

# Biodiversity

## Human Effect on Ecosystem

### Question Paper 1

<b>Level</b>	GCSE (9-1)
<b>Subject</b>	Combined Science – Trilogy - Biology
<b>Exam Board</b>	AQA
<b>Topic</b>	4.7 Ecology
<b>Sub-Topic</b>	Biodiversity – Human Effect on Ecosystem
<b>Difficulty Level</b>	Silver Level
<b>Booklet</b>	Question Paper 1

**Time Allowed:** 60 minutes

**Score:** / 60

**Percentage:** /100

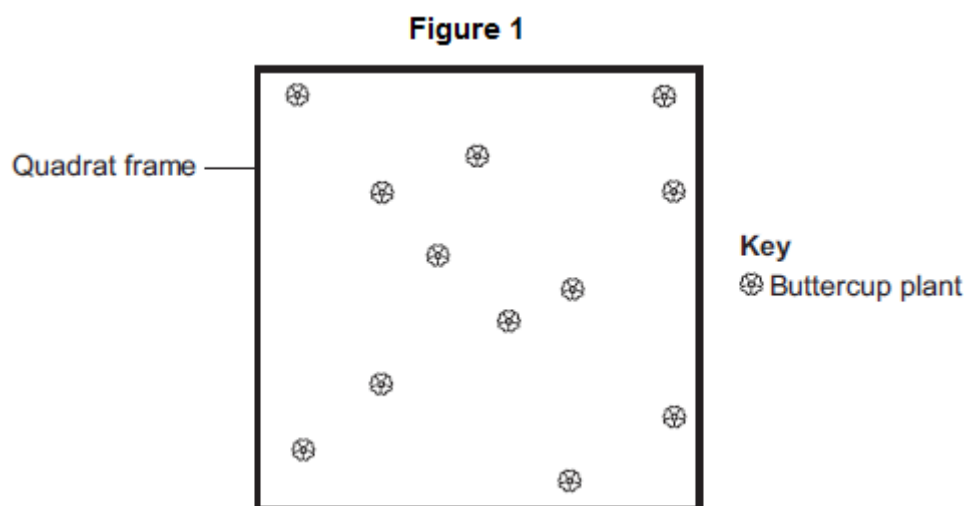
**Grade Boundaries:**

**Q1.** 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.



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?

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(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?

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(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.....

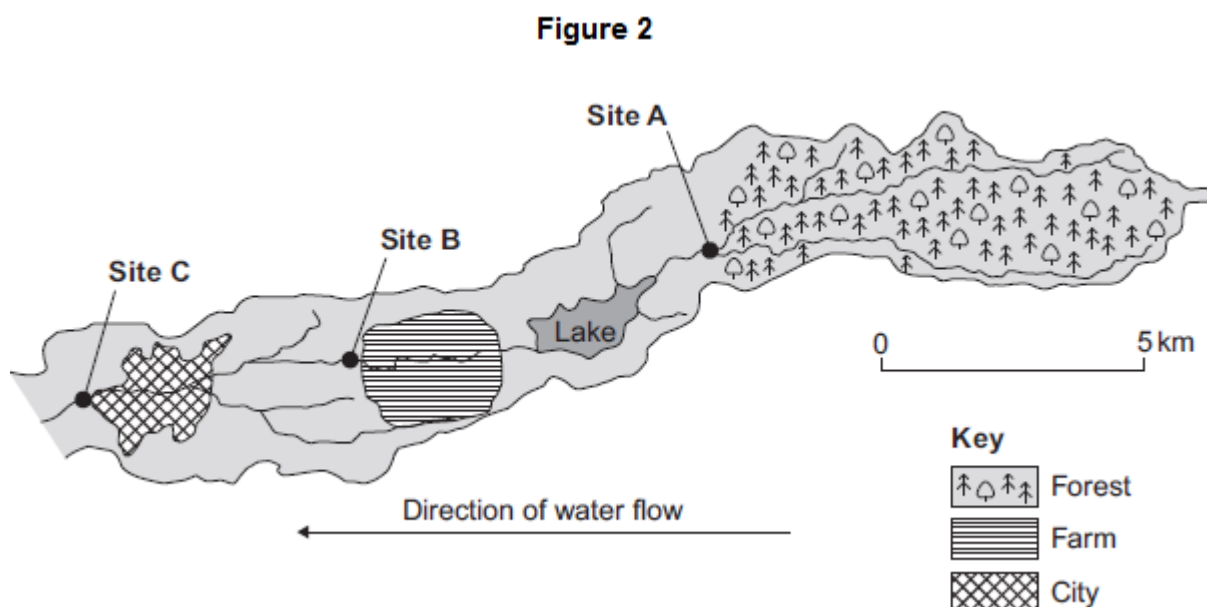
3.....

(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.



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.

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(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.

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(1)

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

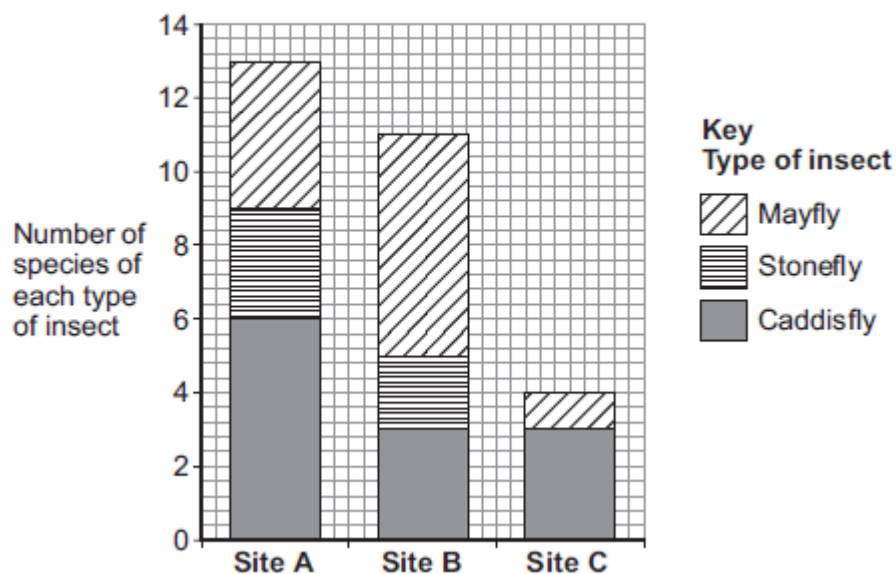
Scientists took many samples of river water from these sites.

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**?

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(1)

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

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(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.

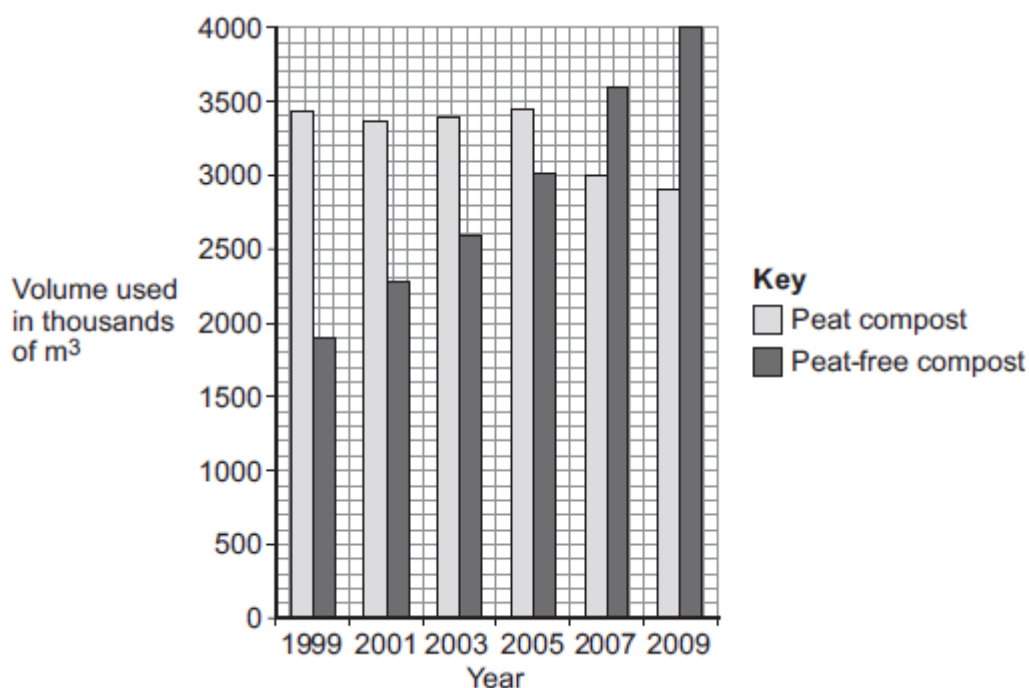
Use information from **Figure 3** to suggest why.

(1)

(Total 19 marks)

**Q2.** 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.

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(2)

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

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(1)

- (c) Deforestation is also damaging ecosystems.

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

(1)

(Total 4 marks)

**Q3.** Freshwater streams may have different levels of pollution. The level of pollution affects which species of invertebrate will live in the water.

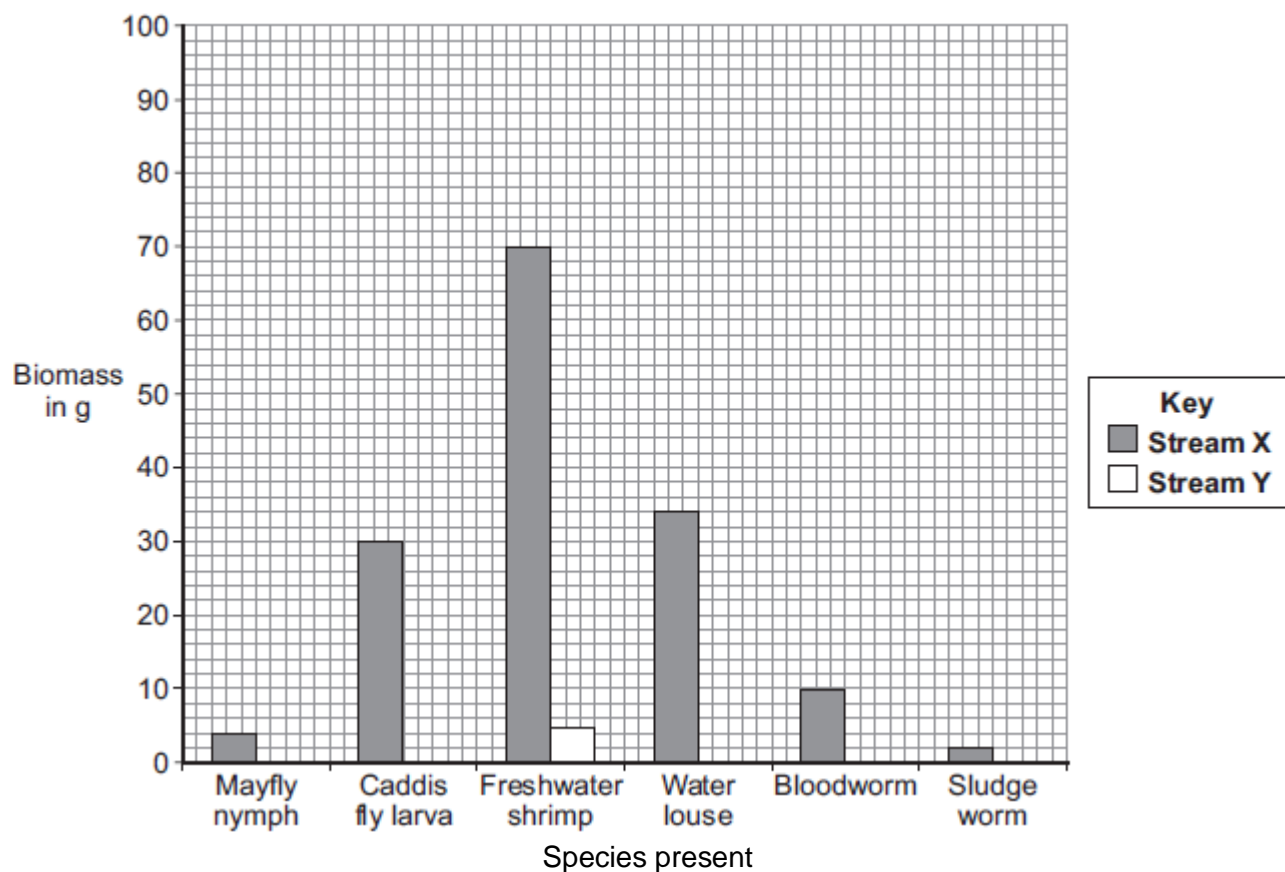
**Table 1** shows the biomass of different invertebrate species found in two different streams, **X** and **Y**.

**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
<b>Total</b>	<b>150</b>	<b>150</b>

- (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.

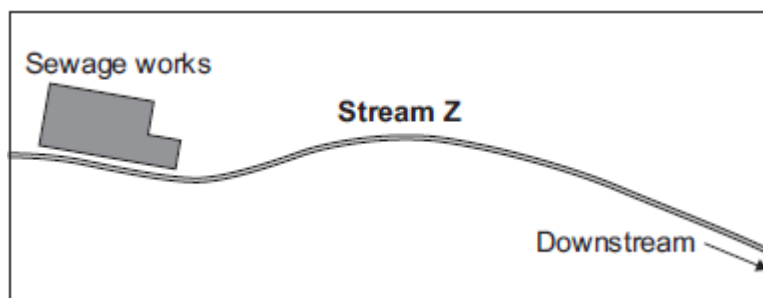
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(2)

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

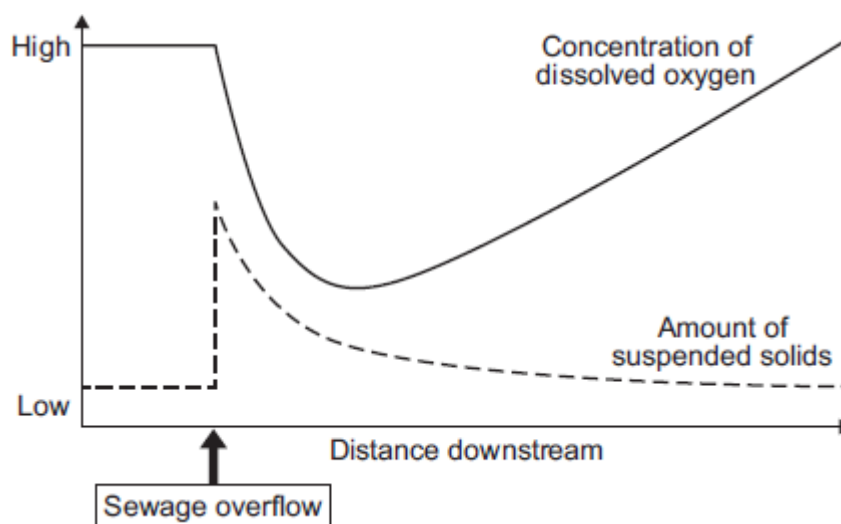


An accident caused sewage to overflow into **Stream Z**.

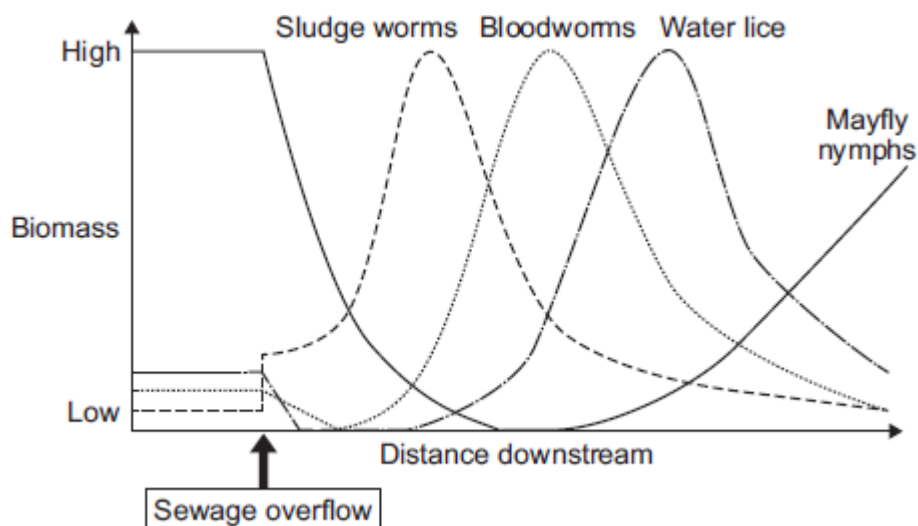
Two weeks later scientists took samples of water and invertebrates from the stream. They took samples at different distances downstream from where the sewage overflowed.

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**.

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(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.

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**(3)**

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

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

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**(2)**

**(Total 13 marks)**

**Q4. 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.



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Give the reasons why deforestation is taking place.

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

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Extra space .....

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**(Total 6 marks)**

**Q5.** Deforestation affects the environment in many ways.

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

Give **two** reasons why.

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2 .....

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(2)

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

- (i) What is meant by *biodiversity*?

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(1)

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

1 .....

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2 .....

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(2)

(Total 5 marks)

**Q6.** 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.

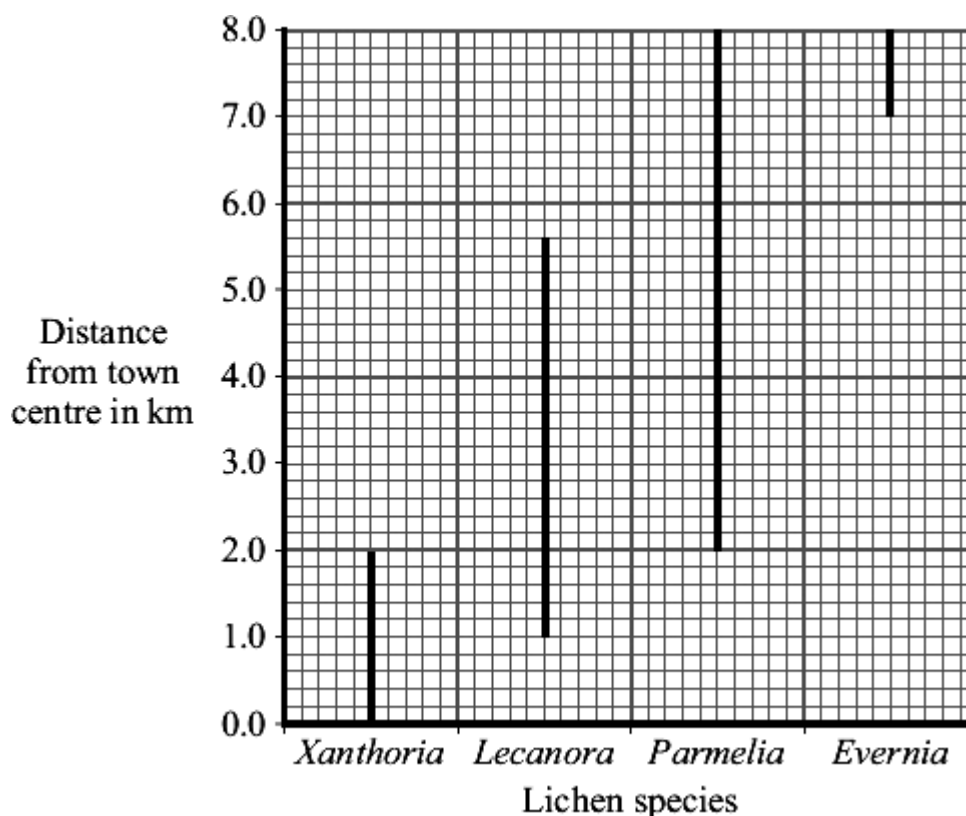
Students investigated the relationship between lichen species and distance from a town centre.

- 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.

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(1)

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

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(1)

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

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(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 .....

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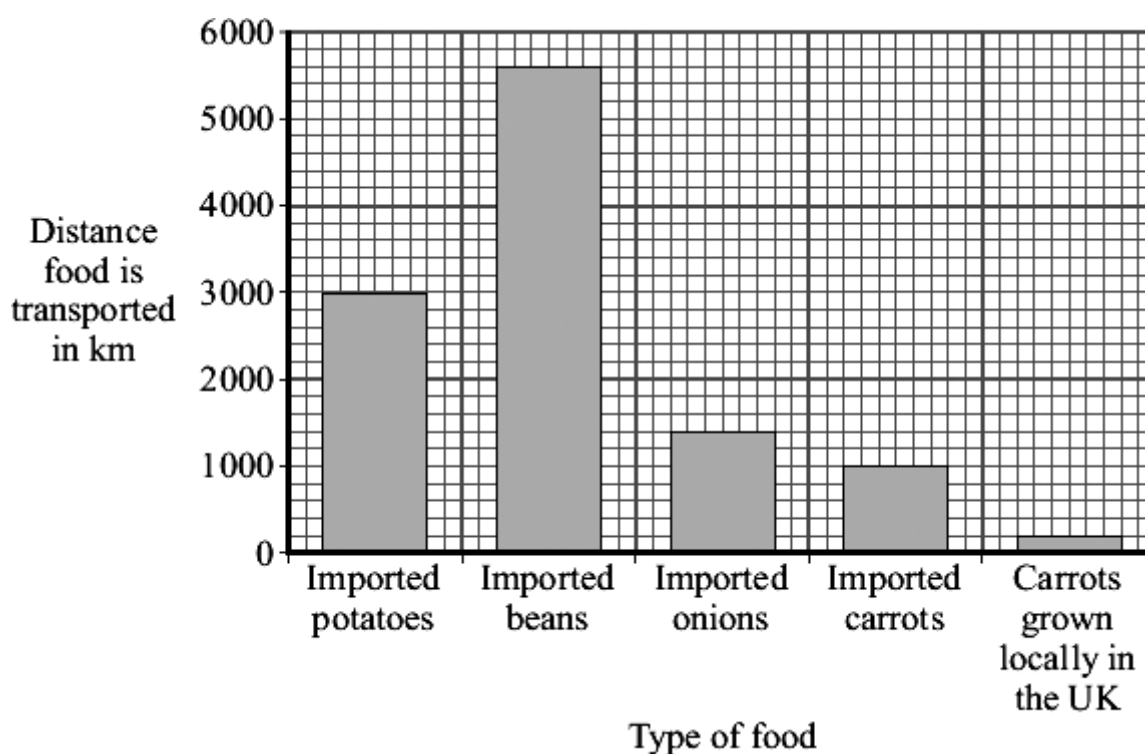
2 .....

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(2)  
(Total 5 marks)

- Q7.** 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.

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..... 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 .....  
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Explanation .....  
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(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.

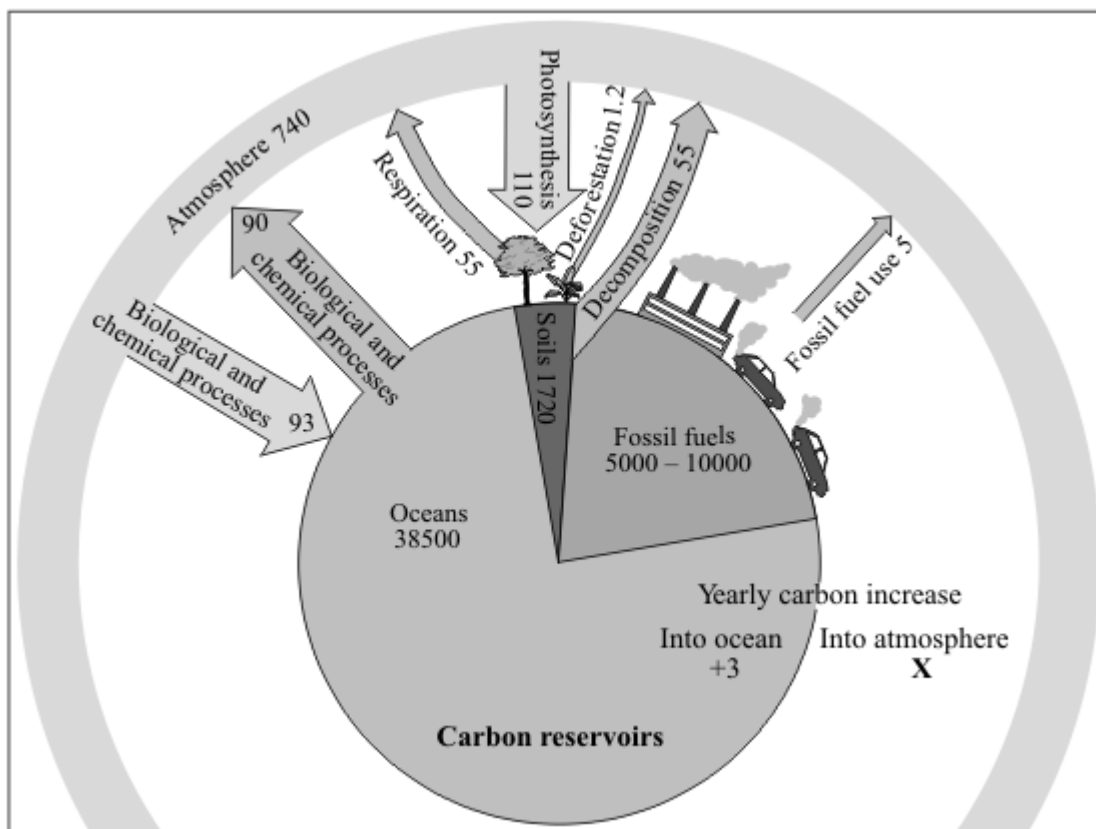
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(2)

(Total 5 marks)



- Q8.** 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.



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

Show all your working.

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**X** = ..... billion tonnes of carbon

(2)

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

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(1)  
(Total 3 marks)