

6. A river is polluted by some raw sewage. This causes changes in the number of microorganisms in the river. This in turn has an effect on the number of large fish in the river.

Describe and explain these changes.

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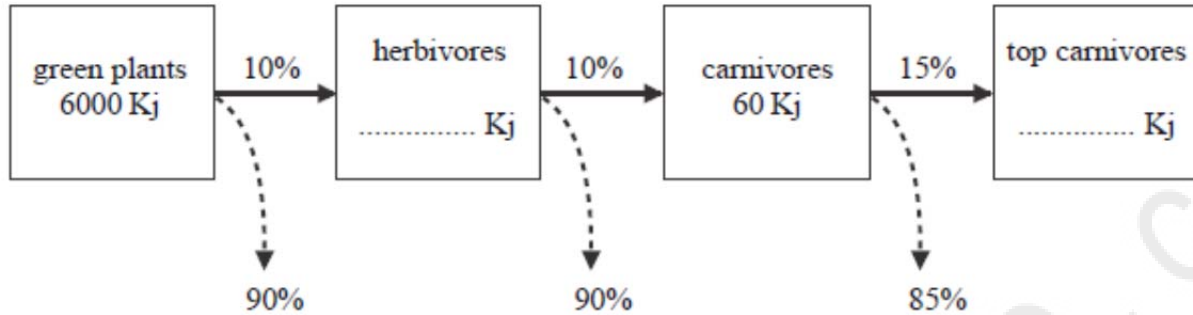
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**(Total 5 marks)**

12. The boxes in the diagram show the amount of energy in different trophic levels of a food chain. The numbers on the solid arrows show the percentage of energy transferred between the organisms in the different trophic levels. The numbers on the dotted arrows show the percentage of energy not transferred from one trophic level to the next.



(a) Complete the diagram by showing the amount of energy in the box for the herbivores and in the box for the top carnivores. (2)

(b) All organisms respire. One reason why 90% of the energy is not transferred from the herbivores to the carnivores is because of respiration by the herbivores.

(i) Give the balanced chemical symbol equation for respiration.

..... (3)

(ii) Give **two** reasons, other than respiration, why 90% of the energy in herbivores is not transferred to the carnivores.

1 .....

.....

2 .....

..... (2)

(c) Which group of organisms shown in this food chain are secondary consumers?

.....(1)

**(Total 8 marks)**

6. increase in number of microorganisms / eq;  
breakdown / decompose/ decomposition;  
bacteria / fungi;  
oxygen reduced;  
respiration;  
fish die;  
decrease in number of fish;  
maximum of 5 (5)

Total 5 marks

12. (a) 600;  
9; (2)

- (b) (i) LHS; RHS; balanced; (3)  
(ii) not eaten / inedible;  
not digested / indigestible / egested;  
excreted / urine / sweating;  
movement;  
heat loss;  
death / decomposers;  
maximum of 2 (2)

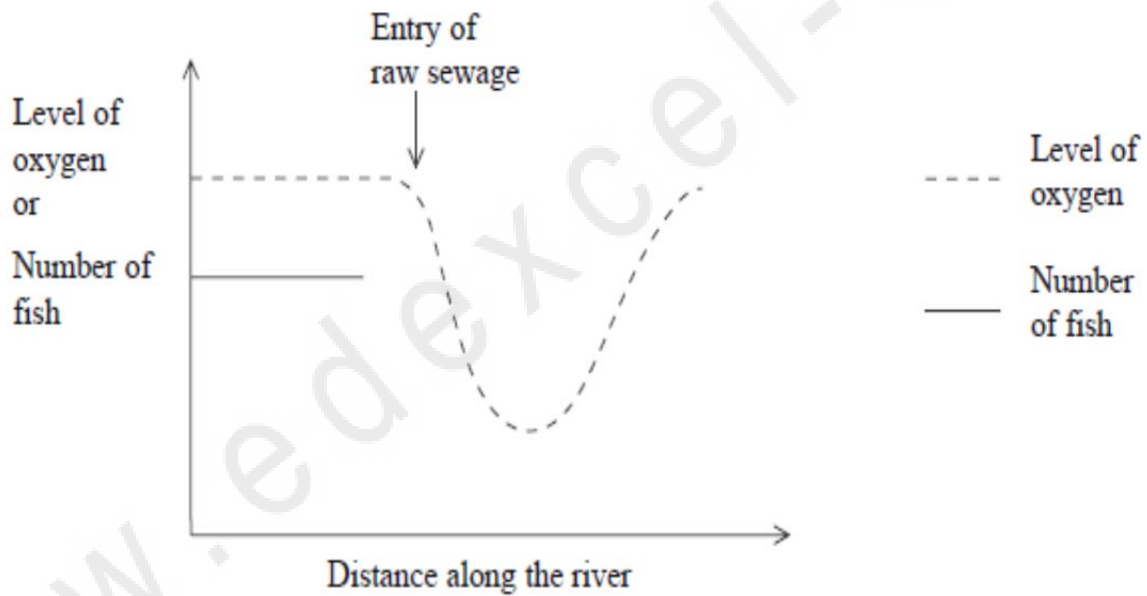
- (c) carnivores; (1)

Total 8 marks

7. The diagram shows where raw sewage entered a river from a village.



The graph shows changes to the level of oxygen in this river. It also shows the number of fish up to the point where untreated sewage entered the river.



(a) (i) Describe how the level of oxygen changed in the river after the entry of raw sewage.

.....  
.....

(1)

(ii) Explain the changes in the level of oxygen after the entry of raw sewage.

.....

.....

.....

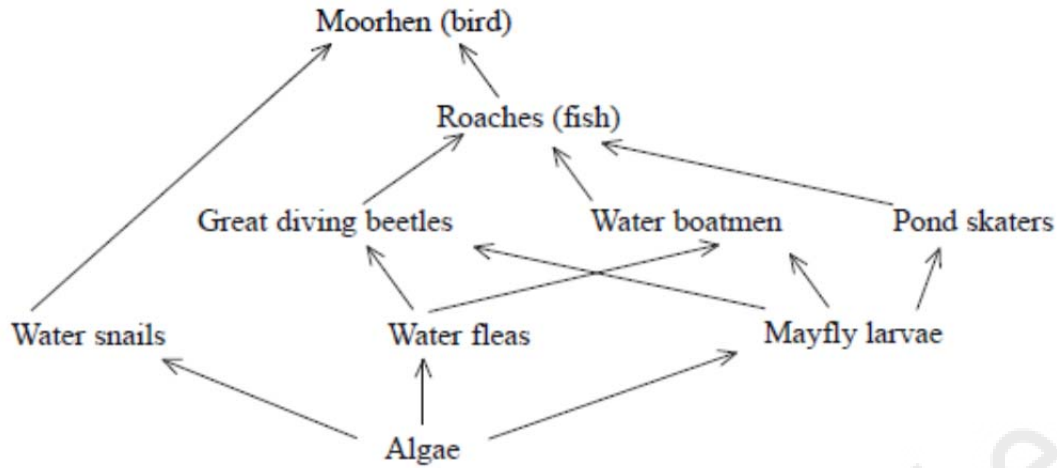
(3)

(b) Continue the line on the graph to show what would happen to the number of fish in the river after the entry of raw sewage. (2)

**(Total 6 marks)**

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14. The diagram below shows a food web in a pond.



(a) How many trophic levels are shown in the food web?

..... (1)

(b) Name **one** secondary consumer in the food web.

..... (1)

(c) What do the arrows in the food web represent?

..... (1)

(d) Identify and draw a food chain from the food web shown that contains five organisms and includes the water boatman. (2)

(e) Food chains rarely include more than five organisms. Use your knowledge about energy transfer to explain why.

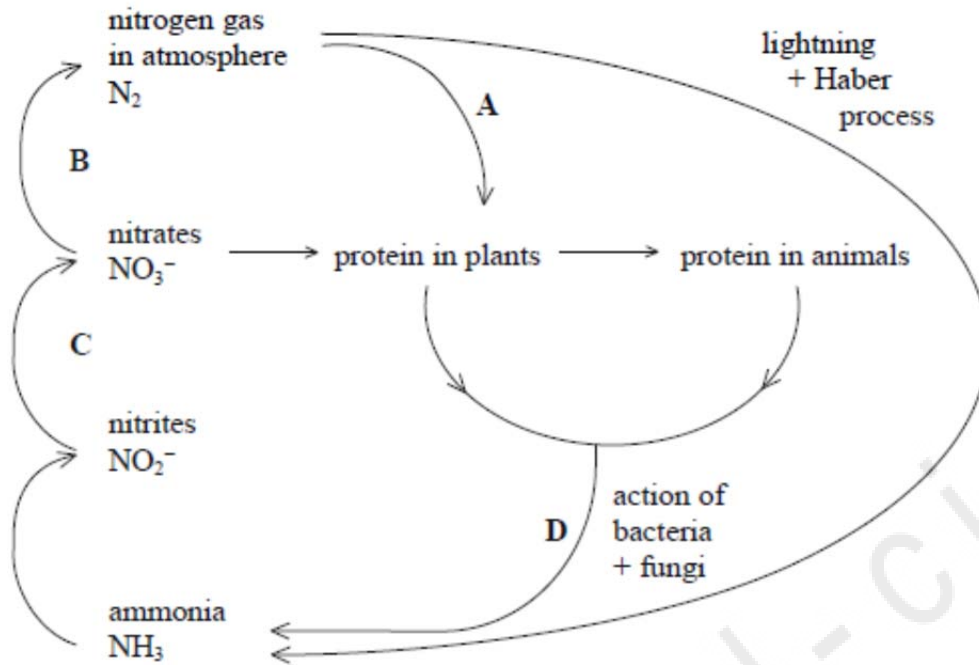
.....  
 .....  
 ..... (3)

(f) Suggest how the population of mayfly larvae in the pond might change if the number of water fleas in the pond decreased. Explain your answer.

.....  
 ..... (2)

**(Total 10 marks)**

16. The diagram shows the nitrogen cycle.



(a) (i) Name processes **A**, **B**, **C** and **D** shown in the diagram.

**A** .....

**B** .....

**C** .....

**D** ..... (4)

(ii) Name the type of organism responsible for process **A**.

..... (1)

(b) Describe how nitrogen in the soil can be converted into plant protein.

.....  
 .....  
 .....  
 ..... (3)

(Total 8 marks)

7. (a) (i) fall + rise / eq; (1)  
 (ii) bacteria / fungi / microorganisms;  
 breakdown / digest / remove (raw sewage) / organic to  
 inorganic;  
 respiration;  
 use of oxygen;  
 less sewage / organic material; max  
 less respiration; (3)

- (b) line down;  
 line up; (2)

Total 6 marks

14. (a) 5; (1)

- (b) moorhen/beetle/boatmen/skaters; (1)

- (c) flow of energy; (1)

- (d) algae → water fleas → water boatmen → roaches → moorhen;;;

- not five organisms -1;  
 no water boatman -1;  
 no producer -1;  
 no arrows/ wrong arrows -2; (2)

- (e) energy lost;  
 respiration;  
 movement;  
 excretion; max  
 egestion/undigested / uneaten; (3)

- (f) mayfly larvae increase; (1)  
 more food/algae available; (1)

OR

- mayfly larvae decrease; (1)  
 more predation by beetle/ water boatman ; (1)

Total 10 marks



17. organisms with desired characteristic chosen;  
cross together;  
look for characteristic in offspring;  
breed from those offspring that have the desired characteristic;  
repeat over several generations ;

example plant species e.g. wheat;  
and example character e.g. stem length;  
example animal species e.g. cattle;  
and example character e.g. milk yield;

max  
(6)

Total 6 marks

6. When a sample of water is tested, its water quality is measured by finding out how much of its oxygen is used up when it is kept sealed in the dark for five days. The oxygen is used by microorganisms breaking down organic matter in the water.

The amount of oxygen used up is called the biological oxygen demand or BOD, and is calculated in mg per litre.

(a) Suggest why the sealed samples are kept in the dark.

.....

.....

.....

(2)

(b) Farm waste contains organic matter and, by law, farms are not allowed to release waste that produces a BOD greater than 25 mg of oxygen per litre.

The table below gives readings for the BOD in the waste produced by four farms.

Farm	BOD in mg per litre	Volume of waste produced per week in litres
A	28	180
B	20	30
C	115	40
D	76	134

(i) Which of these farms are breaking the law?

.....

(1)

(ii) What is the total amount of oxygen used up by microorganisms in one week when they breakdown waste from farm B?

..... mg

(1)

(iii) Which farm causes the greatest total BOD problem?

.....

(1)

(c) Explain the possible effects on a river of releasing waste with a high BOD.

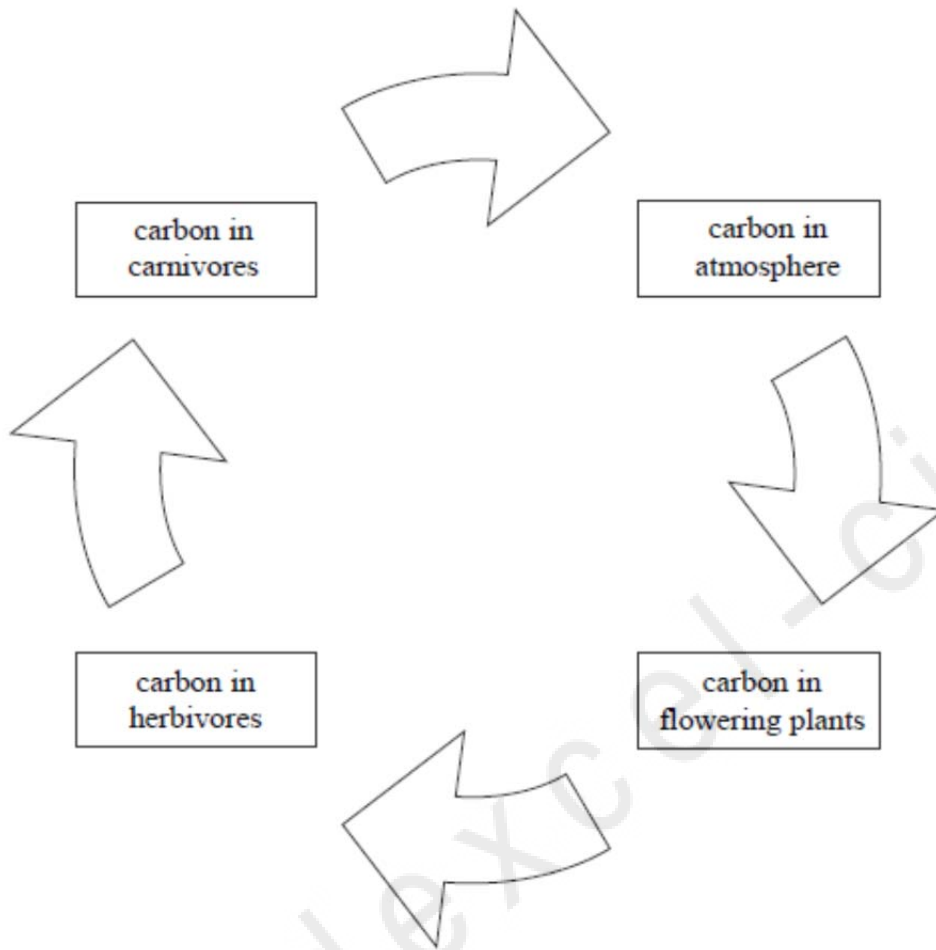
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(3)

**(Total 8 marks)**

8. The diagram shows part of the carbon cycle. This shows how carbon compounds enter and leave living organisms.



(a) (i) The arrows on the diagram represent various processes. (4)

Write a word next to each arrow to show which process it represents. Choose your words from the list. Each word may be used once, more than once or not at all.

- respiration
- photosynthesis
- feeding

(ii) On the diagram, draw and label **one** arrow to represent the process of decomposition. (1)

(b) Burning fossil fuels return carbon dioxide to the atmosphere. Explain how increased use of fossil fuels could affect the environment.

.....

.....

.....

.....

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.....

.....

(Total 10 marks) (5)

6. (a) prevent photosynthesis;  
produces oxygen; (2)
- (b) (i) A, C and D / all except B; (1)  
(ii) 600; (1)  
(iii) D; (1)
- (c) microbes / bacteria / decomposers increase;  
less oxygen; max  
(less) respiration (by organisms); (3)  
death;  
eutrophication;
- Total 8 marks

8. (a) (i) 1 mark for each correct arrow;;; (4)  
(ii) arrow from any box to carbon in atmosphere; (1)
- (b) greenhouse gas;  
greenhouse effect;  
global warming / trap heat / temperature rise;  
ice cap melting;  
sea level rising / flooding; max  
migration/death/loss of species / disruption of food chain; (5)  
climate change / described climate change;

3. A habitat is a place where organisms live. The food chains below are from different habitats.

**From a seashore**

seaweed → periwinkle → oystercatcher  
(a mollusc) (a bird)

**From the edge of a field**

blackberry → bank vole → tawny owl  
(a fruit) (a mammal) (a bird)

(a) (i) Name **one** primary consumer in these food chains.

..... (1)

(ii) What is the original energy source for these food chains?

..... (1)

(b) The following food chains come from a woodland environment.

leaf litter → earthworm → blackbird → sparrow hawk  
dead mouse → blowfly larvae → common frog → grass snake

Other than the names of the organisms, give **two** ways in which these food chains differ from the examples in part (a).

(2)

1 .....

.....

2 .....

.....

(c) (i) Name **two** groups of organisms that can act as decomposers in food chains.

(2)

1 .....

2 .....

(ii) Describe the role of decomposers in the carbon cycle.

.....

.....

.....

.....

(3)

**(Total 9 marks)**

Question Number	Question		
3	(a)		
	Acceptable Answers	Reject	Mark
	(i) periwinkle/(bank) vole;		1
	(ii) sun / light;		1
			(2)

Question Number	Question		
3	(b)		
	Acceptable Answers	Reject	Mark
	4 links / eq, e.g. longer/more organisms/more consumers/ref tertiary consumer; they do not start with a producer / start with dead organisms;		(2)

Question Number	Question		
3	(c)		
	Acceptable Answers	Reject	Mark
	(i) bacteria; fungi;		2
	(ii) rot / decay / digest / breakdown; dead organisms; release carbon dioxide; respiration; carbon dioxide absorbed by plants / used in photosynthesis;		3
			(5)

Total 9 marks



2. In an area of rainforest, there were plans to cut down lots of trees (deforestation) to build a new road. Some people did not want this to happen, but some people did.

(a) Suggest **two** reasons why some people wanted the road to be built. (2)

1 .....

.....

2 .....

.....

(b) Describe **two** biological effects that may occur as a result of deforestation. (4)

1 .....

.....

.....

2 .....

.....

.....

**(Total 6 marks)**

12. The table lists some processes. Complete the table by giving a brief description of what is involved for each process.

Process	Description
decomposition	
transpiration	
nitrification	
vasodilation	

(Total 8 marks)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (a)	access / transport / travel / communication;  trees for a purpose / construction / manufacture / logging / eq; trees for fuel; farming / mining;			Max 2  (2)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (b)	loss of habitat / food; loss of numbers / death / extinction / loss of genes / migration / loss of species / eq;  less photosynthesis; global warming / greenhouse effect / ref to CO <sub>2</sub> in air;  soil erosion idea / <u>leaching</u> ; flooding / eutrophication / desertification / lack of minerals / eq;  less transpiration; less rainfall;			Max 4  (4)

(Total 6 marks)

Question Number	Correct Answer	Acceptable Answers	Reject	Mark											
12	<table border="1"> <thead> <tr> <th>Process</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>decomposition</td> <td>bacteria / microorganisms / fungi / saprobionts / eq;  breakdown/digest dead organisms / organic matter / waste / eq;</td> </tr> <tr> <td>transpiration</td> <td>evaporation / diffusion / loss of water;  from plant / leaf / stomata;</td> </tr> <tr> <td>nitrification</td> <td>bacteria / named bacteria;  ammonia/ammonium (cpds) to nitrite/nitrate / nitrite to nitrate;</td> </tr> <tr> <td>vasodilation</td> <td>widening / eq; I dilation  blood vessels / arteries / arterioles; I capillaries</td> </tr> </tbody> </table>		Process	Description	decomposition	bacteria / microorganisms / fungi / saprobionts / eq;  breakdown/digest dead organisms / organic matter / waste / eq;	transpiration	evaporation / diffusion / loss of water;  from plant / leaf / stomata;	nitrification	bacteria / named bacteria;  ammonia/ammonium (cpds) to nitrite/nitrate / nitrite to nitrate;	vasodilation	widening / eq; I dilation  blood vessels / arteries / arterioles; I capillaries			
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	decomposition	bacteria / microorganisms / fungi / saprobionts / eq;  breakdown/digest dead organisms / organic matter / waste / eq;													
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	nitrification	bacteria / named bacteria;  ammonia/ammonium (cpds) to nitrite/nitrate / nitrite to nitrate;													
vasodilation	widening / eq; I dilation  blood vessels / arteries / arterioles; I capillaries														
			veins	(8)											

(Total 8 marks)

**12.** Farmers often use fertilisers on their fields. Explain the biological consequences that occur when mineral ions from fertilisers are leached from the soil and washed into a lake.

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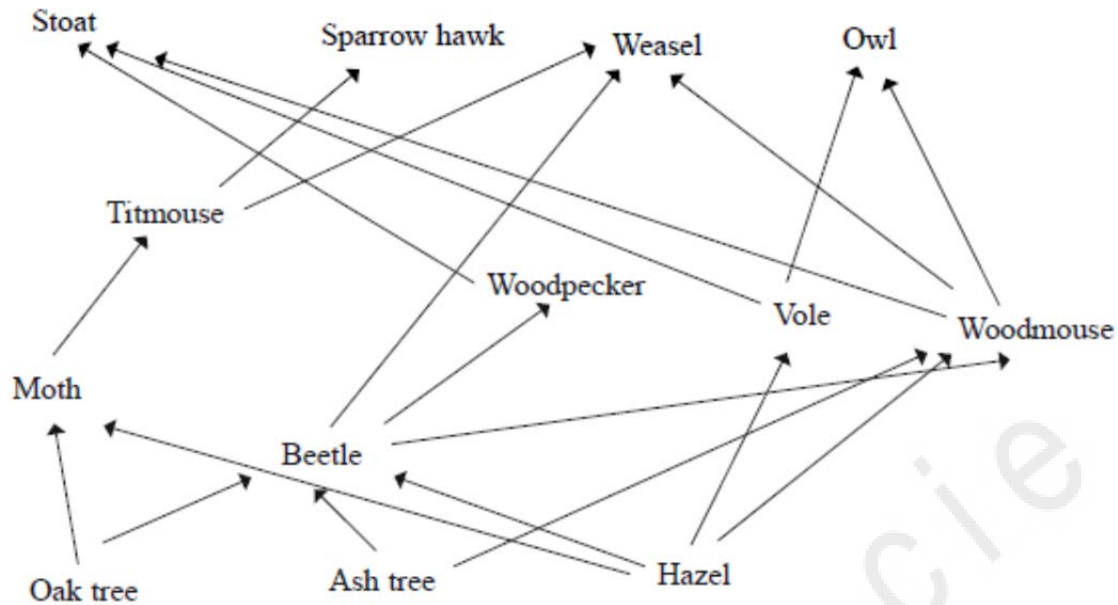
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**(Total 5 marks)**

13. The diagram below shows part of a food web from a woodland.



(a) (i) Name **one** primary consumer in this food web.

..... (1)

(ii) Name the tertiary consumers in this food web.

..... (1)

(b) Suggest why it is an advantage for an animal such as a stoat to feed on more than one type of organism.

.....  
 .....  
 ..... (2)

(c) Why is it difficult to place the woodmouse in a single trophic level?

.....  
 .....  
 ..... (2)

(d) Suggest why it is unusual to find food chains with more than five trophic levels.

.....

.....

.....

.....

.....

(3)

**(Total 9 marks)**

Question Number	Correct Answer	Notes	Mark
12	eutrophication; nitrate / phosphate; growth of water plants / algae / bloom; less light / less photosynthesis; bacteria / microorganisms / eq; respiration; less oxygen / oxygen used; fish / animals die;		(5)

(Total 5 marks)

Question Number	Correct Answer	Notes	Mark
13 (a) (i)	moth / beetle / vole / wood mouse;		(1)

Question Number	Correct Answer	Notes	Mark
13 (a) (ii)	stoat + sparrow hawk + weasel + owl;		(1)

Question Number	Correct Answer	Notes	Mark
13 (b)	survive if one organism dies out / eq; feed in different seasons; easier to find prey / more available / less competition; better chance of balanced diet;		Max (2)

Question Number	Correct Answer	Notes	Mark
13 (c)	eats producer/named producer and consumer/named consumer / eats plants and animals; feeds at (two) different trophic levels / is primary and secondary consumer / is herbivore and carnivore / omnivorous;		(2)

Question Number	Correct Answer	Notes	Mark
13 (d)	energy lost; movement / respiration / excretion / egestion / eq; little energy reaches the top;		Max (3)

(Total 9 marks)



2. The photograph shows a sea turtle on a sandy beach. Some sea turtles are regarded as endangered species.



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

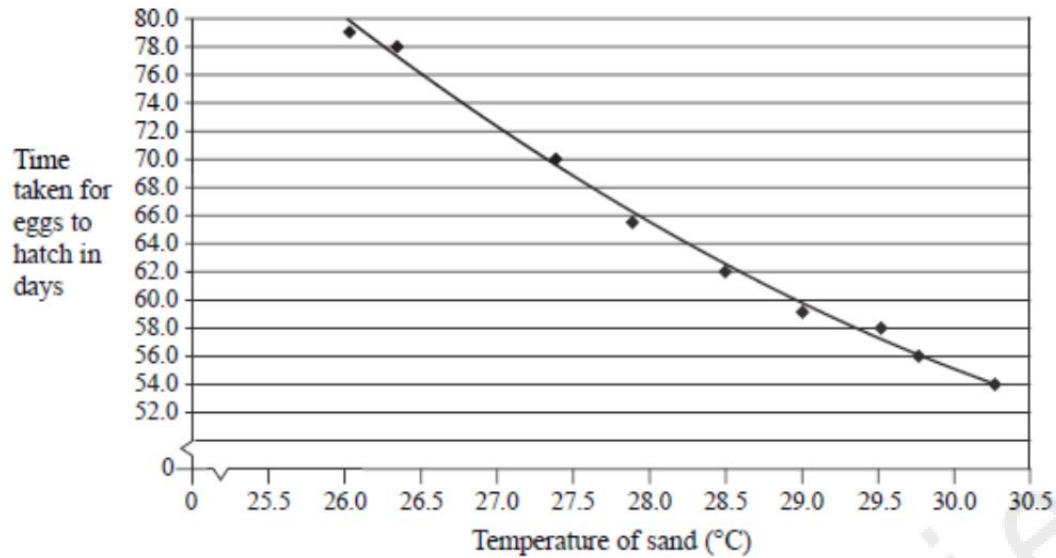
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(1)

(b) Sea turtles feed on jellyfish that have fed on microscopic organisms called plankton. Use this information to draw a food chain in the space below.

(2)

(c) Sea turtles lay their eggs on sandy beaches. They dig holes (nests) in the sand and then lay up to 120 eggs in the hole. They then refill the hole with sand. The temperature of the sand can affect the time taken for the eggs to hatch. This relationship is shown in the graph below.



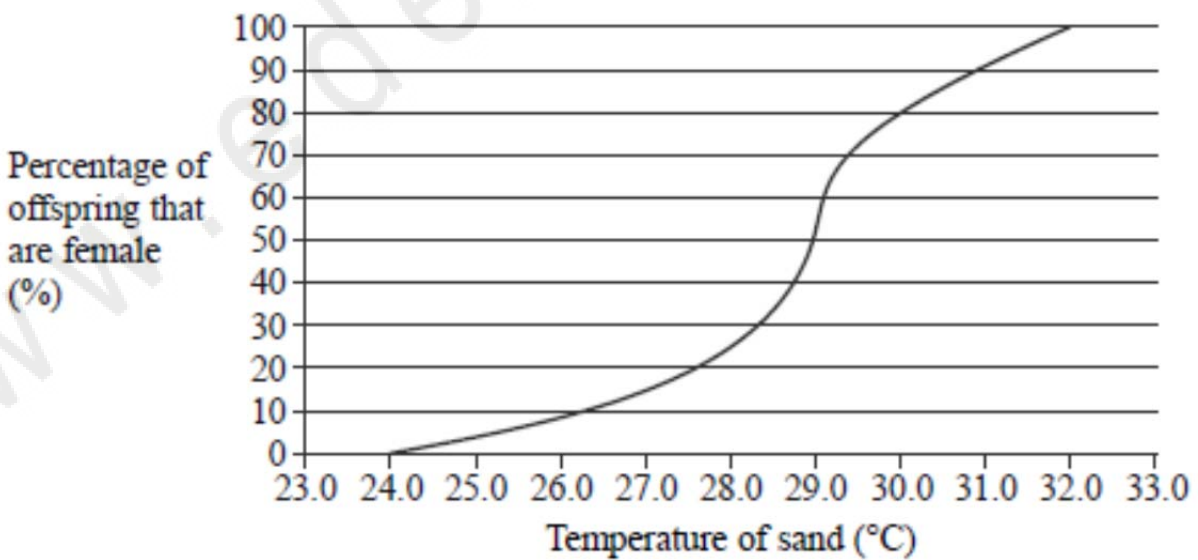
(i) How does the temperature of the sand affect the time taken for the eggs to hatch?

..... (1)

(ii) At what temperature of the sand do the eggs take 55 days to hatch?

..... (1)

(d) Sea turtles are unusual in that the temperature of the sand can also affect the sex of the offspring. The graph below shows this relationship.



(i) What temperature of the sand would give equal numbers of males and females?

.....

(1)

(ii) In one nest, the temperature of the sand was 30 °C. In this nest 120 offspring hatched.

Use the graph to calculate how many of these offspring are likely to be male and how many are likely to be female.

Write your answers in the table below.

Sex	Number of offspring
male	
female	

(2)

(e) Scientists are concerned that global warming might reduce the population of sea turtles.

(i) Use information in the graph from part (c) to support this suggestion.

.....  
.....  
.....

(2)

(ii) Global warming has been linked to increased levels of carbon dioxide in the atmosphere. Suggest how global warming can be reduced.

.....  
.....  
.....  
.....  
.....

(3)

**(Total 13 marks)**

**11.** Birnham Wood contains 400 beech trees, 300 000 primary consumers and 50 000 secondary consumers.

(a) (i) Draw and label a pyramid of **biomass** for Birnham Wood. **(3)**

(ii) Describe how the shape of a pyramid of numbers would differ from a pyramid of biomass for Birnham Wood.

.....  
.....

**(1)**

(b) Explain why transfer of energy between primary and secondary consumers can never be 100% efficient.

.....  
.....  
.....  
.....  
.....

**(4)**

(c) For much of the year at ground level in Birnham Wood it is very dark during the day. However, some small plants do grow there. One of them is the Bird's-Nest Orchid, which has pale brown leaves.

(i) Suggest why it is dark at ground level in Birnham Wood for much of the year.

.....  
.....

**(1)**

(ii) The Bird's-Nest Orchid is not green like most other plants. Explain why the green colour is important to most plants.

.....  
.....  
.....

(2)

(iii) Suggest how the Bird's-Nest Orchid is able to survive even though it is not green.

.....  
.....

(1)

**(Total 12 marks)**

Question Number	Answer	Mark
4325 2H Q2(a)	low in numbers / risk of extinction / risk of dying out / eq;	(1)

Question Number	Answer	Mark
4325 2H Q2(b)	jellyfish in centre; arrows correct;	(2)

Question Number	Answer	Mark
4325 2H Q2(c)(i)	higher temp reduces time to hatch / eq;	(1)

Question Number	Answer	Mark
4325 2H Q2(c)(ii)	30 ( <sup>o</sup> C); Accept within a range of 29.9-30.1	(1)

Question Number	Answer	Mark
4325 2H Q2(d)(i)	29 ( <sup>o</sup> C); Accept within a range of 28.9-29.1	(1)

Question Number	Answer	Mark
4325 2H Q2(d)(ii)	24; 96; (allow one mark for 96 24 / 20:80/eq)	(2)

Question Number	Answer	Mark
4325 2H Q2(e)(i)	eggs hatch early / eq; less developed (premature idea) / less time to develop / eq; OR if graph (d) used fewer males / eq; reject no males less mating / less reproduction / eq;	(2)

Question Number	Answer	Mark
4325 2H Q2(e)(ii)	less burning / less combustion; (of) fossil fuel / named fossil fuel; grow more trees / reduce deforestation; increase photosynthesis; cycle / walk / less cars / reduce electricity use / recycle / wind / tidal / nuclear / renewable / eq; Ignore aerosols, ref to factories, pollution	(3)

(Total 13 marks)

Question Number	Answer	Mark
4325 2H Q11(a)(i)	shape; (3 bars reducing in size from bottom to top) allow smooth order; (trees then primary consumers then secondary consumers) names;(regardless of position)	(3)

Question Number	Answer	Mark
4325 2H Q11(a)(ii)	bottom bar small(er) / fewer trees / inverted pyramid / eq;	(1)

Question Number	Answer	Mark
4325 2H Q11(b)	energy lost / used up / respiration / heat / movement / excretion / egestion / uneaten / indigestible / death / eq;;;	(4)

Question Number	Answer	Mark
4325 2H Q11(c)(i)	trees/leaves/canopy block sun / light;	(1)

Question Number	Answer	Mark
4325 2H Q11(c)(ii)	chlorophyll; (absorb) light; photosynthesis;	(2)

Question Number	Answer	Mark
4325 2H Q11(c)(iii)	feeds on dead material / carnivorous / parasitic / ref to other pigments /eq;	(1)

(Total 10 marks)

6. Carbon on Earth is found in four main sources. The table shows the amount of carbon, in relative units, in these sources.

Source	Relative units of carbon
air	1
plant vegetation	4
fossil fuels	14
limestone (fossil shells of sea animals)	100 000

(a) (i) Name **two** molecules in plants that contain carbon.

- 1 .....
- 2 ..... (2)

(ii) The carbon in plants can be released into the air as carbon dioxide. Give **two** ways by which this can happen.

- 1 .....
- 2 ..... (2)

(iii) Increasing the amount of carbon dioxide in the air can lead to global warming. Give **three** different harmful consequences of global warming.

- 1 .....
- 2 .....
- 3 ..... (3)

(b) Burning some fossil fuels releases sulphur dioxide. Explain the biological consequences of pollution of air by sulphur dioxide.

- .....
- .....
- .....
- ..... (3)

**(Total 10 marks)**



7. Describe how glasshouses can be used to increase the yield of a named crop.

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**(Total 5 marks)**

11. The food chain below is from a pond.

microscopic plants → microscopic animals → insects → fish

(a) (i) How many trophic levels are there in this food chain?

..... (1)

(ii) The microscopic plants are called producers. What term is used to describe the fish?

..... (1)

(b) The energy being transferred along this food chain was measured.

The energy entering into the biomass of each type of organism was measured as was the energy then lost by respiration of these organisms.

The results are shown in the table.

Organism	Energy entering biomass in kJ per m <sup>2</sup> per year	Energy lost by respiration in kJ per m <sup>2</sup> per year
microscopic plants	87 000	50 000
microscopic animals	14 000	8 000
insects	1 600	1 300
fish	500	300

(i) The energy entering the biomass of the insects was 1 600 kJ per m<sup>2</sup> per year. The energy entering the microscopic animals was 14 000 kJ per m<sup>2</sup> per year, but 8000 kJ per m<sup>2</sup> per year of this was lost by respiration. Give two other reasons why the remaining 4 400 kJ per m<sup>2</sup> per year were not available for the insects.

1 .....

2 .....

(2)

(ii) The efficiency with which energy is transferred from the microscopic plants to the microscopic animals can be calculated using the formula:

$$\text{energy transfer efficiency (\%)} = \frac{\text{total energy entering microscopic animals}}{\text{total energy entering microscopic plants}} \times 100$$

Use this formula to calculate the energy transfer efficiency between microscopic plants and microscopic animals. Show your working.

Answer ..... % (2)

(iii) What evidence suggests that the fish need to feed on other organisms in addition to insects?

.....  
.....  
.....

(1)

**(Total 7 marks)**

Question Number	Answer	Mark
6(a)(i)	starch / cellulose / glucose / sucrose / protein / amino acids / fat / carbohydrate / eq;   cell wall	(2)

Question Number	Answer	Mark
6(a)(ii)	respiration; decomposition / decay / rotting / eq; combustion / burning;	Max (2)

Question Number	Answer	Mark
6(a)(iii)	ice caps melt / flooding; habitat destruction; food chain disruption / eq; extinction; soil erosion; climate change / hurricanes / desertification / drought / eq;	Max (3)

Question Number	Answer	Mark
6(b)	dissolves; water / cloud; acid (rain); harms/kills organisms;   harm to humans	Max (3)

(Total 10 marks)

Question Number	Answer	Mark
7	named crop; control light / light bulbs / eq; control carbon dioxide / burning / eq; control temperature heating / eq; control water supply / eq; control humidity / mineral ions / pest; photosynthesis; growth for longer time / growth in cold season;	max (5)

(Total 5 marks)

Question Number	Answer	Mark
11(a)(i)	4;	(1)

Question Number	Answer	Mark
11(a)(ii)	tertiary consumer / top carnivore;	(1)

Question Number	Answer	Mark
11(b)(i)	movement; excretion / eq; egestion / indigestible / faeces / eq; uneaten / eaten by other organisms; death; I heat	max (2)

Question Number	Answer	Mark
11(b)(ii)	16.09 / 16 / 16.1;; Allow one mark in working for 14 000 or 87 000	(2)

Question Number	Answer	Mark
11(b)(iii)	only 300 (from insects) / too much lost by respiration (of insects) / not enough energy / needs 500;	(1)

(Total 7 marks)

9. A woodland community contained a small population of a rare tree species.

(a) (i) What is meant by the term 'population'?

.....  
.....

(1)

(ii) What is meant by the term 'community'?

.....  
.....  
.....

(2)

(b) The woodland was threatened by deforestation.  
Give **two** harmful consequences of deforestation.

1 .....

2 .....

(2)

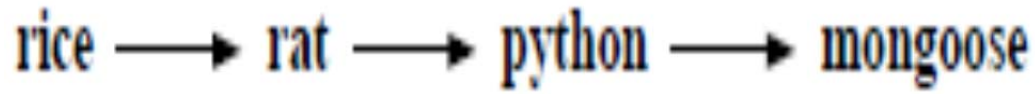
(c) A plant breeder wanted to grow the rare species of tree.  
Explain why tissue culture (micropropagation) would be a suitable method to use.

.....  
.....  
.....  
.....  
.....

(4)

**(Total 9 marks)**

13. (a) The food chain below is found in Asia.



(i) Name the secondary consumer in this food chain.

..... (1)

(ii) Name the top carnivore in this food chain.

..... (1)

(b) The food chain below is found in Australia.

**sugar cane scarab beetle cane toad**

(i) The cane toad was brought into Australia in 1937 and released in large numbers by farmers.

Suggest why the farmers did this.

.....  
.....  
..... (2)

(ii) The cane toad does not have any predators in Australia.

Suggest how the release of cane toads has caused ecological problems.

.....  
.....  
..... (2)

**(Total 6 marks)**





Question Number	Answer	Mark
13(a)(i)	python;	(1)

Question Number	Answer	Mark
13(a)(ii)	mongoose;	(1)

Question Number	Answer	Mark
13(b)(i)	reduce beetles / eat beetles / reduce pest / kill beetles / eq; increase (sugar cane) crop / stop beetles eating sugar cane / eq;  reduce beetles that eat sugar cane = 2 because beetles eat sugar cane = 1	(2)

Question Number	Answer	Mark
13(b)(ii)	increase in number / reproduce / eq; eat other organisms / disrupt food chains / not enough beetles for other species to eat / eq; Ignore idea that more beetles eaten	(2)

2. Explain how sewage pollution can affect the plants and animals in a river.

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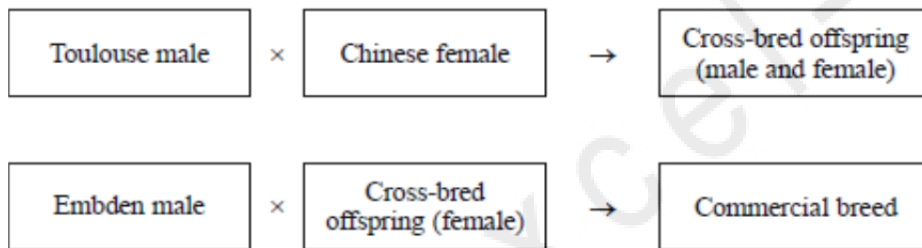
**(Total 5 marks)**

8. The photograph shows a bird called a goose.



Two breeds of goose called Toulouse and Embden grow quickly. However, both breeds lay very few eggs. Another breed of goose called Chinese lays lots of eggs but grows slowly.

Farmers have used a breeding process to produce a commercial breed of goose from these three different breeds. The diagram below shows the breeding process.



(a) Name the **two** desired characteristics farmers wanted to obtain with the commercial breed of goose.

1 .....

2 .....

(2)

(b) Use the information opposite to suggest **one** difference in the characteristics of the cross-bred female and the Chinese female.

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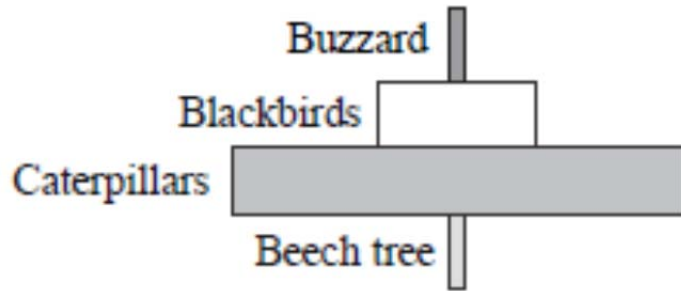
(1)

(c) The breeding process involves farmers choosing which birds breed with each other. What name describes a breeding process in which humans choose which animals breed together?

.....(1)

**(Total 4 marks)**

12. (a) The diagram shows the pyramid of numbers for a food chain found in a wood.



(i) Name the secondary consumer in this food chain.

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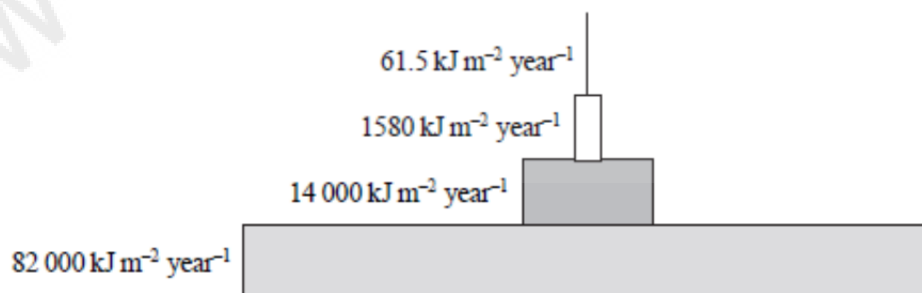
(1)

(ii) Sketch a labelled pyramid of biomass for this food chain.

(3)

(b) Pyramids of energy show the rate of energy flow at successive trophic levels in a given area over a fixed period of time.

The diagram below shows a pyramid of energy.



(i) Calculate the percentage of energy transferred from the producer trophic level to the tertiary consumer trophic level.

Answer .....% (2)

(ii) Explain why so little energy is transferred from one trophic level to the next.

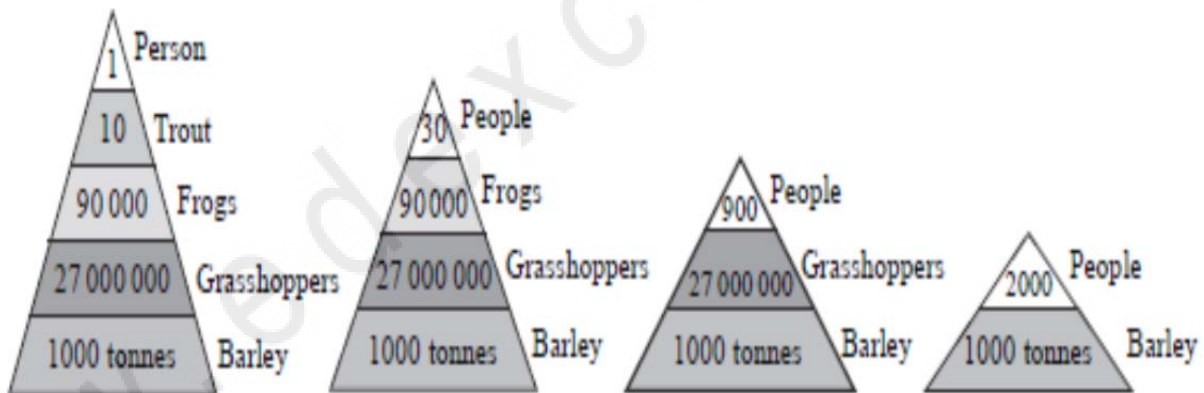
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(c) The diagram below shows the different numbers of humans that can be supported in food chains of different lengths. (3)



(i) How many more humans can be supported on a diet of barley compared to a diet of trout?

..... (1)

(ii) What is the relationship between the length of a food chain and the number of people who can be supported by it? Explain your answer.

.....

..... (2)

**(Total 12 marks)**

### Marks schemes of above questions

Question Number	Answer	Mark
2	bacteria; decomposition / decomposers / decay; oxygen use; respiration; death of organisms / suffocate; mineral ions / named mineral ion / nutrients; Ignore fertiliser growth of algae / growth of plants / eq; eutrophication;	(5)

Question Number	Answer	Mark
8(a)	fast growing; lots of eggs;	(2)

Question Number	Answer	Mark
8(b)	grows faster than Chinese; Allow less eggs than Chinese	(1)

Question Number	Answer	Mark
8(c)	selective breeding / artificial selection;	(1)

Question Number	Answer	Mark
12(a)(i)	blackbirds;	(1)

Question Number	Answer	Mark
12(a)(ii)	shape; order; names (even if order wrong);	(3)

Question Number	Answer	Mark
12(b)(i)	0.075;; allow one mark for 82 000 or 61.5 in working	(2)

Question Number	Answer	Mark
12(b)(ii)	energy lost / wasted / used; respiration / movement / heat / excretion / egestion / not digested / eq;; Ignore growth	(3)

Question Number	Answer	Mark
12(c)(i)	1999;	(1)

Question Number	Answer	Mark
12(c)(ii)	long chain few people / short chain more people; more energy (loss);	(2)