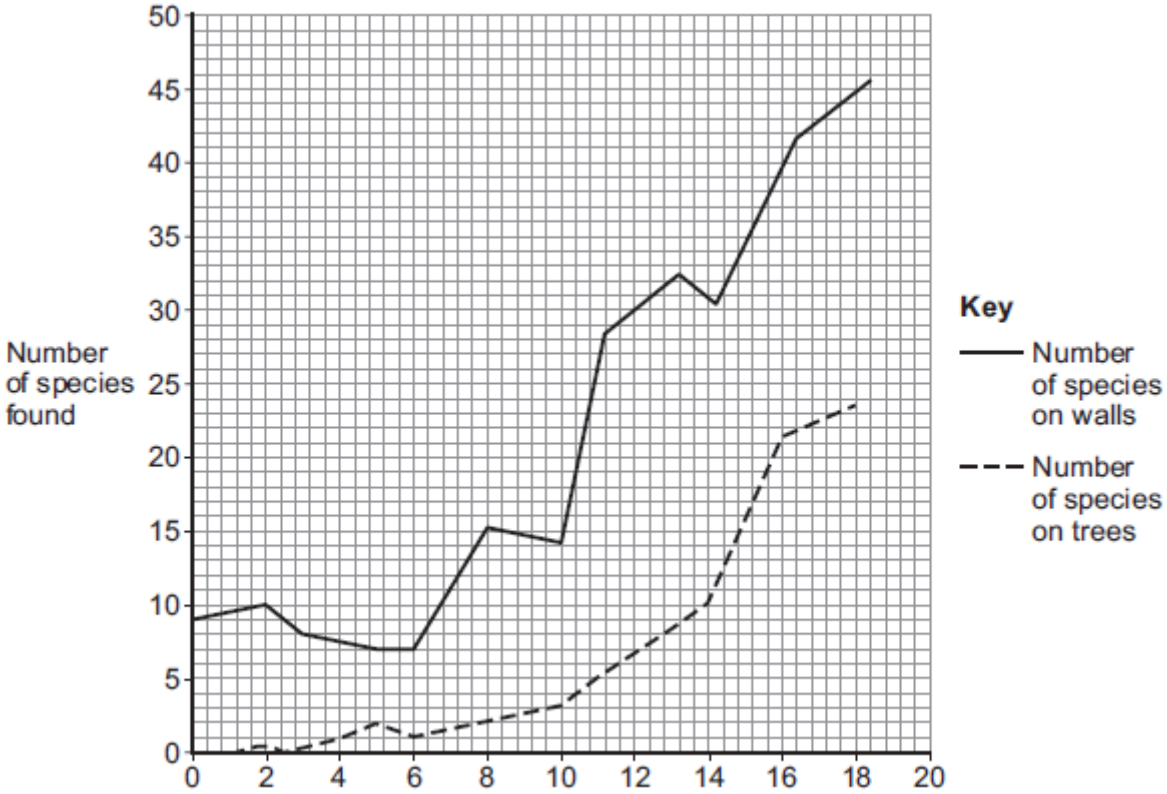
(4)

(Total 14 marks)

Q13.

Lichens can be used as air pollution indicators.

The graph below shows the number of lichen species found growing on walls and trees at increasing distances from a city centre.



(a) (i) How many species of lichen are found on walls 2 km from the city centre?

_____

_____

(1)

(ii) Describe the patterns in the data.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) The table below shows the concentration of sulfur dioxide (SO_2) in the air at different distances from the same city centre.

Distance from city centre in km	SO_2 concentration in g per m^3
0	200
3	160
8	110
13	85
18	65

Suggest how the data in the table could explain the patterns in the graph above.

_____

_____

_____

_____

_____

(2)

(c) Nitrogen oxides are also air pollutants.

The main source of nitrogen oxide pollution comes from road vehicles.

Different lichen species vary in their tolerance of the levels of nitrogen oxides in the air.

Some lichens can only grow in very clean air where there are low levels of nitrogen oxides. They are nitrogen-sensitive.

Some lichens grow very well in high levels of nitrogen oxides. They are nitrogen-loving.

The table below shows one lichen species which is nitrogen-sensitive and one

lichen species which is nitrogen-loving.

Nitrogen-sensitive	Nitrogen-loving
Usnea 	*Xanthoria* 

Usnea © epantha/iStock/Thinkstock;
Xanthoria By Zakwitnij!pl Ejdzej + Iric (CC BY-SA.2.0) via wikicommons

(i) Describe how you would investigate the distribution of the two lichens at different distances into a wood from a main road.

(3)

(ii) Predict the results from the experiment you described in your answer to part **(c)(i)**. Explain why you made this prediction.

(3)

(Total 12 marks)

Q14.

(a) Describe **three** ways in which large-scale deforestation in tropical areas has **increased** the concentration of carbon dioxide in the atmosphere.

1.

2.

3

(3)

(b) Suggest **two** reasons why deforestation also causes a reduction in biodiversity.

_____

_____

_____

(2)

(c) Scientists are thinking of new ways to try to repair the damage done by deforestation.

One way is by carbon sequestration.

(i) What is **carbon sequestration**?

_____

_____

(1)

(ii) Suggest **one** way in which carbon can be sequestered.

_____

_____

(1)

(Total 7 marks)

Q15.

The number of fish in the oceans is decreasing.

The table below shows information about the mass of fish caught by UK fishermen between 2002 and 2010.

Year	Mass of fish caught by UK fishermen from ALL SOURCES in thousands of tonnes	Mass of fish caught by UK fishermen from SUSTAINABLE SOURCES in thousands of tonnes	Percentage of fish caught from sustainable sources
2002	690.0	427.8	62.0

2004	655.0	396.6	60.5
2006	619.0	386.0	62.4
2008	589.0	436.1	74.0
2010	611.5	465.0	

(a) (i) Calculate the percentage of fish caught from sustainable sources in 2010.

_____ %

(2)

(ii) Describe the pattern in the table above for the mass of fish caught from all sources.

Suggest reasons for this pattern.

_____

_____

_____

_____

_____

(4)

(iii) Suggest why the percentage of fish caught from sustainable sources is increasing.

_____

_____

_____

_____

(1)

(b) Give **two** methods of maintaining fish stocks at a sustainable level.

1. _____

2. _____

(2)

(c) The image below shows a fish farm.

© debsthelio/iStock/Thinkstock

In a fish farm, large numbers of fish are grown in cages in the sea.

Why do fish in the cages grow faster than fish of the same species that are free in the sea?

You should refer to energy in your answer.

(4)

(Total 13 marks)

Q16.

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

Deforestation affects the environment.

Deforestation is causing a change in the amounts of different gases in the atmosphere. This change causes global warming and climate change.

The image below shows an area of deforestation.

Give the reasons why deforestation is taking place.

Describe how deforestation is causing the change in the amounts of different gases in the atmosphere.

Extra space

(Total 6 marks)

Q17.

Scientists have produced many different types of GM (genetically modified) food crops.

(a) Use words from the box to complete the sentence about genetic engineering.

clones	**chromosomes**	**embryos**	**genes**

GM crops are produced by cutting _____ out of the _____ of one plant and inserting them into the cells of a crop plant.

(2)

(b) Read the information about GM food crops.

- Herbicide-resistant GM crops produce higher yields.

- Scientists are uncertain about how eating GM food affects our health.
- Insect-resistant GM crops reduce the total use of pesticides.
- GM crops might breed naturally with wild plants.
- Seeds for a GM crop can only be bought from one manufacturer.
- The numbers of bees will fall in areas where GM crops are grown.

Use this information to answer these questions.

(i) Give **two** reasons why some farmers are in favour of growing GM crops.

1. _____

_____

2. _____

_____

(2)

(ii) Give **two** reasons why many people are against the growing of GM crops.

1. _____

_____

2. _____

_____

(2)

(Total 6 marks)

Q18.

Deforestation affects the environment in many ways.

(a) Deforestation increases the amount of carbon dioxide in the atmosphere.

Give **two** reasons why.

1. _____

_____

_____

2. _____

_____

_____

(2)

(b) Deforestation also results in a loss of *biodiversity*.

(i) What is meant by *biodiversity*?

_____

_____

_____

_____

(1)

(ii) Give **two** reasons why it is important to prevent organisms becoming extinct.

1. _____

_____

_____

_____

2. _____

_____

_____

_____

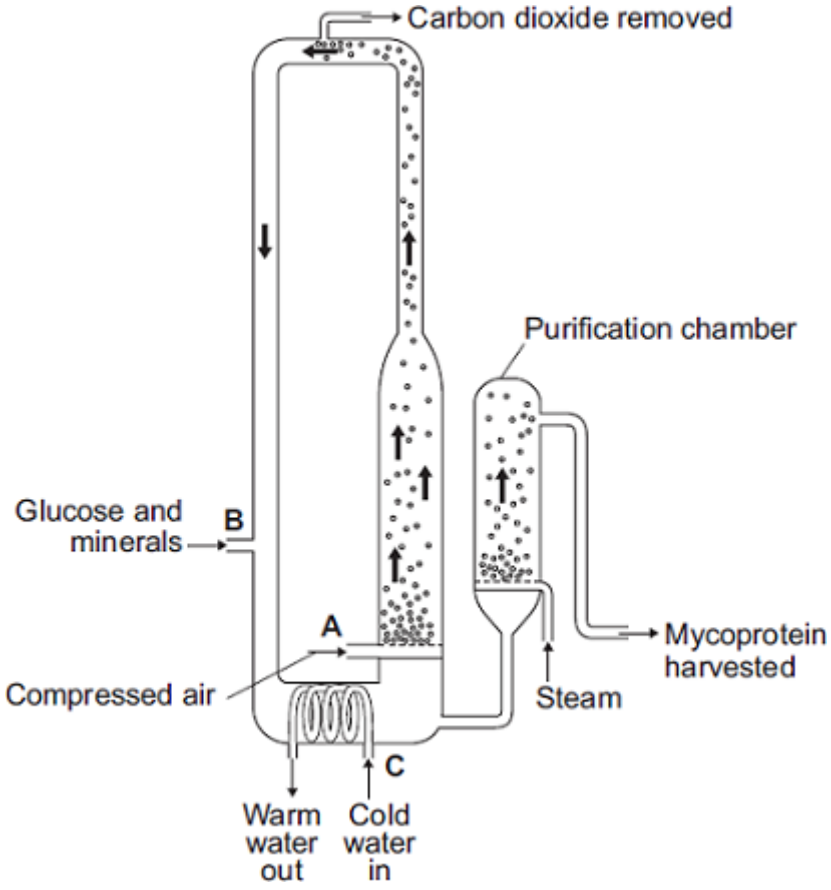
(2)

(Total 5 marks)

Q19.

The diagram shows a fermenter. This fermenter is used for growing the fungus *Fusarium*.

Fusarium is used to make mycoprotein.



(a) Bubbles of air enter the fermenter at **A**.

Give **two** functions of the air bubbles.

1. _____

_____

_____

_____

2. _____

_____

_____

_____

(2)

(b) Why is glucose added to the fermenter?

_____

_____

(1)

(c) The fermenter is prevented from overheating by the cold water flowing in through the heat exchanger coils at **C**.

Name the process that causes the fermenter to heat up.

_____

(1)

(d) It is important to prevent microorganisms other than *Fusarium* growing in the fermenter.

(i) Why is this important?

_____

_____

(1)

(ii) Suggest **one** way in which contamination of the fermenter by microorganisms could be prevented.

_____

_____

(1)

(e) Human cells cannot make some of the amino acids which we need. We must obtain these amino acids from our diet.

The table shows the amounts of four of these amino acids present in mycoprotein, in beef and in wheat.

Name of amino acid	Amount of amino acid per 100 g in mg			Daily amount needed by a 70 kg human in mg
	Mycoprotein	Beef	Wheat	

Lysine	910	1600	300	840
Methionine	230	500	220	910
Phenylalanine	540	760	680	980
Threonine	610	840	370	490

A diet book states that mycoprotein is the best source of amino acids for the human diet.

Evaluate this statement.

Remember to include a conclusion in your evaluation.

(4)

(Total 10 marks)

Q20.

Human activities affect the environment.

(a) Deforestation results in an increase in carbon dioxide levels in the atmosphere.

Give **two** reasons why.

(2)

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

A dairy farmer washes out his cow shed each day. The waste water contains urine and faeces. The waste water overflows into a stream by mistake.

The waste water will have an effect on the plants and invertebrates living in the stream.

Explain why.

(6)

(Total 8 marks)

Q21.

Human activities affect the environment.

(a) **List A** gives four human activities.

List B gives the effect of the activities on the environment.

Draw **one** line from each human activity in **List A** to its effect on the environment in **List B**.

List A **Human activity**	**List B** **Effect on the environment**
	Adds methane to the atmosphere
Digging a new quarry	
	Pollutes hedges around fields
Spraying pesticides on crops	
	Reduces the land available for wild animals
Growing rice	
	Produces lots of litter
Driving cars that release sulfur dioxide	
	Produces acid rain

(4)

(b) Human activities are increasing *global warming* .

Give **two** effects of *global warming* on the environment.

1.

_____

_____

_____

2.

_____

_____

_____

(2)

(Total 6 marks)

Q22.

Scientists have discovered that curry spices affect sheep and cattle. Curry spices can reduce the amount of methane that grazing animals give off.

'Bad' bacteria in the animal's stomach produce methane. About 12% of the animal's food is changed into methane.

The curry spice coriander works like an antibiotic. Adding coriander to animal food reduces methane production by about 40%.

(a) (i) Why does adding coriander to an animal's food reduce methane production?

_____

_____

_____

_____

(1)

(ii) Explain **one** advantage to a farmer of adding coriander to the animal's food.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(b) Farm animals give off large amounts of methane.

Explain the effects of adding large amounts of methane to the atmosphere.

_____

_____

_____

_____

_____

_____

_____

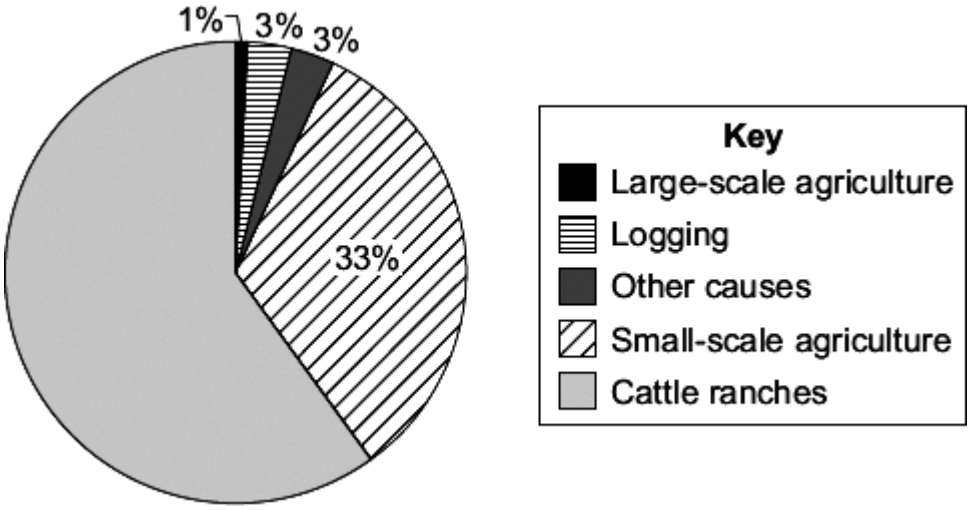
(3)

(Total 6 marks)

Q23.

Large-scale deforestation is taking place in Brazil.

The pie chart shows the causes of deforestation in Brazil.



(a) Calculate the percentage of forest that has been destroyed for cattle ranches.

Show clearly how you work out your answer.

_____

_____

_____

Percentage = _____

(2)

(b) Cattle give off large amounts of methane into the atmosphere.

The methane causes the Earth's temperature to increase.

Give **two** effects of the temperature increase on the environment.

1. _____

_____

2. _____

_____

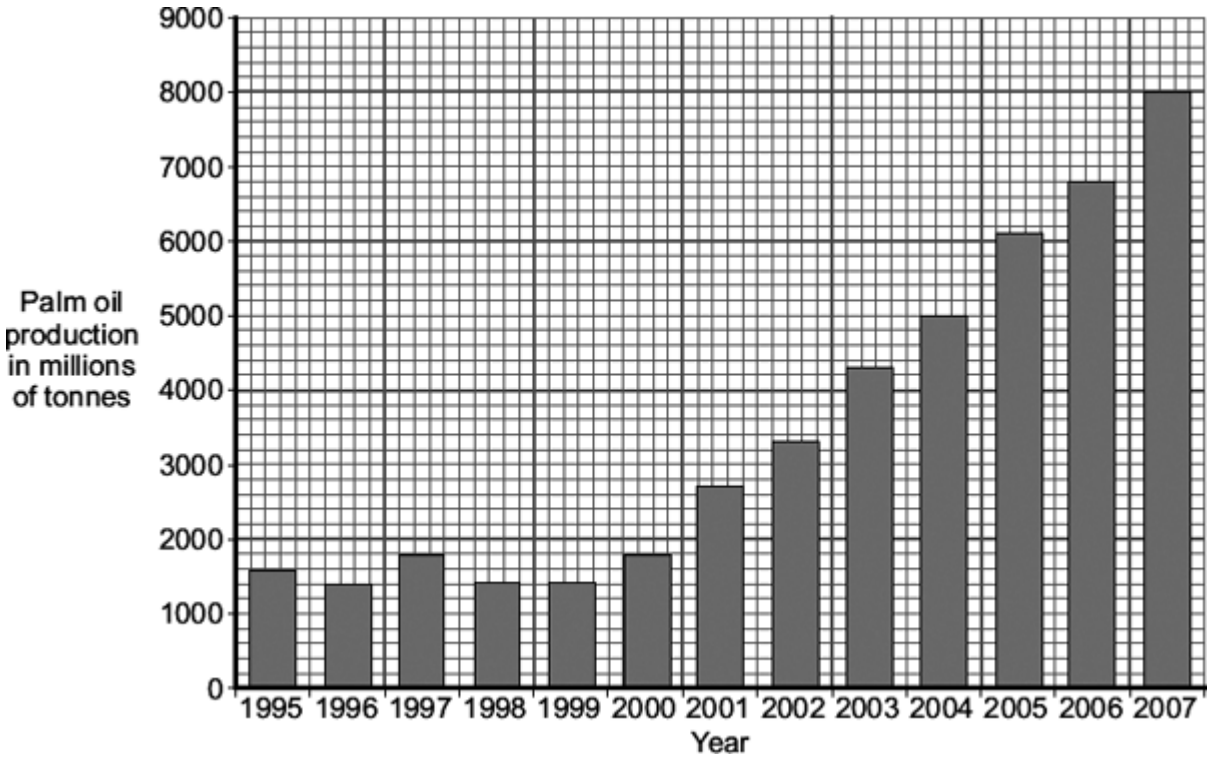
(2)

(Total 4 marks)

Q24.

In South Asia, forests are being cleared to grow palm oil trees. The palm oil is mainly used to produce fuel for motor vehicles.

The graph shows the production of palm oil in one South Asian country.



(a) Calculate the mean increase in palm oil production per year for the five year period 2000 to 2005.

Show clearly how you work out your answer.

_____

_____

_____

_____

Mean increase = _____ millions of tonnes per year

(2)

(b) Clearing forests and replacing the forests with palm oil trees to produce fuel for motor vehicles will affect the composition of the atmosphere.

Explain how.

_____

_____

_____

_____

_____

_____

(5)

(Total 7 marks)

Q25.

The photographs show some ways in which humans affect the environment.

(a) Coal-burning power stations give off smoke. The smoke contains many different gases.

By Norbert Kaiser (English: own work.) [CC-BY-SA-3.0], via Wikimedia Commons

Draw a ring around the correct answer to complete each sentence.

(i) The gas which causes global warming is

carbon dioxide.
oxygen.
sulfur dioxide.

(1)

(ii) The gas which causes acid rain is

methane.
oxygen.
sulfur dioxide.

(1)

(b) The photograph shows a quarry.

By Thomas Bjørkan (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

Draw a ring around the correct answer to complete each sentence.

(i) Quarrying

releases methane into the atmosphere.
increases biodiversity.
reduces land available for animals and plants.

(1)

(ii) Quarrying can be reduced by recycling

metals.
paper.
plastic

(1)

(c) The photograph shows a farmer spraying fruit trees.

Photograph supplied by Hemera/Thinkstock

Chemicals in the spray kill insects on the trees.

Draw a ring around the correct answer to complete each sentence.

(i) The spray contains

fertiliser.

herbicide.

pesticide.

(1)

(ii) The chemical in the spray might also

kill other animals.

kill plants.

increase biodiversity.

(1)

(Total 6 marks)

Q26.

Soay sheep live wild on an island off the north coast of Scotland. No people live on the island.

By Owen Jones = Jonesor [CC-BY-SA-2.5], via Wikimedia Commons

Over the last 25 years, the average height and mass of the wild Soay sheep have decreased.

The scientists think that climate change might have affected the size of the sheep.

(a) More Soay sheep are now able to survive winter than 25 years ago.

What change in the climate may have helped more Soay sheep to survive winters?

_____

_____

(1)

(b) Complete the sentences.

(i) Soay sheep show variation in size because of differences in their

_____

(1)

(ii) The change in the size of the Soay sheep over 25 years can be explained by Darwin's

theory of _____

(1)

(Total 3 marks)

Q27.

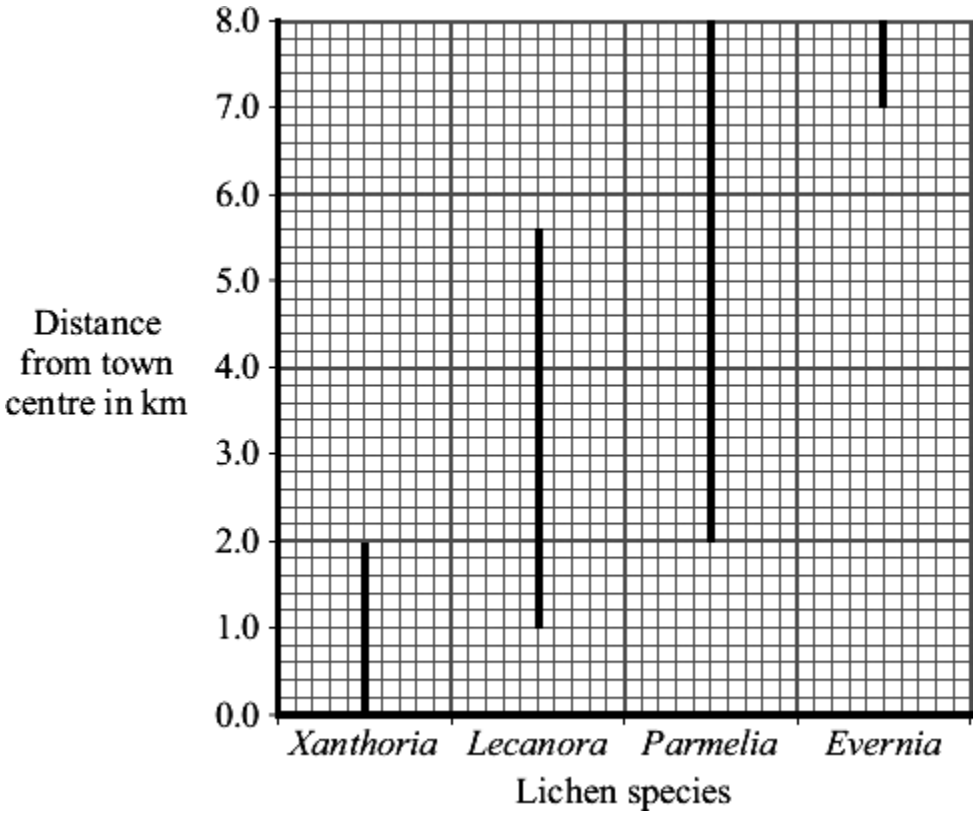
Lichens are sensitive to the amount of sulfur dioxide in the atmosphere. They are used as indicator species for the amount of air pollution. Air pollution is generally higher in town centres than in the countryside.

Students investigated the relationship between lichen species and distance from a town centre.

- On a map, they drew a transect (line) from the centre of the town to the countryside.
- They examined sites every 200 metres along the transect (line).
- At each site, they recorded the lichen species growing on trees and walls up to a height of 2 metres.

The graph shows their results.

The lines on the graph indicate the range of each lichen species.



(a) Give **one** way in which the students could have obtained more accurate results.

_____

_____

_____

_____

(1)

(b) (i) Which lichen species was found over the greatest range?

_____

(1)

(ii) Which lichen species grows only in the least polluted air?

_____

(1)

(c) One student concluded 'You can tell how much sulfur dioxide there is in the air by the amount of *Lecanora* growing'.

Give **two** reasons why this is **not** a valid conclusion.

1.

_____

_____

2.

_____

_____

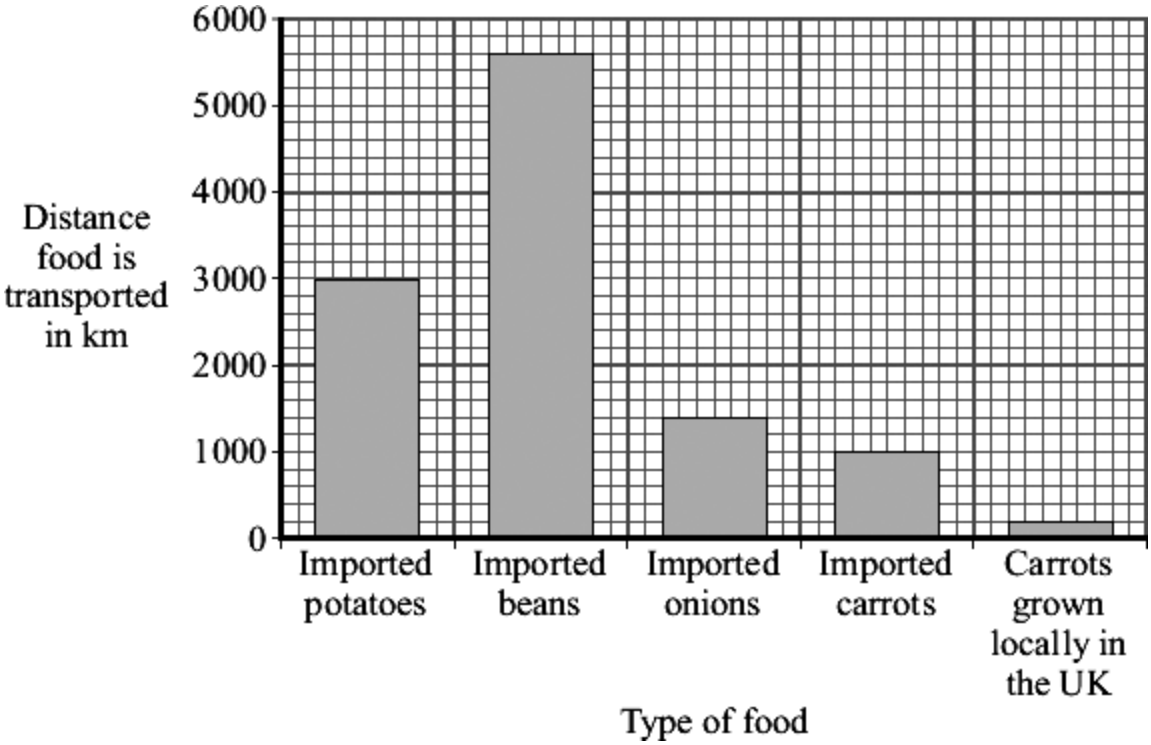
(2)

(Total 5 marks)

Q28.

Some people are concerned about the distance that food is transported between the grower and the supermarket.

The bar chart shows the distances for some foods.



(a) Both imported carrots and carrots grown locally in the UK can be bought in supermarkets all year round.

How many times further are imported carrots transported than carrots grown locally in the UK?

Show clearly how you work out your answer.

_____

_____

_____

_____ times

(1)

(b) Many of the beans sold in supermarkets in the UK are grown in Kenya, a tropical country in Africa.

Beans grow faster in Kenya than they do in the UK.

Suggest and explain **one** reason why.

Reason

_____

_____

Explanation

(2)

(c) Many people believe that we should buy locally produced food instead of food imported from abroad.

Explain how this would help the environment.

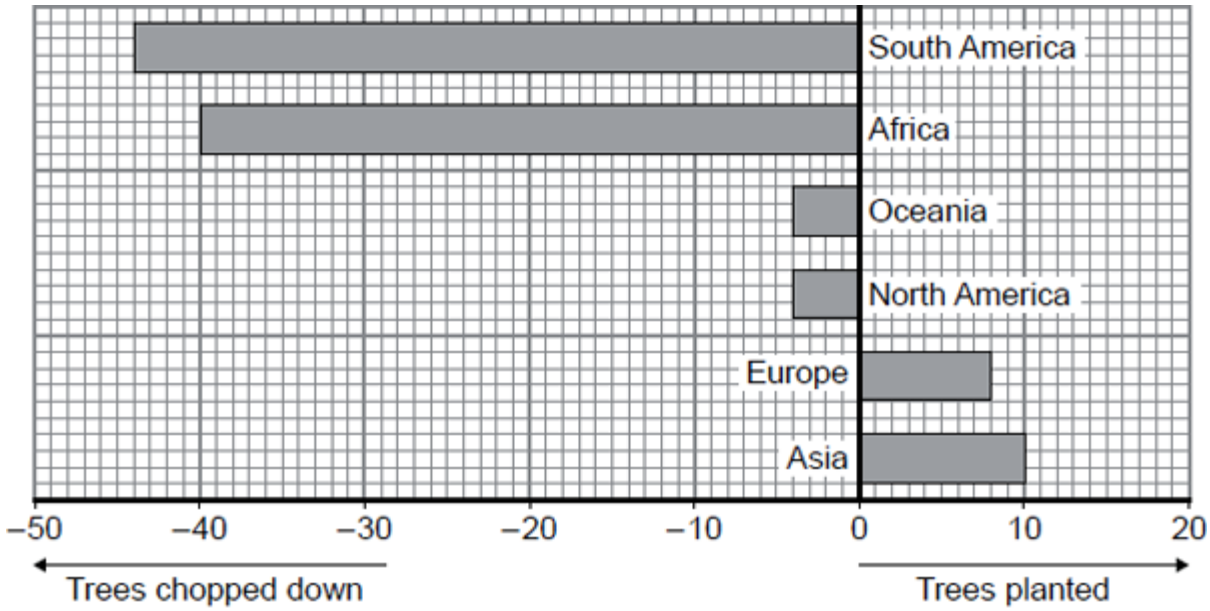
(2)

(Total 5 marks)

Q29.

In many parts of the world, forests are being chopped down (deforestation) so that the land can be used to grow food crops. In other parts, trees are planted to produce new forests.

The graph shows how the area of forest in each of the continents is changing each year.



Change in area of forest in thousands of km^2 per year

(a) (i) What area of forest is being lost in Africa each year?

Area = _____ thousand km^2

(1)

(ii) Use **Steps 1**, **2** and **3** to calculate the total change to the area of forest each year.

Step 1 Calculate the total area of trees chopped down.

_____

_____

Total area chopped down = _____ thousand km^2

Step 2 Calculate the total area of trees planted.

_____

_____

Total area planted = _____ thousand km^2

Step 3 Use your answers from **Steps 1** and **2** to calculate the total change in the area of forest.

_____

_____

Total change in area of forest _____ thousand km^2

(3)

(b) Draw a ring around the correct answer to complete each sentence.

(i) Large scale deforestation reduces the number of

species of

- plants only.
- animals only.
- both animals and plants.

(1)

(ii) The remains of the trees are broken down into carbon dioxide by

- lichens.
- microorganisms.
- plants.

(1)

(iii) The gas released into the atmosphere when trees are burned is

- carbon dioxide.
- methane.
- oxygen.

(1)

(Total 7 marks)

Q30.

The photograph shows an area where a tropical forest is being cleared.

(a) Complete the sentences.

People could use timber from the forest for _____ .

The cleared land can be used for _____ .

Clearing forests increases the concentration of _____ in the atmosphere.

This increase causes global _____ .

(4)

(b) Clearing forests causes some species to become *extinct*.

(i) What is meant by *extinct*?

_____

_____

_____

_____

(1)

(ii) It is important to prevent species from becoming extinct.

Give **one** reason why.

_____

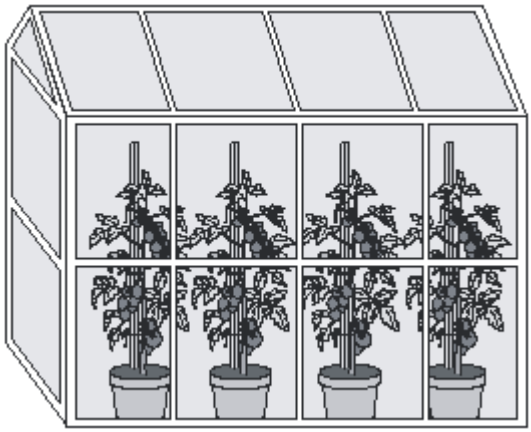
_____

(1)

(Total 6 marks)

Q31.

In this country most tomatoes are grown in greenhouses.



(a) Suggest **one** way in which a grower could increase the yield of tomatoes from plants growing in his greenhouse.

_____

_____

(1)

(b) Large supermarkets often import tomatoes from overseas.

(i) Suggest **two** reasons why a supermarket might decide to import tomatoes rather than buy them from British growers.

1.

_____

_____

2. _____

_____

_____

_____

(2)

(ii) Importing tomatoes may be more damaging to the environment than selling tomatoes grown in this country.

Explain why.

_____

_____

_____

_____

_____

_____

_____

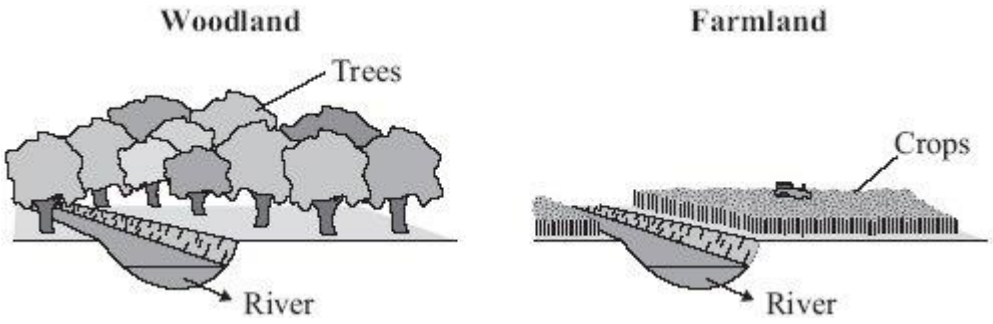
_____

(2)

(Total 5 marks)

Q32.

The drawings show some woodland and some farmland. Both have a river flowing through.



(a) (i) There is a wider variety of wildlife in the woodland than in the farmland.

Give **one** reason why.

_____

_____

_____

(1)

(ii) Farmers remove woodland to provide space for growing crops.

Give **two** other reasons why humans remove woodland.
Do **not** include the uses of wood in your answers.

1. _____

_____

2. _____

_____

_____

(2)

(b) Many farmers spray chemicals on their fields.

Draw a ring around the correct word to complete each sentence.

(i) To make crops grow larger, farmers use

fertilisers
herbicides
pesticides

.

(1)

(ii) To kill insects that feed on the crop, farmers use

fertilisers
herbicides
pesticides

.

(1)

(iii) There is a wider variety of wildlife in the river flowing through the woodland than in the river flowing through the farmland.

Give **one** reason why.

_____

_____

_____

_____

(1)

(c) The population of the UK has increased over the last two hundred years. This increase in population has resulted in damage to the environment.

Apart from farming methods, give **two** ways in which humans damage the environment.

1.

_____

_____

2.

_____

_____

(2)

(Total 8 marks)

Q33.

Copper compounds are found in water that has drained through ash from power stations. Invertebrate animals are used to monitor the concentration of copper compounds in water. First, scientists must find out which invertebrate animals can survive in a range of concentrations of copper compounds.

This is how the procedure is carried out.

- Solutions of different concentrations of a copper compound are prepared.
- Batches of fifty of each of five different invertebrate species, **A**, **B**, **C**, **D** and **E**, are placed in separate containers of each solution.
- After a while, the number of each type of invertebrate which survive at each concentration is counted.

(a) Give **two** variables that should be controlled in this investigation so that the results are valid.

1.

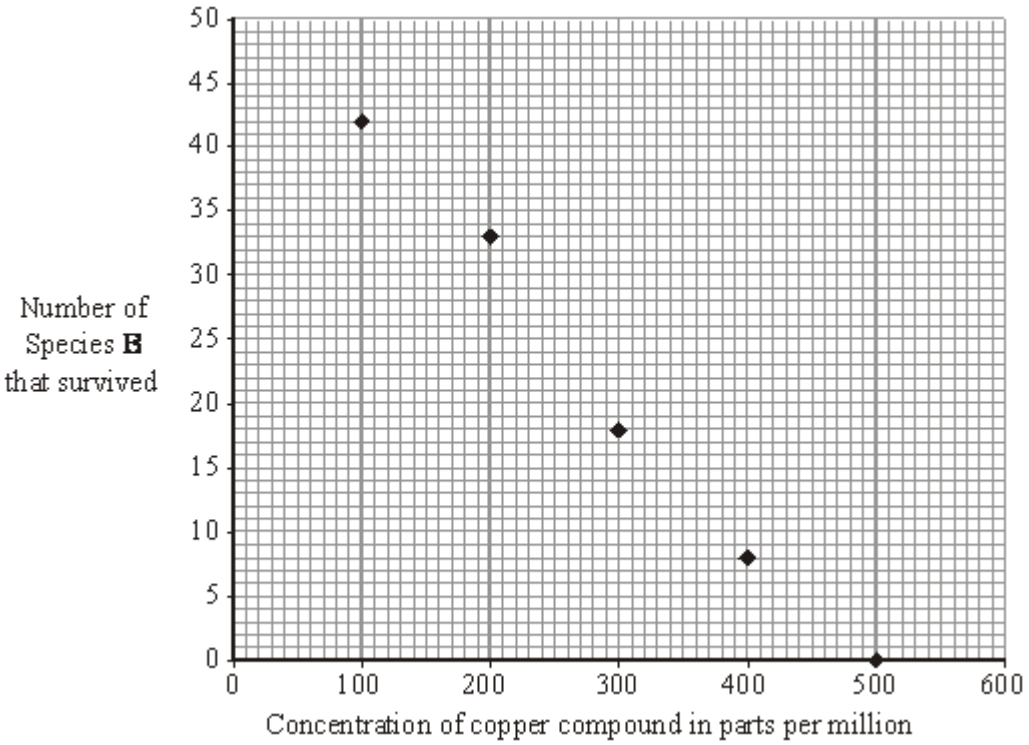
_____

2. _____

___

(2)

(b) The graph below shows the results for species **B**.

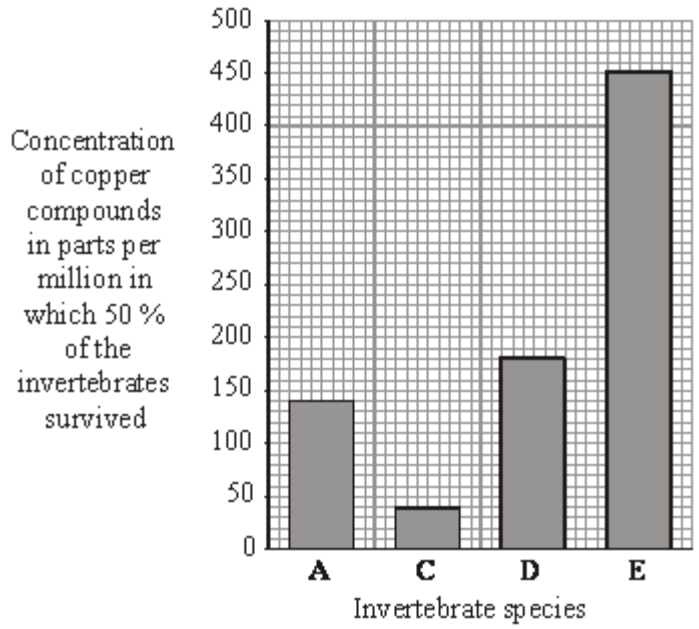


Use the graph to find the concentration of copper compounds in which 50% of Species **B** survived. To obtain full marks you must show clearly on the graph how you obtained your answer.

Concentration _____ parts per million

(2)

(c) The graph below shows the results of the tests on the other four invertebrate species.



(i) Which species, **A**, **C**, **D** or **E**, is most sensitive to the concentration of copper in the water?

_____

Give the reason for your answer.

_____

_____

(1)

(ii) It is often more convenient to use invertebrates rather than a chemical test to monitor water for copper.

Suggest **one** explanation for this.

_____

_____

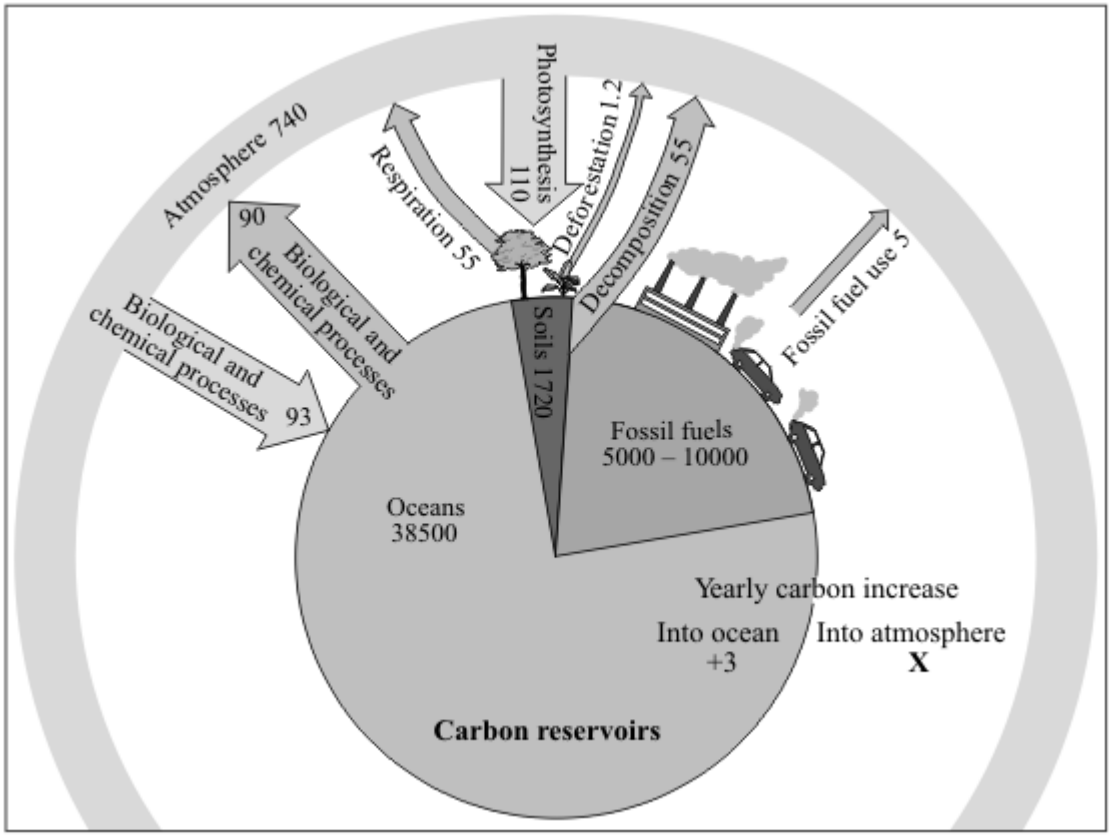
_____

_____

(2)
(Total 7 marks)

Q34.

The diagram shows the mass of carbon exchanged between carbon reservoirs and the atmosphere. The pie chart in the diagram shows the mass of carbon in three reservoirs: oceans, soils and fossil fuels. The figures are in billions of tonnes of carbon per year.



Reproduced by permission of Philip Allan Updates

(a) Calculate **X** (the yearly carbon increase into the atmosphere).

Show all your working.

_____

_____

_____

_____

_____

_____

_____

_____

X = _____ billion tonnes of carbon

(2)

(b) Give **one** reason why deforestation increases the carbon dioxide concentration of the atmosphere.

_____

_____

_____

_____

(1)

(Total 3 marks)

Q35.

A large supermarket chain is advertising ‘our goal is to make our business carbon neutral in the next five years’.

(i) Why does the supermarket management think that this will attract more customers?

_____

_____

_____

_____

(1)

(ii) One step that the supermarket chain intends to take is to obtain as much food as possible from British sources.

Explain how this will help the environment.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(Total 3 marks)

Mark schemes

Q1.

(a)

	1960 − 1977	1977 − 2003	2003 − 2015	
trend in carbon dioxide concentration		increasing	increasing	1
trend in air temperature	decreasing	increasing	constant / decreasing	1

allow synonyms e.g. level / goes up / goes down

(b) traps heat / energy or (long-wavelength / IR) radiation

*do **not** accept light / UV*

or

less loss of heat

allow stops (some) heat escaping
*do **not** accept stops all heat escaping*

or

insulates

ignore greenhouse effect
ignore reference to ozone layer

1

(c) **Level 2:** Some logically linked reasons are given. There may also be a simple judgement.

3–4

Level 1: Relevant points are made. They are not logically linked.

1–2

No relevant content

0

Indicative content

for the theory:

- (overall increased CO_2 parallels) overall increased temperature (e.g. by 0.4 (°C))
- CO_2 traps (long-wave) radiation / IR / heat

against the theory:

- in some years (e.g. 1960–1977) temperature falls (while CO_2 is rising)
- many (large and small) erratic rises and falls in temperature
- overall correlation does not necessarily mean a causal link
- other (unknown) factors may be involved in temperature change

to access level 2 there must be evidence both for and against the theory **and** use of data from the graph

(d) burning of (fossil) fuels

allow e.g. coal / oil / gas
allow driving cars
allow any activity which leads to burning fuels − e.g. using central heating

ignore power stations unqualified
ignore burning / fires unqualified
ignore deforestation

1

(e) photosynthesis

allow full description or full equation
allow a symbol equation which is not balanced

1

(f) any **two** from:

- (some) plants grow faster / higher yield
- loss of habitat
- migration **or** change in distribution*
- extinction*

if neither is given allow alters biodiversity for **1 mark*

allow (in terms of extinction) death due to e.g. lack of water / food or increased disease

ignore death unqualified

2

allow points made using examples

[11]

Q2.

(a) any **two** from:

- sprinkled through air
- air spaces between stones
- thin layer over stones (for efficient diffusion)
- slow flow (for efficient diffusion)

2

(b) green algae

1

(c) (large / small) protist

1

(d) **Level 2 (3-4 marks):**
Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

Level 1 (1-2 marks):
Facts, events or processes are identified and simply stated but their relevance is not clear.

No relevant content (0 marks)

Indicative content

digestion:
- (external) enzymes released
- role of enzymes – e.g. amylase / protease / lipase
- substrates & products – e.g. starch ⟶ sugar / protein ⟶ amino acids / fat ⟶ fatty acids

absorption:
- by diffusion / active transport

deamination:
- amino acids ⟶ ammonia / ammonium ions

release of other ions:
- e.g. phosphate / nitrate / magnesium

respiration:
- produces carbon dioxide (+ water)
  or
  equation is given
- release of energy allows other processes to take place e.g. active transport

[8]

Q3.

(a) (140 + 240 + 380 + 450 =) 1210

1

(b) the local people decided to farm cattle

1

a company starts growing plants for biofuels

1

(c) carbon dioxide

in this order only

1

photosynthesis

1

(d) animals and birds migrate because there is less food

1

more habitats are destroyed

1

(e) any **one** from:
- breeding programmes (for endangered species)
- regeneration (programmes)
- reintroduction of field margins / hedgerows
- awareness raising with politicians / public
- recycling

1

[8]

Q4.

(a) methane is produced

ignore bad smell

1

which is a greenhouse gas / causes global warming

1

(b) (9.80 / 0.20 = 49 therefore) 49:1

1

(c) horse (manure)

*allow ecf from **11.2***

closest to 25:1 (ratio)

1

(d) **Level 3 (5–6 marks):**
A detailed and coherent explanation is given, which logically links how carbon is released from dead leaves and how carbon is taken up by a plant then used in growth.

Level 2 (3–4 marks):
A description of how carbon is released from dead leaves and how carbon is taken up
by a plant, with attempts at relevant explanation, but linking is not clear.

Level 1 (1–2 marks):
Simple statements are made, but no attempt to link to explanations.

0 marks:
No relevant content.

Indicative content

statements:
- (carbon compounds in) dead leaves are broken down by microorganisms / decomposers / bacteria / fungi
- photosynthesis uses carbon dioxide

explanations:
- (microorganisms) respire
- (and) release the carbon from the leaves as carbon dioxide
- plants take in the carbon dioxide released to use in photosynthesis to produce glucose

use of carbon in growth:
- glucose produced in photosynthesis is used to make amino acids / proteins / cellulose
- (which are) required for the growth of new leaves

6

(e) any **three** from:
(storage conditions)
- (at) higher temperature / hotter
- (had) more oxygen
- (had) more water / moisture

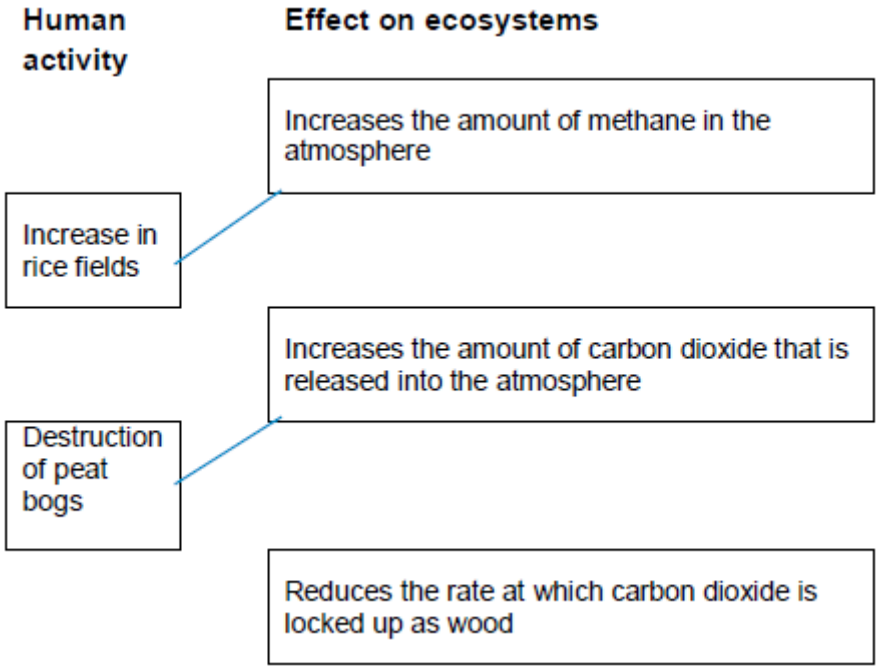
- (contained) more microorganisms (that cause decay)

  allow reference to bacteria / fungi / mould

3

[13]

Q5.



(a)

extra lines from left cancels mark

2

(b) (i) any **two** from:

- (to provide land) for farming / agriculture
- (to provide land) for quarrying
- (to provide land) for building
- to provide wood for building materials
- to provide fuel
- to provide paper

2

(ii) any **two** from:

- changes in earth's climate, ie droughts, flooding, hurricanes
  ignore temperature rise
  allow ice caps melt
- rise in sea levels
- reduce biodiversity
- change in migration patterns
- may change distribution of species

  *ignore acid rain **and** the ozone layer **and** forest fires*

2

[6]

Q6.

(a) (i) forest at the edges (of the island) has been removed

allow centrally the forest remains

1

an appropriate area on the island is identified eg south east **or** bottom right

1

(ii) any **two** from:
- (to provide land) for farming / agriculture
- (to provide land) for quarrying
- (to provide land / wood) for building
  allow to provide timber
- to provide fuel
- to produce paper
  allow forest fires

2

(b) any **two** from:
- decreased biodiversity
- loss of habitats
- increased carbon dioxide (concentration)
- global warming
  allow effects of global warming eg flooding / rise in sea level
  allow soil erosion

2

[6]

Q7.

(a) (i) counts / 12

1

× 120 × 80 / × 9600
or
× area of field

1

(ii) (more) quadrats / repeats

1

placed randomly
ignore method of achieving randomness

1

(b) (i) any **three** from:
- temperature / warmth / heat
- water / rain
- minerals / ions / salts (in soil)
  allow nutrients / fertiliser / soil fertility
  ignore food
- pH (of soil)
- trampling
- herbivores
  ignore predators
- competition (with other species)
- pollution qualified e.g. SO_2 / herbicide

- wind (related to seed dispersal).

  ignore space / oxygen / CO_2 / soil unqualified

3

(ii) light needed for photosynthesis

1

for making food / sugar / etc.

1

effect on buttercup distribution eg more plants in sunny areas / fewer plants in shady areas

1

(c) (i) fertiliser / ions / salts cause growth of algae / plants

1

(algae / plants) block light

1

(low light) causes algae / plants to die

1

microorganisms / bacteria feed on / break down / cause decay of organic matter / of dead plants

*do **not** allow germs / viruses*

1

(aerobic) respiration (by microbes) uses O_2

*do **not** allow anaerobic*

1

(ii) sewage / toxic chemicals / correct named example eg metals / bleach / disinfectant / detergent etc

allow suitable named examples eg metals such as Pb / Zn / Cr / oil / SO_2 / acid rain / pesticides / litter

ignore chemicals unqualified

ignore waste unqualified

ignore human waste / domestic waste / industrial waste unqualified

1

(d) (i) 2

1

(ii) more food

allow other sensible suggestion eg more species colonise from tributary streams after forest

1

(iii) number of stonefly species decreases (from **A** to **B** / **B** to **C** / **A** to **C**) as more pollution enters river / less oxygen

allow fewer species in more polluted water

ignore none are found at site C

1

[19]

Q8.

(a) any **one** from:
- increased pollution
- dumping waste

allow described consequence e.g. vermin

accept (increased) landfill

accept (increased) fly tipping.

1

(b) (i) (mass of SO_2) decreases

1

and then levels off / plateaus

1

(ii) 2008

clear evidence of calculating 700 (000) = 1 mark

2

(iii) any **one** from:
- acid rain
- erosion of statues / buildings
- destruction of habitats
- reduction in biodiversity
- damage to lichen
- breathing problems

ignore reference to ozone layer

allow damage to plants.

1

(c) Carbon dioxide being absorbed in oceans and lakes

1

Photosynthesis by trees

1

[8]

Q9.

(a) any **two** from:
- (volume of) peat compost has been steady and then declined **or** volume of peat compost has declined since 2005

allow 2007 instead of 2005
- (volume of) peat-free compost has increased (since 1999)
- (volume of) peat is higher than peat-free until 2005, then peat-free compost is higher (than peat)

allow 2007
- total volume of peat and peat-free compost has increased.

2

(b) increases carbon dioxide (in the atmosphere)

ignore methane

1

(c) any **one** from:

- reduces biodiversity
- destruction of habitats
- disruption of food chains.

1

[4]

Q10.

(a) (rapid) growth in population (size)

1

increase in the standard of living

accept description of increased standard of living, eg more packaging, more food thrown away or overbuying resources

1

(b) (i) 41.5

allow 1 mark for 9733 ÷ 23454

or

allow 1 mark for 0.415

or

allow 1 mark for 41.49 ***or*** *41* ***or*** *41.4*

2

(ii) any **four** from

arguments for:

- there has been a reduction in total waste
- there has been an increase in (total mass of) recycling
- there has been an increase in the percentage of waste recycled
- it (may) not be possible to achieve zero waste.

arguments against:

- there is still a lot of waste (not recycled)
- there has only been a small reduction in total waste
- there was one year (2006) where total waste went up
- the rate of increase of percentage recycled is slowing down
- no information on materials reused
- no information on waste from factories / industry

max 3 marks for a one sided argument

allow as reason against if clear

allow still more than half or 56.8% of waste (not recycled).

4

(c) (i) any **two** from:

- reduce biodiversity **or** extinction
- change in migration patterns
- change in species distribution
- change in climate

ignore rise in sea levels

ignore temperature change

accept correct examples of climate change e.g. storms, flooding, drought

references to weather changing is insufficient

allow ice caps melting or habitat destruction.

2

(ii) any **one** from:

- absorbed by oceans / ponds / lakes
- peat bogs

allow used for skeletons / shells of sea creatures

allow in fossil fuels / limestone.

1

[11]

Q11.

(a) (i) correct bar heights

*three correct **2** marks*

*two correct **1** mark*

*one or none correct **0** marks*

ignore width

2

(ii) (Stream Y)

has many sludge worms / bloodworms

or

has no mayflies / caddis or few shrimp

*allow **1** mark if invertebrate not named but correct association given*

1

which indicate medium or high pollution

1

(b) (i) suspended solids increase (as a result of sewage overflow)

1

then decrease downstream / return to original levels

1

oxygen levels decrease (after sewage overflow)

1

and then rise again

1

(ii) any **three** from:

- mayflies decrease (to zero) near overflow

accept 'have died out'

- because oxygen is low **or** mayflies have high oxygen demand
- mayflies repopulate / increase as oxygen increases again
- can't be sure if dissolved oxygen or suspended solids is the cause

3

(c) they respire / respiration

*aerobic respiration gains **2** marks*

1

this requires / uses up the oxygen

1

[13]

Q12.

(a) it is impossible to weigh all the fish in the sea

1

(b) (i) increase / from 50 to 350 / by 300 thousand tonnes

1

(ii) due to fishing ban / not allowed

1

(c) (i) fishing quotas / limits

1

changes to net size

1

(ii) yes, biomass increases

1

use of figures from graph eg approx 4- times **or** (was effective at first) but numbers decline again after 2004

must use two comparative figures for 2nd marking point

1

(iii) so that breeding continues

alllow prevent extinction / limit impact of fishing on food chain / web

1

(iv) 95%

*correct answer gains **2** marks*

*2000-100=1900 award **1** mark*

2

(d) any **four** from:

- increase in <u>sea / water</u> temperature

  accept ref to lower <u>sea / water</u> temp if shift in Gulf Stream is referred to
- changes in migration patterns / distribution of species
- more eggs may survive (up to 19 °C) and could lead to an increase in herring pop
- reduction in herring pop (because eggs die if >19 °C)

  accept change in other populations of fish which are alternative prey for cod
- (appropriate) change in cod population as a result

4

[14]

Q13.

(a) (i) 10

1

(ii) any **three** from:

- both increase with distance
- more spp on walls than on trees
- no lichen spp on trees for first 1 km from city
- more steady / less erratic increase on trees than walls (or converse)
- rate of increase increases with distance

3

(b) SO_2 decreases with distance from centre

accept converse

Ignore pollution

1

high SO_2 reduces survival or kills lichen

accept converse

1

(c) (i) any **three** from:

- (line) transect
- quadrat / reference to specific area
- count number of lichens or coverage on trees
- at regular intervals / set distances

3

(ii) (more) Xanthoria nearest road

allow 'nitrogen-loving' for Xanthoria

1

(more) Usnea further from the road

allow 'nitrogen-sensitive' for Usnea

1

because most nitrogen oxide from vehicles (near road)

or

because nitrogen oxide levels will be falling / less further away (from road)

accept converse

1

[12]

Q14.

(a) decrease in photosynthesis (as fewer trees) causes less removal of CO_2

accept forest cleared for livestock which respire and give out CO_2

ignore 'Carbon sink'

1

burning / combustion releases CO_2

1

decay of wood (by microorganisms) releases CO_2

1

(b) any **two** from:

- loss of habitat / shelter
- loss of food source
- smaller populations more vulnerable / less likely to survive
- fewer plant species due to clearing

2

(c) (i) removing carbon dioxide from the air

1

(ii) any **one** from:

- growth of plants (to trap CO_2 in photosynthesis)
  allow afforestation
- CCS (carbon capture and storage)
- separate / store CO_2 from waste gases in industry
- make new peat bogs
- absorbed / dissolved in oceans / lakes / ponds
- used as calcium carbonate to form shells / bones

1

[7]

Q15.

(a) (i) 76.0 / 76

correct answer with or without working gains 2 marks

allow 76.04 for 2 marks

allow 76.04 with extra decimal places eg 76.042 for 1 mark

$\frac{465}{611.5}$ *for 1 mark*

2

(ii) mass of fish declines (until 2008)

ignore use of numbers

allow number of fish decline (until 2008)

1

(due to an) increase in fishing / overfishing

1

and then rises (until 2010)

1

(which could be due to) quotas / net restrictions working

allow any reasonable suggestion, such as countries swapping quotas or restrictions on fishing during breeding seasons

ignore less fishing

*if no other marks awarded allow 1 mark for a decrease in mass **and** an increase in mass if answer relates to sustainable fishing*

1

(iii) (this is due to) public awareness / demand

allow legislation / rules

1

(b) fishing quotas / bans

1

(small) net / mesh size

if size of net is stated then it must be smaller

if size of mesh is stated then it must be larger

1

(c) (fish) cannot move freely / as much

1

(therefore) less <u>energy</u> loss from the fish

*do **not** allow 'no energy is lost'*

ignore references to less heat loss through controlling body temperature

ignore references to respiration

1

(there is) more food available / better quality food / fed more often

accept 'high-protein food (for making cells)'

1

(so) there is more energy for growth **or** (more food) is converted to biomass

1

[13]

Q16.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks
No relevant content

Level 1 (1 – 2 marks)
There is at least one reason for deforestation
or
an attempt at a description of at least one way deforestation is affecting the atmosphere.

Level 2 (3 – 4 marks)
There is at least one reason for deforestation
and
a description of the way deforestation is affecting one gas in the atmosphere
or
the process that causes an effect.

Level 3 (5 – 6 marks)
There are reasons for deforestation
and
a clear description of the way deforestation is affecting one gas in the atmosphere
and
the process that causes this.

examples of the points made in the response

Reasons for deforestation

- timber for construction / furniture / boat building / paper production
- growing plants for biofuels for motor fuel / aviation / lawnmowers
- use of wood as a fuel
- land for building or agriculture to provide food, such as rice fields and cattle ranching

Effects of deforestation

- increase in carbon dioxide in atmosphere
  due to burning
  due to activities of microbes
  less carbon dioxide taken in / locked up (by trees)
  less photosynthesis

- increase in methane in atmosphere
  due to rice production / cattle

extra information
ignore references to oxygen
accept explanations of the effect of water (vapour)

[6]

Q17.

(a) genes

1

chromosomes

1

(b) (i) higher yield

1

less use of pesticides

1

(ii) any **two** from:

- uncertain about effects on health
- fewer bees
- might breed with wild plant
- seeds only from one manufacturer

2

[6]

Q18.

(a) any **two** from:

ignore CO_2 release unqualified

- burning
- activity of microbes / microbial respiration
- less photosynthesis

or

trees take in CO_2

*do **not** accept CO_2 taken in for respiration*

or

less CO_2 locked up in wood

- CO_2 given off by clearing machinery

2

(b) (i) range of different species

accept idea of variety of organisms or plants or animals

1

(ii) any **two** from:

- organisms may produce substances useful to humans
  *do **not** accept if food is only example*
- duty to preserve for future generations
- effect on other organisms, eg food chain effects
  ignore effect on human food supply
- loss of environmental indicators

2

[5]

Q19.

(a) circulating / mixing / described **or** temperature maintenance

1

supply oxygen
or for <u>aerobic</u> conditions
or for <u>faster</u> respiration

*do **not** allow oxygen for anaerobic respiration*

1

(b) energy supply / fuel / use in respiration

*do **not** allow just food / growth*
ignore reference to aerobic / anaerobic

or <u>material</u> for growth / to <u>make</u> mycoprotein

1

(c) <u>respiration</u>

allow exothermic reaction
allow catabolism
ignore metabolism
ignore aerobic / anaerobic

1

(d) (i) any **one** from:

- compete (with *Fusarium*) for food / oxygen **or** reduce yield of *Fusarium*
- make toxic waste products or they might cause disease / pathogenic **or** harmful to people / to *Fusarium*

  *do **not** allow harmful unqualified*

1

(ii) steam / heat treat / sterilise fermenter (before use)

__not__ just clean

or
steam / heat treat / sterilise
glucose / minerals / nutrients / water (before use)
or
filter / sterilise air intake
or
check there are no leaks

*allow sterilisation unqualified **not** just use pure glucose*

1

(e) any **three** from:

- beef is best or beef is better than mycoprotein
- mycoprotein <u>mainly</u> better than wheat
- more phenylalanine in wheat than in mycoprotein

  allow equivalent numerical statements
- but no information given on other amino acids / costs / foods

3

overall conclusion:

statement is incorrect because
either
it would be the best source for vegetarians
or
for given amino acids, beef is the best source
or
three foods provide insufficient data to draw a valid conclusion

1

[10]

Q20.

(a) any **two** from:

- fewer trees to take in carbon dioxide for photosynthesis
- decomposers / microorganisms respire (as they decay debris) releasing carbon dioxide
- burning of wood releases carbon dioxide

allow carbon dioxide released by burning fossil fuels in vehicles / factories

2

(b) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best − fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1 − 2 marks)
There is a brief description of some steps in the process but the order is not clear with little biological vocabulary used.

Level 2 (3 − 4 marks)
There is a reasonably clear description of the process involving many of the steps and using some biological vocabulary.

Level 3 (5 − 6 marks)
There is a clear, logical and detailed scientific description of the process using appropriate biological vocabulary.

examples of biology points made in the response:

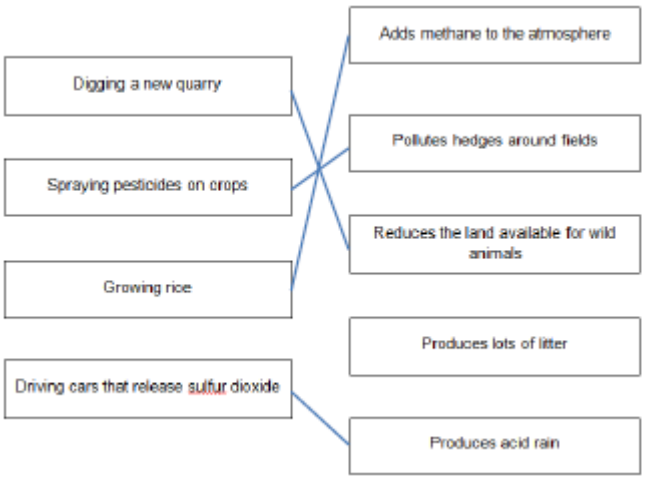
- this contains mineral ions (and organic matter)
- this increases growth of algae / water plants
- the plants / algae (underneath) die
- due to lack of light / photosynthesis / space
- decomposers / microorganisms feed on decaying matter **or** multiply rapidly
- the respiration of decomposers uses up all the oxygen
- so invertebrates die due to lack of oxygen
- this is called eutrophication

6

[8]

Q21.

(a)



1 mark for each correct line

extra line from box in left hand column cancels mark

4

(b) any **two** from:

- climate change
  ignore 'Earth warmer'
- more extreme weather / changes to weather (patterns) / described
- rise in sea level
- melting of ice caps
- reduced biodiversity
- changes to migration patterns
- changes in distribution of species
  accept faster plant growth / tropical species can be grown in UK
  accept tropical diseases / example spread to temperate regions

2

[6]

Q22.

(a) (i) kills / gets rid of / reduces <u>methane</u> bacteria
allow kills / gets rid of / reduces <u>bad</u> bacteria
ignore acts like antibiotic

1

(ii) less food converted to methane
allow can keep more cattle without further environmental damage
ignore energy

1

more growth / meat / muscle / milk produced / more profit / fatter animals
ignore references to bacteria and disease
1

(b) absorbs energy / heat radiated by Earth
allow absorbs / traps energy / heat / from Earth
*do **not** allow absorbs energy / heat from Sun*
1

some energy / heat reradiated
ignore reflected
*do **not** allow reradiates energy / heat from Sun*
1

leading to global warming / enhanced greenhouse effect
accept effects of global warming eg melting ice caps
accept methane is a greenhouse gas
ignore references to ozone
1

[6]

Q23.

(a) 60
*correct answer gains **2** marks*
*if answer incorrect evidence of using 40 gains **1** mark*
2

(b) any **two** from
ignore temperature rise / global warming

- climate change / described e.g. hotter summers / drought / seasons change
- rise in sea levels / flooding
  allow other environmental effects
- glacier melting / ice caps melting
- forest fires
- habitat destruction
- effect on organisms
- eg extinction / migration

2

[4]

Q24.

(a) 860
*correct answer gains **2** marks*
if answer incorrect evidence of (6100 - 1800) ÷ 5

or *4300 ÷ 5*

or *(900 + 600 + 1000 + 700 + 1100) ÷ 5 gains* ***1*** *mark*

allow ecf from 1 incorrect graph reading

2

(b) *ignore references to oxygen / sulfur dioxide / nitrogen oxides / acid rain*
ignore global warming

Effects of deforestation

deforestation increases the amount of carbon dioxide in the atmosphere

award this point only if linked to deforestation

1

any **two** from:

- due to less photosynthesis **or** less carbon dioxide taken in **or** carbon dioxide not locked up in (forest) trees
- due to burning of forest / from machinery
- due to activity of microorganisms / decay

2

Effects of growing palm for fuel

carbon dioxide released when palm oil used as fuel

1

(eventually) CO_2 intake and output might balance out **or** burning palm oil carbon neutral

accept less carbon dioxide than from burning fossil fuels

1

[7]

Q25.

(a) (i) carbon dioxide

1

(ii) sulfur dioxide

1

(b) (i) reduces land available for animals and plants

1

(ii) metals

1

(c) (i) pesticide

1

(ii) kill other animals

1

[6]

Q26.

(a) warmer / dryer

allow greenhouse effect / global warming

ignore wind

1

(b) (i) genes / alleles / chromosomes / DNA / genetic material / genetics

allow inheritance

allow nutrition / food / metabolism / growth rate

ignore environment

1

(ii) natural selection / evolution

allow survival of the fittest

1

[3]

Q27.

(a) any **two** from:

- shorter distance between samples

  ignore repeat investigation /measurements

- sample to greater height

- specify the size of each site

  ignore longer transect

1

(b) (i) Parmelia

1

(ii) Evernia

1

(c) any **two** from:

- Lecanora does not extend over whole range of transect / does not grow everywhere /does not grow in town centre / does not grow in countryside

- Lecanora grows in a range of sulfur dioxide concentrations ***or*** Lecanora only grows in limited range of sulfur dioxide concentrations **or** Lecanora lives over large range of sulfur dioxide concentrations

- other factors eg different pollutant might also influence growth of Lecanora

- sulfur dioxide / pollutant concentration was not measured

  ignore Lecanora does not give accurate measure of sulfur dioxide concentration

- amount of Lecanora not measured

2

[5]

Q28.

(a) 5

1

(b) any **one** from:

allow in either section

- more light

  allow more sun / sunnier

- warm(er) / hot
- more water / lot of rain

1

increased / more photosynthesis

allow in either section
allow more biomass / carbohydrate / named (made)
*do **not** allow food*
allow enzymes / metabolism faster
***NB** for **2** marks this must be linked to heat*
*to gain **2** marks more / increased must be mentioned at least once*

1

(c) less pollution / named pollutant eg carbon dioxide / ֍fumes֍ / emissions

allow examples of effect of less pollution
eg less global warming / less acid rain
allow any relevant environmental effect
eg imported diseases

1

less fuel used / less transport / named transport

ignore 'less distance' / importing
allow 'less distance travelled' / 'less travel'
allow smaller carbon footprint once only for either mark

1

[5]

Q29.

(a) (i) 40

accept -40 or +40

1

(ii) **Step 1** 92

1

Step 2 18

1

Step 3 74

*correct subtraction of answer in **step 2** from answer in **step 1** gains **1** mark*

*correct answer 74 with no working gains **3** marks*

ignore sign

1

(b) (i) both animals and plants

1

(ii) microorganisms

1

(iii) carbon dioxide

1

[7]

Q30.

(a) fuel / houses / paper

allow any object made from wood

1

farming / agriculture / replanting

allow roads / homes / factories

1

carbon dioxide / greenhouse gas / pollution **or** relative named pollutant

1

warming / temperature increase

1

(b) (i) none of species left / died out

1

(ii) may have products useful to humans / examples

*allow preserve for future generations **or** 'still there to look at'*

*allow affect food chains / cycles **or** extinction of other species*

allow non human reasons eg loss of habitat

ignore environmental effects

1

[6]

Q31.

(a) any **one** from:

- increase / give light
- increase temperature / make warmer

award marks if the method by which these could be done is given
eg leave lights on all night **or** use a heater

- increase / give CO_2
- add fertiliser / nutrients / minerals / named
  allow nitrogen
  ignore 'food'

1

(b) (i) any **two** from:

- cheaper
  allow grow faster / more grown
- better quality / flavour
  ignore size
- available all year
  accept converse if clear that answer refers to use of British tomatoes
  allow 'Fair Trade'

2

(ii) any **two** from:

- greater distance **or** more food miles **or** more transport

idea of more needed only once

- transport needs (more) energy / fuel
- reference to eg greenhouse effect / global warming / pollution / CO_2 release / carbon footprint
  ignore ozone

2

[5]

Q32.

(a) (i) (more) habitats / (greater) variety of habitats / range of food
*allow (more) places / trees for homes **or** different places to live*
allow no pesticides /herbicides / chemicals sprayed
allow more food
allow safer / can hide
allow effects of machinery

1

(ii) any **two** from:

- building /houses / factories / etc
  ignore timber / uses of wood
- roads

- quarrying
- waste dumps / landfill
- grazing

2

(b) (i) fertilisers

1

(ii) pesticides

1

(iii) pesticide / herbicide / chemicals / sprays

allow river (through farmland) polluted
allow correct effect of fertilisers on river organisms

1

(c) any **two** from

- pollution / named pollutant / combustion / cars
- dumping waste / litter
  allow 'not recycling'
- raw materials used up **or** reference to quarries / mines
- chopping down trees
- building / houses / etc
- global warming

2

[8]

Q33.

(a) any **two** from: eg

- same volume of solution
  *do **not** allow same size of container*
- left for same length of time
- same temperature
- same oxygen
- same pH
- same number of invertebrates / animals
  *do **not** allow same number of species*
- same age / stage of invertebrates / animals

2

(b) line of best fit / curve / point to point drawn going through 240-260 and 25

1

correct interpolation to X axis

if no work on graph allow 250

1

(c) (i) (C)

50% killed at lowest / low copper concentration

ignore least survivors

1

(ii) any **two** from:

- involves counting
  *easy to count gains **2** marks*
- easy to do
- invertebrates more sensitive
- needs less / no apparatus
  ignore more reliable / accurate

2

[7]

Q34.

(a) 3.2

*award **both** marks for correct answer irrespective of working*

if answer incorrect

(55 + 55 + 1.2 +5) – (110 + 3)

or

116.2 – 113

or

*(55 + 55 + 1.2 + 5 + 90) – (110 + 93) gains **1** mark*

2

(b) any **one** from:

- less carbon dioxide taken in by trees
  *ignore carbon dioxide released by trees **or** trees store carbon dioxide*
- less photosynthesis
- burning trees releases carbon dioxide
- decay releases carbon dioxide

1

[3]

Q35.

(i) customers concerned with the environment / green issues (will be attracted) owtte

allow idea of helping the world

1

(ii) reduces transport of food

1

less carbon dioxide / greenhouse gas / emissions / harmful gases / lower carbon footprint (from transport)

allow less fuel used
ignore pollution unqualified

1

[3]

Q1.

Deforestation affects the environment in many ways.

(a) Deforestation increases the amount of carbon dioxide in the atmosphere.

Give **two** reasons why.

1. _____

2. _____

_____

(2)

(b) Deforestation also results in a loss of *biodiversity*.

(i) What is meant by *biodiversity*?

_____

_____

(1)

(ii) Give **one** reason why it is important to prevent organisms from becoming extinct.

_____

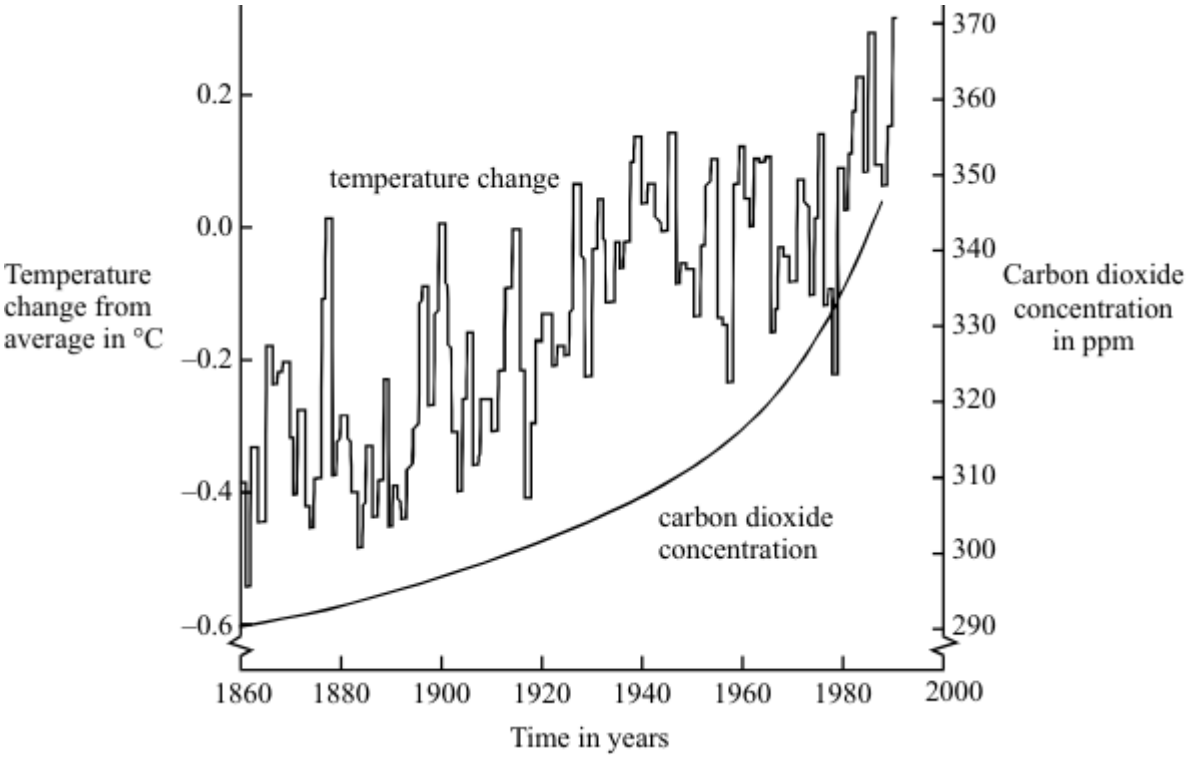
_____

(1)

(Total 4 marks)

Q2.

The graph shows changes in temperature and in carbon dioxide concentration in the earth's atmosphere between 1860 and 1990.



(a) Give **two** human activities which may have helped to increase the concentration of carbon dioxide in the atmosphere.

1 _____

2 _____

(2)

(b) (i) Describe the changes in temperature shown by the graph between 1860 and 1990.

_____

_____

_____

(2)

(ii) Do the data in the graph prove that increased carbon dioxide concentrations in the atmosphere caused the changes in temperature you described in part (b)(i)?
Give a reason for your answer.

_____

_____

(1)

(c) Describe **one** way in which a change in temperature such as that shown in the graph might affect the environment.

_____

_____

(1)

(Total 6 marks)

Q3.

A selective herbicide (a type of pesticide) can be used to kill weeds growing among crop plants.

The table shows the result of adding different amounts of a selective herbicide to a rice crop.

Herbicide added in kg per hectare	Amount of rice produced in tonnes per hectare	Percentage cover of weeds
0.0	50	85
1.7	70	32
3.4	76	24

(a) As more herbicide is applied, what happens to:

(i) the amount of rice produced;

_____

(1)

(ii) the percentage cover of weeds?

_____

(1)

(b) Suggest **two** reasons why rice does not grow well when there are a lot of weeds present.

1. _____

_____

2. _____

_____

(2)

(c) Suggest **one** possible danger of spraying crops with pesticides.

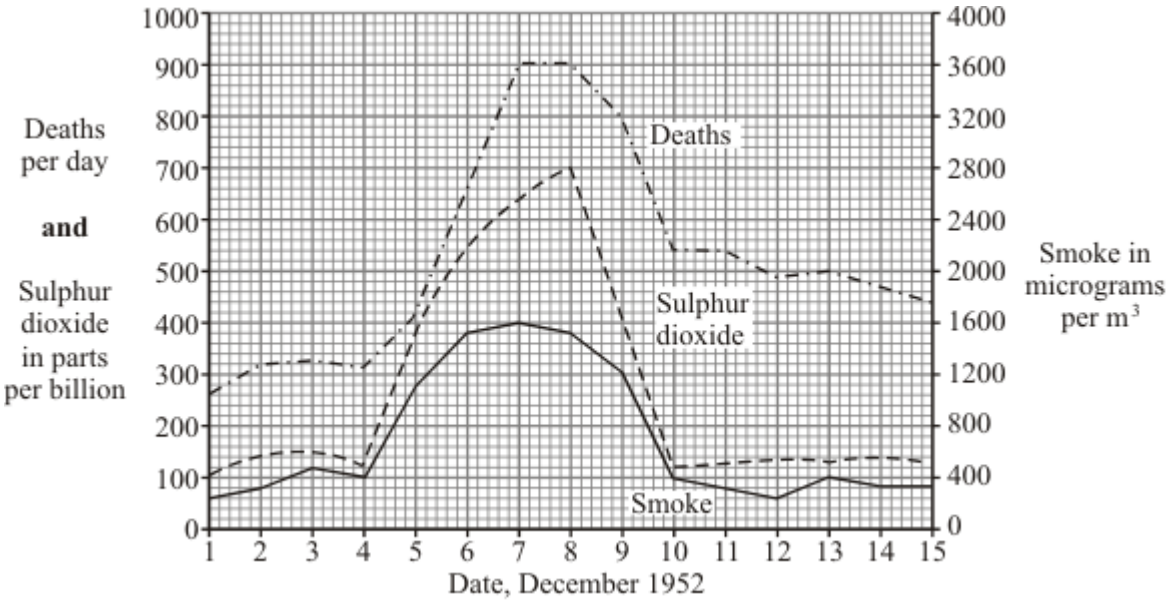
_____

(1)

(Total 5 marks)

Q4.

In December 1952, there was a thick fog in London. The graph shows changes in the amounts of sulphur dioxide and smoke in the air and the number of people dying during this period.



(a) Describe **one** human activity which releases sulphur dioxide into the air.

(1)

(b) Human deaths during this period were caused mainly by lung diseases.

(i) Why were the lungs particularly affected?

(1)

(ii) Give evidence from the graph which suggests that sulphur dioxide might have caused these deaths.

(1)

(iii) Does the graph prove that sulphur dioxide caused these deaths? Explain your answer.

_____

_____

(1)

(Total 4 marks)

Q5.

In recent years, trees have been cut down to create more farm land. More cattle are kept and more rice is grown.

(a) (i) Which gas has increased in the air as a result of trees being cut down?

Draw a ring around **one** answer.

carbon dioxide **oxygen** **sulphur dioxide**

(1)

(ii) Which gas has increased in the air as a result of keeping more cattle and growing more rice?

Draw a ring around **one** answer.

carbon monoxide **hydrogen** **methane**

(1)

(b) What effect may increases in these gases have on global temperatures?

Draw a ring around **one** answer.

decrease **increase** **stay the same**

(1)

(c) List **three** ways in which humans have destroyed the habitats of other animals. Do **not** include cutting down trees in your answer.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(Total 6 marks)

Q6.

The table shows the effects that two different concentrations of sulphur dioxide in the air had on the growth of rye grass plants.

Sulphur dioxide concentration in the air in micrograms per m^3	**9.0**	**191.0**
Number of leaves per plant	85.6	47.3
Total leaf area in cm^2	417.2	203.6
Dry mass of stubble in grams	0.48	0.22

(a) What human activity releases sulphur dioxide into the air?

_____

(1)

(b) (i) What effect does sulphur dioxide have on rainwater?

_____

_____

(1)

(ii) Use information from the table to describe **one** effect of sulphur dioxide on the leaves of the grass plants.

_____

_____

(1)

(c) The stubble consists of the bases of the stems of the plants and the roots left in the soil after harvesting.

Use your answer to part (b) to explain why the dry mass of the stubble was less at the higher concentration of sulphur dioxide.

_____

_____

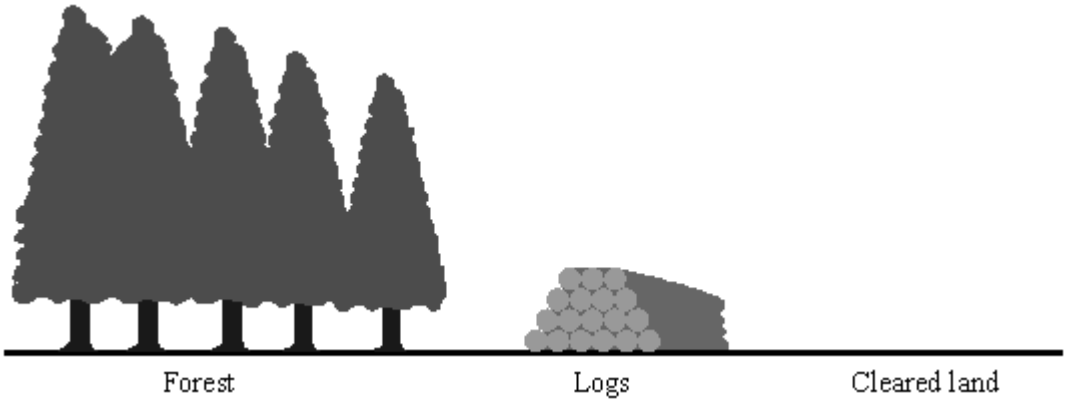
_____

_____

(2)

(Total 5 marks)

Q7.



Some large forest areas are being destroyed. This changes the amount of carbon dioxide in the atmosphere.

(a) (i) State **one** use for the trees that are cut down.

_____

(1)

(ii) State **one** use for the cleared land.

_____

(1)

(iii) How has the destruction of forests affected the amount of carbon dioxide in the atmosphere?

_____

(1)

(b) (i) How has the destruction of forests caused an increased Greenhouse effect?

_____

_____

_____

_____

_____

_____

_____

(4)

(ii) State **one** effect of an increase in the Greenhouse effect.

_____

_____

(1)

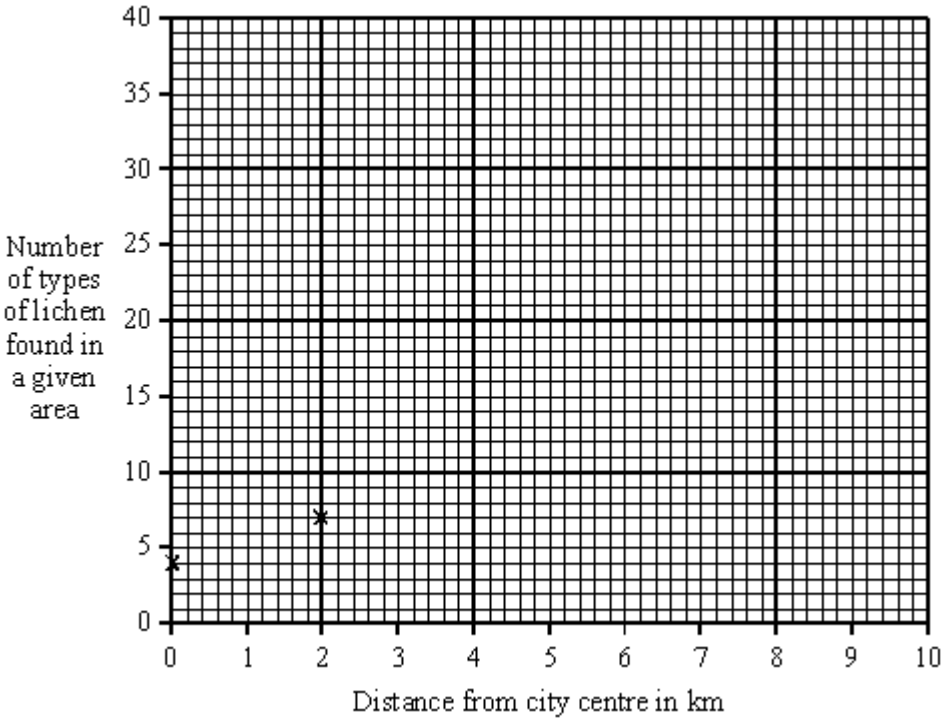
(Total 8 marks)

Q8.

Lichens are simple plants that are easily damaged by air pollution. A large number of different types of lichen is a good indicator of clean air. The table shows how many different types of lichen were recorded at set distances from a city centre.

Distance from city centre in km	Number of types of lichen found in a given area
0	4
2	7
3	10
5	20
6	25
7	40

(a) Draw a graph of these results. The first two points have been plotted for you.



(2)

(b) Use your graph to estimate the number of types of lichen at 4 km from the city centre.

_____

(1)

(c) Use your graph to state a pattern that links the number of types of lichen with the distance from the city centre.

_____

_____

(1)

(d) Since these data were collected, pollution in cities has decreased. Suggest **two** ways that the pollution in city centres has been reduced.

_____

_____

_____

(2)

(e) Burning some fossil fuels produces acid rain. Explain how acid rain is formed and state **one** of its effects.

_____

_____

_____

_____

_____

_____

_____

_____

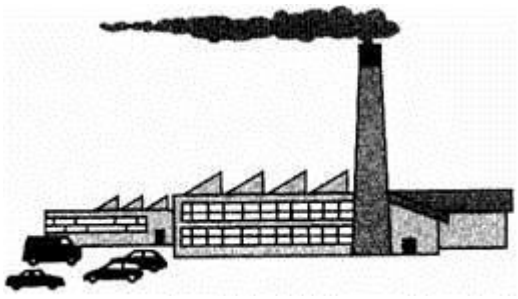
_____

(4)

(Total 10 marks)

Q9.

This question is about pollution.



(a) Use the following words to fill in the gaps. You may use each word once or not at all.

cars	dissolve	evaporate	fuels
kill	plants	soot	sulphur	water

Fossil _____ burnt by industry and _____ can release _____ dioxide into the atmosphere. This can _____ in _____ to form acid rain. When this falls it can _____ fish and damage _____ .

(7)

(b) Carbon dioxide is produced by many industries.

(i) Name **two** types of environmental problems that a build up of carbon dioxide could cause.

1. _____

2. _____

(2)

(ii) Apart from industry, how could carbon dioxide build up in the atmosphere?

_____

_____

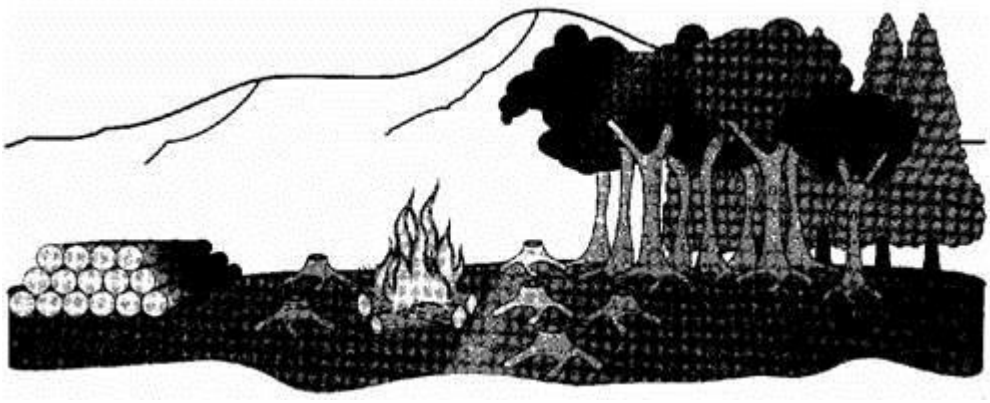
_____

(1)

(Total 10 marks)

Q10.

Tropical rainforests are being cut down to provide hardwood for furniture and to make way for roads and for agriculture. In the 1990s they were being destroyed at a rate of 15 hectares per minute.



(a) Calculate the number of hectares destroyed in **one** day.

_____ hectares

(1)

(b) Soil erosion can be increased by deforestation. Explain how.

_____

_____

_____

(2)

(c) (i) The gas carbon dioxide can contribute to the greenhouse effect. Explain how deforestation over a wide area can contribute to the greenhouse effect.

_____

_____

_____

_____

(3)

(ii) One result of the increased greenhouse effect is global warming. Describe **two** possible effects of global warming on the world.

_____

_____

_____

(2)

(iii) It is possible that planting new forests could stop global warming. Explain why this could happen.

_____

_____

(2)

(Total 10 marks)

Q11.

Coastal grazing marshes provide grazing for cattle and sheep. They also support huge numbers of birds and a wide range of water plant and animal communities. Some of these communities include nationally rare species.

There has been a dramatic reduction in the extent of the grazing marshes in the estuary of the river Thames in recent years. These grazing marshes are downstream from the capital city, London.

The table below shows what some of the grazing marshes have been converted into.

CONVERTED TO	MEAN ANNUAL RATE OF CONVERTION TO OTHER LAND-USED (Hectares/Year)			
	1935-68	1968-72	1972-81	1981-89
Roads and buildings	83	186	142	45
Formal open spaces (parks)	11	30	12	27
Arable (crop-growing)	49	188	90	102
Open water	9	9	7	4
Woodland	3	1	3	2

(a) Explain, as fully as you can, why you think it has been necessary to convert these marshes to other uses.

(3)

(b) Explain, as fully as you can, the possible further effects that these changes in land-use might have on the environment and on the organisms which live in the environment.

(4)

(Total 7 marks)

Q12.

Large areas of rain forest are being cleared and burnt in many parts of the world. The cleared land will often produce crops for only a few years.

(a) Explain why rain forests are being burnt to provide land for crops in many parts of the world.

(2)

(b) Explain why such cleared land will often produce crops for only a few years.

(2)

(c) Explain the effects that large-scale burning of forests may have on the Earth's atmosphere in the short and in the long term.

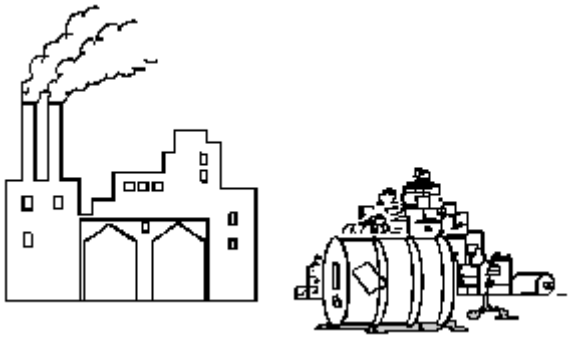
_____

(4)

(Total 8 marks)

Q13.

The drawings below show some of the effects that human activities have on the environment.



Use information from the drawings to give **two** ways in which these human activities affect other living organisms.

1. _____

_____

_____

2. _____

_____

_____

(Total 2 marks)

Q14.

Professor John Lawton researches into the problem of controlling the spread of bracken. Bracken is a fern which threatens upland farms, partly because it poses a health risk to people and animals.

Professor Lawton is waiting for government permission to release the Conservular caterpillar which feeds on the bracken.

The Secretary of State has to decide whether the Conservular caterpillar can be released.

The article printed below describes some of the problems faced by the Secretary of State.

David the caterpillar to bracken's Goliath

Yorkshire farmer Maurice Cottrill has just forked out £500 to have a helicopter hover over his land and spew out gallons of chemicals aimed at destroying one of the most pervasive and dangerous weeds known to man – bracken. In

a little box in a laboratory near Ascot, Berkshire, lies a tiny caterpillar which could have done the job for nothing.

Whether or not that caterpillar and thousand of its chums will ever be let loose on the massive carpet of bracken that is sweeping over Britain at the rate of 53 square kilometres a year has to be decided by the Secretary of State for the Environment.

Weed control through the release of imported insects has never been tried in Britain before. If the Secretary of State permits the experiment, the caterpillar is in for the feast of its life, because five years of painstaking research have proved that bracken is its only food. However, is that the full story? Will the beast stop there, or will it go on, wreaking unforeseen devastation. Can scientists predict what will happen when imported insects are released into the wild?

Bracken is poisonous – more than 20 000 sheep and 1 000 cattle suffer poisoning each year. Its spores are carcinogenic, posing a threat to hill walkers. Bracken costs a depressing £4m a year to control while rendering useless grazing land valued at £5m annually. “Bracken is one factor which is leading to hill farming becoming uneconomic”, says the director of the Ramblers Association. “We are worried about that because, the more uneconomic hill farms become, the more prospect there is of the forestry industry taking over.”

The National Farmers Union are concerned about the consequences of the caterpillar getting out of control. What if it started consuming garden ferns? What if it loved potatoes? On the other hand, the caterpillar might help to preserve important uplands where wildlife flourishes when bracken is kept at bay. However, the experiment takes the scientists into unknown territory.

World-wide, 94 species of weeds have been controlled by biological releases involving 215 types of animal in 50 countries. Professor Lawson says that approximately one-third have achieved effective control and the remainder have failed.

Upland farms are artificial ecosystems, created and maintained mainly for the rearing of sheep and cattle. These farms are being threatened by the spread of bracken. Up to now the only treatment for bracken has been to use herbicides.

Use the article to explain, as fully as you can, what advice you would give the Secretary of State.

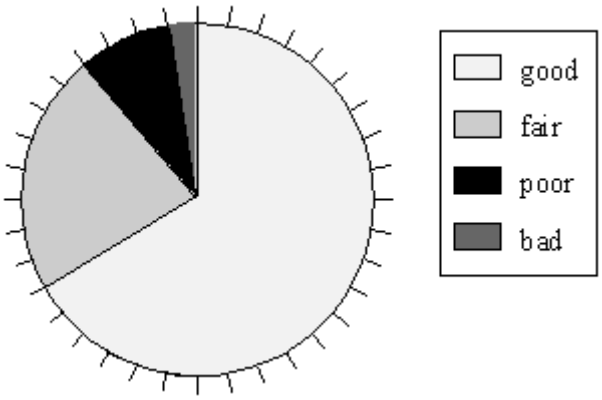
Explain the arguments for and against that lead to your decision.

You will **not** receive marks for simply copying extracts from the article.

(Total 8 marks)

Q15.

The pie diagram shows the quality of river water in England and Wales in 1985.



(a) What proportion of the rivers had good quality water?

_____

(1)

(b) Give **two** ways in which rivers may become polluted.

1. _____

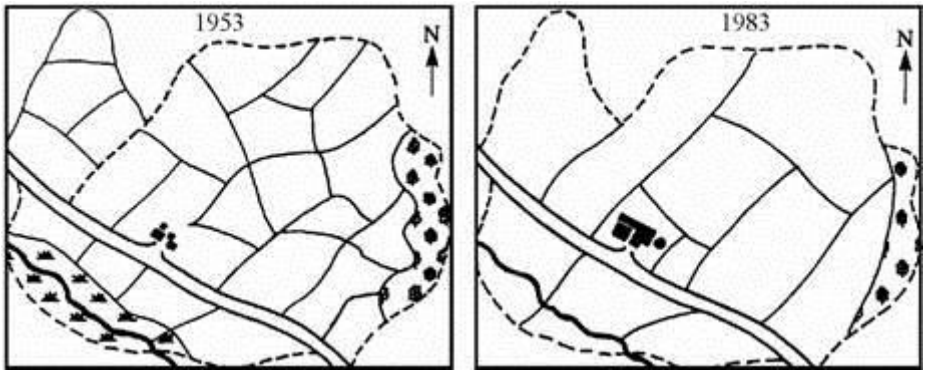
2. _____

(2)

(Total 3 marks)

Q16.

The drawings show changes to a farm between 1953 and 1983.



Key

Hedges

Boundary

River

Buildings

Trees

Marsh

The fields on the farm are separated by hedges.

(i) Give **two** major changes which were made to the land on this farm between 1953

and 1983.

1. _____

_____

2. _____

_____

(2)

(ii) How would these changes affect the number of wild animals which live on the farmland?

_____

Explain your answer.

_____

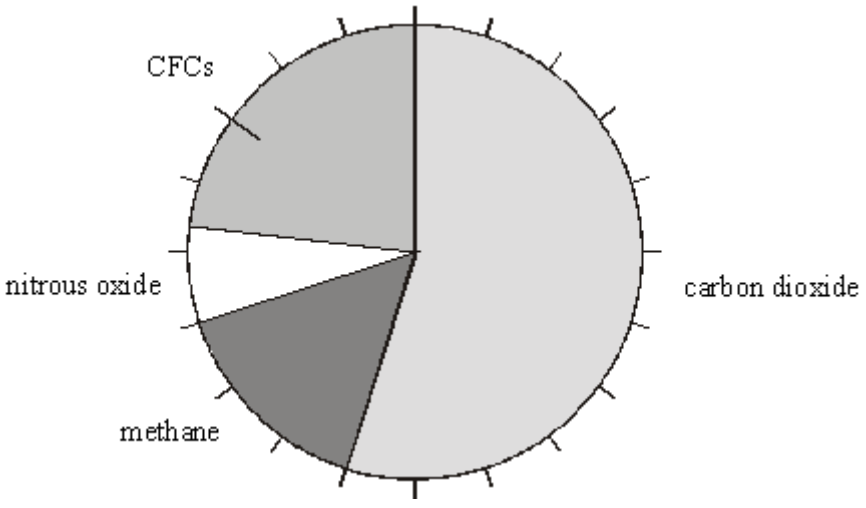
_____

(2)

(Total 4 marks)

Q17.

The pie chart shows the proportions of four greenhouse gases produced by human activities in the 1980s.



(a) Calculate the percentage contribution to the greenhouse gases of methane. Show your working.

Percentage contribution _____ %

(2)

(b) Give **two** ways, other than respiration, by which human activities increase the proportion of carbon dioxide in the atmosphere.

1. _____

_____

2. _____

_____

(2)

(c) What is the principal source of the 'human-made' methane in the atmosphere?

_____

(1)

(d) Explain how increases in the proportion of greenhouse gases in the atmosphere lead to global warming.

_____

_____

_____

_____

_____

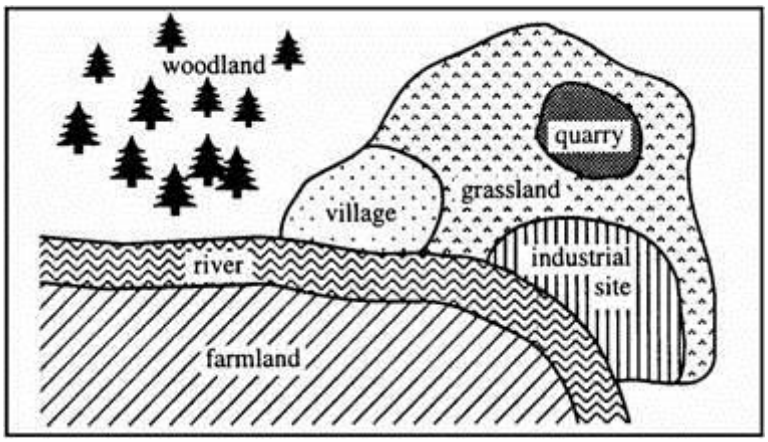
_____

(3)

(Total 8 marks)

Q18.

The diagram shows a village and its surroundings.



(a) Use words from the list to complete the sentences about pollution.

oxygen **pesticides** **sewage** **sulphur dioxide**

The air might be polluted by _____ from the industrial site.

The river might be polluted by _____ from the village and

by _____ from the farmland.

(3)

(b) The owners of the quarry want to make it larger.

Give **one** effect that this might have on wild plants and animals that live near the quarry.

_____

_____

(1)

(Total 4 marks)

Q19.

In tropical areas of the world, forests are being cut down at the rate of 150 hectares every minute of every day.

(a) Give **two** reasons why forests in tropical areas are being cut down at a high rate.

1. _____

_____

2. _____

_____

(2)

(b) Explain how this deforestation is affecting the composition of the atmosphere.

_____

_____

_____

_____

_____

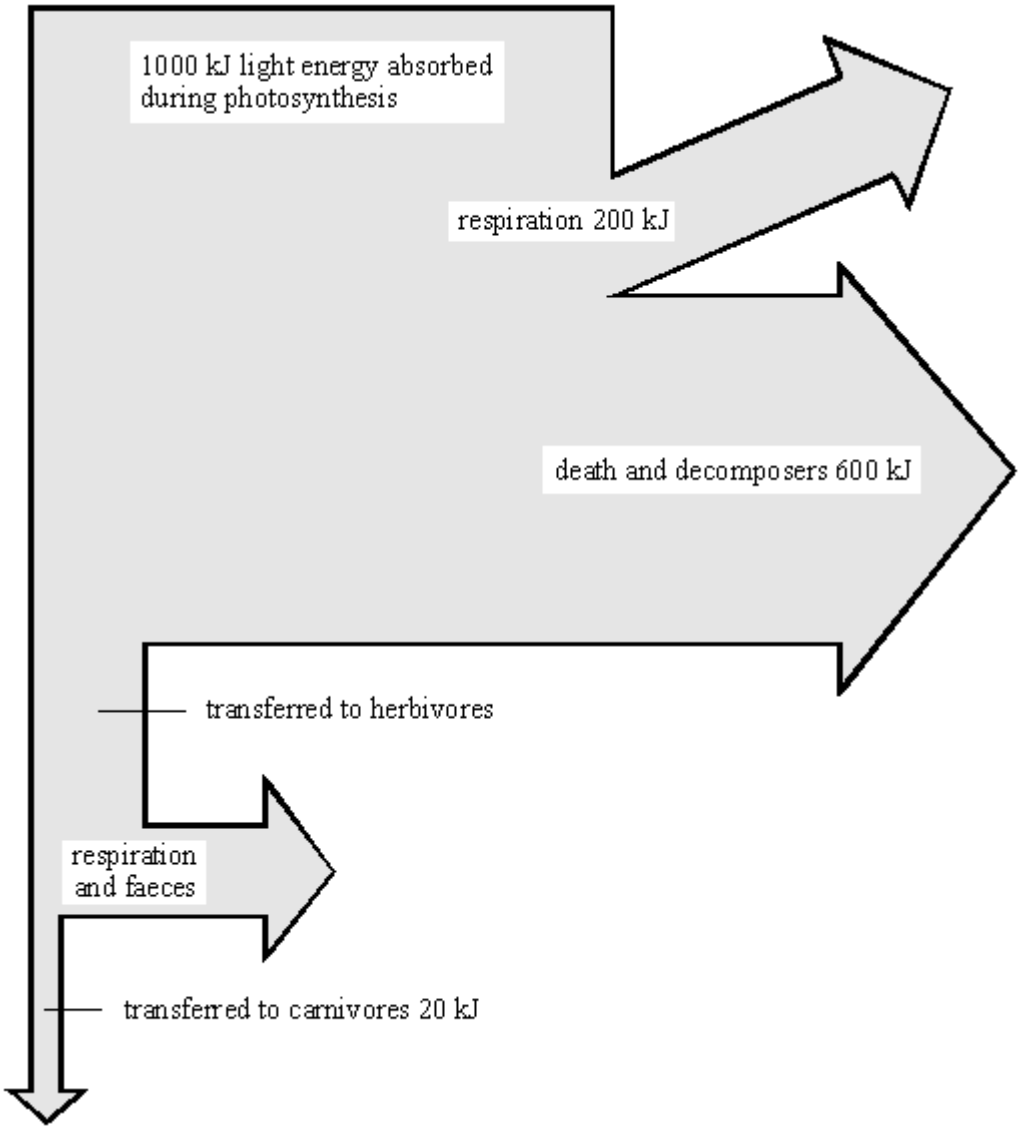
_____

(5)

(Total 7 marks)

Q20.

(a) The diagram shows what happens to each 1000 kJ of light energy absorbed by plants growing in a meadow.



Use the information from the diagram to calculate:

(i) how much energy was transferred to herbivores;

_____ kJ

(1)

(ii) the percentage of the energy absorbed during photosynthesis that was eventually transferred to carnivores. Show your working.

_____ %

(2)

(b) The table gives the energy output from some agricultural food chains.

FOOD CHAIN	ENERGY AVAILABLE TO HUMANS FROM FOOD CHAIN (kJ PER HECTARE OF CROP)
cereal crop ⇒ humans	800 000
cereal crop ⇒ pigs ⇒ humans	90 000
cereal crop ⇒ cattle ⇒ humans	30 000

Explain why the food chain *cereal crop* ⇒ *humans* gives far more energy than the other two food chains.

(3)

(c) The amounts of energy available to humans from the food chain *cereal crop* ⇒ *pigs* ⇒ *humans* can be increased by changing the conditions in which the pigs are kept.

Give **two** changes in conditions which would increase the amount of energy available. In each case explain why changing the condition would increase the available energy.

Change of condition 1 _____

Explanation _____

Change of condition 2 _____

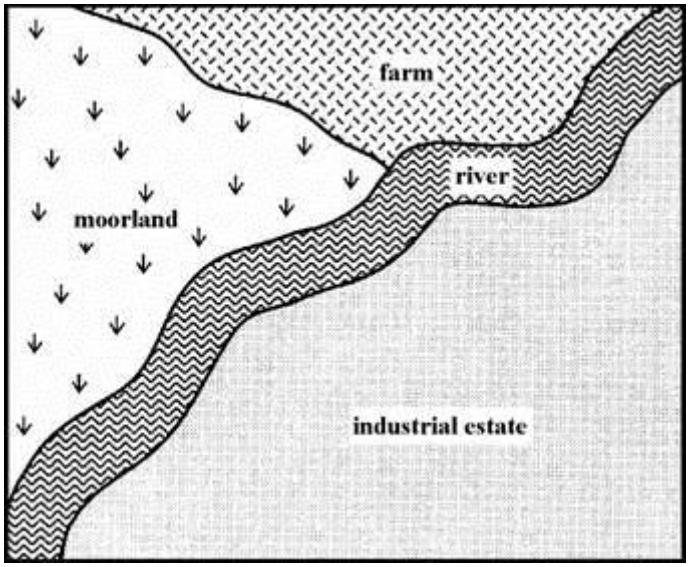
Explanation _____

(4)

(Total 10 marks)

Q21.

The drawing shows an industrial estate and the neighbouring area.



(a) Use words from the list to complete the sentences about effects on the environment.

fertilisers **fuels** **nitrogen** **oxygen**

pesticides **smoke** **sulphur dioxide**

Factories in the industrial estate burn _____ . This pollutes the air with _____ and _____ .

The farm may pollute the river with chemicals such as _____ and _____ .

(5)

(b) Describe how sulphur dioxide may damage the environment.

_____

_____

_____

_____

(2)

(Total 7 marks)

Q22.

Read the passage.

Glutton up a gum tree

Along the banks of the Cygnet River on Kangaroo Island, the branches of the dying gum trees stretch out like accusing fingers. They have no leaves. Birds search in vain for nectar-bearing flowers.

The scene, repeated mile upon mile, is an ecological nightmare. But, for once, the culprit is not human. Instead, it is one of the most appealing mammals on the planet – the koala. If the trees are to survive and provide a food source for the wildlife such as koalas that depend on them, more than 2000 koalas must die. If they are not removed the island's entire koala population will vanish.

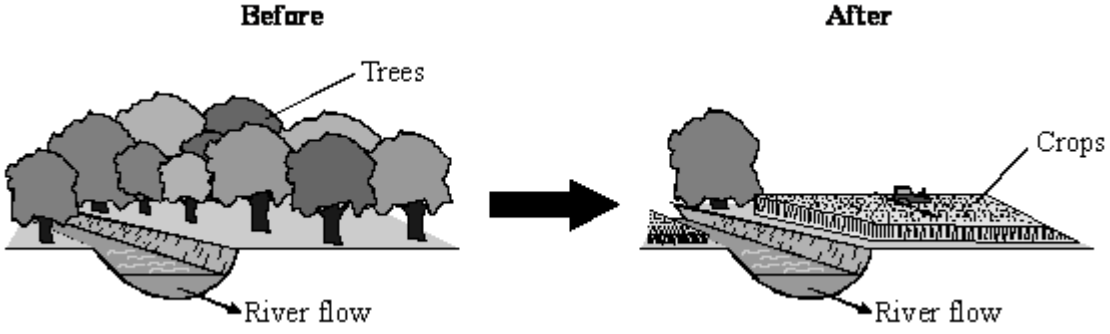
Illegal killing has already started. Worried about soil erosion on the island, some farmers have gone for their guns. Why not catch 2000 koalas and take them to the mainland? "Almost impossible," says farmer Andrew Kelly. "Four rangers tried to catch some and in two days they got just six, and these fought, bit and scratched like fury."

Use the information from the passage and your own knowledge and understanding to give the arguments for and against killing koalas to reduce the koala population on Kangaroo Island.

(Total 4 marks)

Q23.

In many countries, trees are removed so that more land can be used to grow crops.



(a) When trees are removed it becomes more difficult for some plants and animals to survive. Give **one** reason why.

_____

_____

(1)

(b) Farmers often spread chemicals on their fields before growing crops.
When the crops are growing, the farmers sometimes spray them with toxic chemicals.
These chemicals may be washed from the fields and can pollute the rivers.

Name **two** types of these chemicals that might pollute rivers.

1. _____

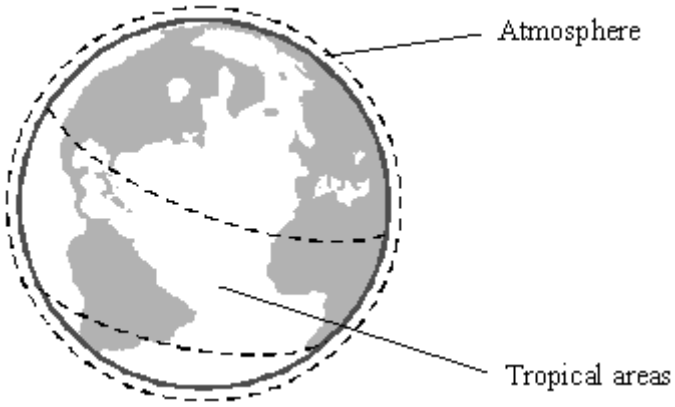
2. _____

(2)

(Total 3 marks)

Q24.

Recently the concentration of carbon dioxide in the Earth's atmosphere has increased slightly. This may be linked to an increase in the 'greenhouse effect'.



(a) The human population has grown rapidly. This has caused an increase in the amount of land used for agriculture, especially in tropical areas.
This has helped to increase the carbon dioxide in the atmosphere.

Give **two** reasons for this.

1. _____

_____

2. _____

_____

(2)

(b) The increased 'greenhouse effect' has caused an increase in the Earth's average temperature.

Give **two** possible environmental effects of this increased average temperature.

1. _____

_____

2. _____

_____

(2)

(c) Name another gas, produced by cattle and rice fields, that also helps cause the 'greenhouse effect'.

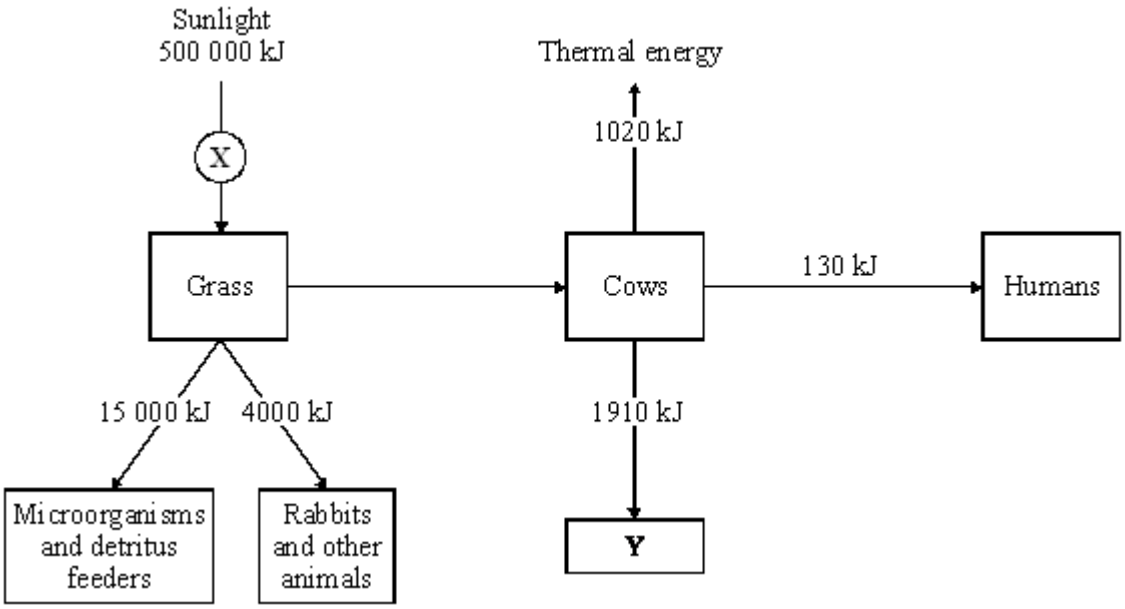
_____

(1)

(Total 5 marks)

Q25.

The diagram shows the amounts of energy that are transferred, over a period of time, through some living things in a grassland habitat.



(a) Calculate the amount of energy transferred from the grass to the cows.

_____

_____

Amount of energy = _____ kJ

(1)

(b) **X** is a process in plants.

(i) Calculate the amount of energy usefully transferred by process **X**.

_____

_____

_____

Amount of energy = _____ kJ

(1)

(ii) Name process **X**.

_____

(1)

(c) Give **two** ways in which energy is 'lost' from the cows at **Y**.

1. _____

_____

2. _____

_____

(2)

(d) Describe how hormones can be used to improve the efficiency of producing food from plants.

_____

_____

_____

_____

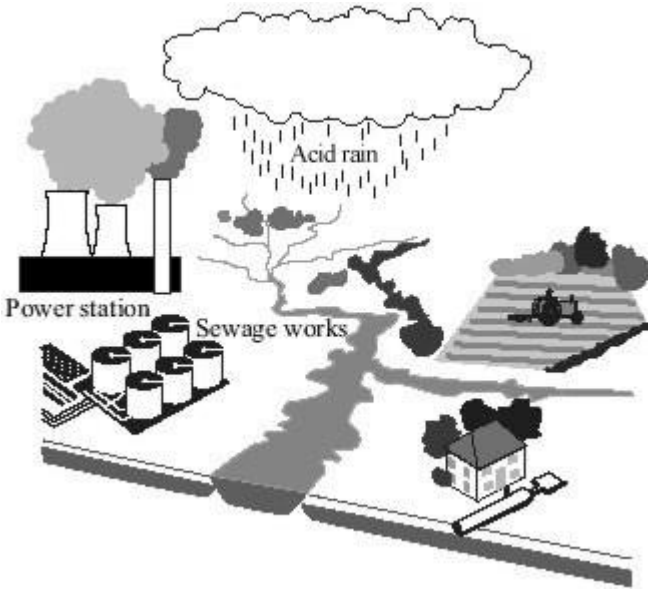
(2)

(Total 7 marks)

Q26.

Rivers can be polluted in different ways, for example:

- the use of toxic chemicals on some farmland;
- the effects of acid rain;
- sewage.



(a) Name **one** type of toxic chemical used on farmland.

_____

(1)

(b) Power stations can cause acid rain to form.
Explain how.

_____

_____

_____

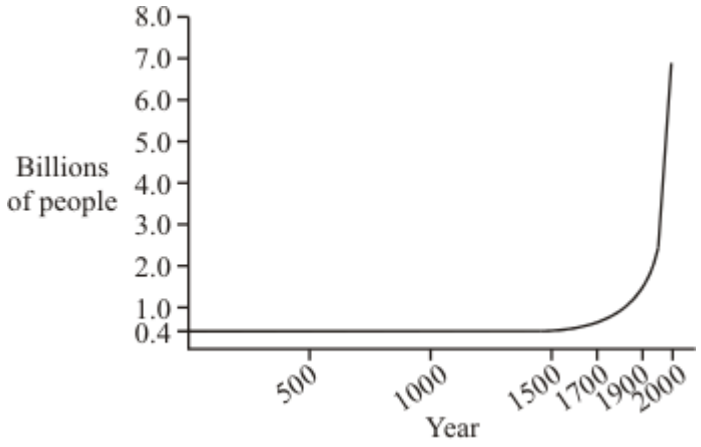
_____

(2)

(Total 3 marks)

Q27.

Improving the quality of life for everyone without damaging the planet for the future is known as sustainable development.
One problem is the rapid growth in the Earth's population of humans during the last 500 years. This is shown by the graph.



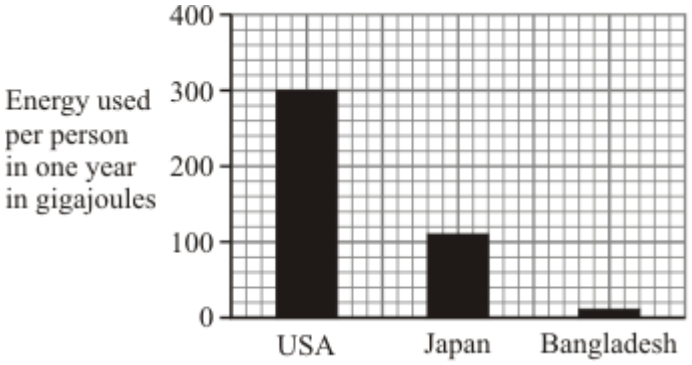
(a) When the Earth's population was much smaller, the effects of human activities on forests were usually small and local.
In the past 500 years there has been large-scale deforestation in some areas. Give **two** reasons for this.

1. _____

2. _____

(2)

(b) Look at the bar chart. It shows the average amount of energy used by each person in one year in the USA, Japan and Bangladesh.



(i) Suggest **one** reason why so much more energy is used per person in the USA than in Bangladesh.

_____

_____

(1)

(ii) Using a lot of resources for energy harms the Earth.
Explain why.

_____

_____

_____

(2)

(c) As we are using more resources, waste management is becoming more important. In the UK much of the solid waste is still being dumped in landfill sites. In 1996, the UK government introduced a landfill tax because landfill sites were being used up. However, the year after the landfill tax was introduced it was estimated that 18 million tonnes of landfill waste was not reported. The government was trying to encourage other forms of waste management, such as:

- reduce waste
- reuse waste
- recycle waste

(i) Explain the main problem caused by the landfill tax.

_____

_____

_____

(2)

(ii) Describe **one** example of how each of the different forms of waste management can be put into practice.

Reduce waste _____

_____

Reduce waste _____

_____

Reduce waste _____

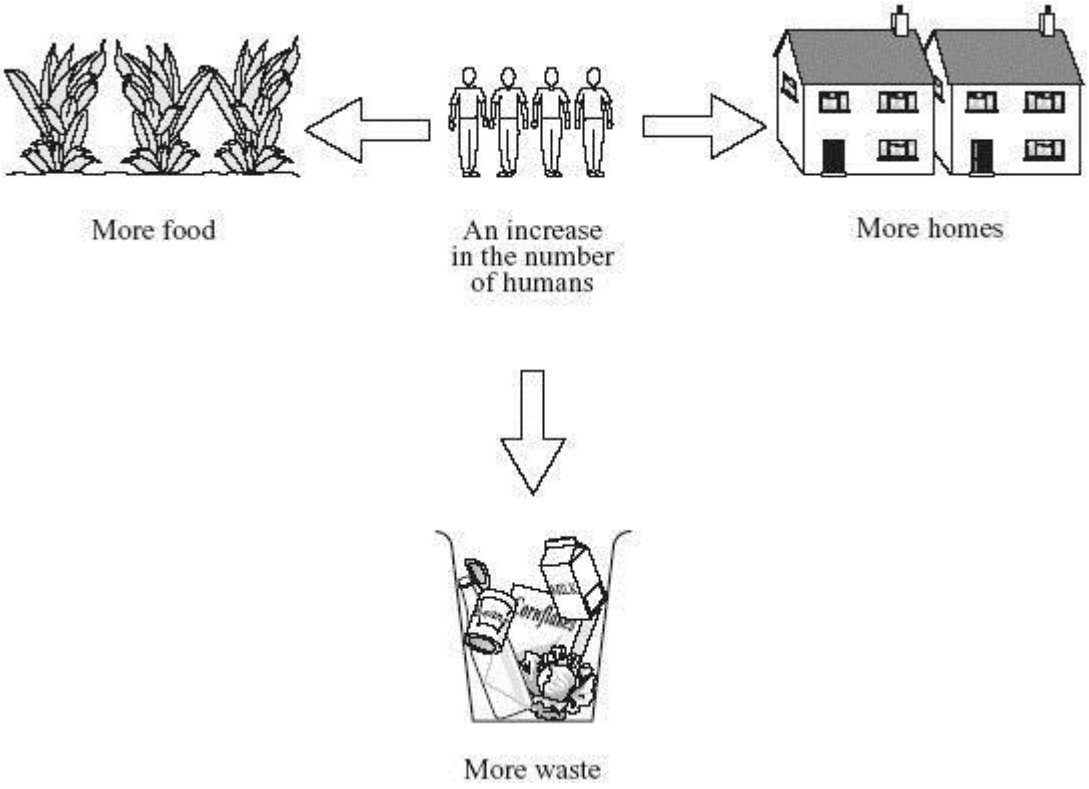
_____

(3)

(Total 10 marks)

Q28.

The population of humans is rising. The diagram shows ways in which this affects the environment.



Humans reduce the amount of land available for other animals and plants. Use information from the diagram to state **three** ways in which this happens.

1. _____

_____

2. _____

_____

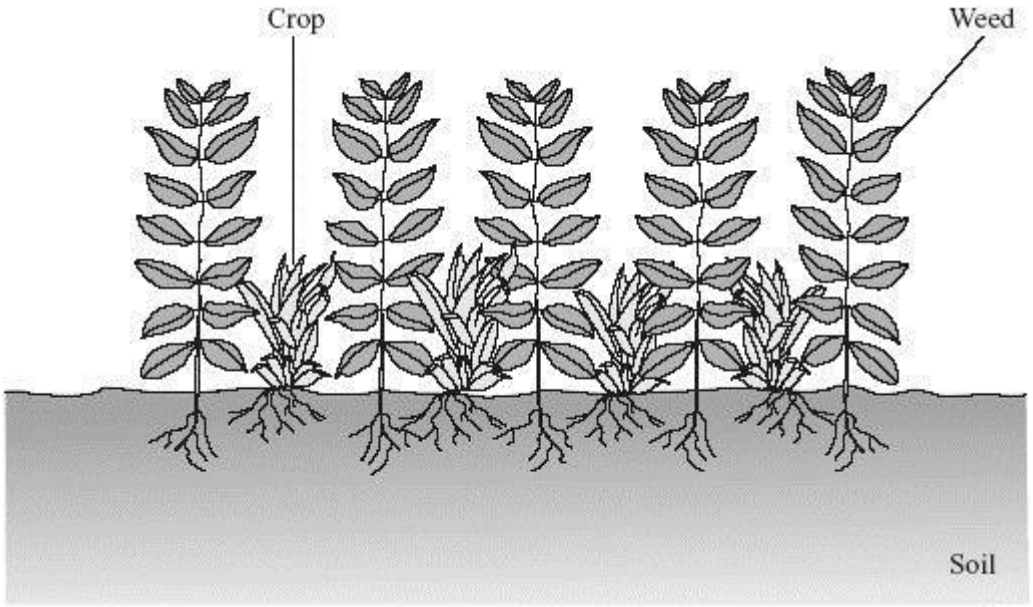
3. _____

_____

(Total 3 marks)

Q29.

Farmers need to get rid of weeds because they can stop crops growing well.



(a) Write down **three** things that crops and weeds compete for.

1. _____

2. _____

3. _____

(3)

(b) Complete this sentence by crossing out the **two** words that are wrong in the box.

Chemicals that are used to kill weeds are called

fertilisers
herbicides
pesticides

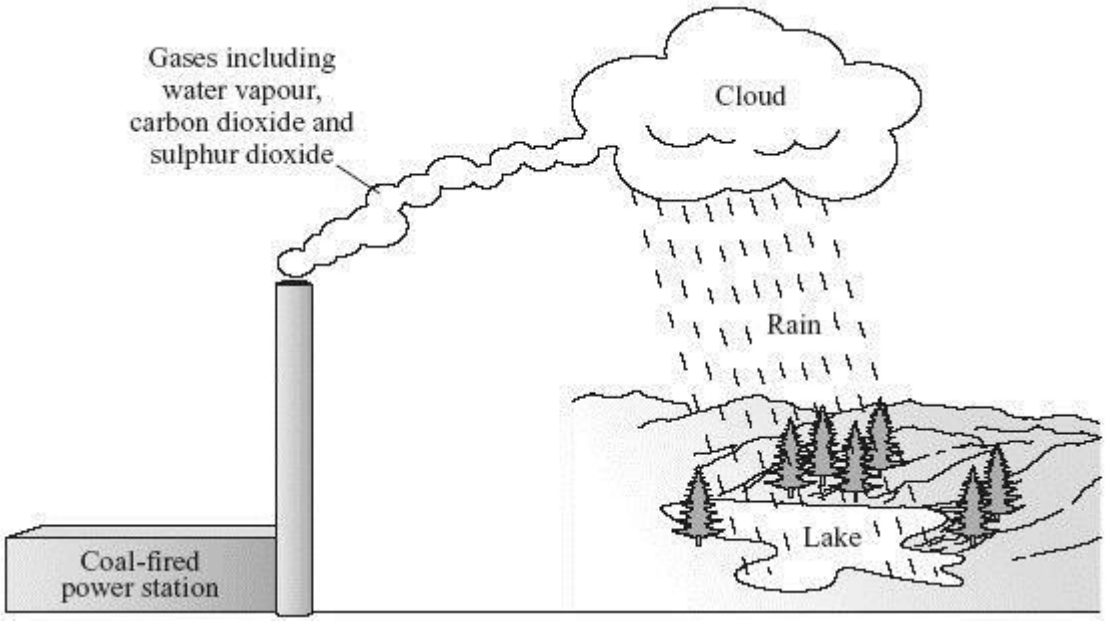
.

(1)

(Total 4 marks)

Q30.

Coal is used in many power stations.



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.

Use information from the diagram to describe, in as much detail as you can, how using coal in power stations can damage the environment.

(Total 4 marks)

Q31.

Many of the plants that we eat as fruits and vegetables in the UK are imported. The transport used to import foods accounts for about 2.5% of the UK's carbon dioxide emissions. During winter, it is necessary to import foods because most of the UK's fresh vegetables have to be grown in greenhouses. Energy is needed to heat and light these greenhouses.

Give **one** argument for and **one** against growing all of our vegetables in the UK. These arguments should consider the environmental effect of carbon dioxide emissions.

Argument for:

Argument against:

(Total 3 marks)

Q32.

Nitrate fertilisers are important in agriculture. They help to increase crop yields and so make food cheaper to buy. Some of the nitrate fertilisers run off into rivers and get into drinking water. The problem is that the nitrates can react with iron in our blood. This reduces the blood's ability to carry oxygen. If the amount of nitrate in drinking water is too high, it can cause 'blue baby syndrome', in which babies look blue due to lack of oxygen.

The table shows the amount of nitrate fertilisers used and the crop yield.

Nitrate fertilisers in kilograms per hectare of land	0	150	250
Crop yield in tonnes per hectare of land	5	8	7

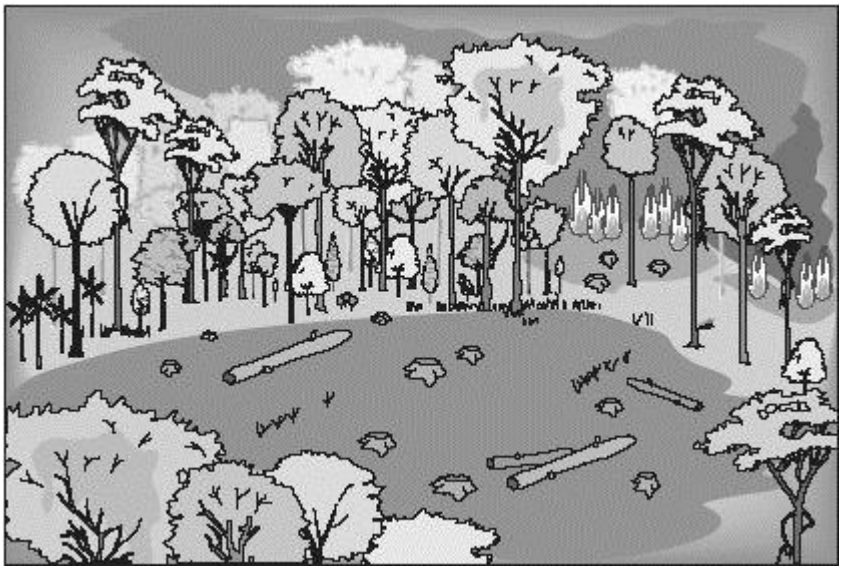
Use the information above to suggest what should be done, by farmers and government, to prevent 'blue baby syndrome'. Explain the reasons for your suggestions.

(Total 3 marks)

Q33.

The picture shows a forest being cleared so that rice can be grown.

The trees are chopped down and then burned.



(a) Complete the sentences by using the correct words from the box

acid rain	**carbon dioxide**	**the greenhouse effect**
methane	**sulphur dioxide**	

Burning trees give off the gas _____ .

The rice crop will increase the amount of the gas _____ in the atmosphere.

These two gases help to cause _____ .

(3)

(b) Burning fossil fuels also causes pollution.

Name **one** fossil fuel.

_____

(1)

(Total 4 marks)

Q34.

The information in the table compares two farms. Both are the same size, on similar land, close to one another and both are equally well managed.

Name of farm	Activity	Energy value of food for humans produced in one	Number of people whose energy requirements can be

		year	met by this food
Greenbank Farm	Grows food for humans	3285 million kJ	720
Oaktree Farm	Grows food for animals on the farm which become food for humans	365 million kJ	80

(a) Use this information to work out the average daily human energy requirement in kilojoules (kJ) per day.

_____

_____

Energy requirement = _____ kJ/day

(2)

(b) The figures show that farms like Greenbank Farm can be nine times more efficient at meeting human food energy requirements than farms such as Oaktree Farm.

(i) The food chain for Greenbank Farm is:

vegetation → humans

What is the food chain for Oaktree Farm?

_____

(1)

(ii) Explain why Greenbank Farm is much more efficient at meeting human food energy requirements.

_____

_____

_____

_____

_____

(3)

(c) The human population has been increasing rapidly throughout this century. It is now about 6 billion and is still growing. What does the information in this question suggest about likely changes in the human diet which may need to occur during the coming century? Explain your answer.

_____

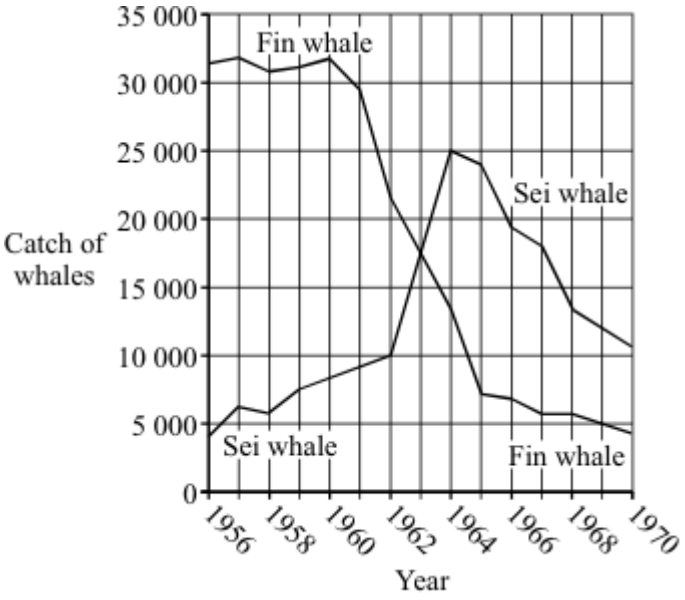
_____

(4)

(Total 10 marks)

Q35.

During the last hundred years many species of whales have been over-hunted. This has led to a dramatic decrease in their numbers. The graph shows the catches of two of these species, Fin whales and Sei whales, between 1956 and 1970.



(a) When did over-hunting begin to affect the Fin whale population?

(1)

(b) Complete the sentence.

When a species is over-hunted many adults are killed. The population numbers fall dramatically because the death rate is far greater than the

(1)

(c) (i) In what **year** were the catches of Fin whales and Sei whales the same?

(1)

(ii) Between 1963 and 1964 how did the catches of Fin whales and Sei whales alter?

Fin whales _____

Sei whales _____

(1)

(d) Suggest why the catches of Sei whales increased between 1956 and 1964.

_____

_____

(1)

(Total 5 marks)

Mark schemes

Q1.

(a) any **two** from:

ignore CO_2 release unqualified

- burning
- activity of microbes / microbial respiration
- less photosynthesis

  *do **not** accept CO_2 taken in for respiration*

  or

  trees take in CO_2

  or

  less CO_2 locked up in wood
- CO_2 given off by clearing machinery

2

(b) (i) range of different species

accept idea of variety of organisms or plants or animals

1

(ii) any **one** from:

- organisms may produce substances useful to humans

  *do **not** accept if food is only example*
- duty to preserve for future generations
- effect on other organisms e.g. food chain effects

  ignore effect on human food supply
- loss of environmental indicators

1

[4]

Q2.

(a) burning / combustion fossil fuels / burning wood

accept named fossil fuel
accept driving cars / any vehicles
*do **not** accept burning / combustion unqualified*
*do **not** accept factories*
ignore factory chimneys unqualified
ignore respiration

1

deforestation

1

(b) (i) (overall) increase

1

fluctuations

highs are higher <u>and</u>

*lows are not as low = **2** marks*

1

(ii) no – could be due to some other factor **or**
could be coincidence **or** fluctuations ±
same size as the overall rise or large
fluctuations or sometimes when CO_2 rises temperature doesn't

1

(c) any **one** biotic **or** abiotic effect eg:

*do **not** credit just "climate / weather change"*
allow <u>extreme</u> climate / weather change

changes in rainfall

accept drought, desert formation

ice-caps melting / rise in sea level

accept flooding

changed pattern of winds

changed pattern of migration

changed species survival

changed growth

1

[6]

Q3.

(a) (i) increases

1

(ii) decreases

1

(b) any **two** from:

- competition for water
- competition for ions / minerals / salts / nutrients

accept correct named example
*do **not** accept food*
*do **not** accept <u>all</u>*

- competition for light

2

(c) kills / harms other / named organisms

1

[5]

Q4.

(a) burning fossil fuels / named example

accept <u>driving</u> cars / lorries etc burning fuels in power stations
ignore combustion unqualified
*do **not** accept catalytic converter on its own **or** emissions from power stations*

1

(b) (i) pollutants / smoke <u>breathed in</u>

1

(ii) SO_2 and deaths rise (and fall) at same times **or**
SO_2 and deaths parallel each other / show same pattern

1

(iii) no – could be due to some other factor / pollutant / to smoke **or** correlation not precise / described

explanations must come to a conclusion
named examples must be plausible allow 'coincidence'

1

[4]

Q5.

(a) (i) carbon dioxide

accept other positive indications

1

(ii) methane

1

accept other positive indications

(b) increase

accept other positive indications

1

(c) any **three** from:

building

accept houses / airports / roads / factories

farming / removing hedgerows / fire

*do **not** accept pesticides, fertilisers etc*

quarrying / mining

industry

accept release of toxic chemicals / named eg
accept acid rain / global warming only if linked to production

*by human activity do **not** accept just 'pollution'*

drainage of marshland

dam construction / flooding land

dumping waste

*do **not** accept fly tipping, litter*

3

[6]

Q6.

(a) burning fossil fuels / coal / gas / oil

accept driving vehicles / eg cars

accept coal-fired power station
accept car emissions

ignore combustion unqualified
*do **not** accept power station unqualified*
*do **not** accept using fossil fuels*

1

(b) (i) (SO_2) makes it acidic / makes acid rain / lowers pH

1

(ii) any **one** from:

(SO_2) kills leaves reduces number of leaves reduces leaf area
or smaller leaves causes fewer leaves to grow

ignore correct extras, eg
withered, yellow etc

1

(c) any **two** from:

(fewer leaves / less leaf S.A) so less photosynthesis

less food / less sugar / less starch supplied (to roots / to stems)

(SO_2) lowers pH of soil / makes soil acidic

ions (/minerals / salts / nutrients) less available (to plants)

accept don't get enough nutrients

2

[5]

Q7.

(a) (i) building
or
wood/timber/furniture
or
paper
or
packaging

or
fuel/burning
*do **not** accept 'logs' by itself*
1

(ii) farming/agriculture
or
building
or
roads
1

(iii) increased CO_2
1

(b) (i) trees photosynthesise/less photosynthesis takes place (and)
accept burning trees (1)
1

trees/photosynthesis uses carbon dioxide
releases CO2 (1)
1

lets in heat/energy
*do **not** accept sunshine*
1

prevents it escaping (from the atmosphere)
or
being reflected/retransmitted into space
1

(ii) global warming
accept increased 'el nino'

or
a named effect of global warming such as polar ice cap melt, climatic change, increased temperature/sea level rising
accept warmer weather
1

[8]

Q8.

(a) award two marks for correct plotting

deduct 1 mark for each error, minimum mark 0
2

(b) 14 − 16
transfer error allowed
1

(c) lichen **types** increase with distance
accept converse
1

(d) any two from:

more bicycles used

smoke free zones

out of town shopping

2

park and ride/other schemes to keep cars from city centres e.g. pedestrian areas

increased use of public transport

less/improvements in factories/power stations

improved technology in cars

(e) $SO_2/NO_2/CO_2$ (or words)
or
oxides of nitrogen dissolves/combines/reacts (in water)
*do **not** accept mixes*

1

makes an (weak) acid
n.b. acid as an adjective not a noun

1

any one from:

acidification of water/soil

damage to trees/plants

1

damage/dissolve/erosion of cement **or**
marble/limestone **or** metals **or**
buildings **or** statues
accept corrodes

kills fish

loss of leaves

1

[10]

Q9.

(a) fuels

1

cars

1

sulphur

1

dissolve

1

water

1

kill

1

plants

1

(b) (i) any **two** from:

acid rain **or** specific effects of acid rain up to a maximum of **2**

global warming **or** consequences of global warming up to a maximum of **2**

increased greenhouse effect

2

(ii) deforestation **or** less plants
or
volcanoes
or
car (internal combustion engines)
or
types of domestic fires **or** central heating
or
burning rubbish **or** wood

accept inversion effects in African ***or*** *volcanic lakes*

1

[10]

Q10.

(a) 21 600

no marks for working

1

(b) soil not held in by tree <u>roots</u>

1

water falls on the soil or wind reaches soil
or trees normally intercept
or
soil washed away or soil blown away

1

(c) (i) less carbon dioxide removed
or trees (normal) remove CO_2

ignore reference to O_2

1

more carbon dioxide added by burning (wood)

or (more) CO_2 from decomposition

1

(carbon dioxide) stops (radiant) heat escaping from earth
or less heat escapes

1

(ii) any **two** from:
changed patterns of rainfall **or** wind or causes drought

NOT just 'climate change'

accept increased evaporation

polar ice caps melting **or** sea levels rise
or desert formation **or** loss of habitat

changed plant growth **or** changed distribution of species
or species become extinct

accept named example

accept killing and dying of species

2

(iii) (more) photosynthesis (because more trees)

1

(more) carbon dioxide removed from atmosphere **or** trees remove CO_2

*ignore references to transpiration **or** water vapour*

(as a minimum photosynthesis uses CO_2 = 2 marks)

ignore reference to oxygen

1

[10]

Q11.

(a) increases in human population;

gains 1 mark

2 of:
have led to need for land to be used for housing;
and for industry; farming; transport; leisure

each for 1 mark

3

(b) 4 of e.g.
reduced number of habitats;
possible reduction in number of species;
more waste/pollution;
examples of pollution;
one effect of this waste;
reference to herbicides/pesticides;

references to excess fertilisers;
reference to food chain effects

each for 1 mark

4

[7]

Q12.

(a) increased human population
increased standard of living

each for 1 mark

2

(b) nutrients absorbed by plants not replaced

each for 1 mark

2

(c) increased release of carbon dioxide into atmosphere when trees are burned
reduced rate of carbon dioxide removal from atmosphere
increased carbon dioxide absorbs more of energy radiated by Earth
global rise in temperature

each for 1 mark

4

[8]

Q13.

e.g.
waste gases/air pollution harms living organisms
dumped waste can make land unfit to live on/
drainage pollutes water/harms organisms

for 1 mark each

(if no marks can allow – pollution harms organisms = 1)

[2]

Q14.

Cogently argued based on biological principles, for **and**
against introduction of caterpillar
maximum of 4 pros e.g.
fewer chemicals used therefore less expense
less chemical damage to other plants
consequent benefits to food chains
fewer farm animals poisoned therefore more economic
countryside more varied therefore more attractive to tourists
tourists bring economic advantages
greater variety of habitats therefore greater variety of species

any 4 for 1 mark each

4

cons e.g.
danger to livelihoods if crops destroyed by caterpillar
relatively low chance of success since only one third of schemes
effective world-wide

unlikely to be natural predators therefore ecological balance affected

any 2 for 1 mark each

2

cogently argued case **gains up to 2 marks**

2

[8]

Q15.

(a) two thirds/66%

for 1 mark

1

(b) 2 of:
by sewage
by chemicals fertilizers

any 2 for 1 mark each

2

[3]

Q16.

(i) fewer hedges
marsh drained
less woodland/trees
more farm buildings

any 2 for 1 mark each

2

(ii) fewer
e.g. fewer habitats

for 1 mark each

2

[4]

Q17.

(a) 15%

for 2 marks

2

(b) combustion,
deforestation

for 1 mark each

2

(c) rice fields

for 1 mark

1

(d) greenhouse gases absorb energy,
which is radiated by Earth,
keeping the Earth warmer than it would otherwise be

for 1 mark each

3

[8]

Q18.

(a) sulphur dioxide
sewage
pesticides

for 1 mark each

3

(b) *idea of* reduced numbers / loss of habitat (home) / killed or damaged by pollution

for 1 mark

1

[4]

Q19.

(a) e.g.
timber
agriculture
roads / urban development / buildings

any two for 1 mark each

2

(b) *ideas that (accept reverse arguments)*
increased carbon dioxide content since less during photosynthesis
and locked-up as wood burning increases carbon dioxide content
increased activity of microbes increases carbon dioxide content
oxygen content reduced water vapour content reduced

any five for 1 mark each

5

[7]

Q20.

(a) (i) 200 kJ

for 1 mark

1

(ii) 2

gains 2 marks
(if answer incorrect, 20 / 1000 × 100 gains 1 mark)

2

(b) *ideas that*
energy lost by animal (pig / cattle) / extra stage / extra trophic level
in waste materials e.g.

in muscular activity / movement
in keeping body temperature higher than surroundings / lost as heat

any three for 1 mark each
references to respiration regarded as neutral

3

(c) *ideas that*
controlling (high) temperature of surroundings / keeping indoors / insulating
reduces energy transferred from animal as heat / animal uses body heat to maintain temperature restricting movement (e.g. caging or keeping in darkness)
reduces muscular contraction / muscular activity

each for 1 mark
accept respiration as explanation once only if neither explanation point has received credit
reject give more food / different food

4

[10]

Q21.

(a) fuels
smoke / sulphur dioxide
smoke / sulphur dioxide
pesticide / fertiliser
pesticide / fertiliser

for 1 mark each

5

(b) produces acid (rain)

for 1 mark

which may damage trees (*reject* plants unqualified)
which may make lakes / rivers too acid for animals or plants
which may affect stonework / metals / paint
(ozone damage or global warming disqualifies the effect mark)

any one for 1 mark

2

[7]

Q22.

<u>pros e.g.:</u>

gum trees survive therefore less soil erosion
therefore food webs not disrupted
if no culling, whole Koala population may die
easier to cull because Koalas are difficult to catch

<u>cons e.g.:</u>

Koala's 'right to life' / ethical issue
better to transfer to reserves on mainland than kill
could use tranquillisers to catch without killing

could allow population to stabilise naturally

max 4 of the above; max 3 pros or cons.

[4]

Q23.

(a) habitats destroyed

*accept idea that the places to live **or***
*food **or** minerals are reduced **or** less shelter*

1

(b) any **two** from

fertilisers / named fertilisers

accept sewage / lime

pesticides

herbicides

2

[3]

Q24.

(a) any **two** from

- deforestation reduces carbon dioxide removal from the atmosphere

  accept less photosynthesis for reduces carbon dioxide removal
  accept cutting down trees for deforestation
  ignore cutting down plants
  accept there are less trees to remove carbon dioxide

- burning wood / trees (releases carbon dioxide)

- microbes decay / decompose wood / trees (releasing carbon dioxide

2

(b) may cause a rise in sea level

accept may cause polar / ice caps to melt / flooding
*do **not** accept global warming **or** greenhouse effect **or** erosion*

1

may cause changes in the Earth's climate

*accept causes changes in the weather **or** named, comparative **type** of weather **or** drought*
accept seasonal changes

1

(c) methane

*accept natural gas **or** CH_4*

1

[5]

Q25.

(a) 3060 (kJ)

1

(b) (i) 22060 (kJ)

1

(ii) photosynthesis

1

(c) faeces / undigested food

reference to movement and respiration are neutral

urine / urea

2

accept excretion / waste / droppings if
<u>both</u> of the mark points are not gained

(d) any **two** from

- control ripening
- herbicides
- prevent over ripening in transport
- stimulate root growth

other growth references are not neutral

- use in tissue culture to produce large numbers of plantlets

2

[7]

Q26.

(a) any **one** from:

herbicide

accept weedkiller

pesticide

accept insect killer
*do **not** accept fertilisers*

1

(b) any two from:

- (fossil) fuels are burned
- sulphur dioxide is released
- (sulphur dioxide) dissolves / reacts (in water)

accept sulphur oxides are released

2

[3]

Q27.

(a) any two from:

agriculture

*accept land to grow crops **or** graze cattle*

buildings

roads

any 2 <u>different</u> uses for wood for 1 mark each

accept wood for burning (energy)
accept timber for wood

2

(b) (i) (USA has) more wealth / technology / devices / need for <u>electricity</u>

1

(ii) damage done

e.g. pollutant / mining / non-renewable / deforestation

1

linked effect

e.g. greenhouse effect / visual pollution / run out of resources / flooding

1

(c) (i) **Problem –** because some people did not want to pay the (landfill) tax

1

Waste dumped elsewhere

1

(ii) named example of

Reduce – such as less packaging / repairing

1

Reuse – such as glass bottles / shopping bags / ink jet cartridges

1

Recycle – such as metals, glass, paper

Mark as a whole

1

[10]

Q28.

any **three** from

building

accept building of houses, roads, power stations

quarrying

farming

'dumping' waste

[3]

Q29.

(a) any **three** from:

space

accept land, room

water

accept rain

nutrients

accept fertilisers, nitrates, minerals
*do **not** accept food*
*do **not** accept just sun*

light

carbon dioxide

3

(b) herbicides

1

[4]

Q30.

Quality of Written Communication

1 mark for correct sequencing
burning → named gas → correct environmental problem

1

any **three** from:

coal / fossil fuel is <u>burned</u>

(water vapour and carbon dioxide and) sulphur dioxide formed

accept nitrogen oxides

(gases) dissolve / react in rain

accept dissolve / react in water vapour

make acid rain

damages trees

*accept harms plants **or** animals **or** damage to buildings*

makes rivers /lakes acidic

accept carbon dioxide is a greenhouse gas / causes global warming for 2 marks

3

[4]

Q31.

indication that carbon dioxide emissions contribute to global warming

accept 'greenhouse effect' for global warming

1

argument for:
in terms of decreases carbon dioxide emissions because less (fuel / energy used for) transport / imports

1

argument against:
in terms of increases carbon dioxide emissions because of (fuel / energy used for) heating and lighting greenhouses

1

[3]

Q32.

use less nitrate / fertiliser

accept use none
use a different fertiliser is neutral
prevent nitrate fertiliser run off is neutral

1

any **two** from:

explanation that with less or none the crops still grow

make more land available to grow more crops

monitoring of water

legislation

organic farming / manure

genetically modified crops

give babies bottled water

2

[3]

Q33.

(a) carbon dioxide

1

methane

1

greenhouse effect

1

(b) coal / oil / gas / peat / petrol / paraffin

1

[4]

Q34.

(a) 12 500

incorrect numerical answer but clear evidence of correct working e.g. 365 million ÷ 365 ÷ 80 ***or*** *3285 million ÷ 365 ÷720 credit with (1)*

2

(b) (i) vegetation
→ (farm) animals → humans

accept any correct variation on this theme
e.g. grass → lambs → humans

1

(ii) any **three** linked points from

* less links in the food chain

or *only one link in the food chain*

* energy 'wasted' **or** 'lost' **or** 'used' at each link
* energy 'wasted' **or** 'lost' in (the process of) respiration
* energy 'used' to maintain body temperature
* energy 'used' by the animals in movement

3

(c) people will eat more/greater proportion of food from plants

accept people will eat less/smaller proportion of food from animals
do not credit 'everyone will stop eating meat'

1

any **three** linked points from

these marks are independent of the 'prediction' mark
do not credit 'food from plants will become less expensive'

* meat will become more expensive
* only a limited area of land available on the planet (for food production **or** otherwise)
* more people means less land available for food production because some used for housing etc.
* land will become more expensive

* land will have to be used more efficiently

or *more people will go hungry*

or *people will (each) eat less*

* livestock farmers will try to improve efficiency
* (leading to) growth of 'factory farming'
* demand for food will rise (total)

3

[10]

Q35.

(a) 1960 **or** 1961

1

(b) birth rate

accept reproductive rate

1

(c) (i) 1963

1

(ii) Fin go down
Sei go up

both are required for the mark to be given

1

(d) any **one** from

there are fewer Fin whales so Sei whales start being caught more

Sei whales are breeding more

accept population goes up

there are more Sei whales because there are fewer Fin whales to eat their food to compensate for lower catches of other whales

accept argument based on predation

1

[5]

Q1.

The figures below show the levels of carbon dioxide in air from 150 000 years ago.

TIME	CARBON DIOXIDE CONCENTRATION
1500 years ago	270 parts per million
1800 AD	290 parts per million
1957	315 parts per million
1983	340 parts per million

(a) Explain why carbon dioxide levels in the atmosphere are changing.

(3)

(b) It is suggested that the increased level of carbon dioxide in the air is causing the atmosphere to warm up (the “Greenhouse Effect”).

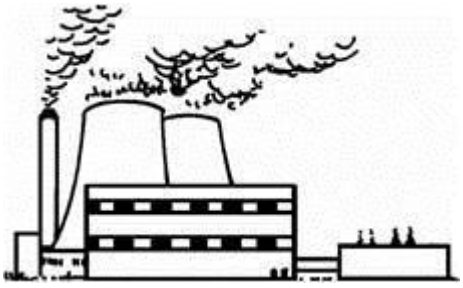
Describe, as fully as you can, **two** major effects of global warming and how these may affect the human population.

(6)

(Total 9 marks)

Q2.

Some power stations burn coal to make electricity.
Smoke and waste gases go up the chimney.



Suggest **three** ways in which the smoke and waste gases from a power station can damage the environment.

1. _____

_____

2. _____

_____

3. _____

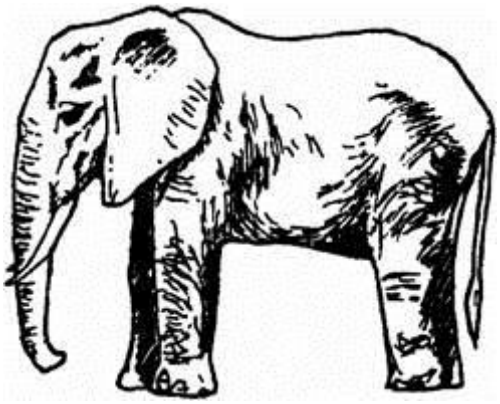
_____

(Total 3 marks)

Q3.

The elephant is likely to become extinct in parts of Africa.

Use the information below to explain **three** reasons why.



* The African elephant eats lots of trees and other plants for food.
* In Africa the human population is increasing and more food is needed to feed the extra people.
* More trees are cut down for fuel and to clear land for growing crops.
* Elephants are killed by poachers who want the ivory from their tusks.
* A herd of elephants needs a large area in which to live and feed.

1. _____

_____

2. _____

_____

3. _____

_____

(Total 3 marks)

Q4.

The table below shows a wheat farmer's calendar.

October	Winter Wheat is sown and germinates. Phosphate/potash fertiliser is applied.
March	Wheat plants resume growth. Nitrate fertiliser is applied.
April	Ammonium nitrate, the main fertiliser, is applied. Fungicide may be sprayed to control mildew or rust on wheat.
May	Extra ammonium nitrate fertiliser may be applied. A second spraying of fungicide may be needed. Dwarfing hormone sprayed to keep wheat straw (stalks) short.
June	Insecticide spray against aphids may be needed. Extra spraying of fungicide may be needed.
August	Wheat is harvested.
August/ September	Ground sprayed with weedkiller. Stubble (remains of wheat plants) is ploughed in ready for the next crop.

This process uses expensive fertilisers and pesticides to grow pest free crops which may be produced in excess.

What are the reasons for and against growing wheat in this way?

For _____

_____

_____

(3)

Against _____

_____

_____

(4)

(Total 7 marks)

Q5.

200 years ago there were fewer people in Britain. Much of the land was countryside where wild animals and plants lived.
The number of humans has increased greatly since then.

Describe **three** different ways in which people have reduced the amount of land for wild animals and plants.

1. _____

2. _____

3. _____

(Total 3 marks)

Q6.

The following statement appeared in a popular journal. “Removal of tropical rainforests, more rice fields and greater industrialisation may be causing an increase in the ‘greenhouse effect’.”

Explain this statement as fully as you can.

_____

_____

_____

_____

_____

_____

(Total 5 marks)

Q7.

The following passage is from a newspaper report on a recent conference about global warming.

> If we keep pumping out greenhouse gases, islands in the Pacific will disappear; droughts in Africa will bring famine to 50 million people; floods in low lying places like Bangladesh will make 200 million people homeless; Venice will be submerged:

(a) Name **one** major greenhouse gas.

_____

(1)

(b) Explain how greenhouse gases may cause effects like those described in the passage.

_____

_____

_____

_____

(4)

(Total 5 marks)

Mark schemes

Q1.

(a) *idea:*
more (fossil) fuel burned (do not credit simply more people/cars/industry)
deforestation = less photosynthesis
deforestation = more respiration/burning
each for 1 mark

3

(b) *idea*:
climate change
for 1 mark

warmer/colder/drier/wetter
food production affected/starvation
mayor ecosystems destroyed/damaged
any two for 1 mark each

6

<u>sea level rise</u>
for 1 mark

low land flooded
less food grown/starvation
homes/factories flooded
any two for 1 mark each

Allow
polar ice caps melt
sea water expands

[9]

Q2.

idea that

- acid rain
- pollutes lakes/rivers and kills fish
- corrodes buildings
- kills trees and plants
- adds carbon dioxide to atmosphere
- increases greenhouse effect
- changes climate
- raises sea levels

- affects wildlife/cities/farmers
- smoke/soot makes surroundings dirtier
- other suitable examples

any three for 1 mark each

Credit any reference to pollution for 1 mark if above answers not given

Mark the first correct/incorrect answer on each line (some may be neutral) unless some lines not used

[3]

Q3.

Factor and effect needed.
idea

- killed by poachers (for tusks/ivory)
- not enough food for elephants because humans cut down trees
- not enough space because more used by people/agriculture
- food/space destroyed by humans
- killed for food

any three for 1 mark each

[3]

Q4.

ideas for

- more food produced/increased yield
- cheaper food
- bigger income for farmer (<u>allow</u> profit)
- less loss/damage/spoilage of crop
- <u>allow</u> less wasted growth (of straw due to drawing)

any three for 1 mark each

3

ideas against

- chemicals harm people (do <u>not</u> accept “affect flavour”)
- fertiliser costly
- fewer worms (in soil)
- weedkillers kill valued/useful wild plants

- insecticides/pesticides kill useful insects/other animals

  (general idea that chemicals harm plants/animals gets only 1 of these)

- (weedkillers insecticides/pesticides/fungicides/hormones/chemicals) contaminate water
- (increased risk) pesticide resistance over production/food mountains
- possible eutrophication/nitrate in river/extra plant growth/
- explanation of eutrophication

  for 1 mark each to a maximum of 4 marks

4

[7]

Q5.

- roads
- factories / industries
- airports
- railways
- housing estates / towns / cities
- farms / farming / crops
- quarries / mines
- theme parks
- play areas
- rubbish dumps

‘Buildings’ as an only answer

award one mark

any sensible answers which refer to land being covered
[Do not allow deforestation, pollution, golf courses, parks]

any three for 1 mark each

[3]

Q6.

- methane is given off from rice fields
- industry / burning fossil fuels which increases CO_2 in the atmosphere
- deforestation increases CO_2 due to burning / rotting trees
- deforestation means less CO_2 used (in photosynthesis) / less carbon locked up in wood
- methane / carbon dioxide a greenhouse gas

- greenhouse gases increase Earth's temperature / cause global warming
- reduce radiated energy or 'reflect back' radiation

any five for 1 mark each
(do not credit references to cattle producing methane or to effects of global warming)

[NB

- *claims that SO_2 a greenhouse gas and/or referring to acid rain*
- *referring to ozone layer[deduct 1 mark for each]*

[5]

Q7.

(a) carbon dioxide / methane / natural gas / North Sea gas
(credit CO_2 / CH_4)

for 1 mark

1

(b)
- reduce energy / heat radiated by / lost by Earth (into space)
(*not* heat / energy trapped)
- heat / energy radiated back to Earth
(*not* reflected)
- keep the Earth warmer (than it would otherwise be)
or cause of global warming (*not* greenhouse effect)
- causes seawater to expand
- causes ice (caps) / glaciers to melt
- cause a rise in sea level
- cause changes in the Earth's climate

(*credit* named climatic change but not drought)

(NB. Deduct 1 mark for any reference to ozone layer)

any four for 1 mark each

4

[5]