1. (a) Explain **two** environmental problems that are normally associated with large-scale deforestation.

1 .....

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2 .....

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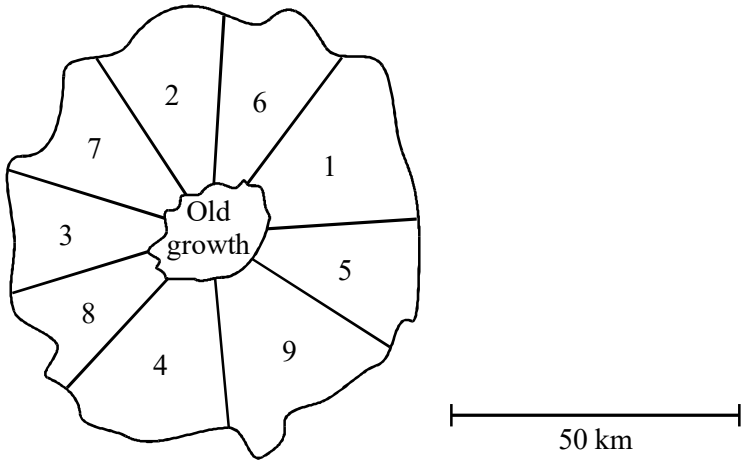
(2)

(b) Logging is the removal of mature trees from a forest. The diagram shows a method of sustainable logging of an area of tropical rainforest. Each of sectors 1 to 9 is logged in sequence and the "old growth" area is never felled. Felling in each sector takes about 35 years.



Explain how the pattern of logging shown in the diagram would help to conserve the rainforest community.

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(3)

(Total 5 marks)

2. (a) Insecticides are pesticides which kill insects. A low concentration of insecticide was sprayed on the leaves of rose plants to kill greenfly which were feeding on the plants. Ladybirds eat greenfly. One month after spraying, the concentration of insecticide in the tissues of ladybirds was found to be higher than the concentration sprayed on the rose plants. Explain why.

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(3)

(b) Spotted knapweed is a common weed in the USA. Two methods, chemical control and biological control, have been used to reduce the numbers of spotted knapweed plants. The table shows the results of an investigation comparing the effectiveness of these two methods.

Month	**Mean number of spotted knapweed plants per m^2**	
	Chemical control	**Biological control**
February	2	2
March	15	3
April	3	3
May	20	5
June	3	4
July	16	3
August	2	2

(i) Describe the pattern of plant numbers resulting from the use of

chemical control; .....

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(1)

biological control. .....

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(1)

(ii) Explain how chemical control leads to the changes in the number of spotted knapweed plants from March to June.

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(1)

(c) Explain why the spotted knapweed plants were never completely eliminated when using

(i) chemical control;

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(2)

(ii) biological control.

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(2)

(Total 10 marks)

3. One of the most valuable crops planted by the Forestry Commission is spruce because use its yield of timber is high. Early trial plantings showed that spruce trees grew very slowly when planted on land on which heather was also growing.

(a) Name the type of competition shown between spruce and heather.

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(1)

(b) Give **two** resources for which spruce and heather are likely to be competing.

1. .....

2. .....

(1)

(c) Further trial plantings on land dominated by heather showed that the growth of spruce was greatly assisted by planting another tree species at the same time. This use of a „nurse" crop is now standard practice. The table shows the results of some of these trial plantings.

	Height of spruce after 15 years / metres
spruce, heather and Japanese larch	4.5
spruce, heather and Scots pine	3.1
spruce, heather and Corsican pine	3.5
spruce and heather	2.0

(i) Young spruce trees were 50cm high when planted. Calculate the difference in the rate of growth when these trees were grown with Japanese larch compared to the control. Show your working.

Answer.....

(2)

(ii) Suggest **one** way in which a ‚nurse" crop may aid the growth of spruce trees.

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(1)
(Total 5 marks)

4. Read the following passage.

Madagascar

The island of Madagascar has been described as the laboratory of evolution. It broke away from mainland Africa at least 120 million years ago and, following this, many new species developed. Estimates of the number of plant species on the island vary from 7 370 to 12 000, making it botanically one of the richest areas in the world. Of 400 flowering plant families found worldwide, 200 grow only in Madagascar. Among animals, true lemurs are found nowhere else, and 95 per cent of the country"s 235 known species of reptiles evolved on the island. Over the past 25 years the human population has doubled. Land shortage is leading to clearing of the forest, and Madagascar is now facing deforestation on a massive scale. Scientists have estimated that even if the forest could recover, regeneration could take up to a hundred years.

(a) Explain what is meant by the term *species.*

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(2)

(b) (i) Explain the processes which might have led to the evolution of new species on the island.

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(4)

(ii) Suggest and explain how the number of animal species on the island may have changed as it became „botanically one of the richest areas in the world".

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(2)

(c) Describe the processes by which forest is able to regenerate after being cleared.

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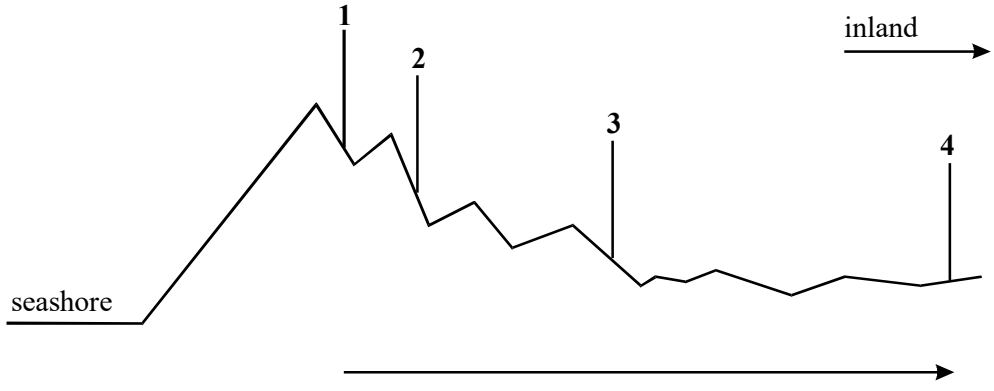
(4)
(Total 12 marks)

5. The diagram shows the profile of a sand-dune ecosystem. Samples were collected at points **1, 2, 3** and **4.** The samples showed the trends indicated below the diagram.



Increase in number of species of plant
Increase in organic matter in sand
Decrease in amount of sand deposited by wind

(a) One way in which mineral ions enter this ecosystem is by the action of microorganisms on organic molecules in the soil. Suggest **two other** ways in which mineral ions enter a sand-dune ecosystem.

1. .....

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2. .....

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(2)

(b) Giving a reason for your answer in each case, at which of points **1** to **4** would you expect to find

(i) a climax community;

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(ii) the lowest soil moisture content;

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(iii) the highest proportion of plants which are wind-dispersed?

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(4)

(Total 6 marks)

6. Carbon dioxide is an essential raw material required by plants, but its concentration in the air is only about 0.03%. In a closed glasshouse carbon dioxide concentrations are often enriched. Carbon dioxide enrichment is normally carried out in the light and when vents are closed. Enrichment is only worthwhile for most crops during winter or early spring.

(a) Give **two** methods for enriching the carbon dioxide content of the air in glasshouses.

1 .....

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2. .....

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(2)

(b) Explain why the concentration of carbon dioxide is **not** normally enriched to more than 0.1%.

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(2)

(c) Suggest why carbon dioxide enrichment is normally carried out only in winter or early spring.

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(2)

(Total 6 marks)

7. The expanding human population places increasing demands on limited resources to satisfy food production. Farmers employ a variety of methods to eliminate crop-destroying pests in order to increase food production. In the short term, chemical sprays have proved an effective method. However, the use of chemicals, particularly „broad spectrum" compounds, has caused problems. For this and other reasons alternative methods of controlling pests are now being used. Integrated pest management utilises chemical and biological control methods, together with a number of agricultural practices, e.g. crop rotation and planting pest-resistant varieties. Pest-resistant varieties have been produced by many years of selective breeding and more recently by genetic engineering.

(a) Explain what is meant by „biological control", and describe **one** example of how biological control has been used to control a specific pest.

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(3)

(b) Explain the advantages and disadvantages of using biological methods, rather than chemicals, to control pests.

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(4)

(c) Briefly describe the process of genetic engineering and suggest **one** advantage it has compared to selective breeding.

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(5)

(Total 12 marks)

8. The rhinoceros beetle is a pest which damages coconut palms growing on South Pacific islands. One method of control is to introduce a virus which kills the beetles. The virus was first used on the island of Tonga in 1971. The table shows the results of surveys of rhinoceros beetle damage to palm trees carried out at two sites in 1971 and 1978.

Site	1971		1978	
	Number of palm trees examined	Number of palm trees damaged by beetles	Number of palm trees examined	Number of palm trees damaged by beetles
A	289	48	302	23
B	226	34	278	28

(a) The virus was introduced at sites A and B. At site A the virus was introduced as part of an integrated pest management scheme.
Was the introduction of the virus more successful at site A or at site B?
Support your answer with suitable calculations from the data in the table.

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(3)

(b) (i) Suggest **two** techniques which could be combined with the introduction of the virus to produce effective pest management schemes.

1. .....

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2. .....

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(2)

(ii) Explain the benefits of an integrated pest management scheme.

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(2}

(c) Introduction of the virus is an example of biological control.

Explain **two** possible limitations of biological control methods.

1. .....

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2. .....

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(2)
(Total 9 marks)

9. (a) Why do plants need ions which contain nitrogen?

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(1)

(b) (i) Explain why it is necessary for farmers to apply fertilisers to land that is used annually to grow a cereal crop.

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(2)

(ii) Explain what is meant by *the law of diminishing returns* with respect to the application of artificial fertilisers.

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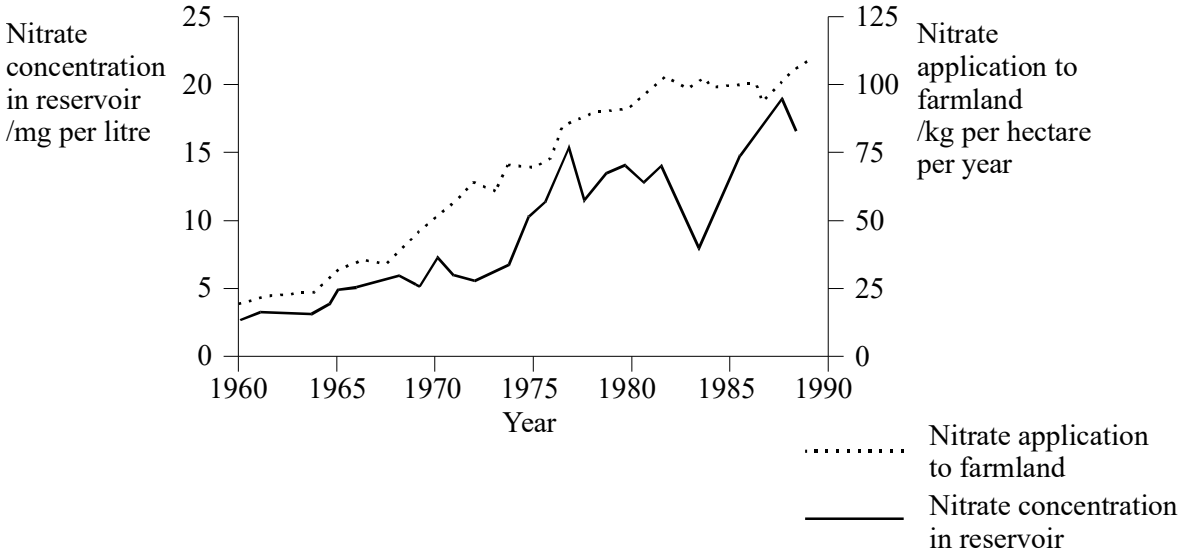
(2)

(c) The graph shows the relationship between nitrate application to farmland and the concentration of nitrate in a nearby reservoir.



(i) Explain why there was an overall increase in the concentration of nitrate of nitrate in the reservoir between 1960 and 1990.

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(1)

(ii) Suggest **one** explanation for the large fall in nitrate concentration in the reservoir between 1982 and 1984.

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(2)

(d) Explain why there is concern at the amount of nitrates being leached into rivers, lakes and reservoirs.

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(4)

(Total 12 marks)

10. Yield in glasshouse crops can be increased by enhancement of the environmental conditions.

(a) (i) The yield of a crop grown in a glasshouse without enhancing the conditions is lower in winter than in summer. Explain **three** reasons for the lower yield.

1. .....

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2. .....

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3. .....

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(3)

(ii) Give **two** factors that could be enhanced to increase yield. For each describe how this could be achieved.

Factor.....

How enhancement achieved.....

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Factor.....

How enhancement achieved.....

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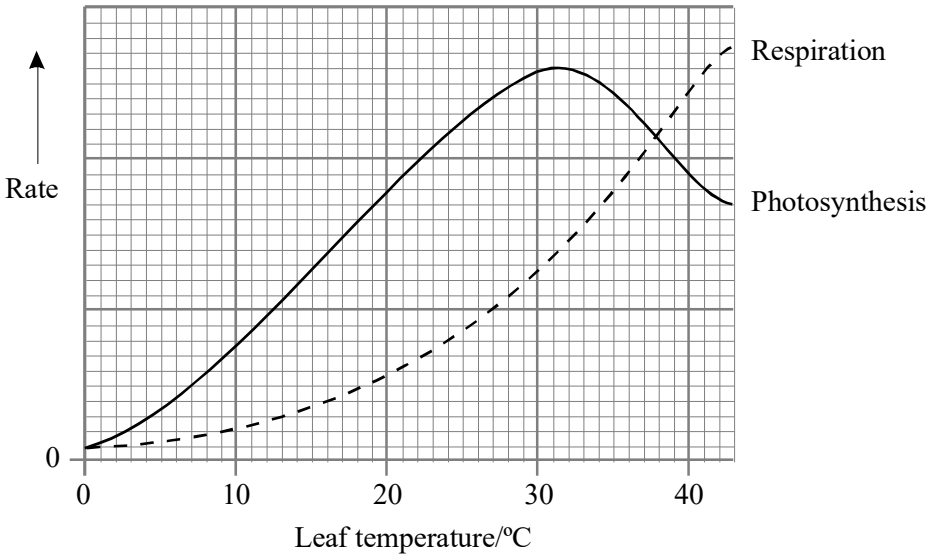
(2)

(b) The graph shows the rate of photosynthesis and the rate of respiration at different temperatures.



At what temperature is **net assimilation rate** at its maximum? Explain your answer.

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(2)
(Total 7 marks)

11. (a) Describe how **one** named parasite or predator is used successfully in the biological control of a named pest.

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(2)

(b) Most cases of successful biological control using parasites have involved

1 the search for parasites of the pest in the country of origin, especially in areas with a similar climate to the planned area of release;

2 the study of the effect of the parasite on other organisms under laboratory conditions;

3 release of large numbers of parasites which results in a decline in the pest population;

4 the stable existence together of both pest and parasite at low population densities.

Explain the importance of **each** of the above steps in achieving successful biological control of a pest.

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(8)

(c) Suggest **two** advantages of using biological control rather than pesticides.

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(2)

(Total 12 marks)

12. The energy value of the biomass synthesised by the producers in an ecosystem is a measure of the productivity of the ecosystem. The table shows the estimated annual mean energy value of the biomass synthesised in ecosystems in a country and the sea beside it.

Ecosystem	Estimated mean energy value of biomass synthesised by producers/kJ $m^{-2}y^{-1}$
Deep ocean	3 000
Shallow sea	10 200
Alluvial plain – farmland	29 000
Alluvial plain – woodland	35 000
Mountain grassland	3 500
Desert	2 200

(a) Explain how energy is transferred into biomass by producers.

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(3)

(b) (i) Suggest why the deep ocean has a lower productivity than the shallow sea.

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(2)

(ii) Suggest **one** reason why the productivity of the farmland on the alluvial plain is lower than that of the woodland. Explain your answer.

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(2)

(c) In which ecosystem would you expect there to be the smallest number of animal species? Explain your answer.

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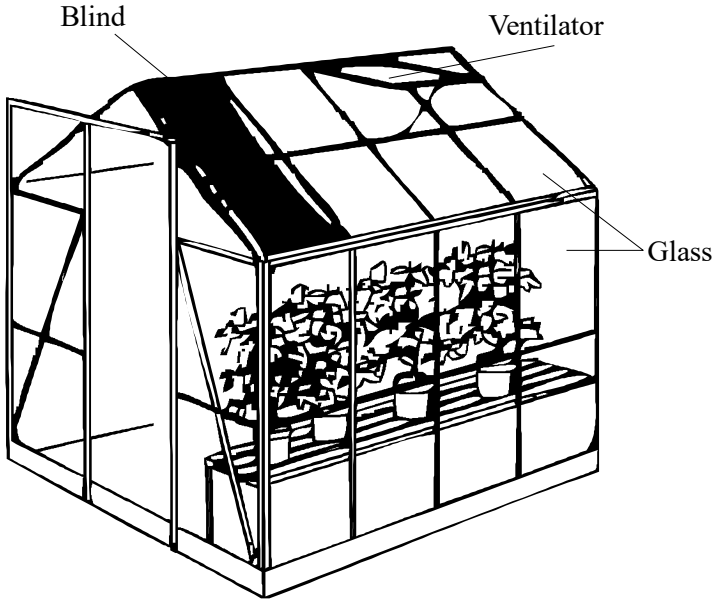
(2)
(Total 9 marks)

13. A glasshouse modifies the physical environment of a crop and enables factors that limit photosynthesis to be controlled. The diagram shows a glasshouse.



(a) Each of the labelled parts is involved in controlling the physical environment of a glasshouse. What is the role of each of these parts?

(i) Glass.....

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(ii) Blinds.....

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(iii) Ventilator.....

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(4)

(b) Large commercial glasshouses use automatic water sprinklers to maintain the optimum water content in the soil. Explain why the rate of photosynthesis falls if there is a shortage of water in the soil.

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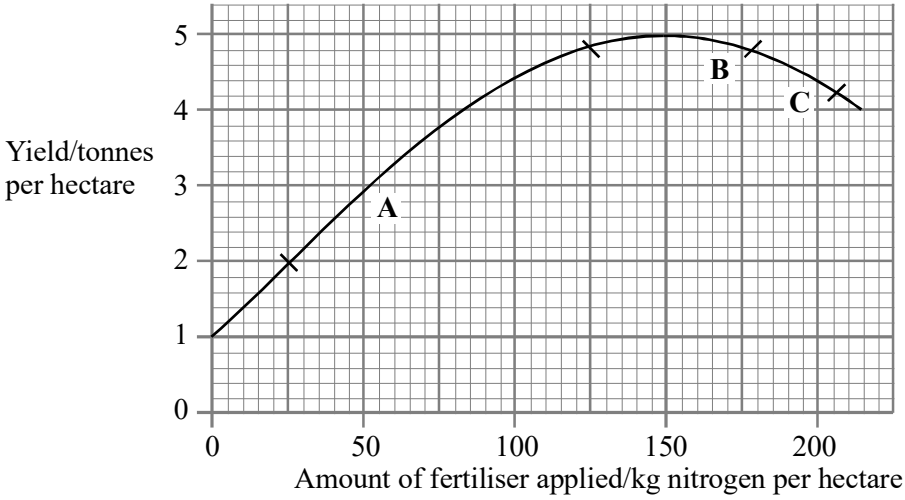
(2)
(Total 6 marks)

14. (a) The graph shows the yield of a crop when different amounts of a nitrogen-containing fertiliser are applied.



(i) Explain the effect of the amount of fertiliser applied on the yield of the crop for each of the labelled sections of the curve.

A.....

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B.....

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C.....

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(3)

(ii) A fertiliser costs 120p per kg nitrogen and the crop sells for £200 per tonne. Use the graph to calculate whether applying 125 or 150 kg nitrogen per hectare would be more profitable. Show your working.

(2)

(b) Give **one** advantage and **one** disadvantage of using inorganic fertilisers instead of manure.

Advantage.....

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Disadvantage.....

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(2)
(Total 7 marks)

15. One type of aphid is a pest of cucumbers grown in glasshouses. The aphid invades glasshouses in large numbers during April and breeds rapidly. It can be controlled by chemicals, although secondary infestations often occur which are difficult to remove with chemicals. Two methods have been tested for keeping a parasite of the aphid in the crop before the aphids invade.

Method 1	Method 2
Maize planted between the cucumbers. The maize is infested with a type of aphid that is not damaging to cucumbers. These aphids are host to the aphid parasite. The maize needs an irrigation system.	The aphid parasite is released at weekly intervals during the period when the cucumber crop is at risk

To investigate the effectiveness of each technique, cucumber aphids were released onto crops of cucumbers in glasshouses.
The table shows the results.

Time from introducing aphids/ days	Number of cucumber aphids per leaf		
	Untreated	Method 1	Method 2
0	0	0	0
7	60	30	30
21	1500+	140	80
35	1500+	55	25
49	1500+020	6	

(a) Which of the two methods would you consider to be more economical? Use the information above to support your answer.

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(2)

(b) What are the advantages and disadvantages for a grower of cucumbers of using biological control instead of chemicals for controlling aphids.

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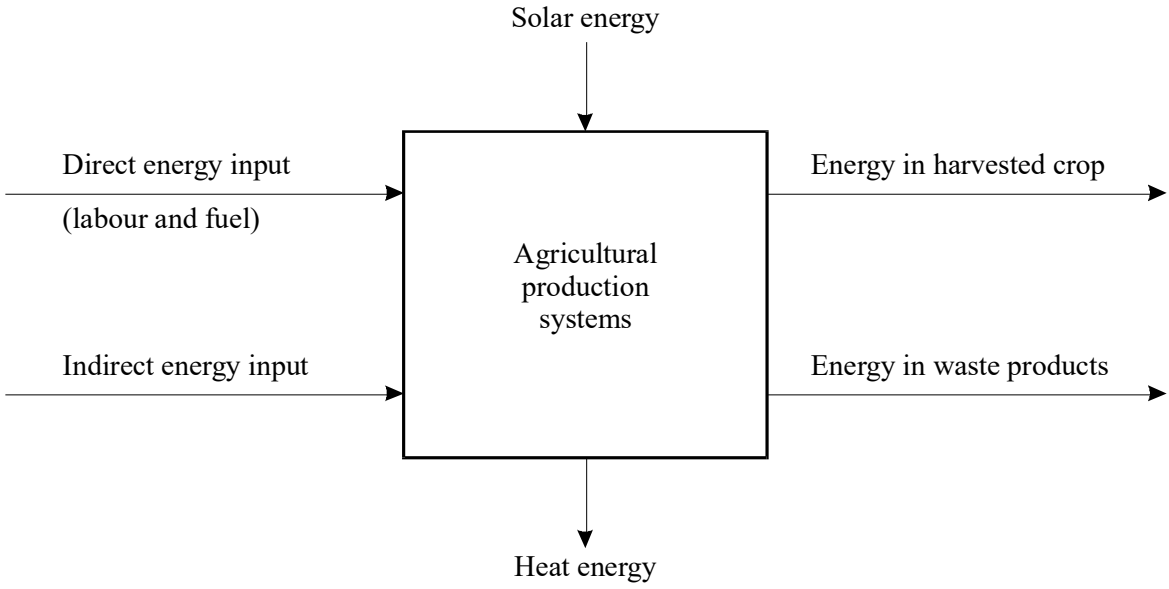
(4)
(Total 6 marks)

16. The diagram summarises the flow of energy through agricultural production systems.



(a) Suggest what is meant by an *indirect* energy input.

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(1)

(b) (i) The energy efficiency of the system is the energy in the harvested crop divided by the total energy input, expressed as a percentage. The energy efficiency of rice production in the United States is 1.55%. The energy efficiency of rice production in Indonesia is 7.08%. Explain the difference between these figures.

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(2)

(ii) Solar energy is used more efficiently by plants grown in modern intensive agricultural systems than in subsistence agricultural systems. Suggest a reason for this.

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(1)

(c) An African village which relied on subsistence agriculture grew thirty species of crop plant. Explain why this would have resulted in a higher total food yield than would have been obtained from growing a single species.

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(2)
(Total 6 marks)

17. The Everglades in Florida is a very large area of natural swamp which contains many important and endangered species. The director of Florida's drug control policy has suggested spraying the Everglades with a fungus to reduce illegal cannabis growing. The fungus suggested is *Fusarium oxysporum* which infects a number of species of plant. Researchers have developed a variety of the fungus which they claim will attack only the cannabis plant. Environmentalists have strongly protested against using this fungus.

(a) Suggest and explain **two** reasons why this method of biological control might be preferable to using a chemical spray to kill the cannabis plants.

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(4)

(b) Suggest **two** reasons why environmentalists would object to using the fungus for controlling cannabis.

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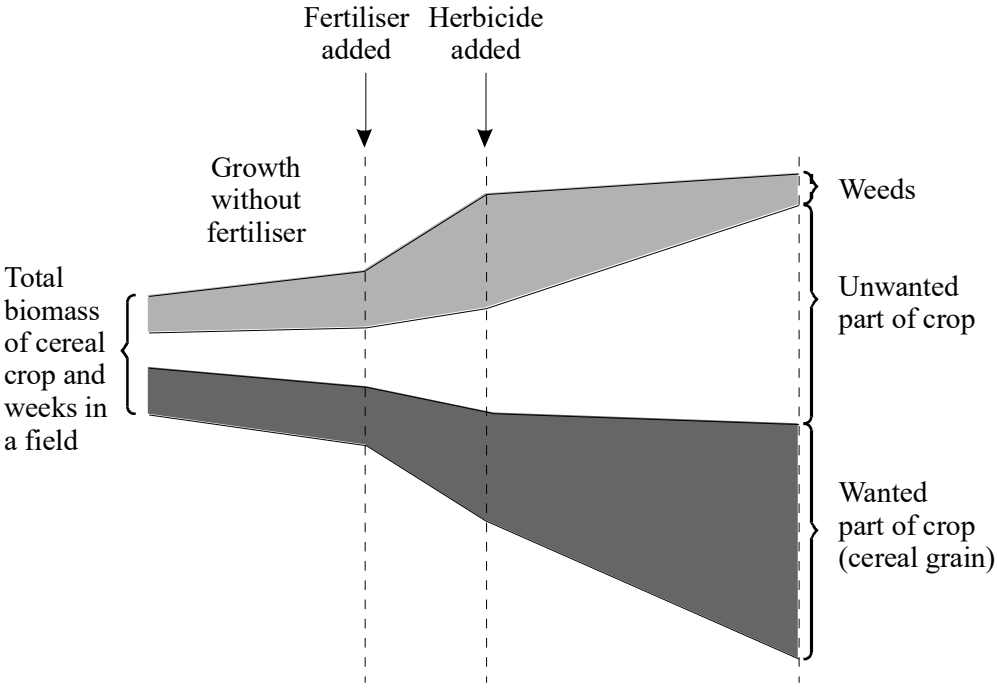
(2)
(Total 6 marks)

18. The diagram shows changes in the biomass of a cereal crop and of the weeds in a field.



(a) Describe and explain the effect of adding fertiliser on the biomass of the plants.

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(2)

(b) Explain why the application of herbicide increases the final yield of the crop.

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(1)

(c) Suggest **two** ways, other than adding fertiliser or herbicide, of ensuring that the maximum amount of grain is harvested.

1.....

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2.....

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(2)

(d) Explain how selective breeding could result in a reduction in the unwanted part of the crop.

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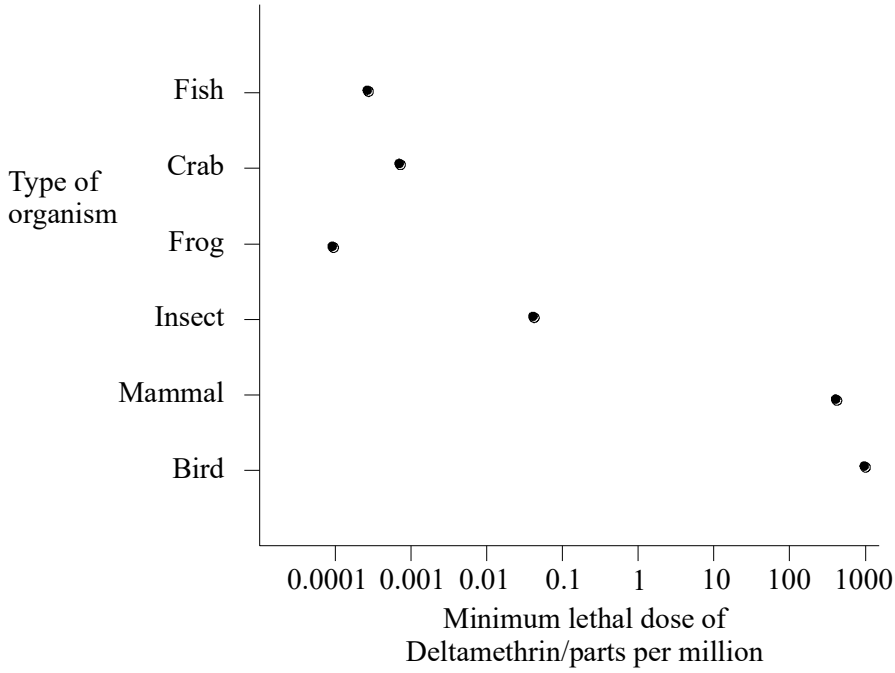
(2)

(Total 7 marks)

19. Deltamethrin is a synthetic insecticide. The chart shows the minimum lethal dose for different groups of organisms.



(a) Use the information in the chart to explain why Deltamethrin

(i) may be used as an insecticide on plants intended for human consumption;

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(1)

(ii) should not be used in areas close to ponds and streams.

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(3)

(b) (i) Systemic insecticides are absorbed by plants and are transported through their tissues. The plant tissues become toxic to insects feeding on them. Explain **two** advantages of using systemic insecticides rather than other types of insecticide.

1.....

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2.....

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(2)

(ii) Suggest how genetic engineering could be used to protect plants from

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(2)
(Total 8 marks)

20. (a) Give **two** reasons why much of the sunlight falling on the leaves of a plant grown in a glasshouse is not used in photosynthesis.

1.....

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2.....

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(2)

(b) What measurements could be taken in order to find the rate of photosynthesis?

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(2)

(c) Outline how you would investigate the effect of temperature on the yield of a crop of plants grown in a glasshouse.

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(3)

(Total 7 marks)

21. (a) Describe and explain the effects of monoculture on the environment.

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(4)

(b) Polychlorinated biphenyls (PCBs) are pesticides which were widely used in the countries surrounding the Baltic Sea. PCBs are non-biodegradable.

(i) Chemical analyses show that gulls, which feed on fish from the Baltic Sea, have very high concentrations of PCBs in their body tissues.
Suggest an explanation for this.

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(2)

S (ii) Suggest, in terms of molecular structure, why some pesticides are non-biodegradable.

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(2)

S (iii) In some populations of pests there are individuals which are resistant to pesticides. Explain why the proportion of pesticide-resistant pests may rise in populations that are sprayed with insecticide.

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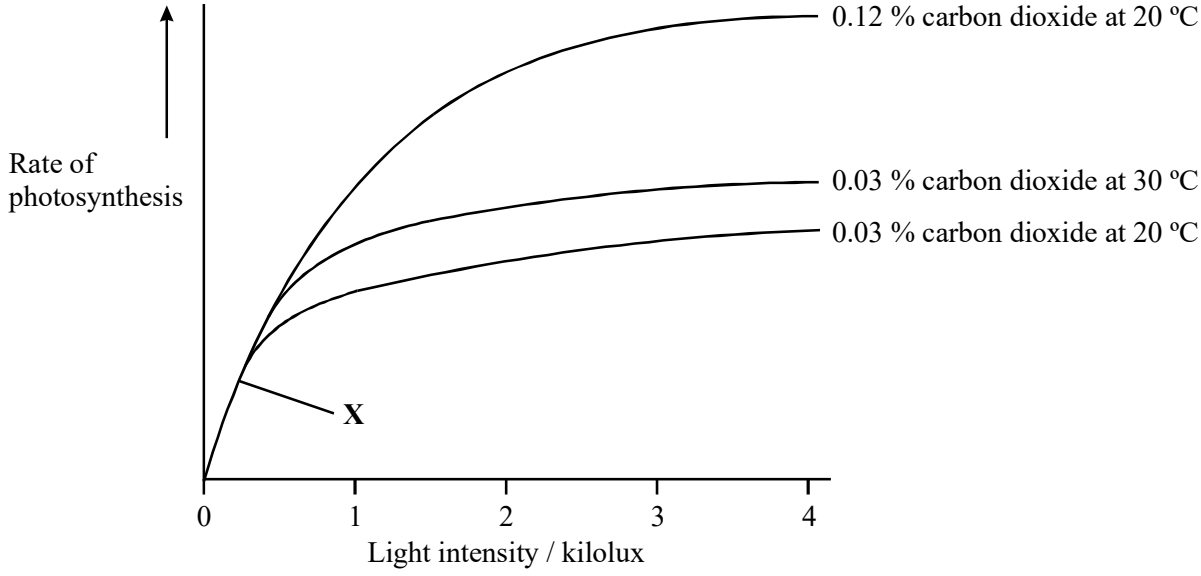
(3)

(Total 11 marks)

22. The graph shows the effect of carbon dioxide concentration, light intensity and temperature on the rate of photosynthesis of a crop plant.



(a) Which factor is limiting the rate of photosynthesis at point **X**? Explain your answer.

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(1)

(b) In a glasshouse in winter, the mean carbon dioxide concentration is 0.03%, the temperature is 20 °C and the light intensity is 3 kilolux.

Using the graph, predict whether increasing the carbon dioxide concentration to 0.12 % or the temperature to 30 °C would result in the greater increase in growth. Using your knowledge of photosynthesis, give an explanation for your answer.

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(2)

(c) Explain why it is not advisable to increase the temperature in a glasshouse on a dull winter day.

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(2)

S (d) Little of the sunlight falling on the leaves of a plant grown in a glasshouse, even under optimum conditions, is used in photosynthesis. Give **two** explanations.

1 .....

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2 .....

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(2)
(Total 7 marks)

23. Spider mites are a major pest of cucumbers. An investigation was carried out to compare the effectiveness of two methods of controlling this pest. Two plots of cucumber plants infested with spider mites were used. One plot was treated with a chemical pesticide; a biological control agent was used on the other plot. **Figures 1** and **2** show the results. The arrows show when the chemical pesticide was applied **(Figure 1)** and when the predator was introduced **(Figure 2)**.

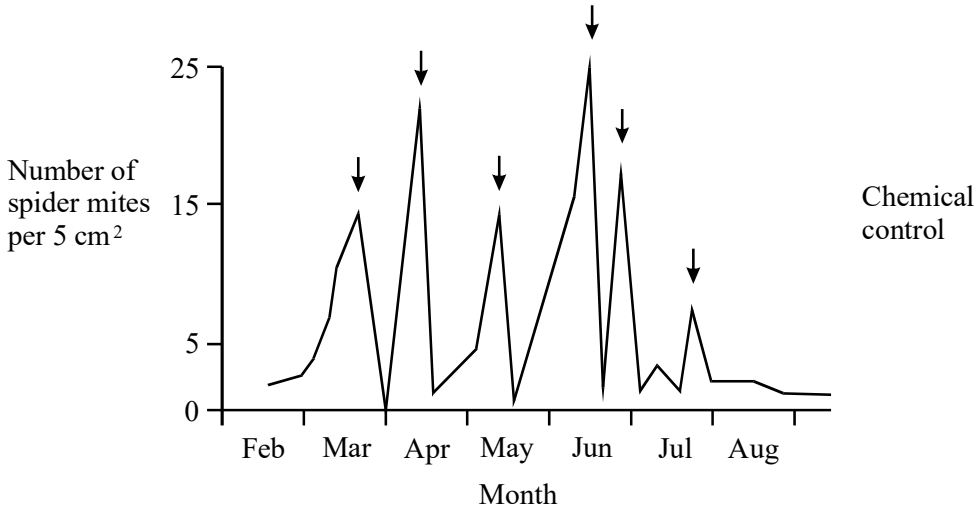

Figure 1

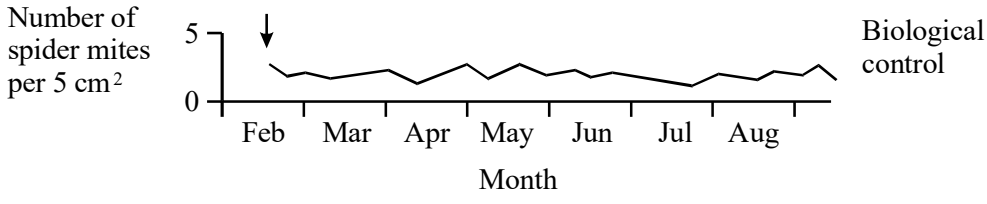

Figure 2

(a) Using evidence from the graphs, give **two** advantages of biological control over chemical control.

1 .....

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2 .....

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(2)

(b) Describe **two** features that a predator must have if it is to be a successful biological control agent.

1 .....

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2 .....

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(2)
(Total 4 marks)

24. (a) Clover is a leguminous plant. A clover plant has root nodules, which contain nitrogen-fixing bacteria.

Describe the nutritional advantage gained as a result of this relationship by

(i) the clover plant;

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(ii) the nitrogen-fixing bacteria.

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(2)

(b) Cereals may be grown in rotation with other crops, including clover. No fertiliser is added. Alternatively, cereals may be grown every year in the same field and supplied with fertiliser.

Explain **two** advantages of growing cereal crops in rotation with clover instead of growing them every year in the same field and applying fertiliser.

1 .....

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2 .....

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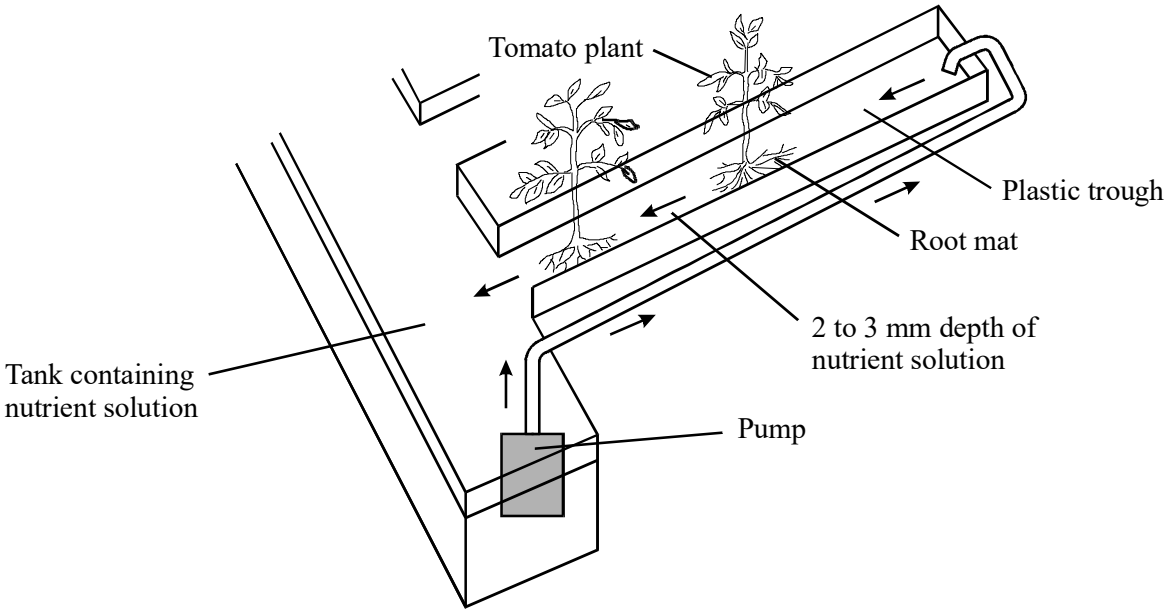
(4)
(Total 6 marks)

25. Tomato growers have increased the yield of fruit from 100 to 400 tonnes per hectare by growing the tomato plants in automatically heated glasshouses and enhancing the carbon dioxide concentration. To control the nutrient supply to the roots, the plants are grown without soil in plastic troughs, as shown in the diagram.



(a) Explain how enhancing the carbon dioxide concentration helps to increase the yield.

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(2)

(b) Maintaining a high temperature in a glasshouse in winter, when the light intensity is low, may reduce the yield. Explain how.

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(2)

S (c) Tomato fruits have a high percentage of water. When making tomato ketchup, it is more economical to use fruits which have a low percentage of water. Growers can reduce the water content of the fruit by adding sodium chloride to the nutrient solution in the plastic trough.

Explain how adding sodium chloride can reduce the water content of the fruit.

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(2)
(Total 6 marks)

26. Over a million tonnes of salmon per year are produced in fish farms. The salmon are grown in large cages in sheltered waters, such as off the west coast of Scotland. The cost of these farmed salmon is much lower than that of wild salmon.

(a) Give **two** reasons why farmed salmon are cheaper than wild salmon.

1 .....

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2 .....

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(2)

S (b) Large amounts of waste food and faeces fall through the bottom of the cages. This results in a much reduced diversity of marine organisms below and around the cages.
Explain how the organic matter in the water causes this reduction in diversity.

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(2)

S (c) Farmed salmon are fed on pellets made from small fish. About five tonnes of small fish are required for each tonne of salmon produced. Give **two** reasons why this high ratio is needed.

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2 .....

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(2)
(Total 6 marks)

27. A popular lake in the United States was affected by large swarms of midges (small biting insects) in the summer. The lake was sprayed with insecticide to kill the midges. The effect of spraying on the following food chain in the lake was investigated.

Plant plankton $\rightarrow$ sunfish $\rightarrow$ western grebe

(a) Shortly after spraying the concentration of insecticide in the water of the lake was 2×10^{-5} g dm^{-3}. After four weeks the concentration in the plant plankton was equivalent to 5×10^{-3} g dm^{-3}.

By how many times was the insecticide concentrated?

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(1)

(b) After a few months the concentration of insecticide in the grebes was more than six times the concentration in the sunfish. Explain why.

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(2)

(c) Another lake, which contained dead trout, was found to be contaminated by waste containing mercury ions.

(i) In an investigation, the lethal concentration of mercury ions for trout was 42 parts per billion over four days. Explain what is meant by *lethal concentration*.

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(1)

S (ii) Explain how heavy metal ions are toxic to animals.

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(3)
(Total 7 marks)

28. (a) Farmers who grow wheat sometimes leave a field fallow for a year by not growing a crop in it. The concentration of nitrate ions in the soil decreases when a field is left fallow.

(i) When grass is grown in the field, fewer nitrate ions are lost than when the field is left with bare soil. Explain why.

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(1)

(ii) A crop of leguminous plants such as clover may be grown in the field and then ploughed in. Explain why less fertiliser would be needed for the wheat crop in the following year.

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(2)

(b) The table gives information about the yield and profitability of a wheat crop grown using different amounts of fertiliser.

Nitrogen fertiliser applied / kg ha^{-1}	**Grain yield / tonnes ha^{-1}**	**Grain protein / %**	**Value added by using fertiliser / £ha^{-1}**	**Cost of using fertiliser / £ha^{-1}**	**Benefit : cost ratio**
0	2.4	11.7	–	–	–
25	2.5	12.5	19	11	1.7 : 1.0
50	2.5	12.9	25	22	1.1 : 1.0
75	2.5	13.3	31	33	0.9 : 1.0
100	2.5	13.5	37		

(i) Describe the effects of increasing fertiliser application on the yield and protein content of the grain produced.

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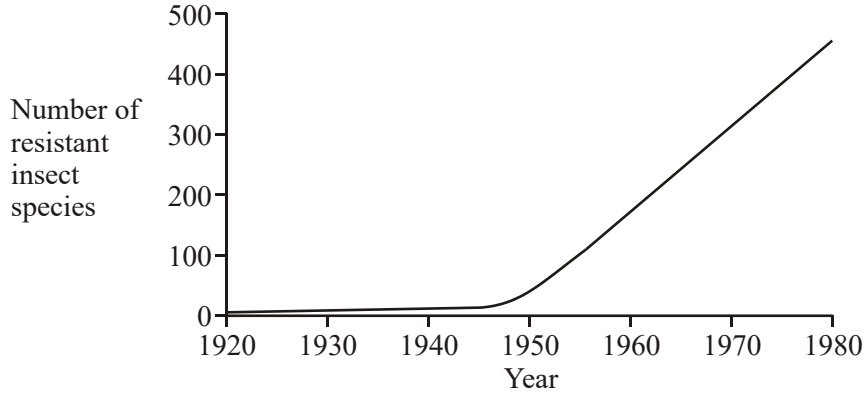
(2)

(ii) Use the data in the table to estimate the benefit : cost ratio for a fertiliser application of 100 kg ha^{-1}. Write your answer in the table.

(1)

(Total 6 marks)

29. The graph shows the number of species of insects reported to be resistant to at least one insecticide between 1920 and 1980.



(i) Suggest **one** reason why there was a rapid rise in resistant species after 1950.

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(1)

S (ii) Explain how an insect population can become resistant to an insecticide.

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(3)
(Total 4 marks)

30. The mesquite tree grows in dry areas which have soils with low concentrations of ions. Its roots grow down to 25 metres and contain nitrogen-fixing bacteria. It is considered a pest in areas where farm animals graze because it out-competes grass. In some areas, young mesquite trees are cut down and then ploughed into the ground. This is expensive but makes the soil slightly more fertile for a few years.

(a) (i) Using the information given, explain **one** way in which mesquite trees are adapted for survival.

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(1)

S (ii) Name the type of competition occurring between mesquite and grass.

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(1)

S (iii) Explain how ploughing the mesquite into the soil makes it more fertile.

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(3)

(b) Attempts have been made to use biological control to prevent the spread of mesquite, using beetles whose larvae eat the seeds of mesquite. Describe the principles involved in biological control.

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(3)

(Total 8 marks)

31. (a) Explain **one** advantage of using a combination of chemical and biological approaches to pest control.

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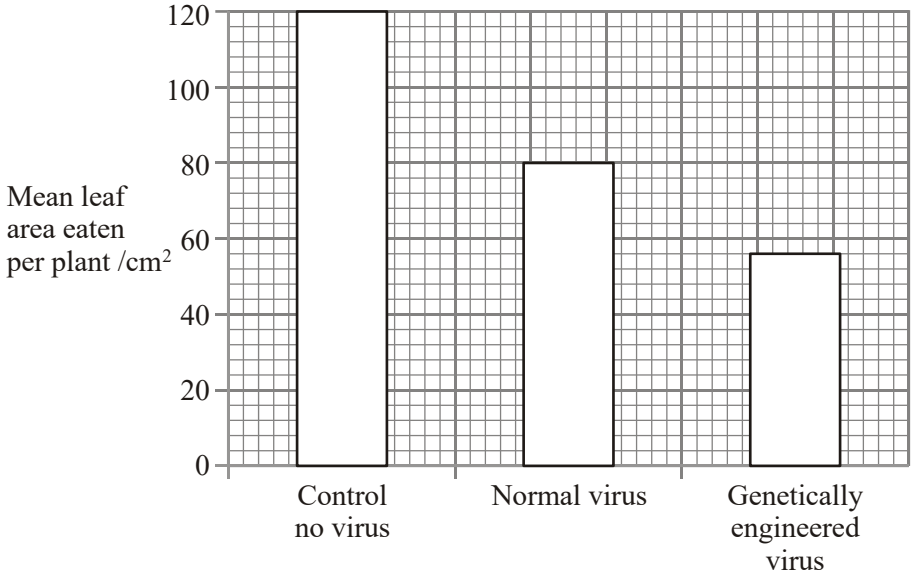
(2)

(b) Caterpillars damage crop plants by eating the leaves. There is a virus which kills caterpillars within a few days of infecting them. A genetically engineered form of the virus has been produced which contains a gene from a scorpion. This gene codes for production of a toxin specific to insects.

In an investigation, sample areas of crop were treated with either the normal or the genetically engineered virus. The bar chart shows the damage caused by caterpillars to the leaves of the crop plants.



(i) How much more effective is the genetically engineered virus than the normal virus? Show your working.

Answer .....

(2)

(ii) Explain why the area of leaf eaten is less when caterpillars are infected with the genetically engineered virus rather than with the normal virus.

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(2)
(Total 6 marks)

32. Organochlorines are non-biodegradable insecticides which were widely used in the 1950s in the UK to treat cereal seeds before sowing. They are poisonous to fish, mammals and birds and are stored in their fat. The use of these insecticides caused a reduction in the population size of the peregrine, a bird which feeds on seed-eating birds.

(a) Explain how feeding on seed-eating birds could have resulted in the death of large numbers of peregrines.

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(3)

(b) Suggest why treating seeds with insecticide was considered to be a better method of pest control than spraying insecticide on the soil.

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(1)

(Total 4 marks)

33. (a) Explain how including leguminous plants in a crop rotation reduces the need to use artificial fertilisers.

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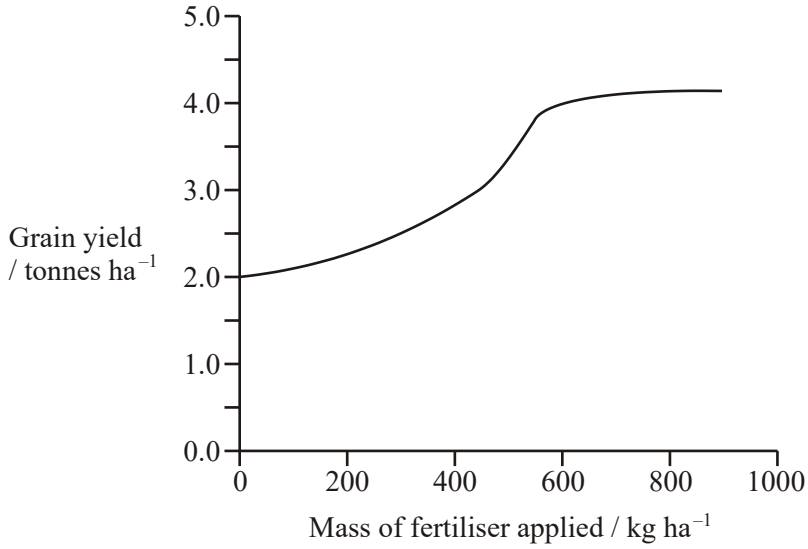
(2)

(b) The graph shows the effects of applying potassium fertiliser at different rates to a crop of wheat.



Explain how the graph shows the law of diminishing returns.

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(2)

S (c) Application of very high concentrations of fertiliser to the soil causes plants to wilt. Explain why.

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(2)
(Total 6 marks)

34. (a) Explain how the use of insecticides may poison the animals at the top of a food chain.

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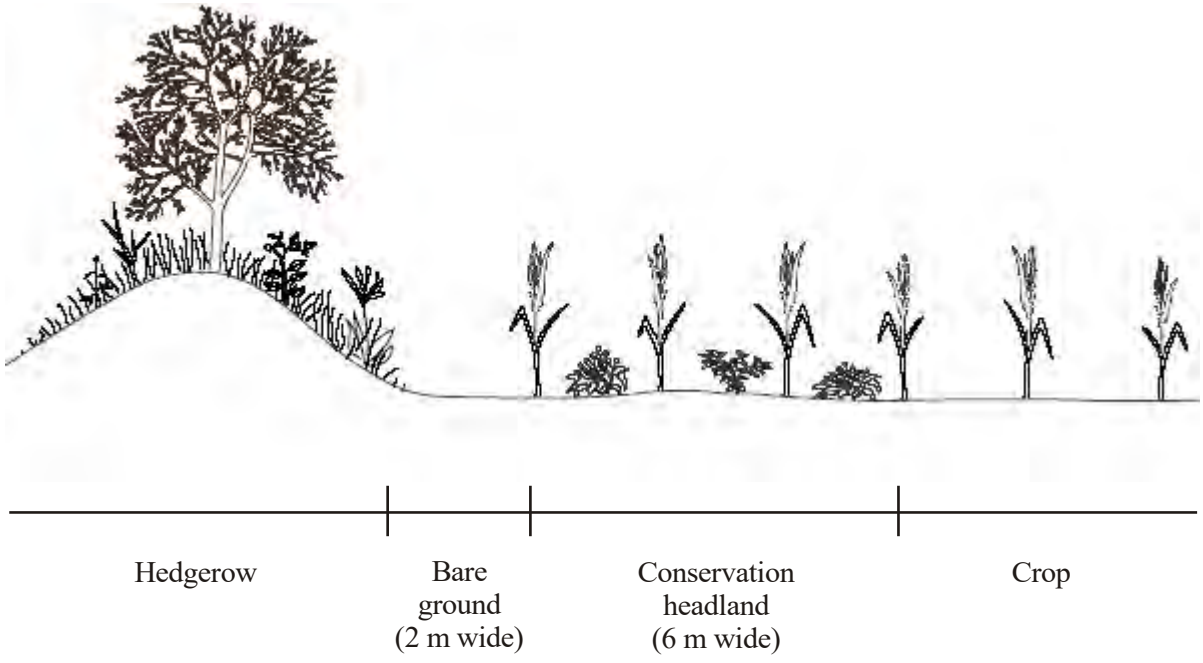
(2)

The diagram shows a hedgerow and part of a field with a crop. The land is farmed in a way that conserves wildlife. The strip of bare ground next to the hedgerow is ploughed frequently to prevent any plants from growing. The first 6 m of the field, called the conservation headland, is sprayed with a selective herbicide to control some kinds of weeds. The rest of the field is sprayed with herbicide to kill all weeds.



S (b) Suggest **one** advantage of leaving a strip of bare ground between the hedgerow and the field.

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(1)

(c) Suggest the benefit of allowing some weeds to grow in the conservation headland.

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(2)

S (d) After harvesting the crop, the farmer digs the unwanted stems and roots into the soil. Explain how the nutrients contained in these plant parts become available for use by other organisms.

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(4)
(Total 9 marks)