BIODIVERSITY + EFFECT HUMANS ON ECOSYSTEMS PART II

Q1.

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.

_____

_____

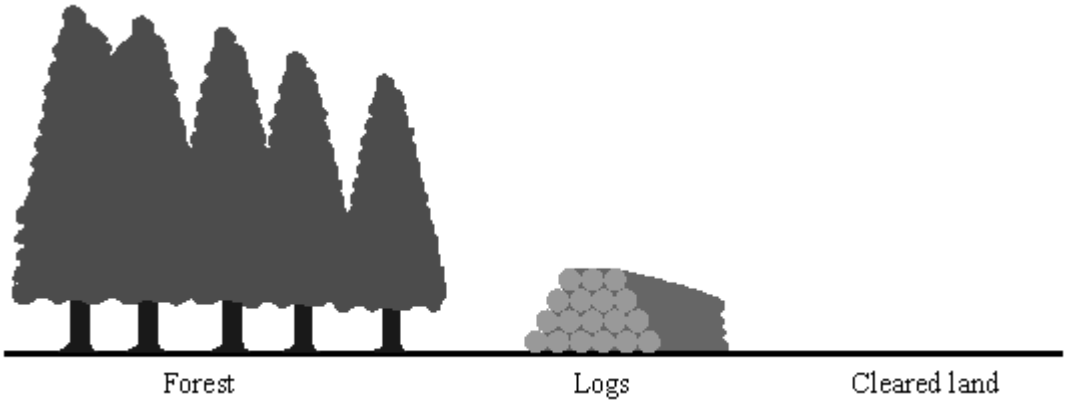
_____

_____

(2)

(Total 5 marks)

Q2.



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)

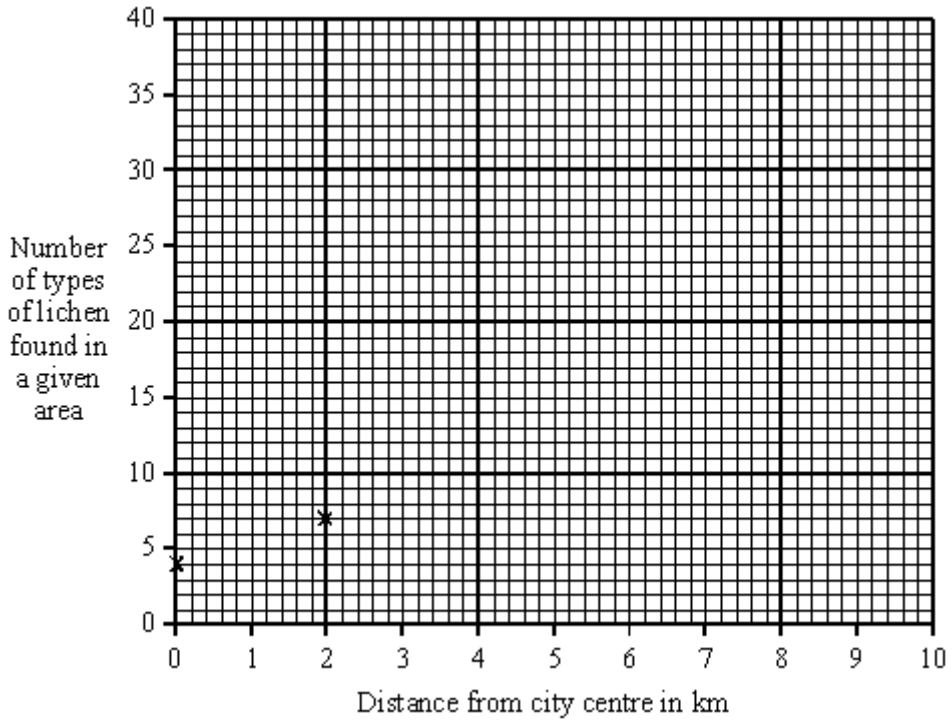
(Total 8 marks)

Q3.

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.

_____

_____

_____

_____

_____

_____

_____

_____

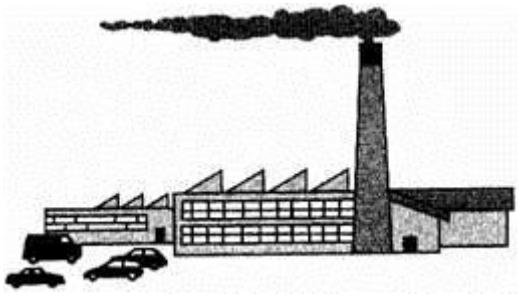
_____

(4)

(Total 10 marks)

Q4.

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?

_____

_____

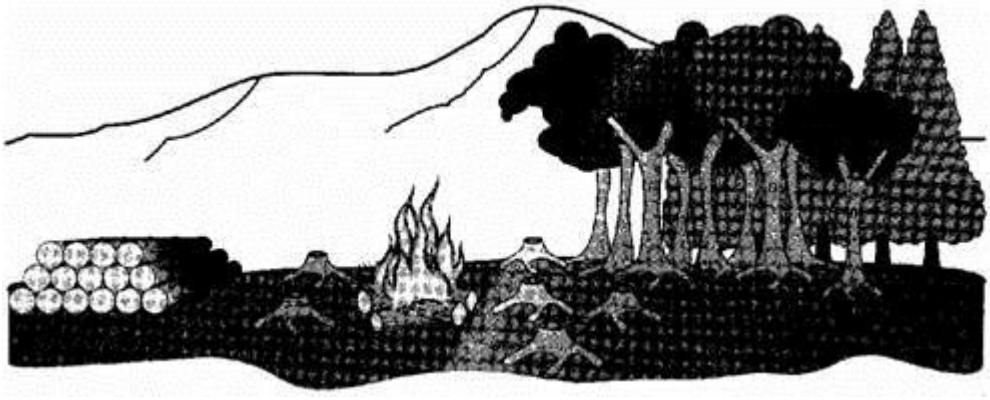
_____

(1)

(Total 10 marks)

Q5.

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)

Q6.

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)

Q7.

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.

_____

_____

_____

_____

_____

_____

_____

_____

_____

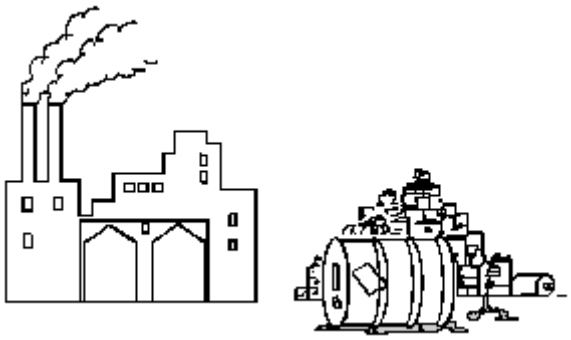
_____

(4)

(Total 8 marks)

Q8.

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)

Q9.

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.

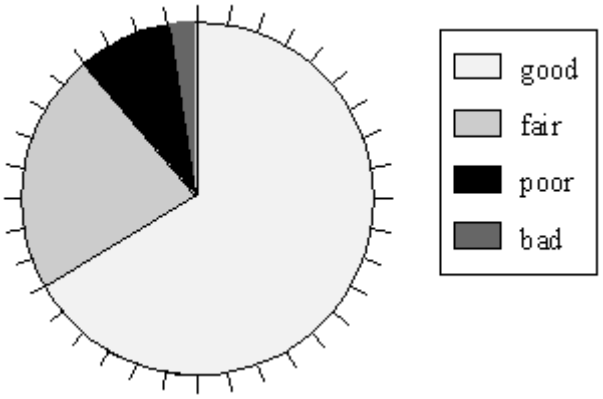
Explain the arguments for and against that lead to your decision.

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

(Total 8 marks)

Q10.

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. _____

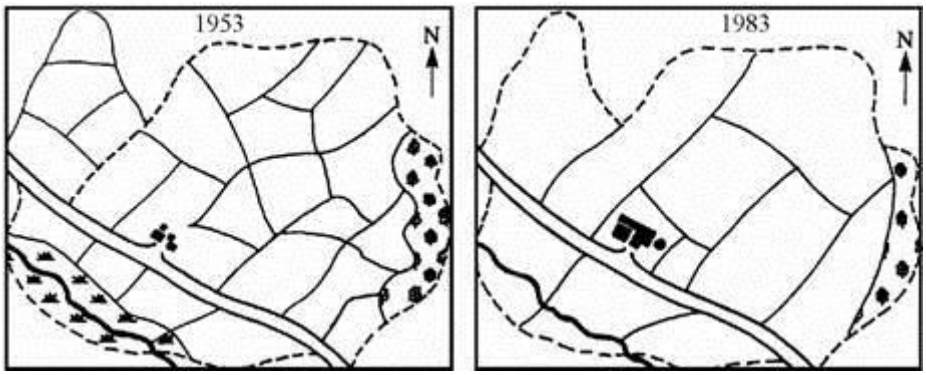
2. _____

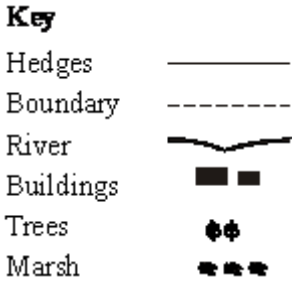
(2)

(Total 3 marks)

Q11.

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





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.

_____

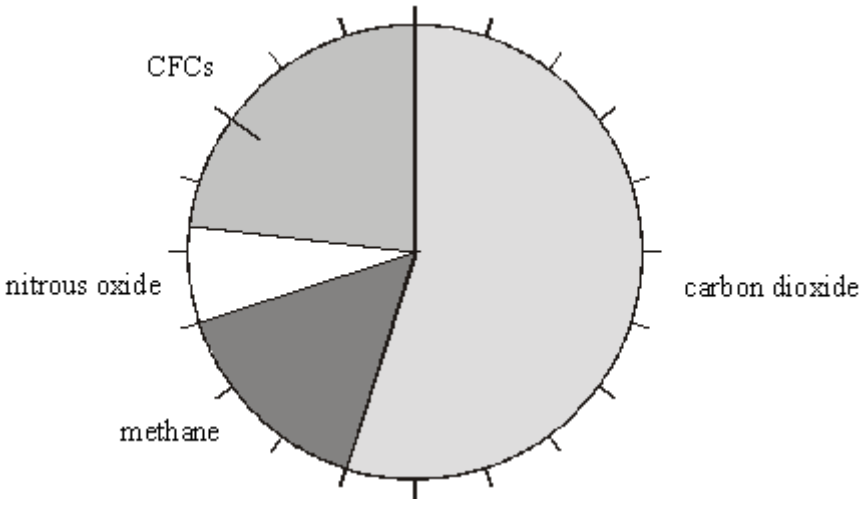
_____

(2)

(Total 4 marks)

Q12.

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.

_____

_____

_____

_____

_____

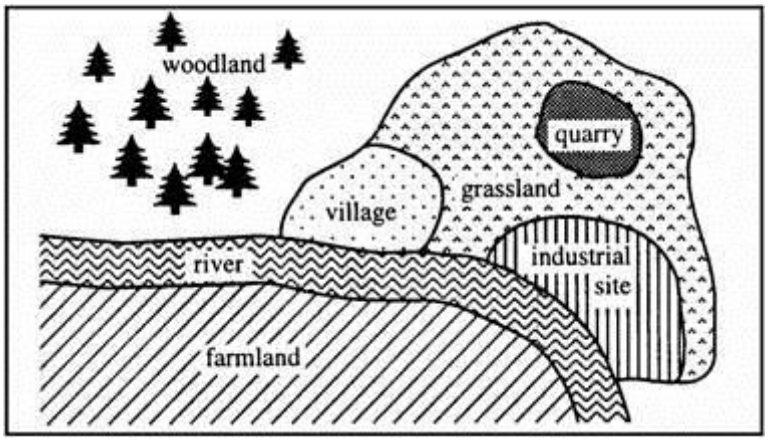
_____

(3)

(Total 8 marks)

Q13.

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)

Q14.

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.

_____

_____

_____

_____

_____

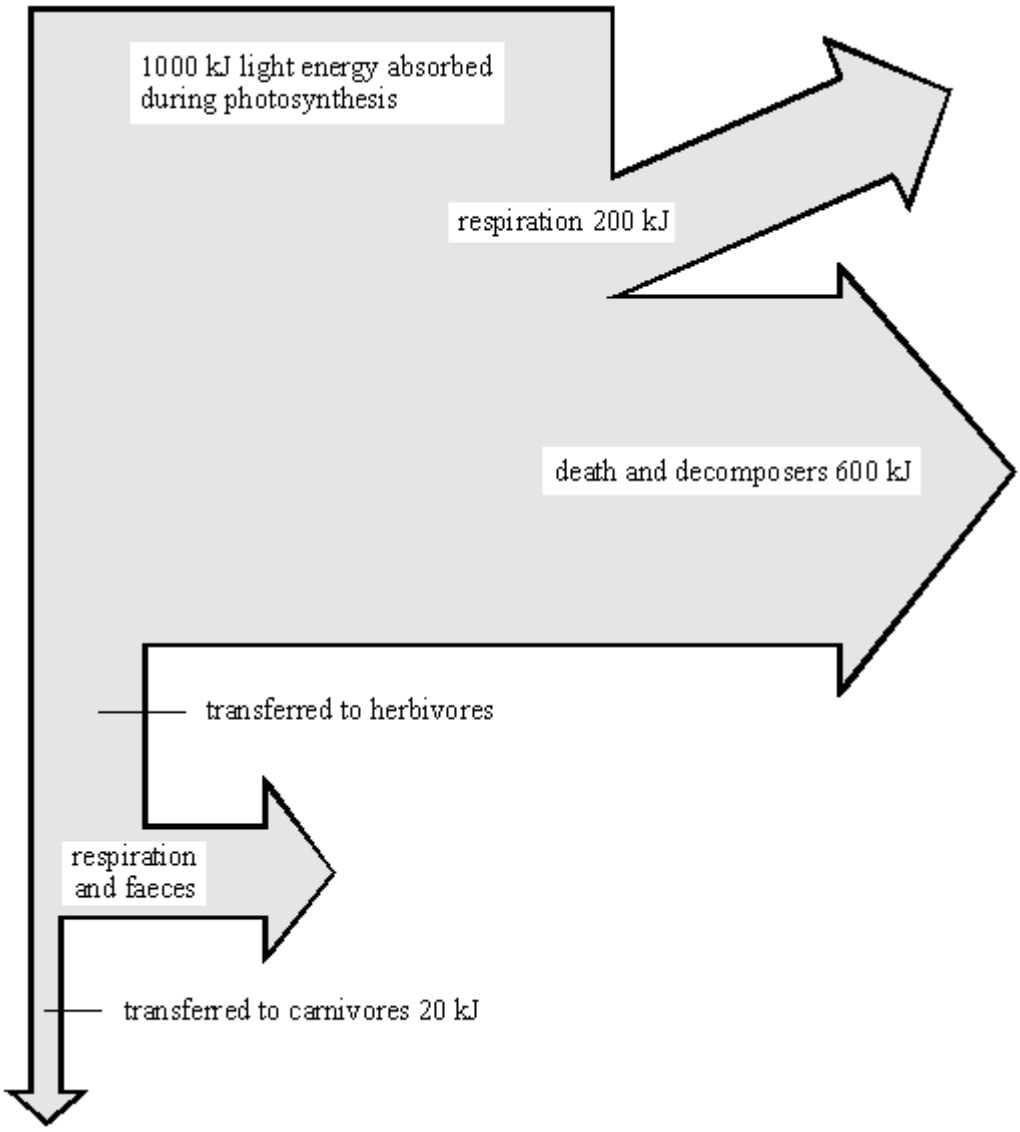
_____

(5)

(Total 7 marks)

Q15.

(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 _____

_____

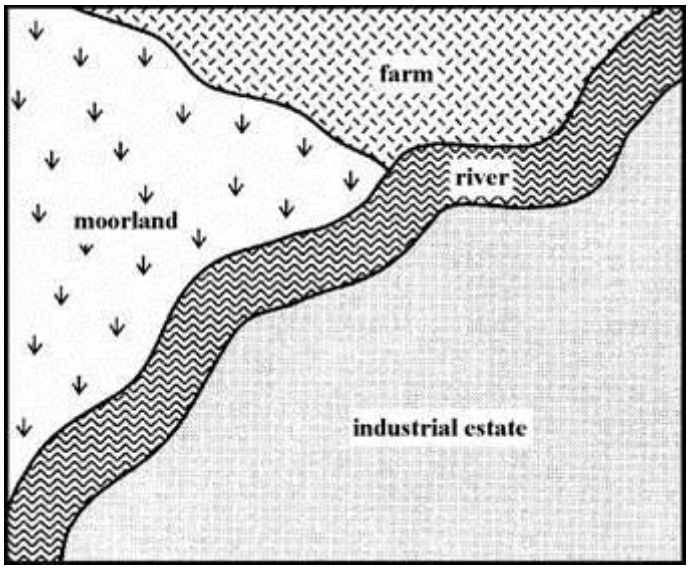
_____

(4)

(Total 10 marks)

Q16.

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)

Q17.

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.

_____

_____

_____

_____

_____

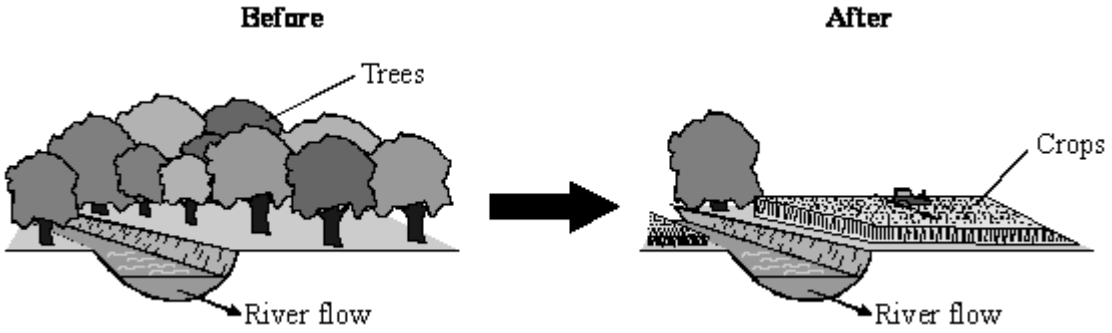
_____

_____

(Total 4 marks)

Q18.

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. _____

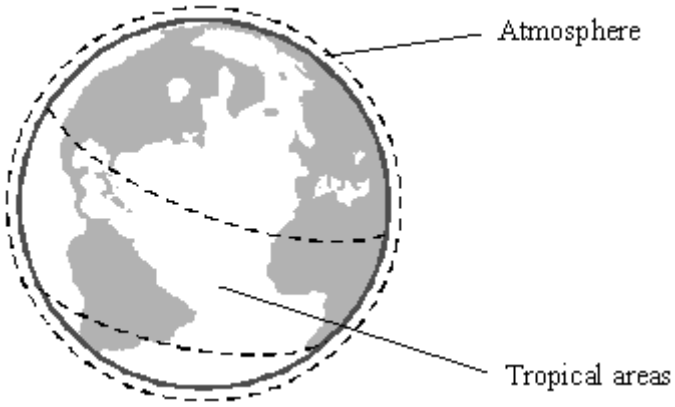
2. _____

(2)

(Total 3 marks)

Q19.

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'.

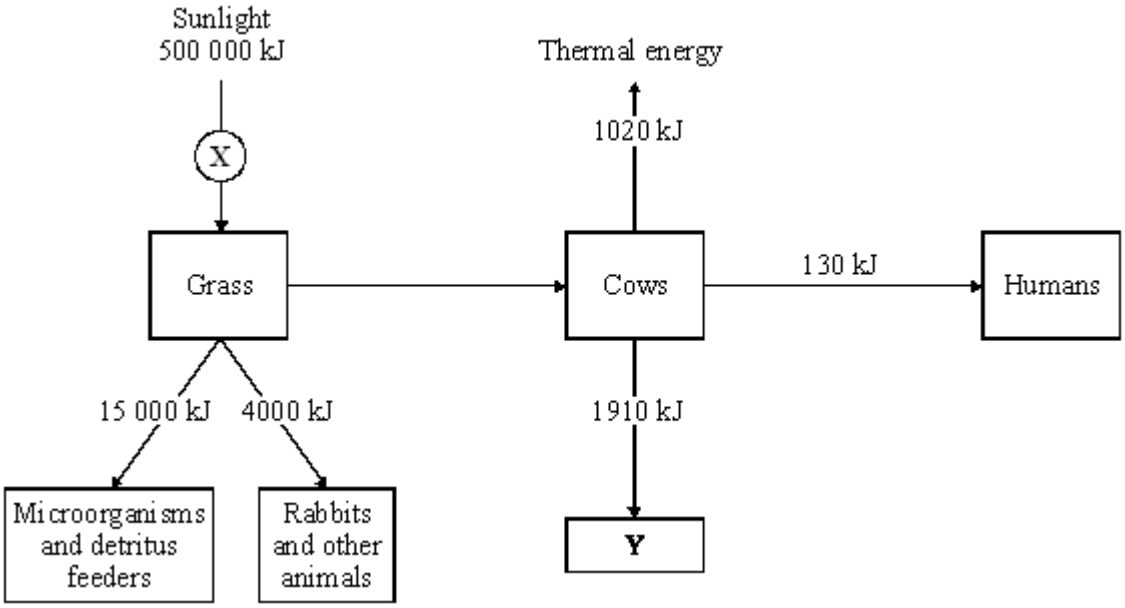
_____

(1)

(Total 5 marks)

Q20.

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.

_____

_____

_____

_____

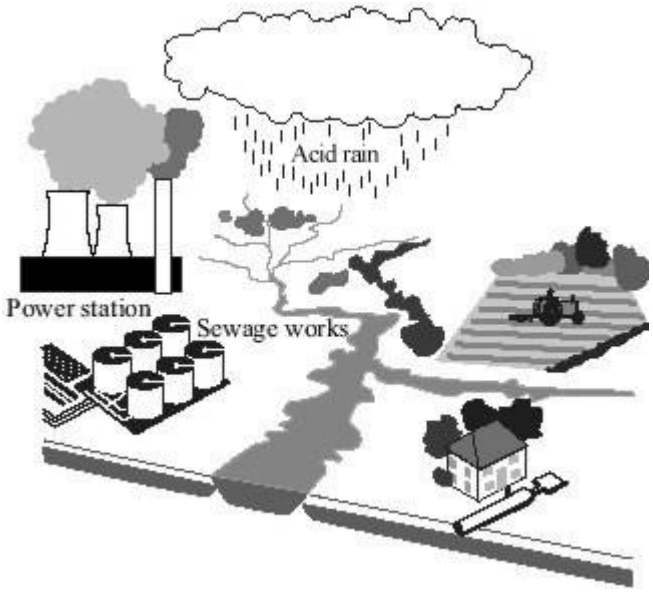
(2)

(Total 7 marks)

Q21.

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.

_____

_____

_____

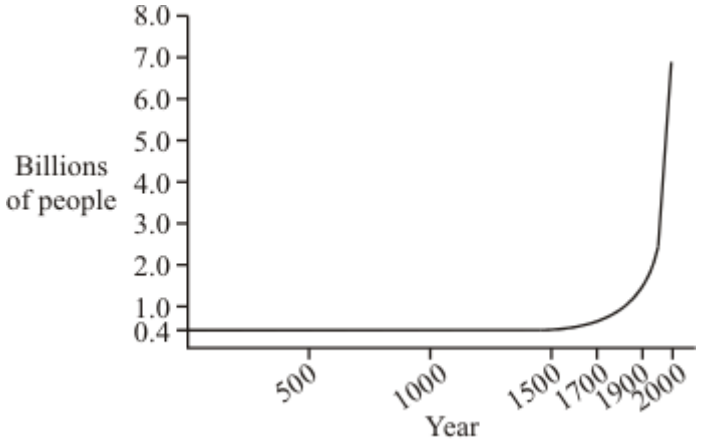
_____

(2)

(Total 3 marks)

Q22.

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.



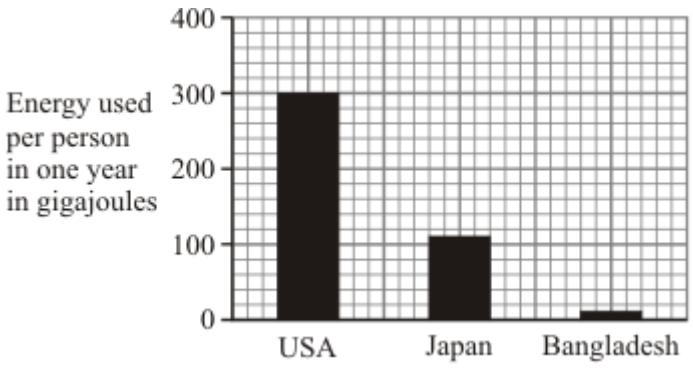
(a) When the Earth's population was much smaller, the effects of human activities on forests were usually small and local.
In the past 500 years there has been large-scale deforestation in some areas. Give **two** reasons for this.

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 _____

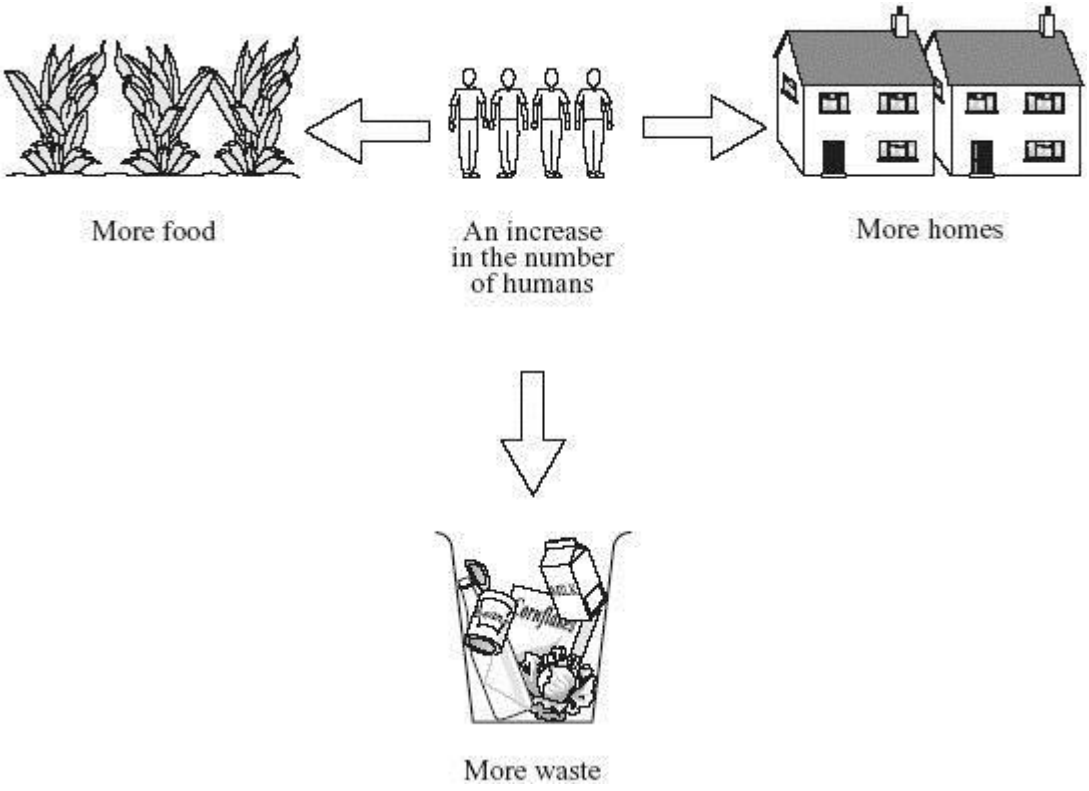
_____

(3)

(Total 10 marks)

Q23.

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. _____

_____

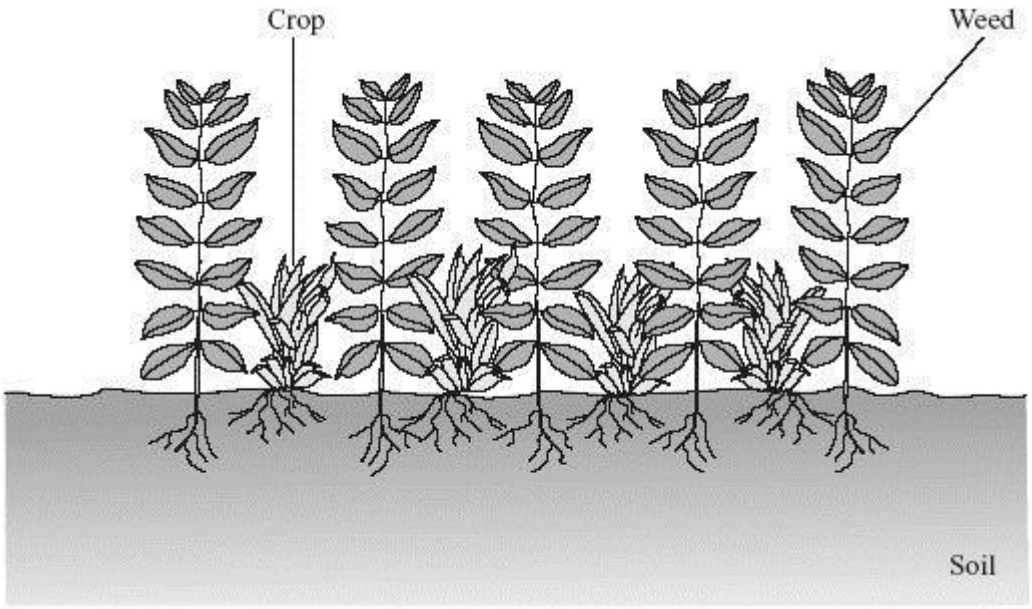
3. _____

_____

(Total 3 marks)

Q24.

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

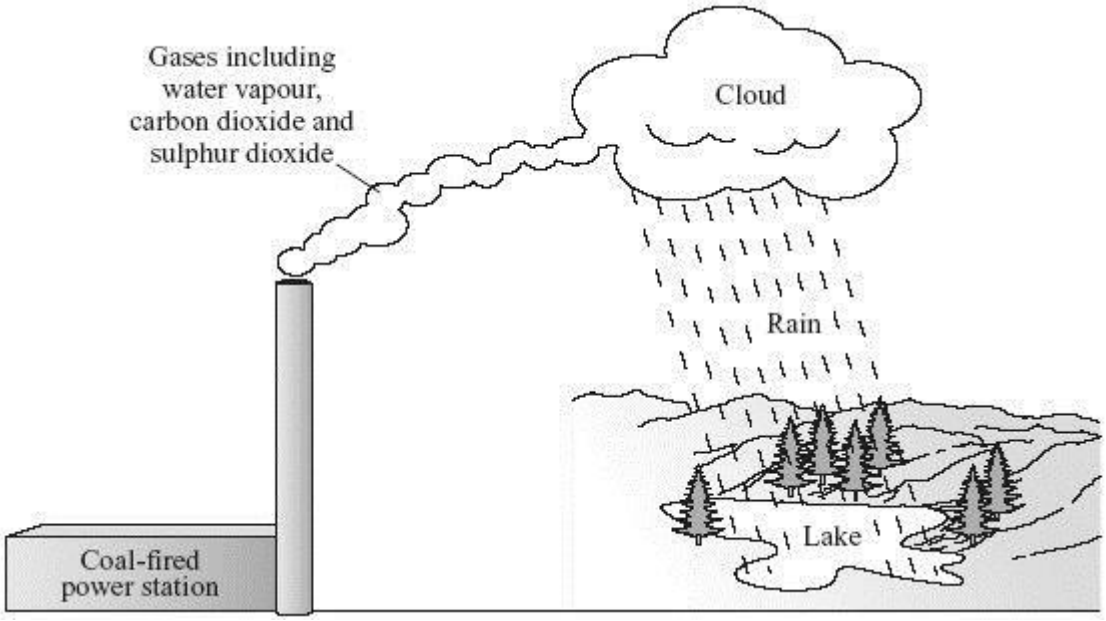
.

(1)

(Total 4 marks)

Q25.

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)

Q26.

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)

Q27.

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

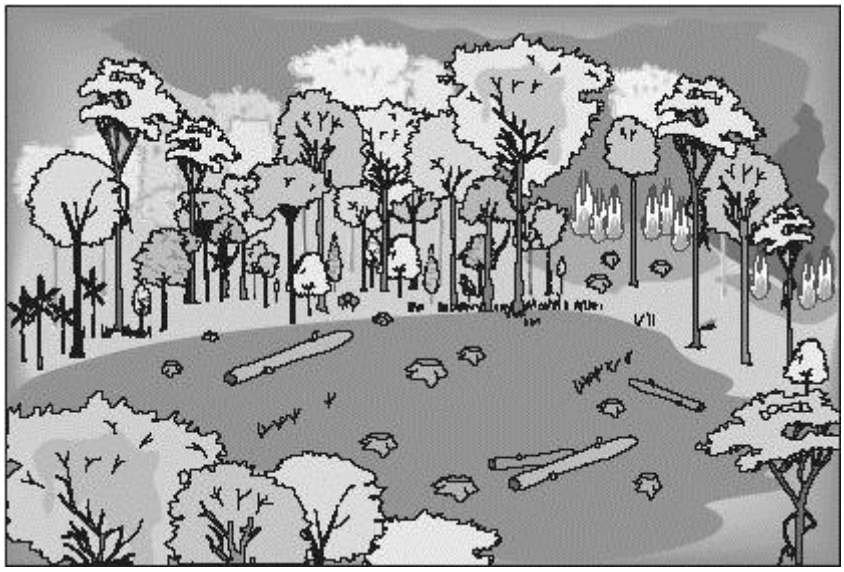
Use the information above to suggest what should be done, by farmers and government, to prevent 'blue baby syndrome'. Explain the reasons for your suggestions.

(Total 3 marks)

Q28.

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)

Q29.

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 year	Number of people whose energy requirements can be 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.

_____

_____

_____

_____

_____

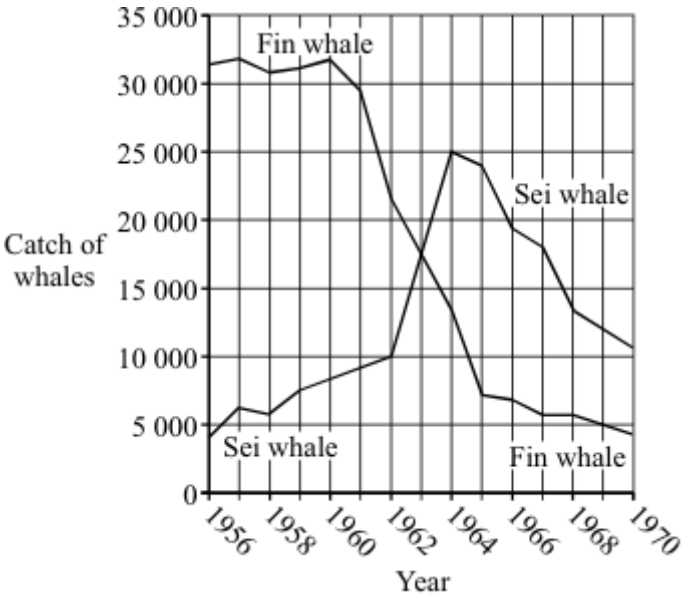
_____

(4)

(Total 10 marks)

Q30.

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)

Q31.

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").

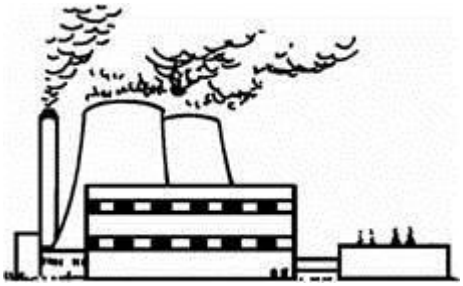
Describe, as fully as you can, **two** major effects of global warming and how these may affect the human population.

(6)

(Total 9 marks)

Q32.

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. _____

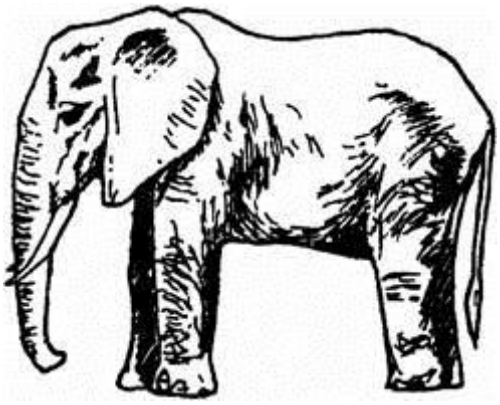
_____

(Total 3 marks)

Q33.

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)

Q34.

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)

Q35.

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)

Q36.

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)

Q37.

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)