AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.7.3 BIODIVERSITY AND THE EFFECT OF HUMAN INTERACTION ON ECOSYSTEMS (PACK 1)

SCORE	PERCENTAGE
/269	%

STEMUP

These questions belong to AQA, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by AQA. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with AQA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. AQA has not endorsed, approved or been involved in the production of it. AQA and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

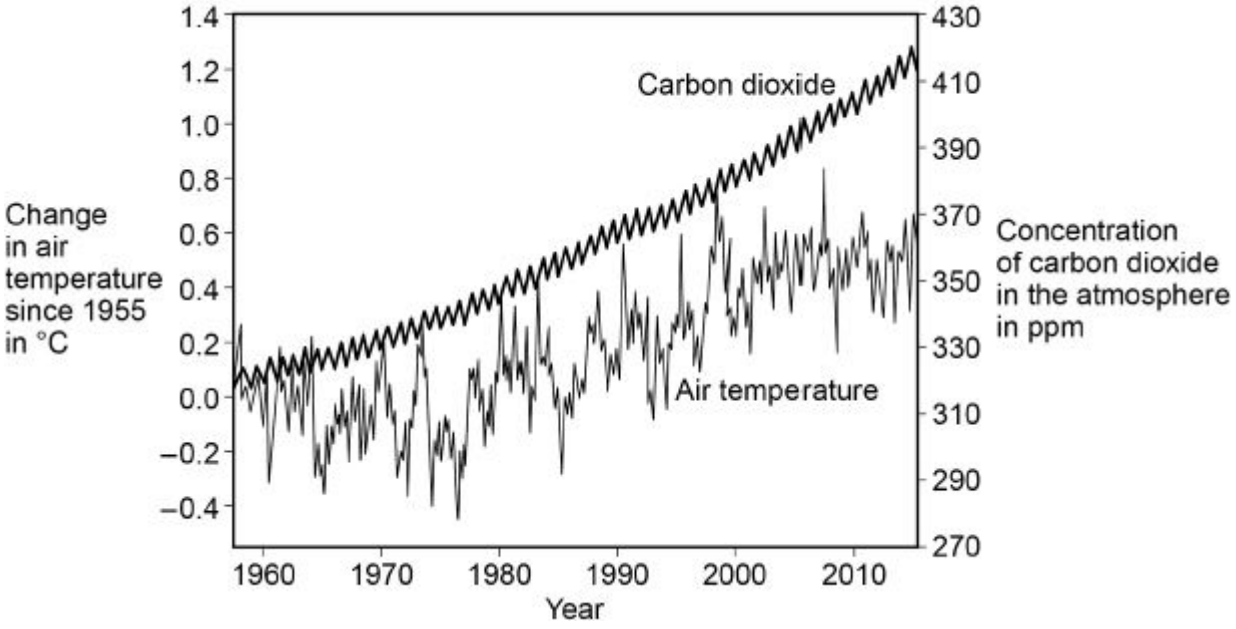
AQA publishes its past papers, mark schemes and examiner reports. Always check the current specification at aqa.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

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?

STEMUP.CO.UK

_____

_____

(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.

_____

STEMUP.CO.UK

_____

(1)

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

1. _____

_____

2. _____

_____

(2)

(Total 11 marks)

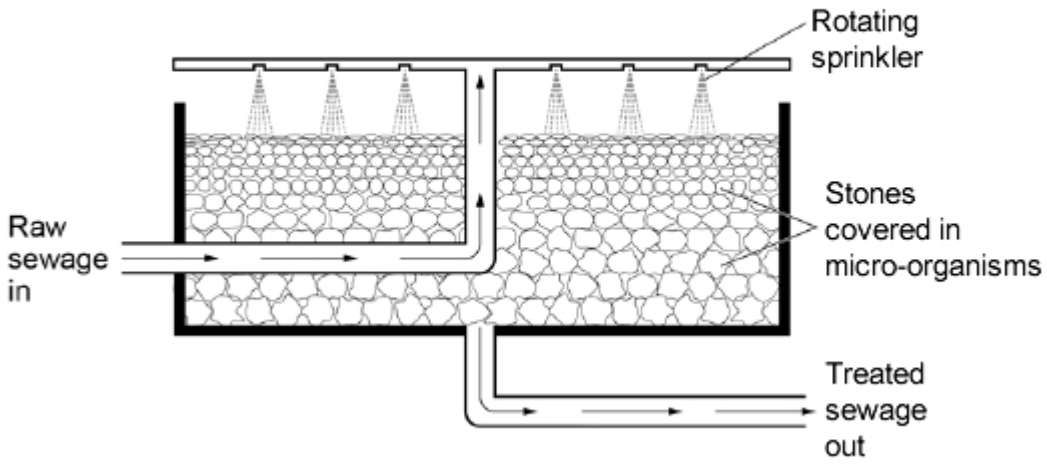
Q2.

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. _____

_____

2. _____

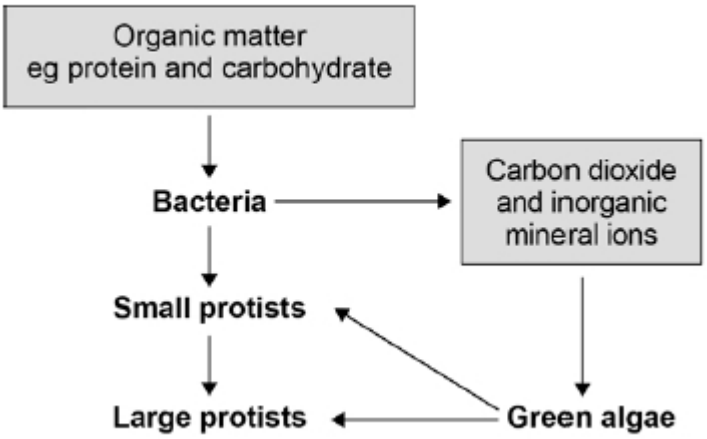
STEMUP.CO.UK

_____

(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.

_____

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

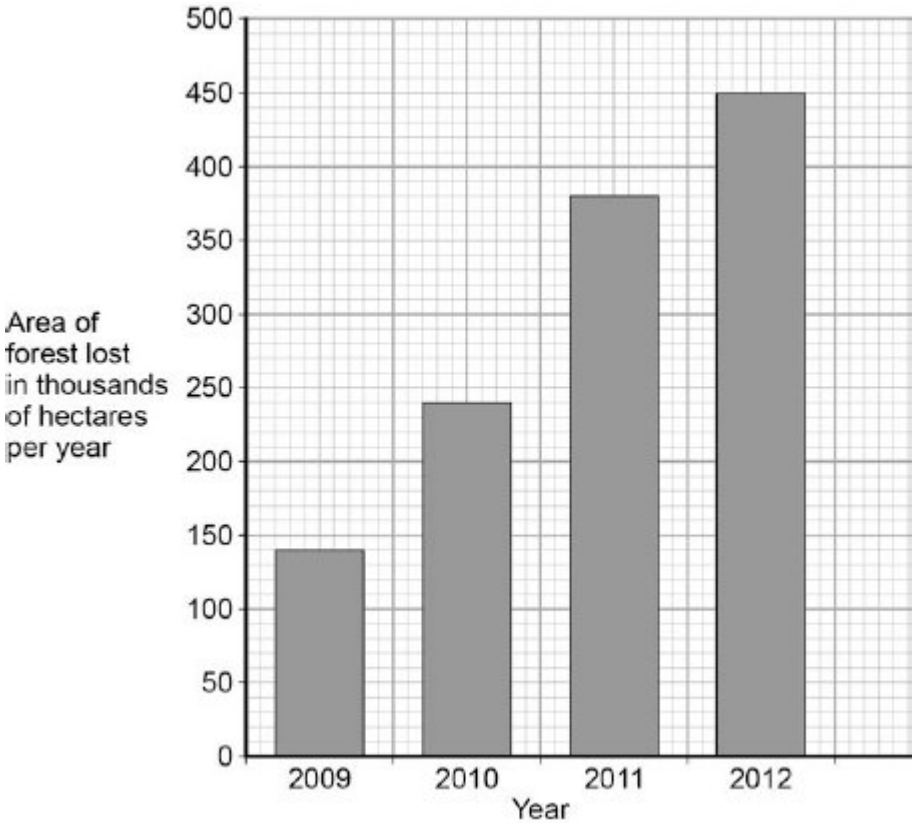
_____

(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)

STEMUP.CO.UK

(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 ☐

STEMUP.CO.UK

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 compost	Mass of carbon in sample in g	Mass of nitrogen in sample in g	Carbon:nitrogen ratio
Chicken manure	8.75	1.25	7:1
Horse manure	10.00	0.50	20:1
Peat moss	9.80	0.20	**X**

STEMUP.CO.UK

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.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

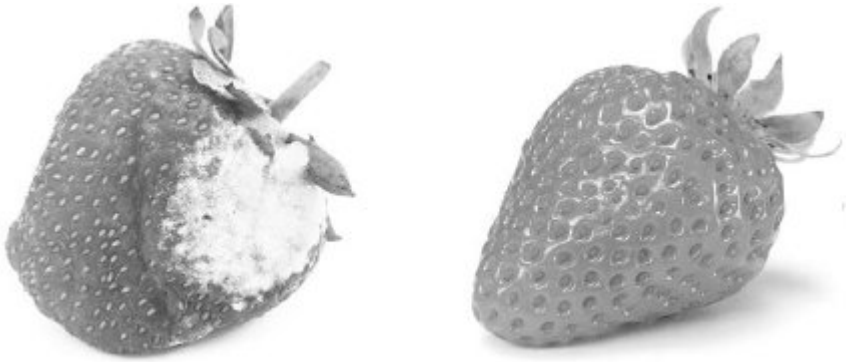
(6)

(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**

STEMUP.CO.UK



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
	Increases the amount of methane in the atmosphere
Increase in rice fields	
	Increases the amount of carbon dioxide that is released into the atmosphere
Destruction of peat bogs	
	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.

STEMUP.CO.UK

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. _____

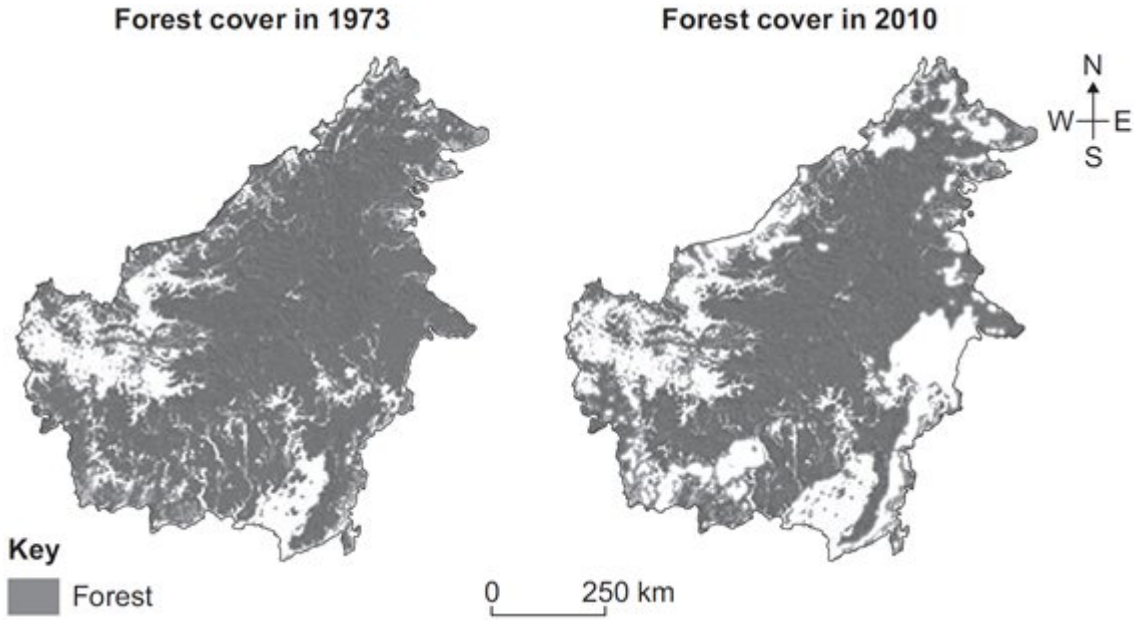
_____

(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.

_____

_____

_____

STEMUP.CO.UK

_____

(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.

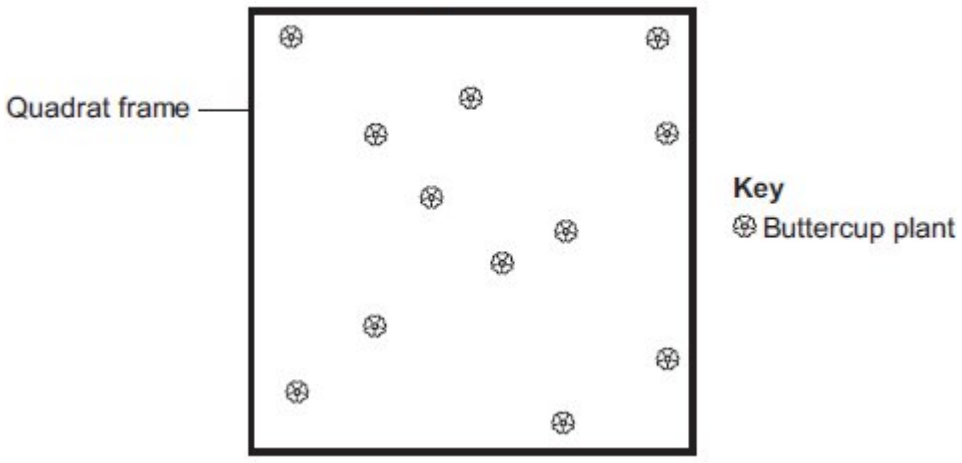
A grassy field on a farm measured 120 metres by 80 metres.

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



STEMUP.CO.UK

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)

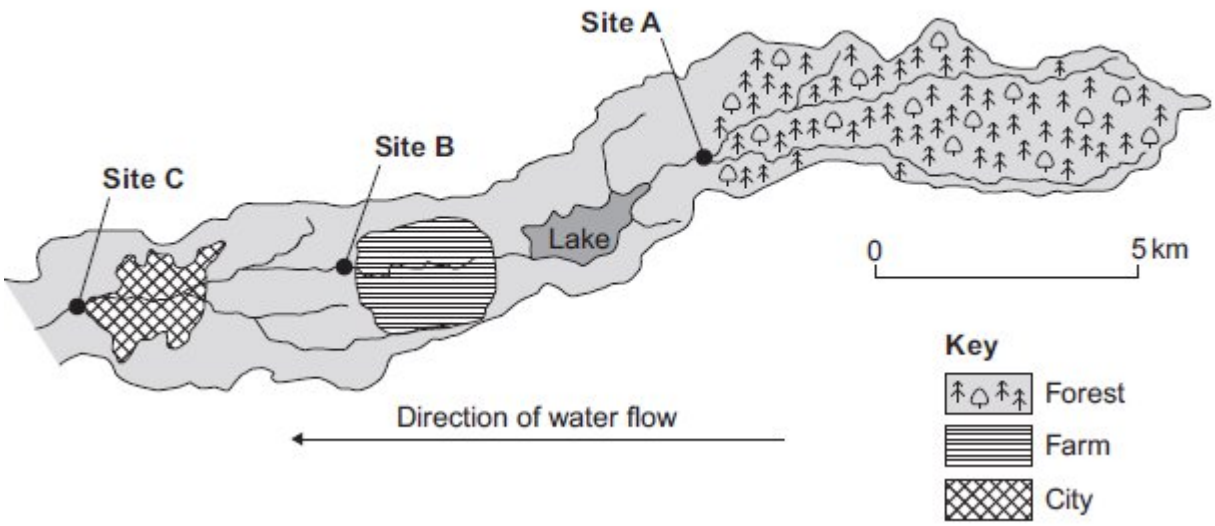
(ii) Explain how the amount of sunlight could affect the distribution of the buttercup plants.

(3)

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

STEMUP.CO.UK

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**.

STEMUP.CO.UK

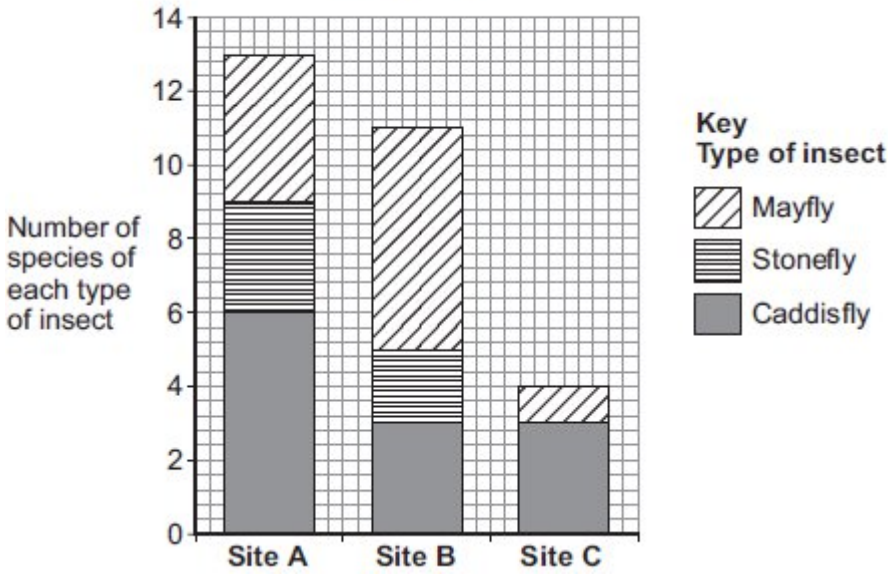
Scientists took many samples of river water from these sites.

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.

_____

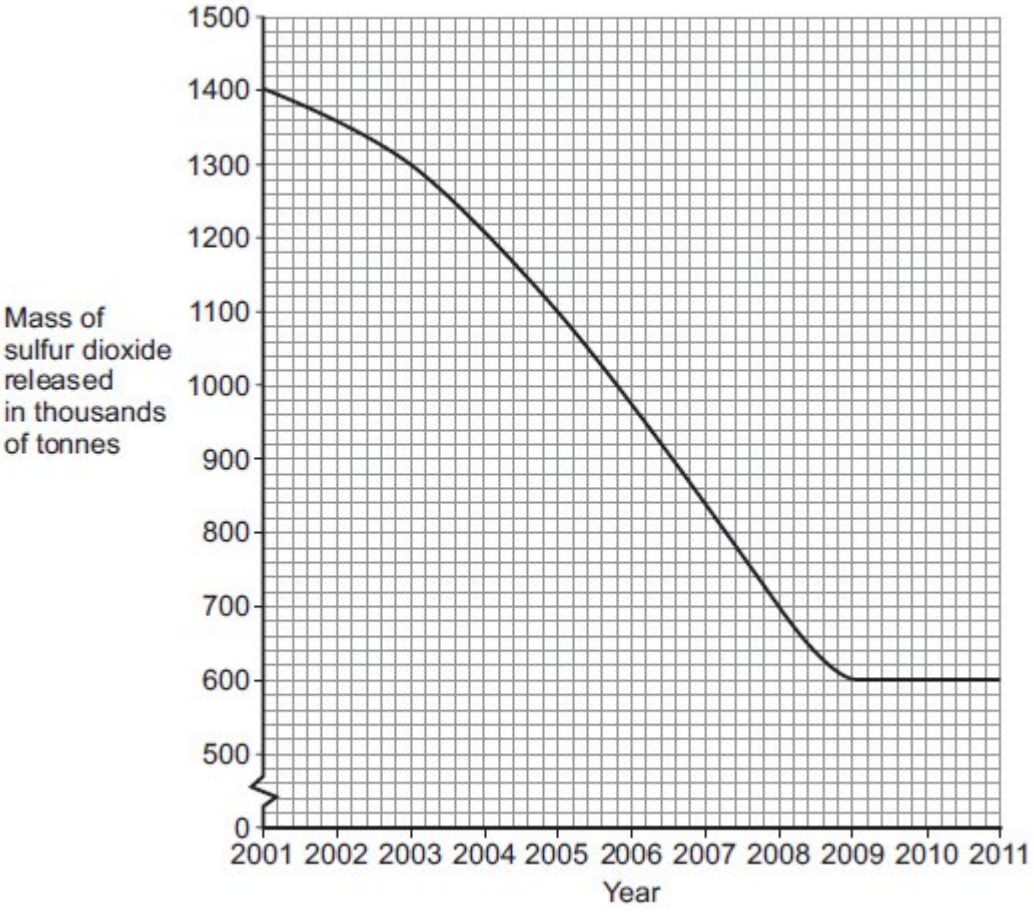
STEMUP.CO.UK

_____

(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?

_____

_____

_____

STEMUP.CO.UK

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)

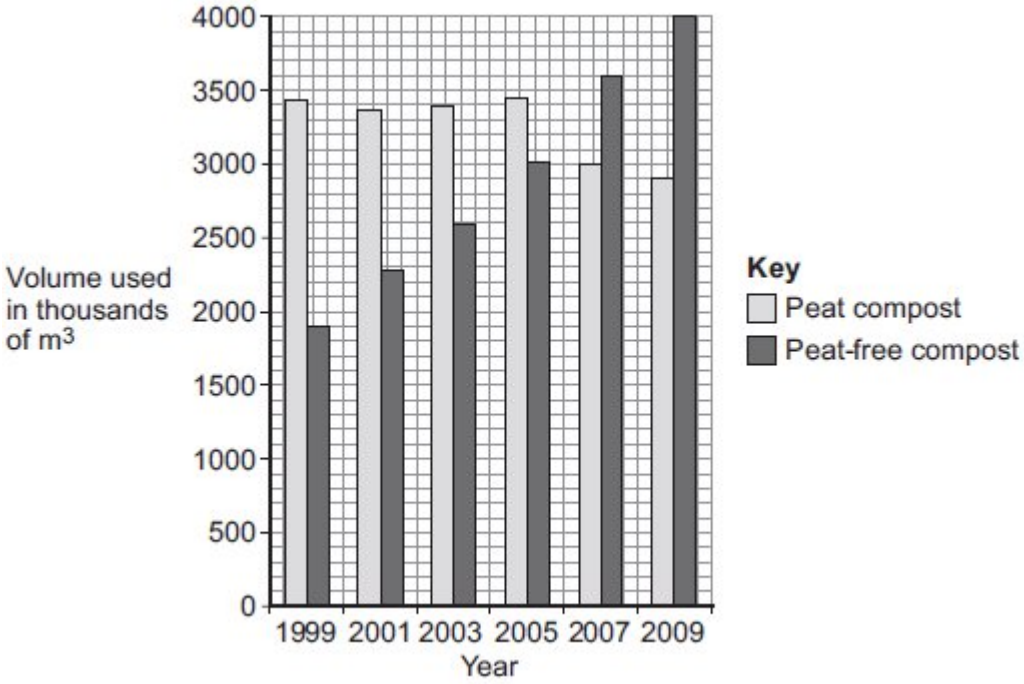
(Total 8 marks)

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.

STEMUP.CO.UK



(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.

STEMUP.CO.UK

(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.

_____

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

_____

(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

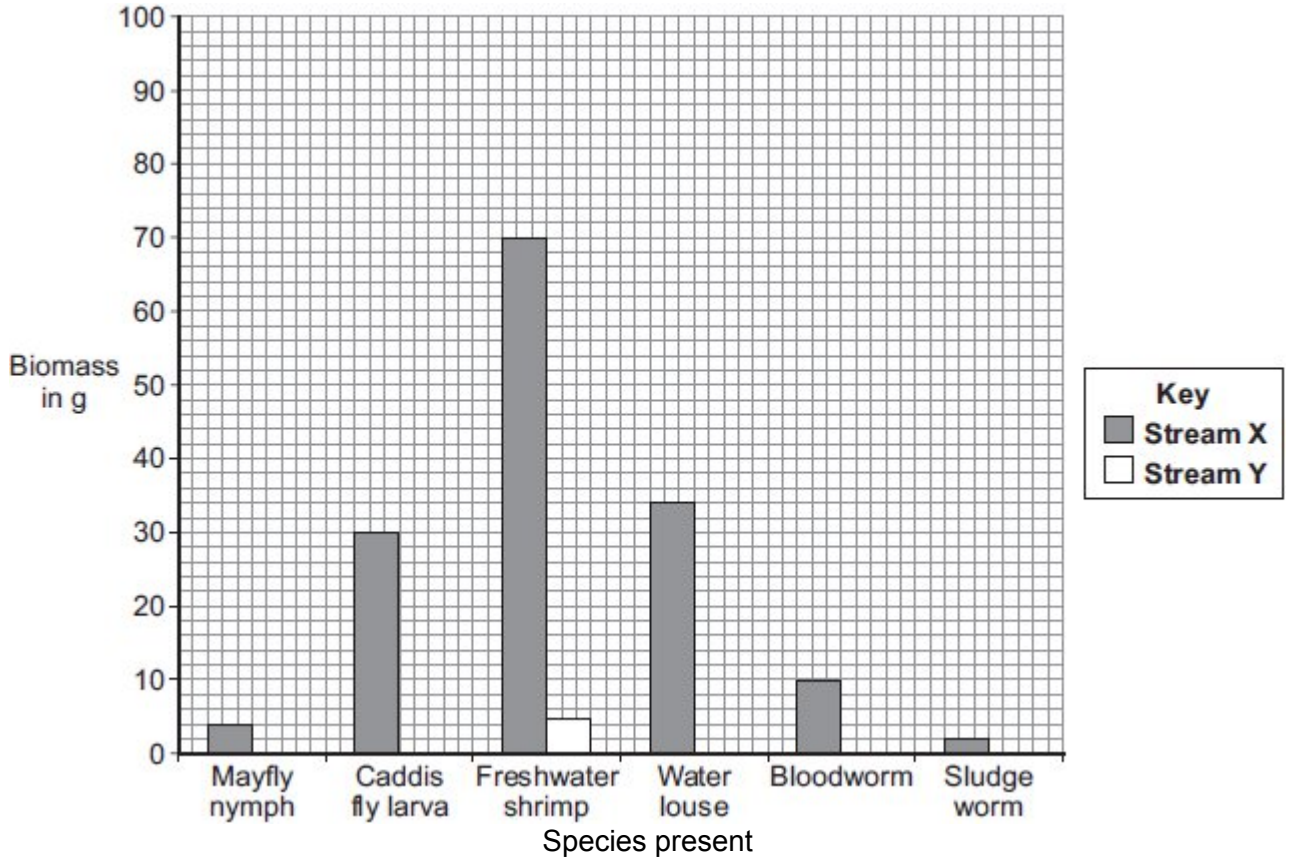
STEMUP.CO.UK

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

STEMUP.CO.UK

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.

_____

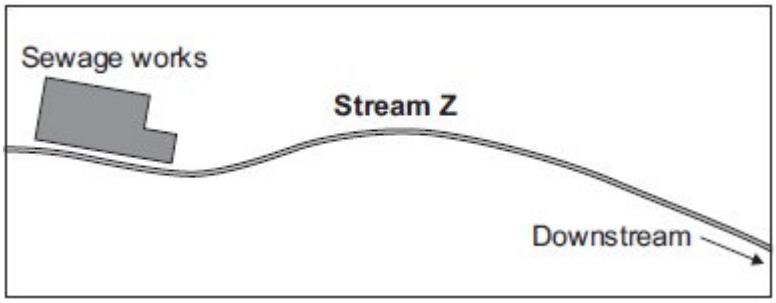
_____

_____

_____

(2)

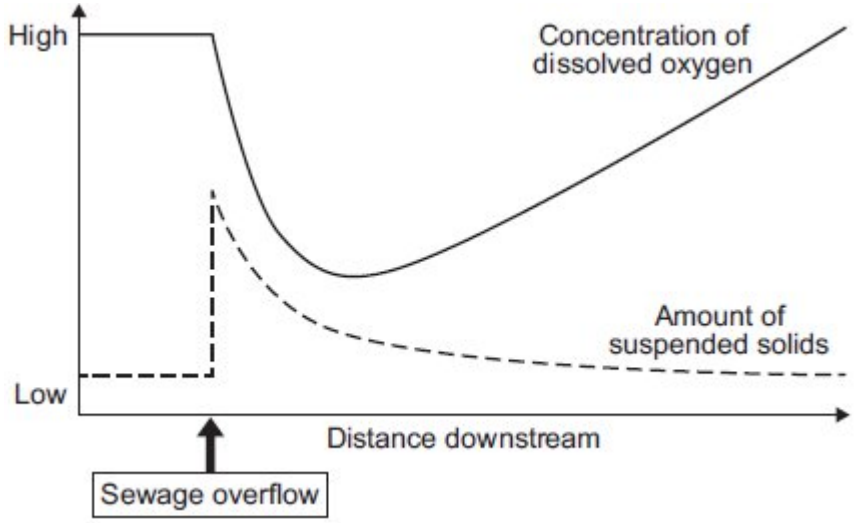
(b) There is a sewage works near another stream, **Z**.



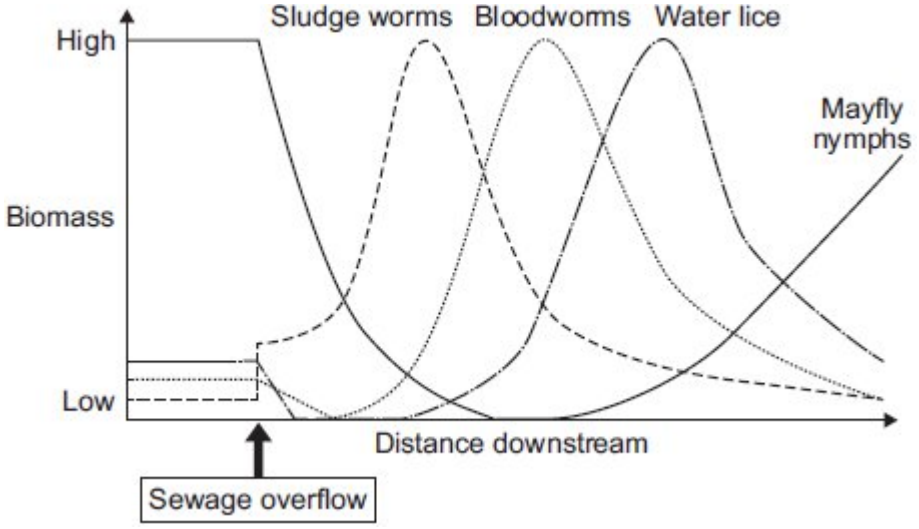
An accident caused sewage to overflow into **Stream Z**.
Two weeks later scientists took samples of water and invertebrates from the stream.
They took samples at different distances downstream from where the sewage overflowed.
The scientists plotted the results shown in **Graphs P** and **Q**.

Graph P: change in water quality downstream of sewage overflow

STEMUP.CO.UK



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.

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

(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.



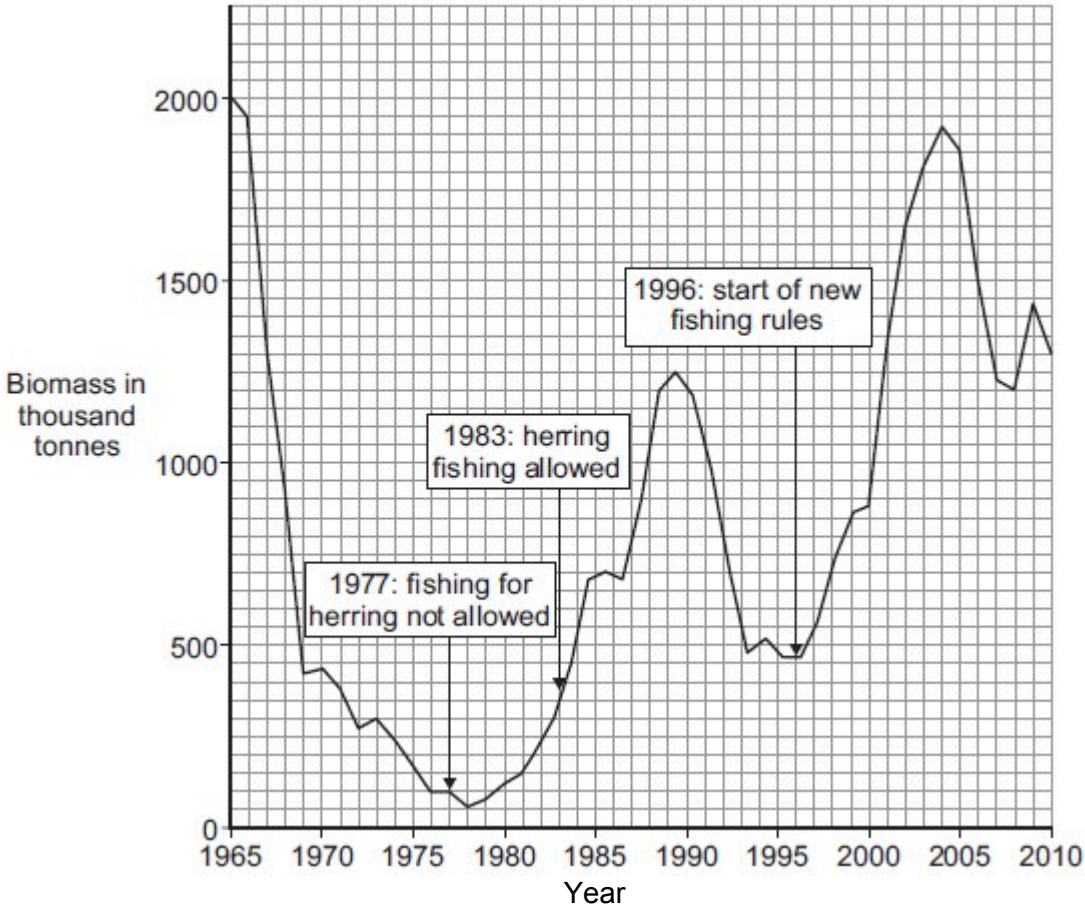


By Atle Grimsby from Utsira, Norway (Herring Catch at Utsira) [CC-BY-2.0 (http://creativecommons.org/licenses/by/2.0)], via Wikimedia Commons.

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.

STEMUP.CO.UK



(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)

STEMUP.CO.UK

(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.

STEMUP.CO.UK

Suggest how climate change could affect North Sea fish.

_____

_____

_____

_____

_____

_____

_____

_____

_____

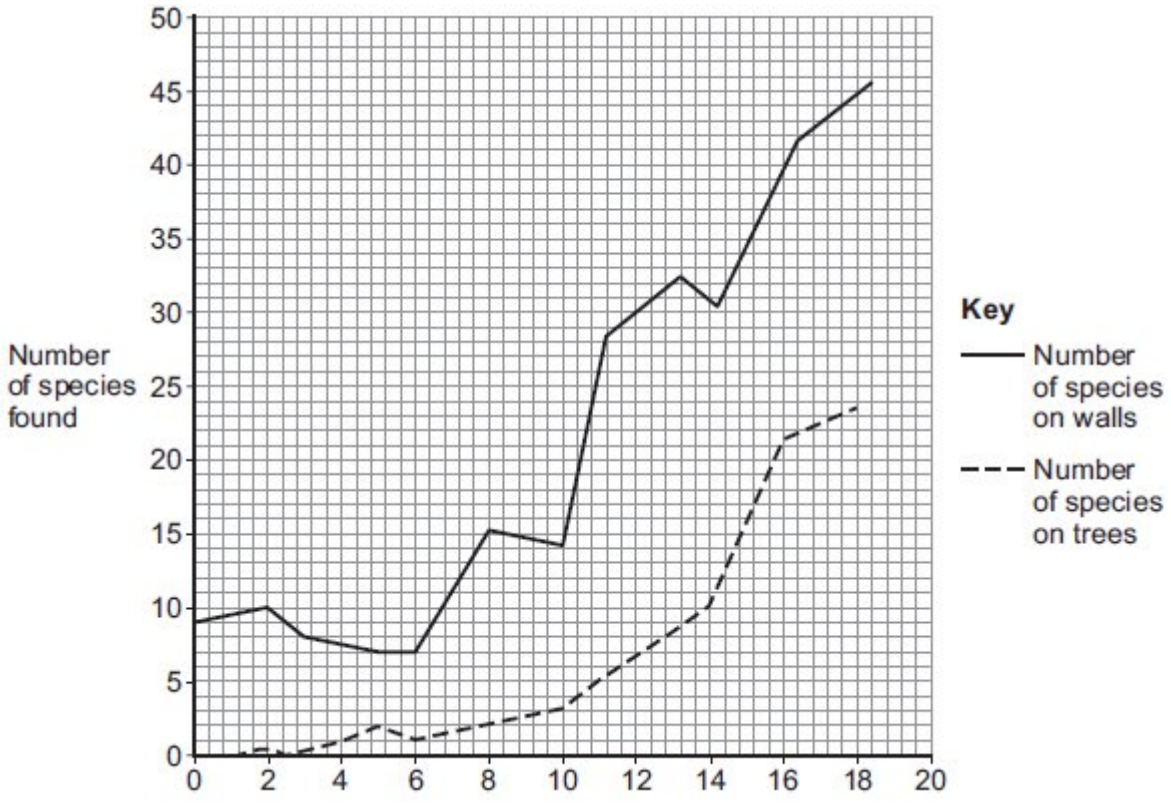
(4)

(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.



Distance from city centre in km

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

STEMUP.CO.UK

_____

(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.

STEMUP.CO.UK

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)

STEMUP.CO.UK

(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.

STEMUP.CO.UK

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.

STEMUP.CO.UK

_____

_____

(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)

STEMUP.CO.UK

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.



© Nivellen77/iStock/Thinkstock

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.

STEMUP.CO.UK

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)

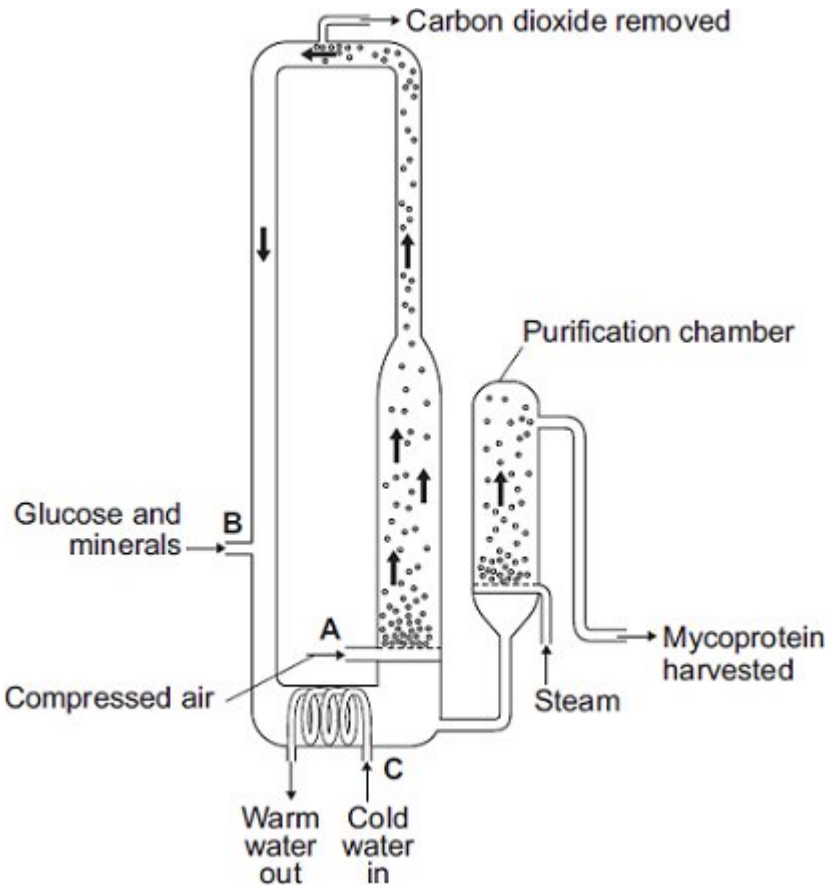
(Total 5 marks)

Q19.

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

Fusarium is used to make mycoprotein.

STEMUP.CO.UK



(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.

STEMUP.CO.UK

(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.

_____

_____

_____

_____

_____

_____

_____

_____

STEMUP.CO.UK

_____

_____

(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.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

STEMUP.CO.UK

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 8 marks)

Q21.

Human activities affect the environment.

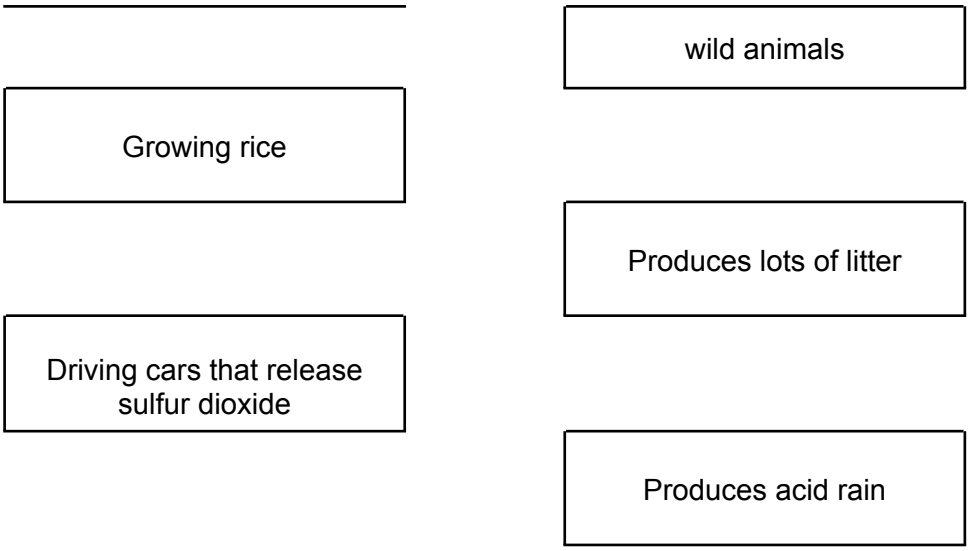
(a) **List A** gives four human activities.

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

STEMUP.CO.UK



(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.

_____

_____

_____

STEMUP.CO.UK

_____

(2)

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

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

_____

_____

_____

_____

_____

_____

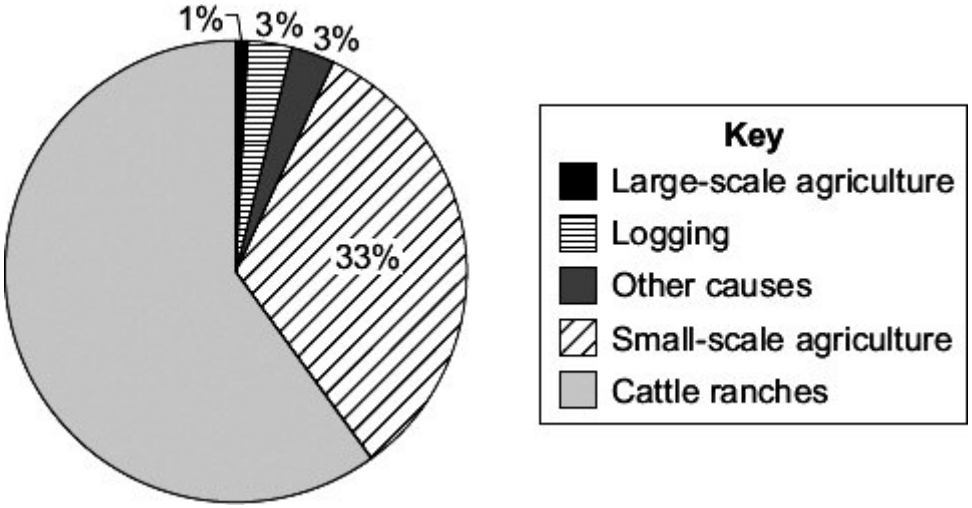
(3)

(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.

STEMUP.CO.UK

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

1. _____

_____

2. _____

_____

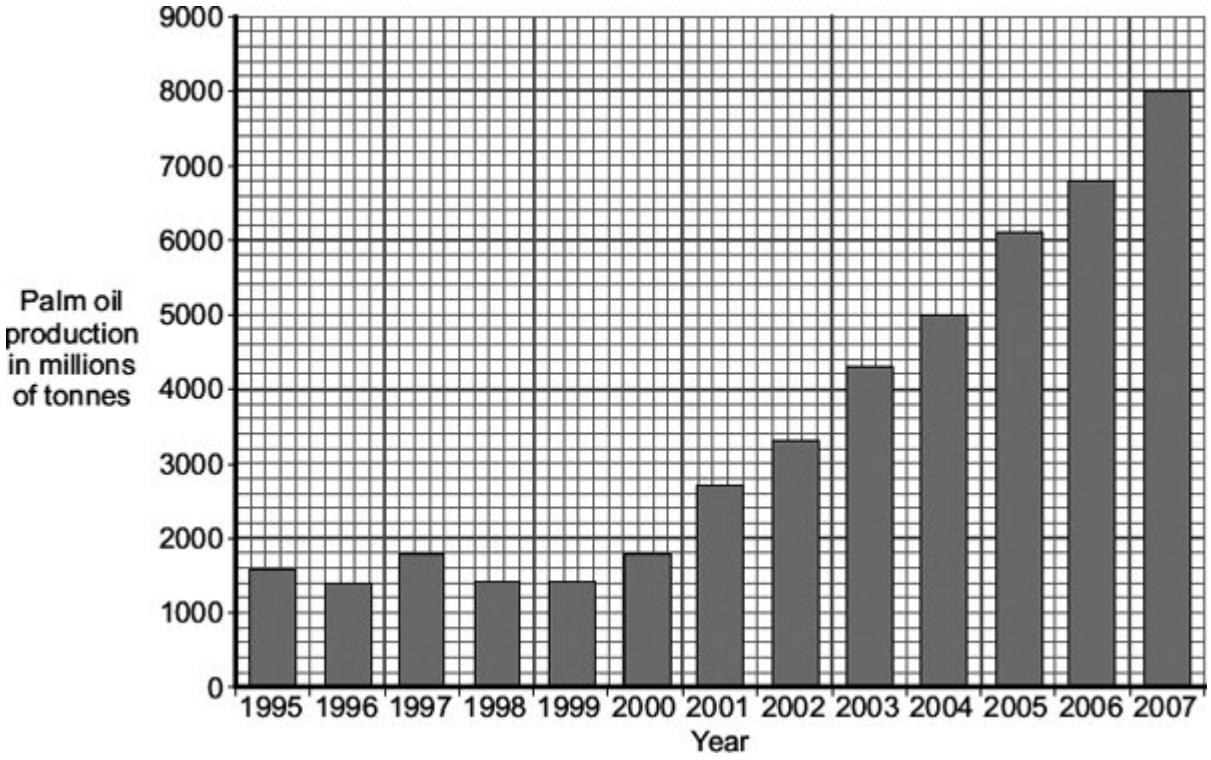
(2)

(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.

STEMUP.CO.UK

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.

STEMUP.CO.UK



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.

STEMUP.CO.UK



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

STEMUP.CO.UK

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)

STEMUP.CO.UK

(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.

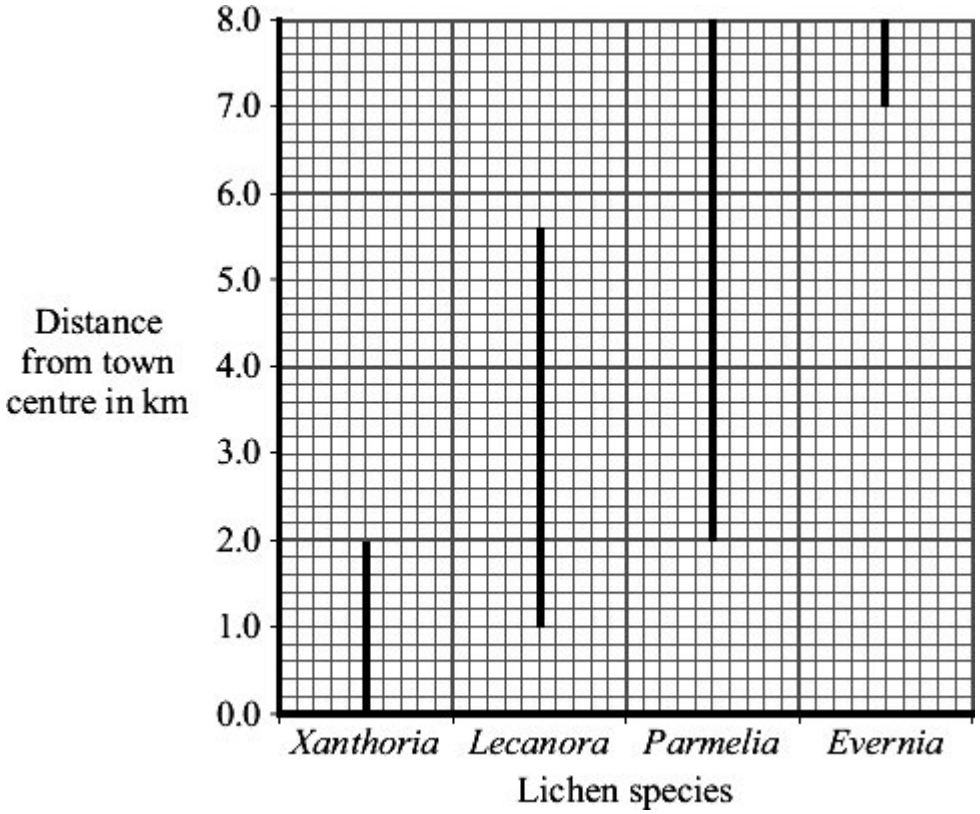
Lichens are sensitive to the amount of sulfur dioxide in the atmosphere. They are used as indicator species for the amount of air pollution. Air pollution is generally higher in town centres than in the countryside.

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.

_____

STEMUP.CO.UK

_____

(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. _____

_____

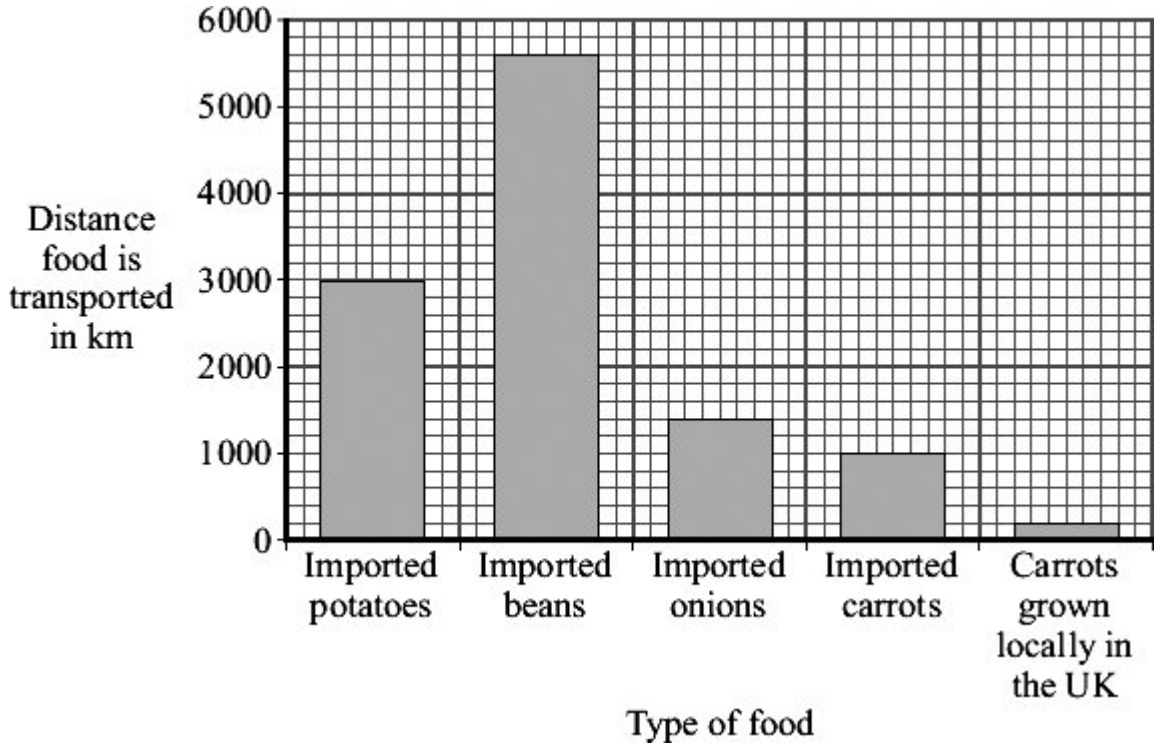
(2)

(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.



STEMUP.CO.UK

(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)

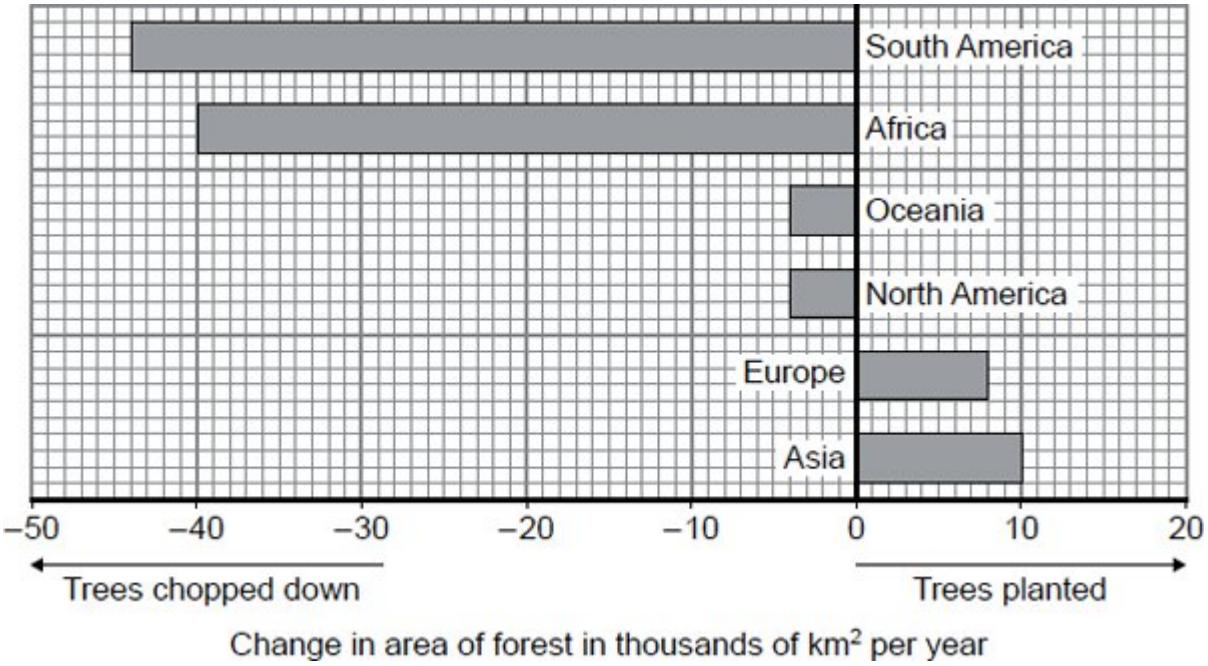
(Total 5 marks)

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.

STEMUP.CO.UK



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

Area = _____ thousand km²

(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 km²

Step 2 Calculate the total area of trees planted.

_____

Total area planted = _____ thousand km²

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 km²

(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

STEMUP.CO.UK

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.

STEMUP.CO.UK

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.

_____

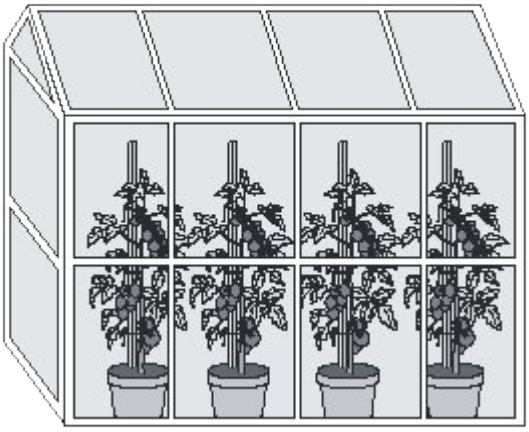
_____

(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. _____

_____

STEMUP.CO.UK

2. _____

_____

(2)

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

Explain why.

_____

_____

_____

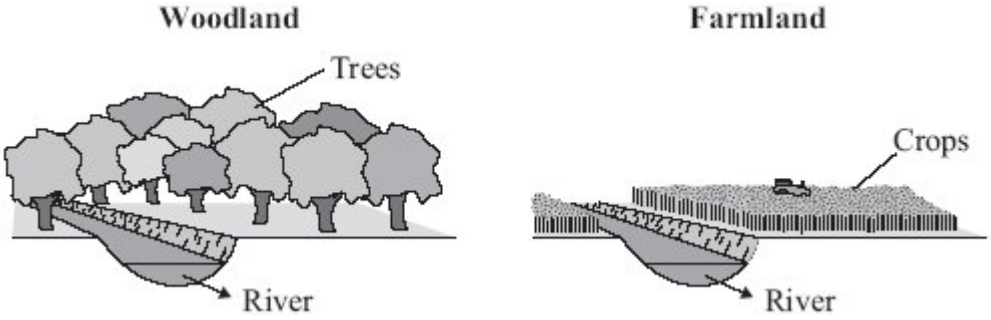
_____

(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. _____

_____

STEMUP.CO.UK

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.

STEMUP.CO.UK

- 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.

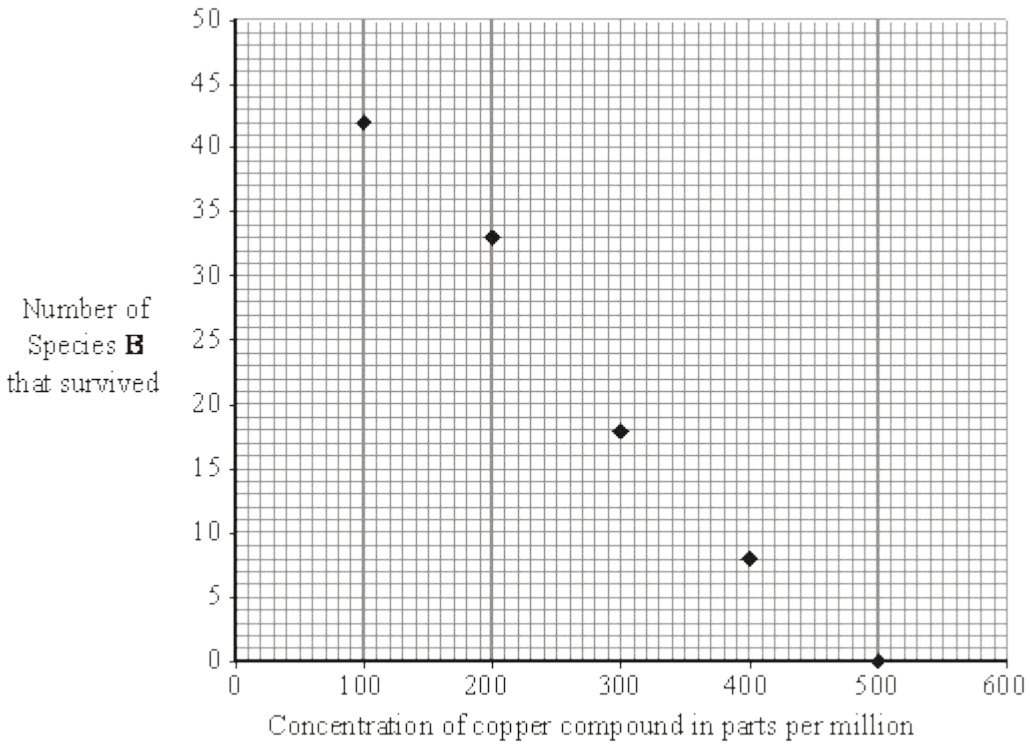
(a) Give **two** variables that should be controlled in this investigation so that the results are valid.

1. _____

2. _____

(2)

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



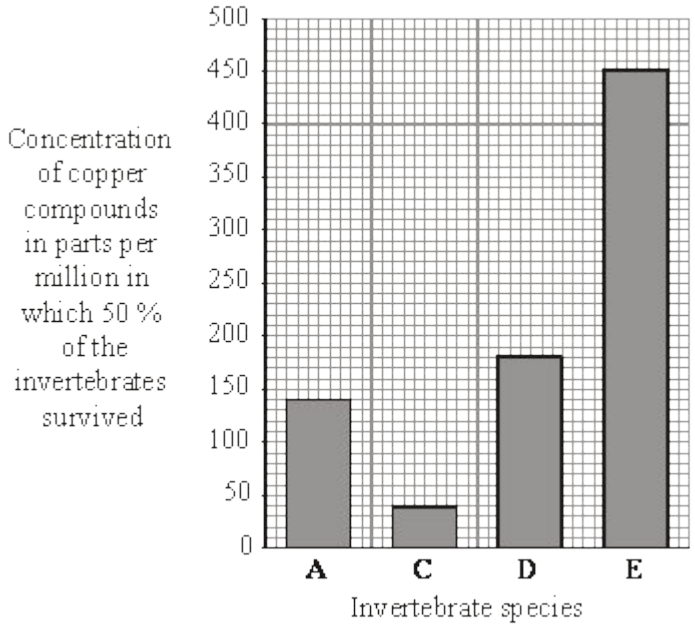
Use the graph to find the concentration of copper compounds in which 50% of Species **B** survived. To obtain full marks you must show clearly on the graph how you obtained your answer.

Concentration _____ parts per million

(2)

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

STEMUP.CO.UK



(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.

_____

_____

_____

_____

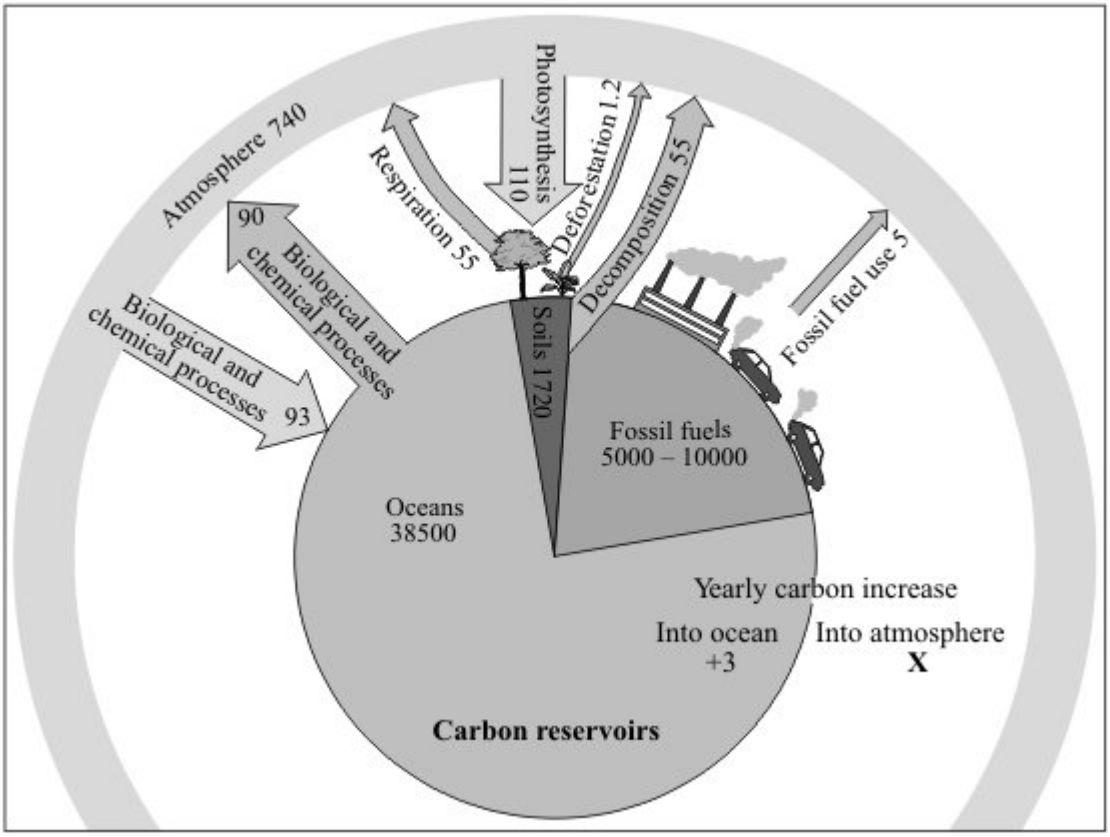
(2)

(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.

STEMUP.CO.UK



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?

STEMUP.CO.UK

_____

_____

(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)

STEMUP.CO.UK