CAMBRIDGE IGCSE BIOLOGY · 0610

BIOLOGY



EXAM QUESTION PACK

TOPIC 19: ORGANISMS AND THEIR ENVIRONMENT

SCORE	PERCENTAGE
/	%

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Organisms and their environment – 2023 November IGCSE 0610

1. Nov/2023 /Paper_ 0610/11/No.36

Which process decreases the amount of carbon dioxide in the atmosphere?

A combustion

B decomposition

C photosynthesis

D respiration

2. Nov/2023 /Paper_ 0610/11/No.37

It is estimated that 90% of the energy which flows through living organisms in a food chain is lost between one trophic level and the next.

The producers in a food chain contain 1000 units of energy.

How many units will reach the quaternary consumers in the food chain?

A 0.1 units

B 1 unit

C 10 units

D 100 units

3. Nov/2023 /Paper_ 0610/13/No.28

What is an example of a population?

A all the animals and plants living in a lake

B all the different herbivores in a forest

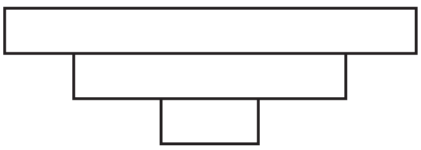
C all the mahogany trees growing in a forest

D all the species of animals in Africa

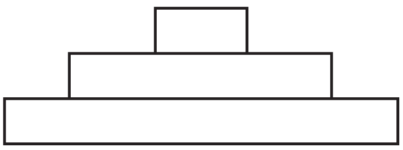
4. Nov/2023 /Paper_ 0610/13/No.36

The diagrams show pyramids of numbers and biomass.

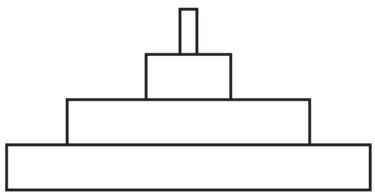
1



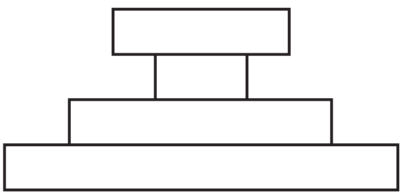
2



3



4



Which pyramids could be pyramids of biomass?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

5. Nov/2023 /Paper_ 0610/13/No.37

Which process transfers energy between the first and second trophic levels of a food chain?

A egestion

B ingestion

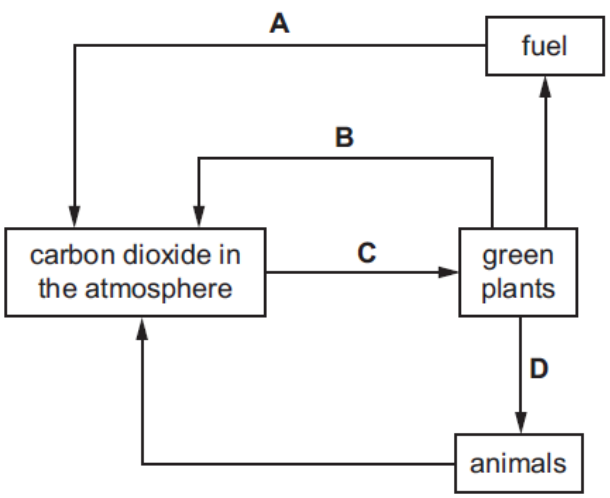
C photosynthesis

D respiration

6. Nov/2023 /Paper_ 0610/13/No.38

The diagram shows part of the carbon cycle.

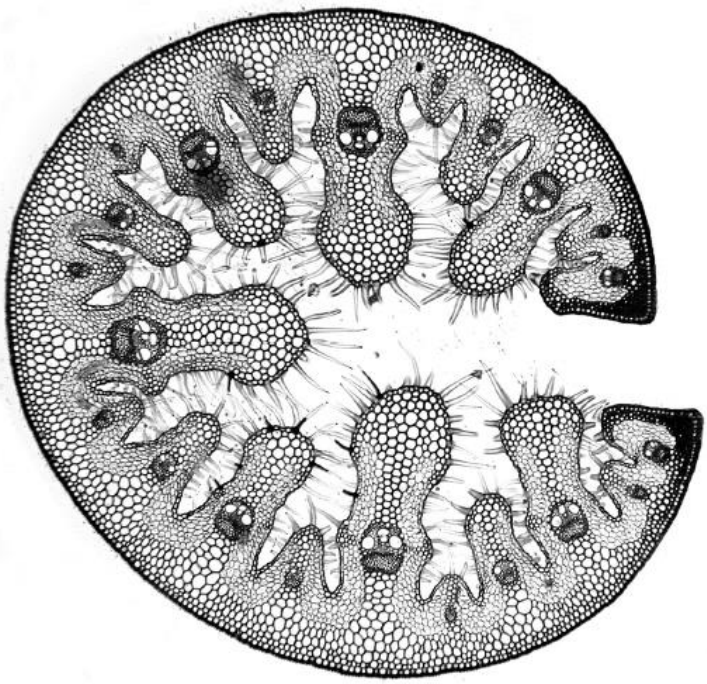
Which arrow represents respiration?



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7. Nov/2023 /Paper_ 0610/21/No.33

The photomicrograph shows a cross-section through a marram grass leaf.



Which feature is an adaptation of a xerophyte?

A the presence of chloroplasts

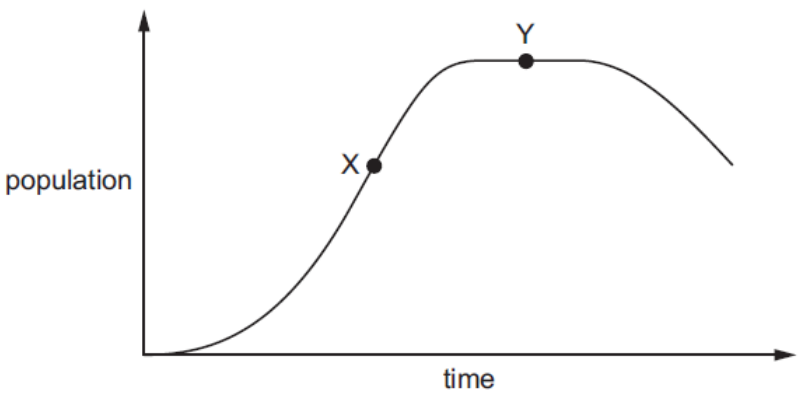
B the presence of fine hairs

C the presence of phloem tissue

D the presence of xylem vessels

8. Nov/2023 /Paper_ 0610/21/No.35

The graph shows the growth of a population of rabbits in one area.



Which statements are correct?

1 At X, the birth rate is higher than the death rate.

2 At X, there are no deaths and the population is limited by a lack of food.

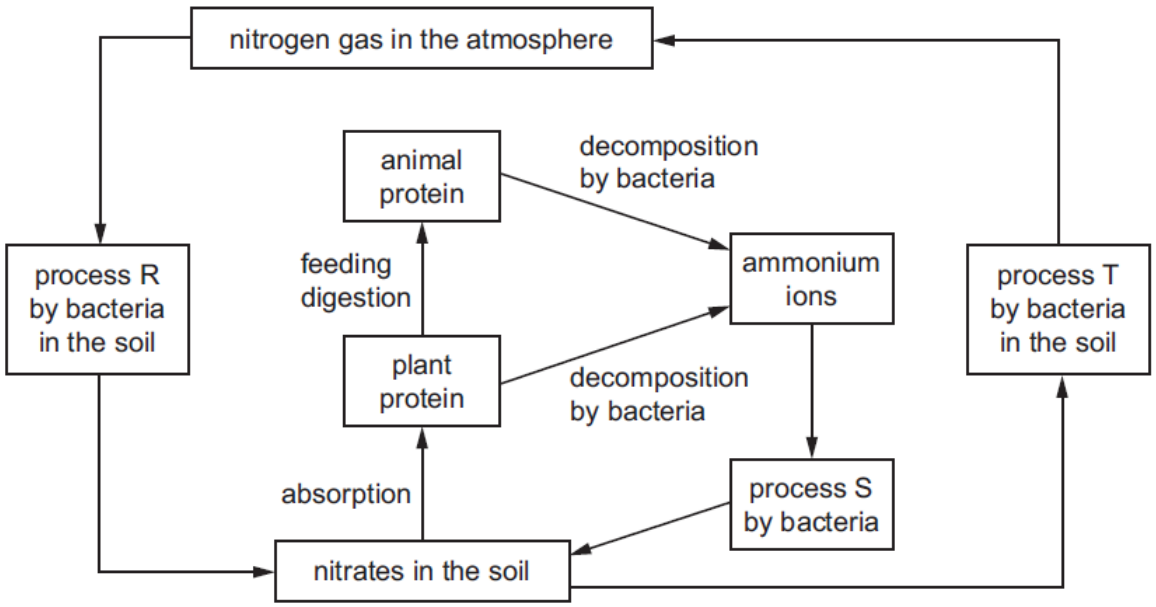
3 At Y, the birth rate and death rate are equal.

A 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 only

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9. Nov/2023 /Paper_ 0610/21/No.37

The diagram shows part of the nitrogen cycle.



Which row shows the correct processes for R, S and T?

	denitrification	nitrogen fixation	nitrification
A	R	S	T
B	T	S	R
C	T	R	S
D	S	R	T

10. Nov/2023 /Paper_ 0610/22/No.35

Which row shows features of xerophytes that reduce water loss?

	green colour from chlorophyll	leaves reduced to spines	presence of stomata	thick cuticle
A	✓	✗	✓	✗
B	✓	✓	✗	✗
C	✗	✓	✗	✓
D	✗	✗	✓	✓

key

✓ = reduces water loss

✗ = does **not** reduce water loss

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11. Nov/2023 /Paper_ 0610/22/No.36

The diagram shows a food chain.

tree → insect → blue tit → hawk

Which statement about a pyramid based on this food chain is correct?

A Drawn as a pyramid of biomass, the hawk would have the largest bar size.

B Drawn as a pyramid of energy, the tree would have the largest bar size.

C Drawn as a pyramid of energy, the tree would have the smallest bar size.

D Drawn as a pyramid of numbers, the hawk would have the largest bar size.

12. Nov/2023 /Paper_ 0610/22/No.37

During the nitrogen cycle, which process releases nitrogen gas into the air?

A decomposition

B denitrification

C nitrification

D nitrogen fixation

13. Nov/2023 /Paper_ 0610/23/No.36

In which process in the nitrogen cycle do microorganisms take nitrogen from the air and convert it into nitrogen compounds?

A decomposition

B denitrification

C nitrification

D nitrogen fixation

14. Nov/2023 /Paper_ 0610/31/No.6

(a) The boxes on the left show two terms.

The boxes on the right show the descriptions of some terms.

Draw **one** line to link each term to its description.

Draw **two** lines.

term	description
	a group of organisms that can reproduce to produce fertile offspring
	all of the populations of different species in an ecosystem
community	
	an organism that gets its energy by feeding on other organisms
	a group of organisms of one species, living in the same area, at the same time
population	
	the position of an organism in a food chain, food web or ecological pyramid
	a unit containing the different species of organisms and their environment, interacting together

[2]

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(b) The growth of bacteria in a flask containing nutrients was monitored for six hours.

The number of **live** bacteria per cm^3 was estimated every 30 minutes.

Fig. 6.1 shows the results.

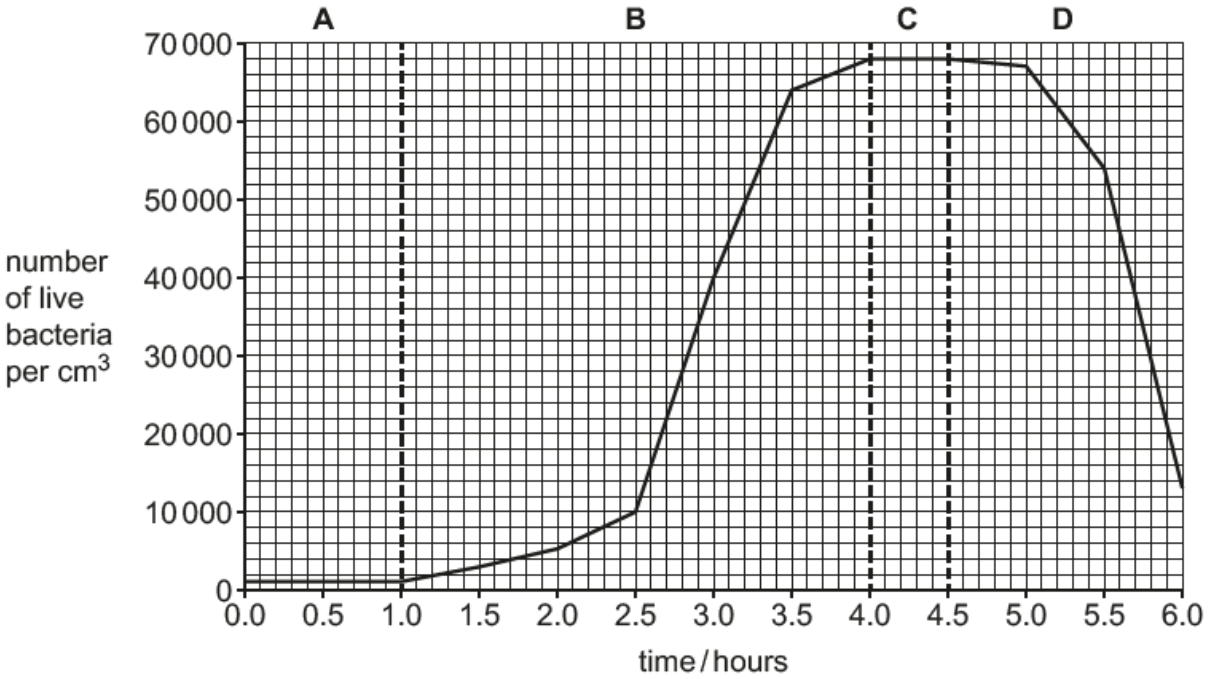


Fig. 6.1

(i) The data in the graph has been divided into four phases: **A**, **B**, **C** and **D**.

The list shows the names of the four phases.

death **exponential** **lag** **stationary**

Use the words from the list to identify phases **A**, **B**, **C** and **D** shown in Fig. 6.1.

A .....

B .....

C .....

D .....

[2]

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(ii) Complete the sentences using the data shown in Fig. 6.1 and your knowledge.

The number of live bacteria in phase **A** remained at .....

per cm^3.

In phase **B** the number of live bacteria doubled between 2.0 hours and

..... hours.

The maximum number of live bacteria occurred in phase ..... .

In phase ..... the number of live bacteria decreased because

the bacteria did not have enough ..... .

[5]

[Total: 9]

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(a) Fig. 4.1 shows a marine food web.

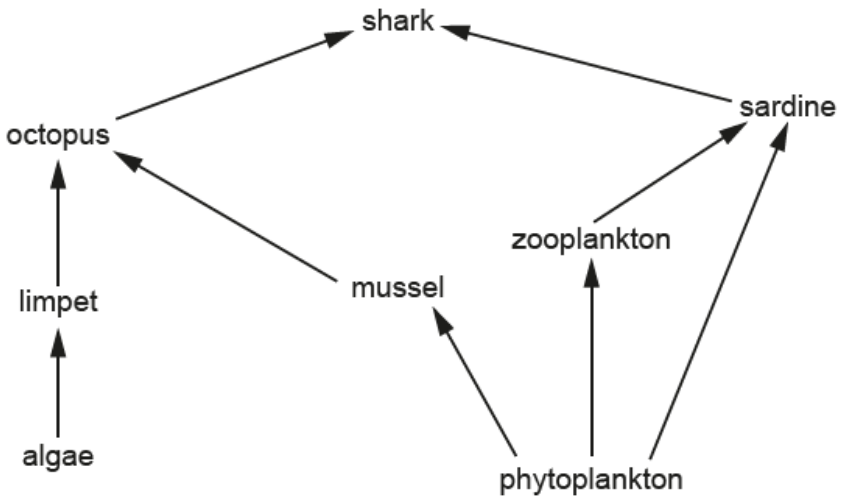


Fig. 4.1

(i) Place ticks (✓) in the boxes to show the correct descriptions for the organisms shown in Fig. 4.1.

organism	carnivore	herbivore	producer	tertiary consumer
algae				
zooplankton				
shark				

[3]

(ii) Construct **one** food chain from Fig. 4.1 that contains **four** organisms including the **octopus**.

..... [2]

(iii) Identify **one** organism in Fig. 4.1 that feeds at the second **and** third trophic levels.

..... [1]

(b) State the name of the type of organism that gets its energy from dead organic material.

..... [1]

(c) State the principal source of energy in most biological systems.

..... [1]

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(d) Outline ways humans can directly impact food webs.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

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16. Nov/2023 /Paper_ 0610/33/No.8

Fig. 8.1 is a diagram showing part of the carbon cycle.

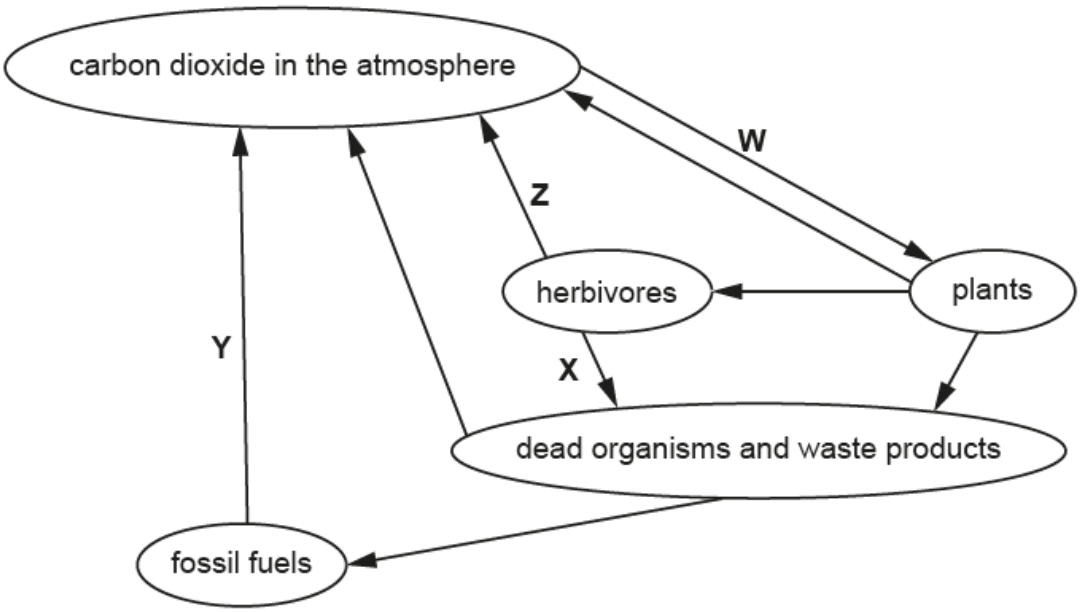


Fig. 8.1

(a) Identify the processes labelled **W**, **X**, **Y** and **Z** in Fig. 8.1.

W .....

X .....

Y .....

Z .....

[4]

(b) State the names of **two** biological molecules found in plants that contain carbon.

1 .....

2 .....

[2]

(c) An increase in the concentration of carbon dioxide in the atmosphere is causing the enhanced greenhouse effect.

State the name of **one** other greenhouse gas.

..... [1]

[Total: 7]

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17. Nov/2023 /Paper_ 0610/41/No.5

Fig. 5.1 shows the changes in the percentage of the total global fish stocks that are overfished and those that are sustainable.

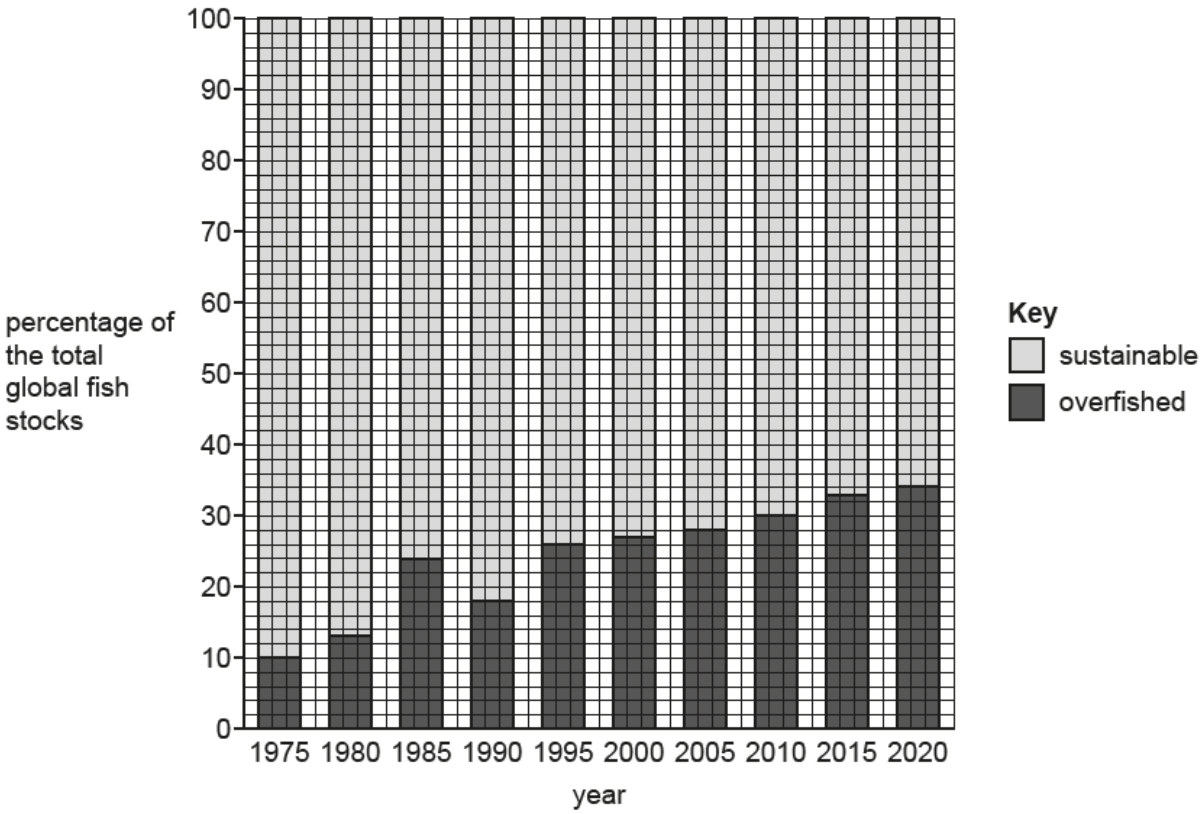


Fig. 5.1

(a) Use the information in Fig. 5.1 to:

(i) State the percentage of fish stocks that were sustainable in 2020.

..... % [1]

(ii) State which five-year period had the greatest increase in sustainable fish populations.

..... [1]

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(b) Overfishing is one reason why populations of fish decline.

Explain the risks to a species if its population size decreases.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Describe **and** explain how fish stocks can be managed sustainably and how overfishing can be prevented through conservation.

.....

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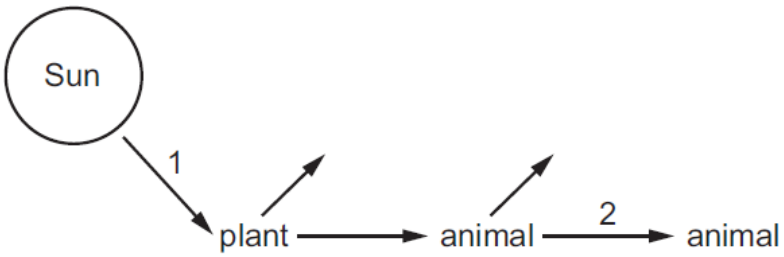
..... [6]

[Total: 11]

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1. June/2023/Paper_0610/11/No.36

The diagram shows energy flow from the Sun, through a food chain and into the environment.



What is the form of energy for each numbered arrow?

	stage 1	stage 2
A	heat	chemical
B	heat	kinetic
C	light	chemical
D	light	kinetic

2. June/2023/Paper_0610/11/No.37

In a pyramid of numbers, what does the top of the pyramid represent?

A carnivores

B decomposers

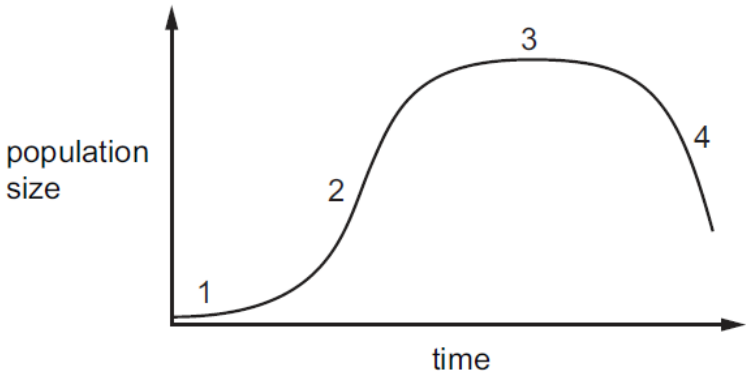
C herbivores

D Sun

3. June/2023/Paper_0610/11/No.38

A few yeast cells were placed in a container of nutrient solution.

The graph shows how their population size changed over time.



Which row shows when the reproduction rate was greater than the death rate for the numbered phases on the graph?

	reproduction rate greater than death rate			
	1	2	3	4
A	✓	✓	✓	✗
B	✓	✓	✗	✗
C	✓	✗	✗	✗
D	✗	✓	✓	✓

key

✓ = yes

✗ = no

4. June/2023/Paper_0610/12/No.36

Which term is used to describe an organism that makes its own organic nutrients?

A carnivore

B decomposer

C herbivore

D producer

5. June/2023/Paper_0610/12/No.37

What is the principal source of energy for most food chains?

A carbon dioxide gas

B glucose

C oxygen

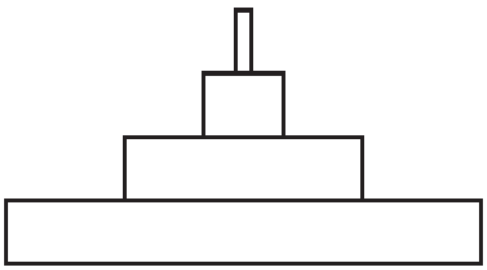
D sunlight

6. June/2023/Paper_0610/12/No.38

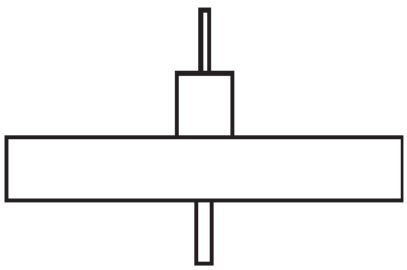
A single tree is food for a large population of caterpillars. Several small birds eat the caterpillars. The small birds are eaten by a bird of prey.

Which is the pyramid of biomass?

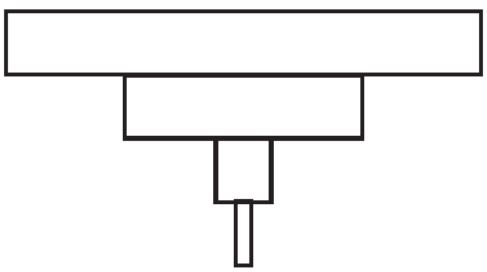
A



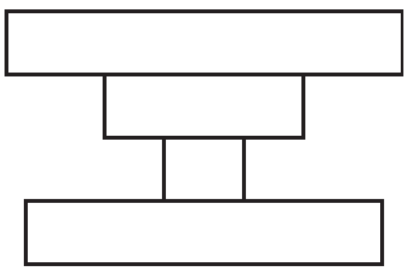
B



C



D



7. June/2023/Paper_0610/13/No.36

Where does the energy being transferred along a food chain originally come from?

A producer

B photosynthesis

C carbon dioxide

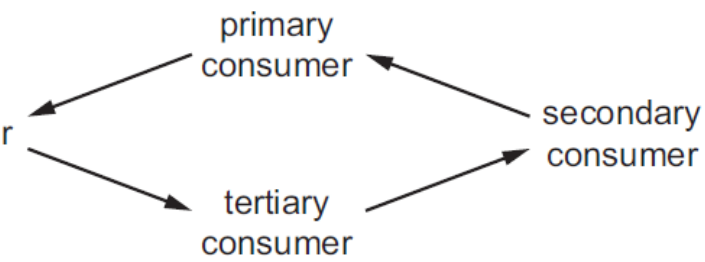
D the Sun

8. June/2023/Paper_0610/13/No.37

Which diagram shows energy passing along a food chain?

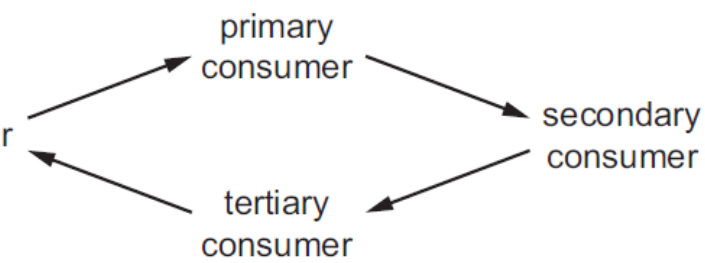
A producer → primary consumer → secondary consumer → tertiary consumer

B



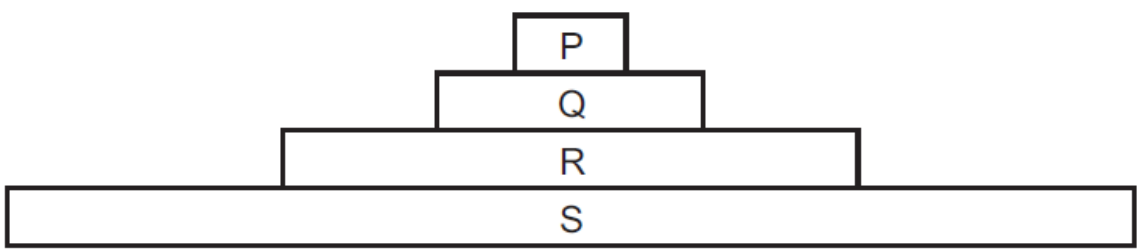
C producer ← primary consumer ← secondary consumer ← tertiary consumer

D



9. June/2023/Paper_0610/13/No.38

The diagram shows a pyramid of biomass for all the organisms in an ecosystem.



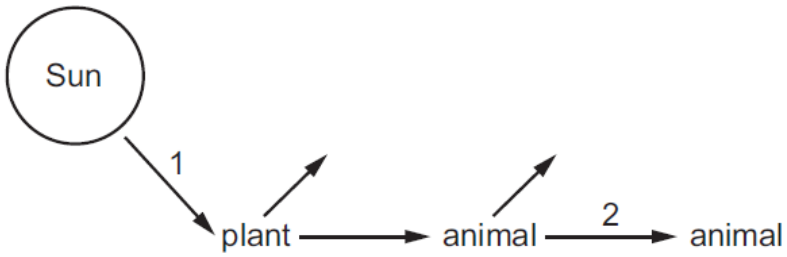
Which organisms are carnivores?

A P and Q **B** P and R **C** Q and R **D** R and S

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10. June/2023/Paper_0610/21/No.35

The diagram shows energy flow from the Sun, through a food chain and into the environment.



What is the form of energy for each numbered arrow?

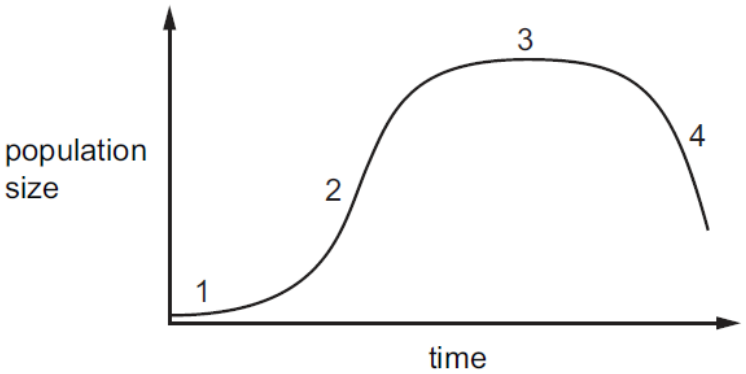
	stage 1	stage 2
A	heat	chemical
B	heat	kinetic
C	light	chemical
D	light	kinetic

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11. June/2023/Paper_0610/21/No.36

A few yeast cells were placed in a container of nutrient solution.

The graph shows how their population size changed over time.



Which row shows when the reproduction rate was greater than the death rate for the numbered phases on the graph?

	reproduction rate greater than death rate			
	1	2	3	4
A	✓	✓	✓	✗
B	✓	✓	✗	✗
C	✓	✗	✗	✗
D	✗	✓	✓	✓

key

✓ = yes

✗ = no

12. June/2023/Paper_0610/22/No.35

Which term is used to describe an organism that makes its own organic nutrients?

A carnivore

B decomposer

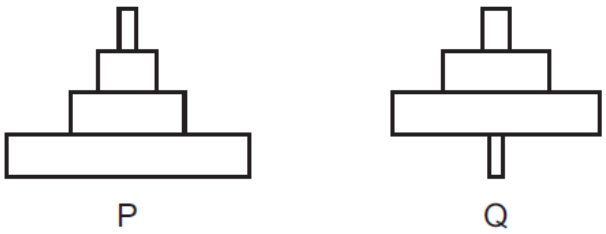
C herbivore

D producer

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13. June/2023/Paper_0610/22/No.36

The diagram shows two pyramids based on food chains in which the producer is a large tree.



P Q

What do the two pyramids represent?

	P	Q
A	biomass	biomass
B	biomass	numbers
C	numbers	biomass
D	numbers	numbers

14. June/2023/Paper_0610/23/No.35

Where does the energy being transferred along a food chain originally come from?

A producer

B photosynthesis

C carbon dioxide

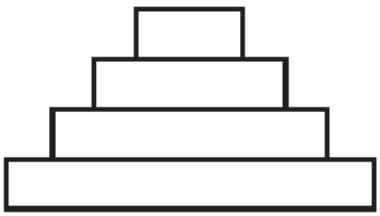
D the Sun

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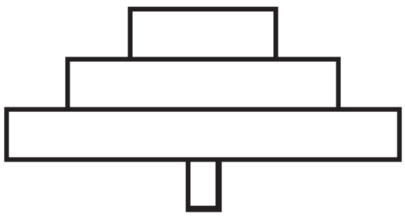
15. June/2023/Paper_0610/23/No.36

Which diagram shows a pyramid of biomass for a forest?

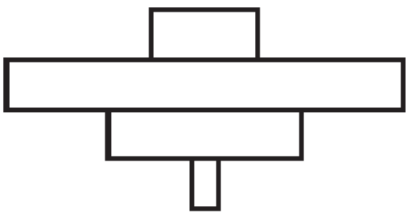
A



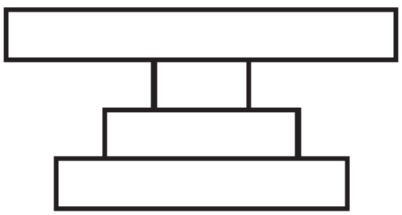
B



C



D



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(a) Write the food chain for the pyramid of numbers shown in Fig. 5.1.

..... [2]

(b) Identify the number of trophic levels in Fig. 5.1.

..... [1]

(c) The words in the list can be used to describe the organisms shown in Fig. 5.1.

carnivore **consumer** **decomposer** **herbivore** **producer**

Choose words from the list to describe the:

banana plant .....

tree frog ..... and ..... .

[3]

(d) State **one** advantage of using a pyramid of biomass rather than a pyramid of numbers.

.....

.....

..... [1]

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(e) Describe how plants synthesise carbohydrates.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

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17. June/2023/Paper_0610/33/No.8

(a) State **one** source of methane gas.

..... [1]

(b) Fig. 8.1 is a graph showing the estimated change in methane concentration in the atmosphere over a thousand-year period.

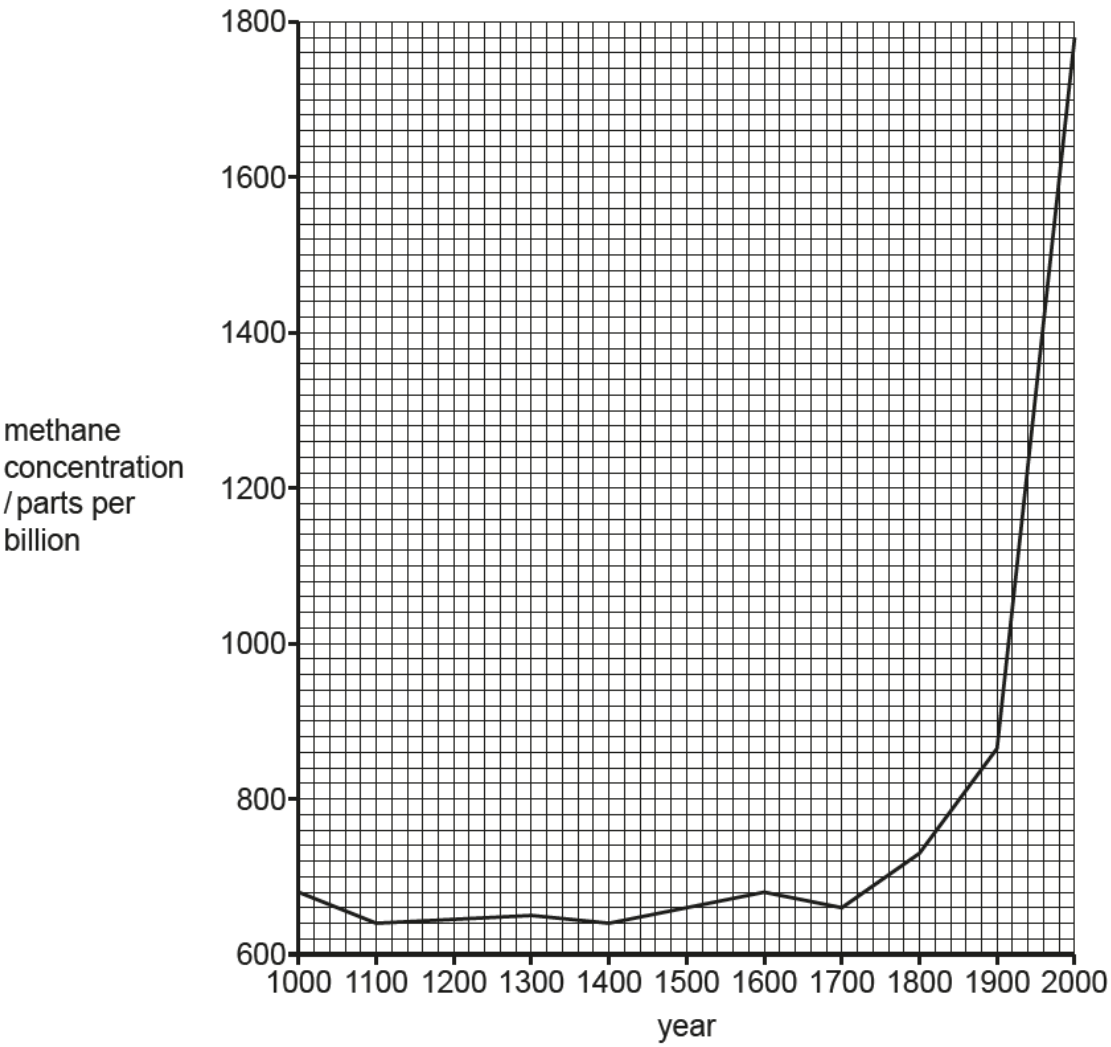


Fig. 8.1

Complete the sentences to describe the changes in methane concentration shown in Fig. 8.1.

The general trend is for methane concentration to ..... .

The concentration of methane was the same in the year 1000 and in the year ..... .

Over the thousand-year period shown in the graph, the concentration of methane has increased by ..... parts per billion.

[3]

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(c) **(i)** State **one** process, other than respiration, that releases carbon dioxide into the atmosphere.

..... [1]

(ii) State **two** effects on the environment of increasing carbon dioxide and methane concentrations in the atmosphere.

1 .....

2 .....

[2]

(iii) State **one** natural process that removes carbon dioxide from the atmosphere.

..... [1]

(d) Yeast can be used to produce ethanol for use as a biofuel.

(i) State the name of the process used by yeast to produce ethanol.

..... [1]

(ii) Large amounts of ethanol are required as a biofuel.

Maize is a food plant that is also used to produce ethanol as a biofuel.

Maize grown for ethanol production is grown in large-scale monocultures.

Describe the **disadvantages** of growing crop plants such as maize in a large-scale monoculture.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 12]

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18. June/2023/Paper_0610/42/No.4

(a) A student recorded the information about an aquatic habitat.

Fig. 4.1 shows the student's notes.

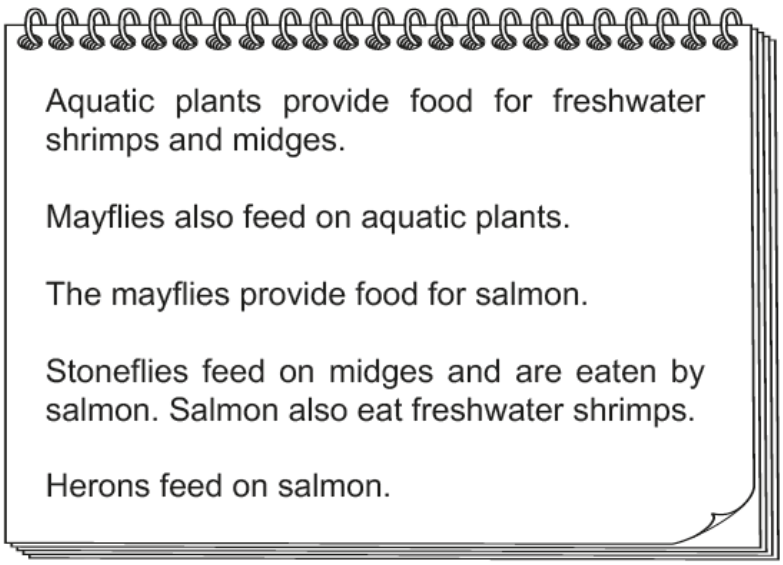


Fig. 4.1

(i) Construct a food web to show the feeding relationships described in Fig. 4.1.

Do **not** draw the organisms.

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(ii) Complete Table 4.1 using the information in Fig. 4.1 by identifying the names of the missing trophic levels and **one** organism at each different trophic level.

Table 4.1

name of the trophic level	organism in Fig. 4.1
producer	aquatic plants
primary consumer	
secondary consumer	

[3]

(iii) Outline how the energy in the primary consumers in this aquatic food web is used to produce biomass in the secondary consumers.

.....

.....

.....

.....

.....

.....

..... [3]

(iv) Humans also eat salmon.

Predict the impact on the feeding relationships shown in Fig. 4.1 of overharvesting of salmon.

.....

.....

.....

.....

.....

.....

..... [3]

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(b) Describe what is meant by the term decomposer.

.....

.....

..... [1]

(c) Animals such as salmon can be farmed for meat.

Explain why it is more energy efficient for humans to eat crop plants than to eat livestock that have been fed on crop plants.

.....

.....

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.....

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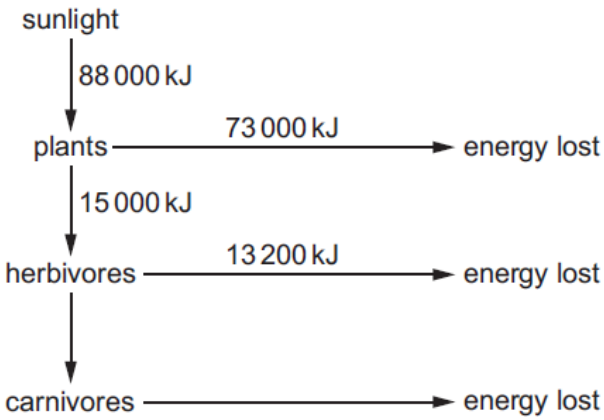
..... [4]

[Total: 18]

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19. March/2023/Paper_ 0610/12/No.36

The numbers in the diagram show the amount of energy transferred through part of an ecosystem.



How much energy is transferred from herbivores to carnivores?

A 15 000 kJ + 13 200 kJ

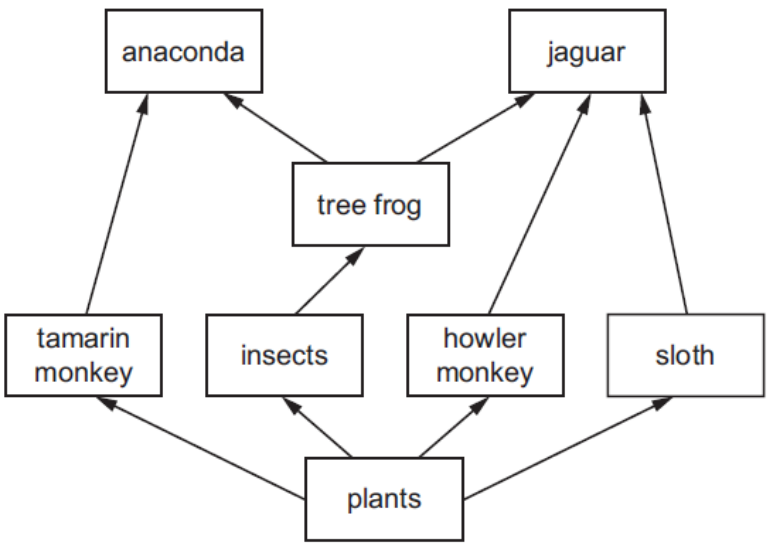
B 15 000 kJ – 13 200 kJ

C 88 000 kJ + 15 000 kJ

D 88 000 kJ – 15 000 kJ

20. March/2023/Paper_ 0610/12/No.37

The diagram shows a food web in a rainforest.



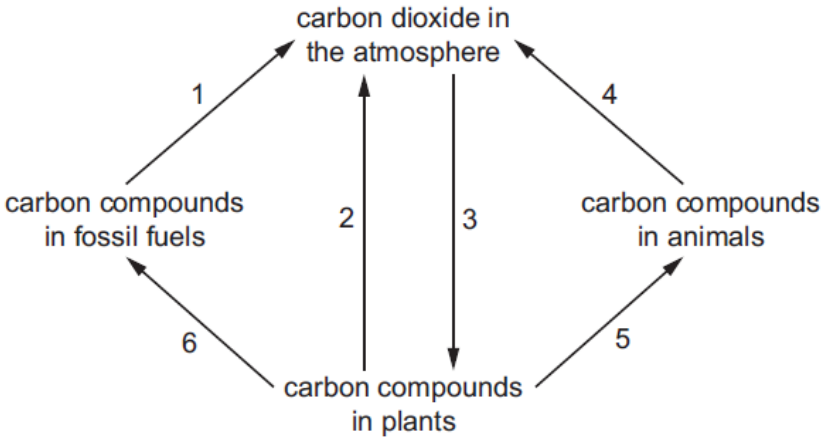
How many trophic levels are shown in this food web?

A 1 **B** 3 **C** 4 **D** 8

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21. March/2023/Paper_ 0610/12/No.38

The diagram shows the carbon cycle.



Which labelled processes represent respiration?

A 1 and 4 **B** 1 and 5 **C** 2 and 4 **D** 3 and 6

22. March/2023/Paper_ 0610/22/No.33

Which feature is found in a hydrophytic plant?

A Leaves are curled with stomata on the inside.

B Leaves are reduced to spines.

C Stomata are sunk in pits in the epidermis.

D There is no waxy cuticle.

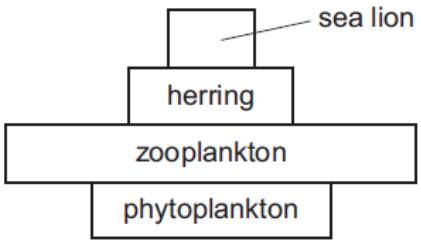
23. March/2023/Paper_ 0610/22/No.35

The diagram shows a food chain.

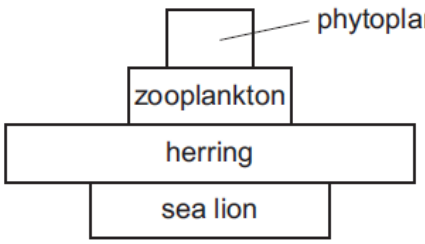
phytoplankton → zooplankton → herring → sea lion

Which diagram shows a pyramid of energy for this food chain?

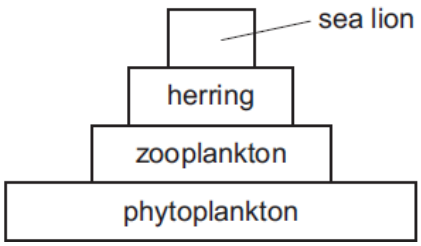
A



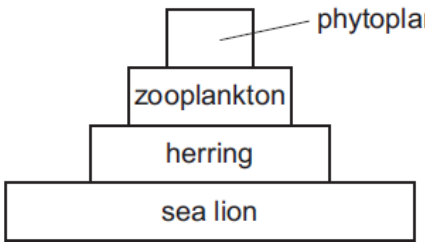
B



C

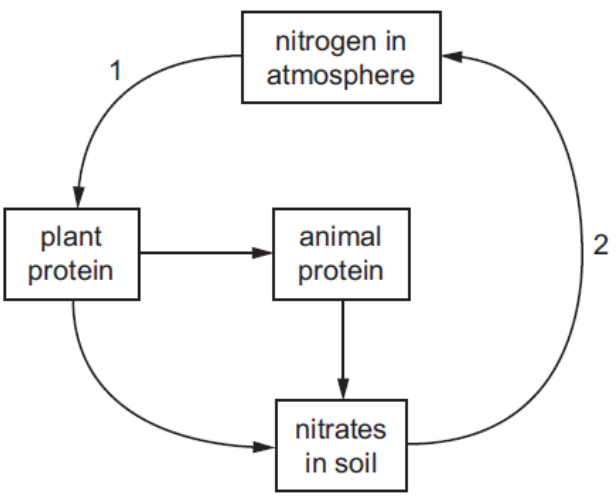


D



24. March/2023/Paper_ 0610/22/No.36

In the nitrogen cycle, what are processes 1 and 2?



	process 1	process 2
A	decomposition	nitrification
B	denitrification	nitrogen fixation
C	nitrification	evaporation
D	nitrogen fixation	denitrification

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25. March/2023/Paper_ 0610/32/No.6

Fig. 6.1 is a diagram representing part of the carbon cycle.

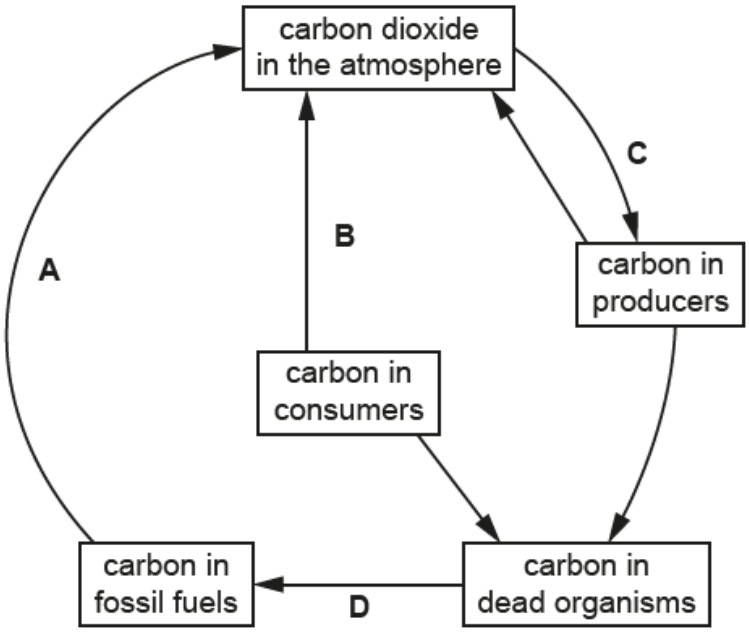


Fig. 6.1

(a) Using the information in Fig. 6.1, identify the number of processes that remove carbon dioxide from the atmosphere.

..... [1]

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(b) The boxes on the left show letters representing processes in Fig. 6.1.

The boxes on the right show the names of some processes.

Draw lines to link each letter to the correct process.

Draw **four** lines.

letter in Fig. 6.1	**process**
	combustion
A	
	decomposition
B	
	formation of fossil fuel
C	
	photosynthesis
D	
	respiration

[4]

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(c) Energy is transferred through feeding in food webs.

(i) Draw an arrow **on Fig. 6.1** to represent the process of herbivores feeding. [1]

(ii) State the principal source of energy in most food webs.

..... [1]

(d) Explain why fossil fuels **cannot** be described as a sustainable resource.

.....

.....

.....

.....

.....

[2]

(e) Deforestation can cause an increase in the carbon dioxide concentration in the atmosphere.

State **two other** undesirable effects of deforestation.

1 .....

2 .....

[2]

(f) Adding extra carbon dioxide to the atmosphere causes an enhanced greenhouse effect.

(i) State the usual concentration of carbon dioxide in the atmosphere.

..... % [1]

(ii) State **one other** pollutant that causes an enhanced greenhouse effect.

..... [1]

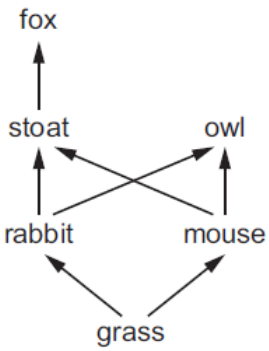
[Total: 13]

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Organisms and their environment – 2022 November IGCSE 0610 Biology

1. Nov/2022/Paper_11/No.37

The diagram shows a woodland food web.



Which organisms are secondary consumers?

A fox and owl

B fox and stoat

C mouse and rabbit

D owl and stoat

2. Nov/2022/Paper_11/No.38

Which statement describes a population?

A all the three-spined stickleback fish living in a lake

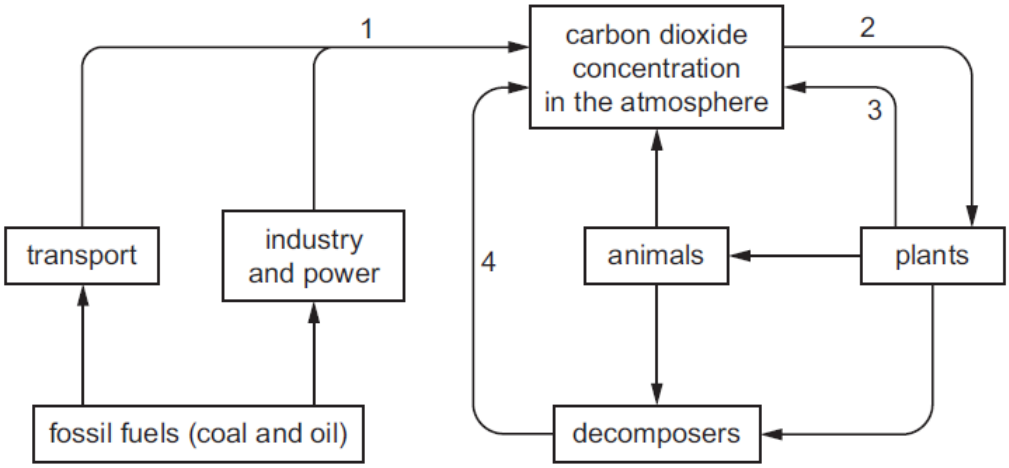
B all the organisms living in a lake

C all the fish living in a lake

D all the three-spined stickleback fish that have ever lived in a lake

3. Nov/2022/Paper_12/No.36

The diagram shows part of the carbon cycle.



Which processes reduce or increase carbon dioxide concentration in the atmosphere?

	reduces	increases
A	1	4
B	2	3
C	3	2
D	4	1

4. Nov/2022/Paper_12/No.37

The diagram shows a food chain.

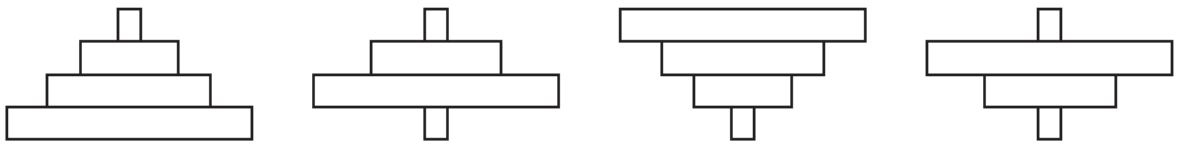
rose bush → aphids → ladybirds → spiders

A disease reduced the number of ladybirds.

What would be the likely effect of this on the numbers of aphids and spiders?

	aphids	spiders
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

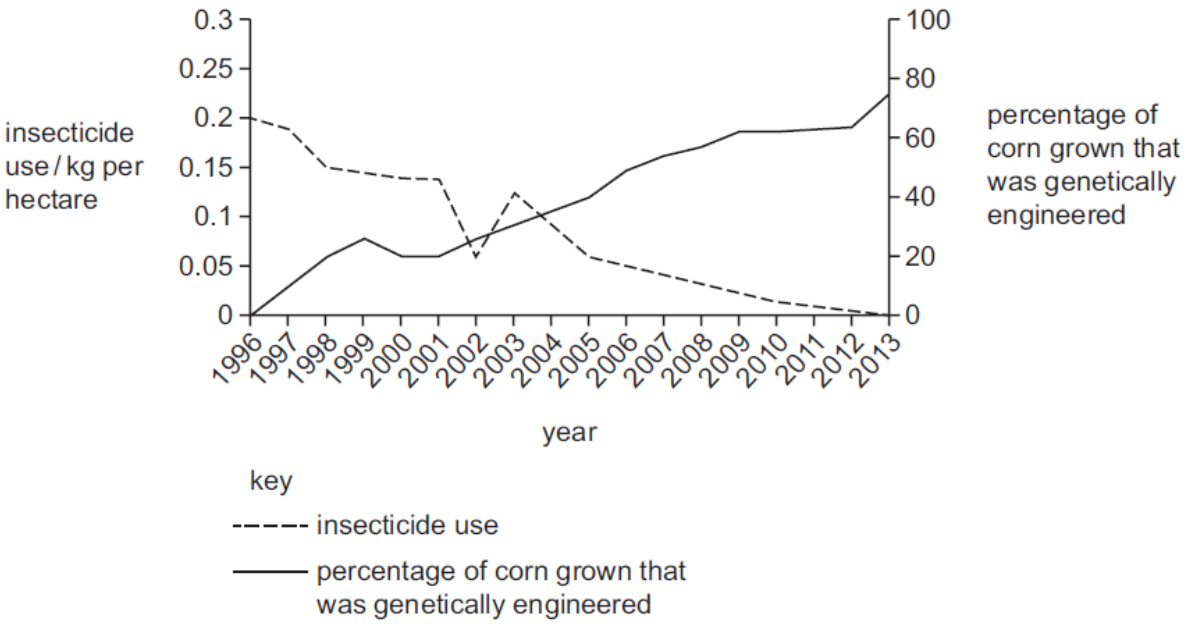
5.



6. Nov/2022/Paper_12/No.39

Corn that has been genetically engineered to be resistant to pests was developed in the 1990s.

The graph shows the change in the percentage of corn grown that was genetically engineered and the change in the mass of chemical insecticides used.



Which statement describes the data shown in the graph between 1996 and 2013?

A The percentage of corn grown that was genetically engineered increased and the use of insecticides decreased.

B The percentage of corn grown that was genetically engineered increased and the use of insecticides increased.

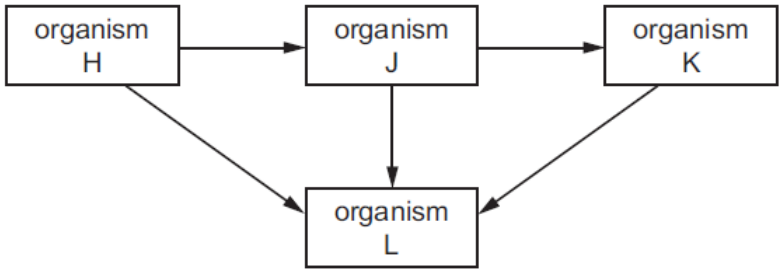
C The percentage of corn grown that was genetically engineered decreased and the use of insecticides decreased.

D The percentage of corn grown that was genetically engineered decreased and the use of insecticides increased.

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7. Nov/2022/Paper_13/No.36

Letters H, J, K and L show the organisms that make up a simple food web.

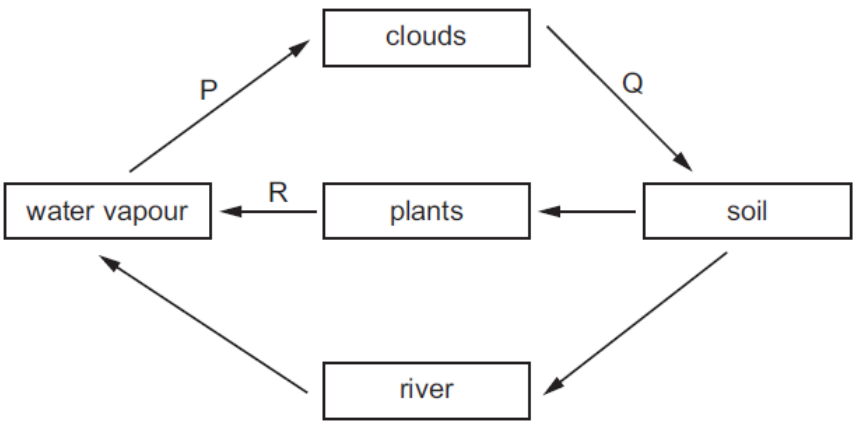


Which row identifies the types of organism shown in the food web?

	carnivore	decomposer	producer
A	H	L	K
B	J	K	H
C	K	L	H
D	L	J	K

8. Nov/2022/Paper_13/No.37

The diagram shows part of the water cycle.



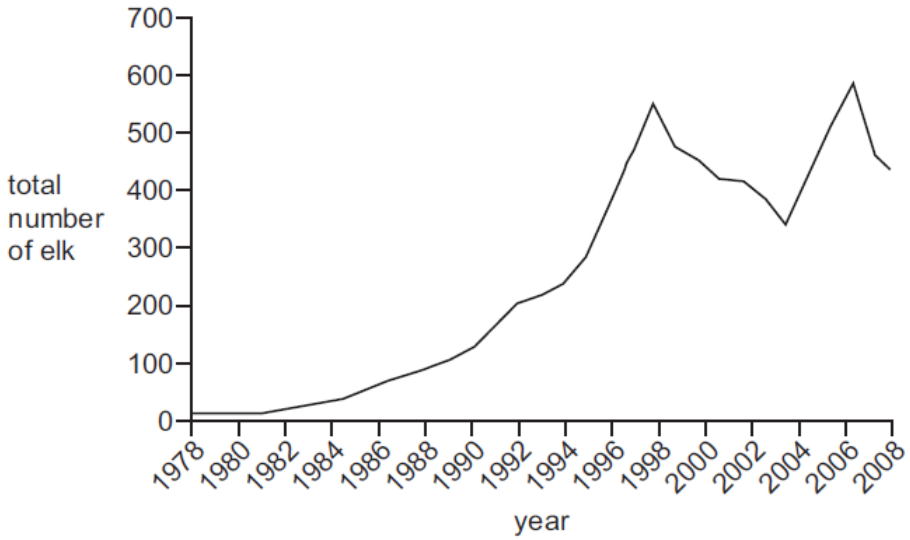
Which row identifies the different parts of the water cycle?

	P	Q	R
A	condensation	transpiration	precipitation
B	condensation	precipitation	transpiration
C	evaporation	transpiration	precipitation
D	evaporation	precipitation	transpiration

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9. Nov/2022/Paper_13/No.38

Elk are mammals and they are herbivores. The graph shows the total number of elk in a national park between 1978 and 2008.



What is a possible explanation for the change in the elk population between 1978 and 1992?

A decrease in disease

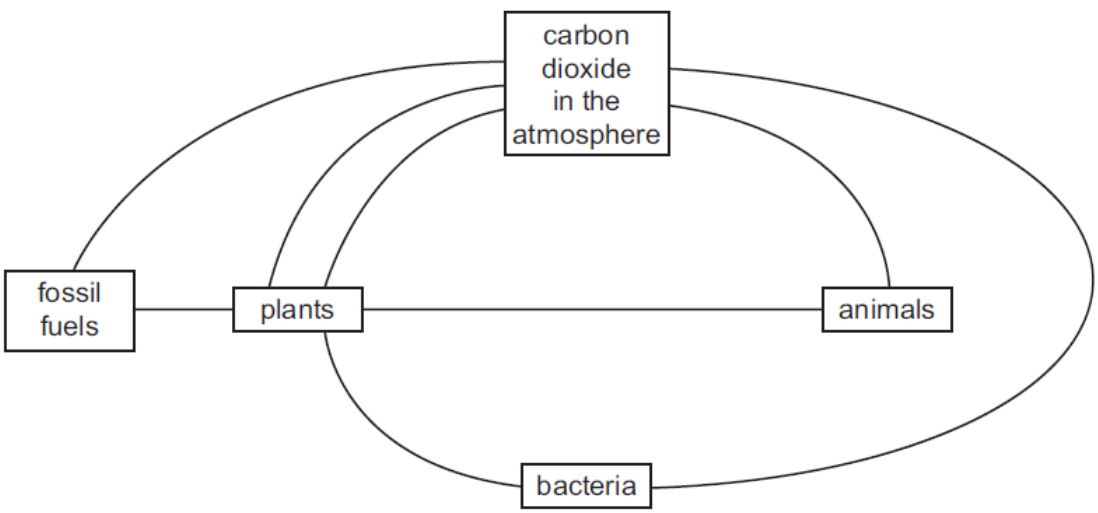
B decrease in food source

C increase in hunting

D increase in predation

10. Nov/2022/Paper_13/No.39

The diagram shows part of the carbon cycle. The arrowheads are missing from the diagram so the direction of movement of carbon is not shown.



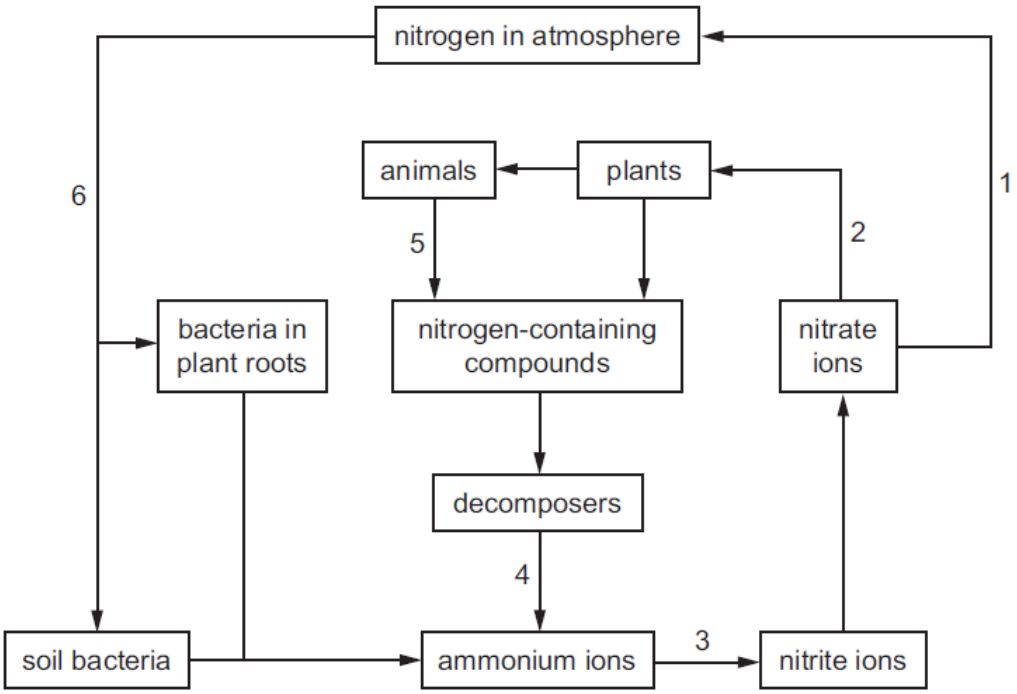
How many arrows should point **towards** the box labelled carbon dioxide in the atmosphere?

A 1 **B** 2 **C** 4 **D** 5

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11. Nov/2022/Paper_21/No.36

The diagram shows part of the nitrogen cycle.



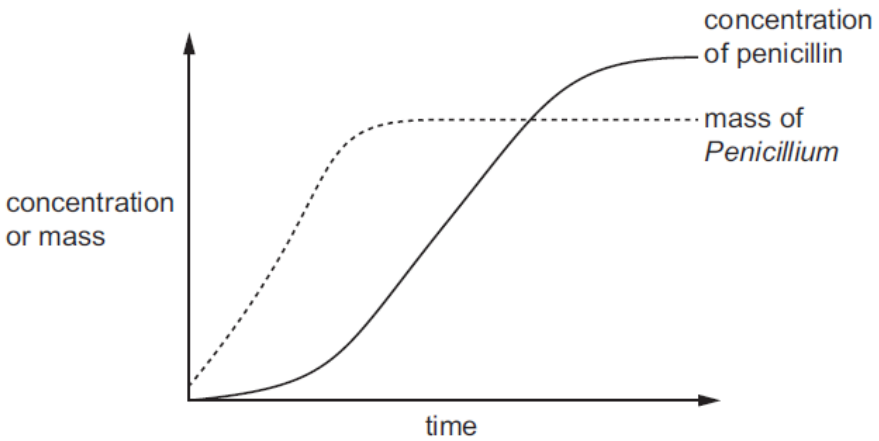
Which row shows the correct labels?

	denitrification	absorption	nitrification	nitrogen fixation
A	3	2	4	6
B	3	5	4	1
C	1	2	3	6
D	1	5	3	4

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12. Nov/2022/Paper_21/No.38

The graph shows the growth of the fungus *Penicillium* and its production of the antibiotic penicillin in a fermenter.



Which stage of the *Penicillium* growth curve produces the highest concentration of penicillin?

A lag phase

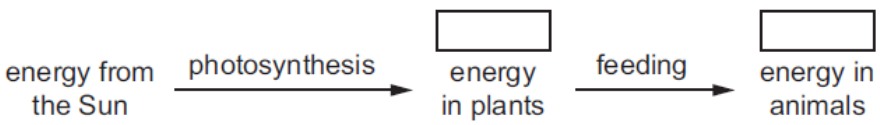
B exponential phase

C stationary phase

D death phase

13. Nov/2022/Paper_22/No.35

The diagram shows the flow of energy through living organisms.



Which term should be placed in both boxes to complete the diagram?

A chemical

B heat

C kinetic

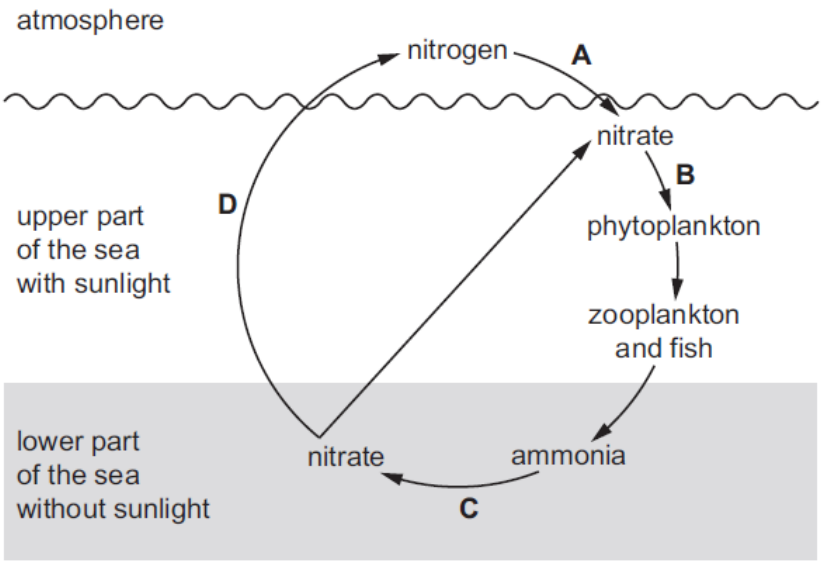
D light

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14. Nov/2022/Paper_22/No.36

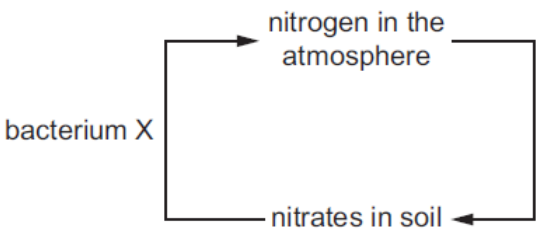
The diagram shows the nitrogen cycle in the ocean.

Which stage represents nitrification?



15. Nov/2022/Paper_23/No.35

The diagram shows part of the nitrogen cycle.



Which process in the cycle is performed by bacterium X?

A decomposition

B nitrification

C nitrogen fixation

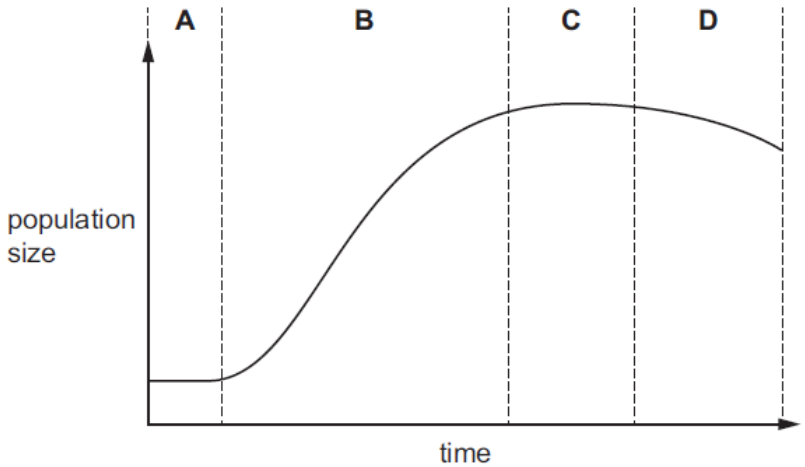
D denitrification

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16. Nov/2022/Paper_23/No.36

The graph shows changes in the population size of a microorganism growing in a fermenter.

What is the exponential phase?



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(a) The population of leatherback turtles in one part of the Pacific Ocean was monitored over several years.

The population numbers were estimated and the results are shown in Fig. 3.1.

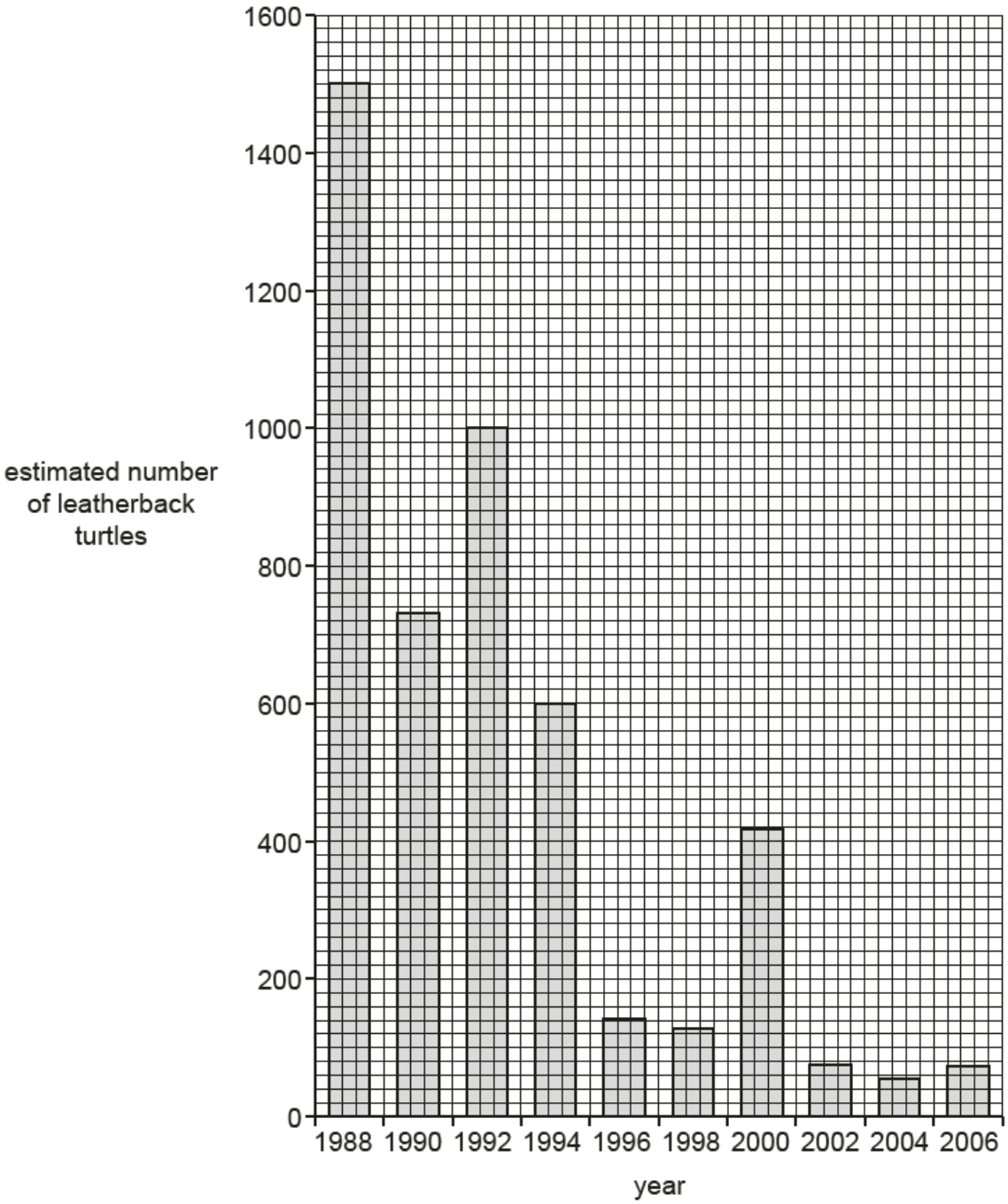


Fig. 3.1

(i) State the year with the lowest estimated number of leatherback turtles shown in Fig. 3.1.

..... [1]

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(ii) Using the information in Fig. 3.1, calculate the percentage decrease in the number of turtles between 1988 and 1994.

Space for working.

..... %
[2]

(b) One reason for the decrease in population numbers of leatherback turtles is pollution by discarded rubbish such as plastics.

State **two** ways in which the amount of plastic pollution can be reduced.

1 .....

.....

2 .....

.....
[2]

(c) Suggest other factors, apart from pollution, that can lead to a decrease in the population of leatherback turtles.

.....

.....

.....

.....

.....

.....

..... [3]

(d) Plastic is a non-sustainable resource that is made from fossil fuels.

Complete the sentence to define a sustainable resource.

A sustainable resource is one which is ..... as rapidly as it is removed from the environment so that it does not ..... .

[2]

[Total: 10]

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18. Nov/2022/Paper_42/No.5

Fig. 5.1 shows Mackinlay's cuckoo-dove, *Macropygia mackinlayi*, which is found on most of the islands in the south-west of the Pacific Ocean.



Fig. 5.1

(a) Karkar Island is one island where Mackinlay's cuckoo-dove is found. This species is part of many communities that are adapted to the different habitats on the island.

(i) Define the term community.

.....

.....

..... [1]

(ii) Complete the passage with the most appropriate word or phrase.

Adaptation is sometimes defined as the process resulting from .....

....., by which populations become more suited to their

..... over many generations.

[2]

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(b) The highest point on Karkar Island is 1800 m above sea level.

In 1969, a researcher surveyed the bird species on Karkar Island. He recorded the vertical distribution of the birds between sea level and 1600 m.

In 2013, other researchers repeated the survey.

Fig. 5.2 shows the ranges of four species, as recorded in the two surveys. The vertical lines represent the range of heights where the birds were seen on the island.

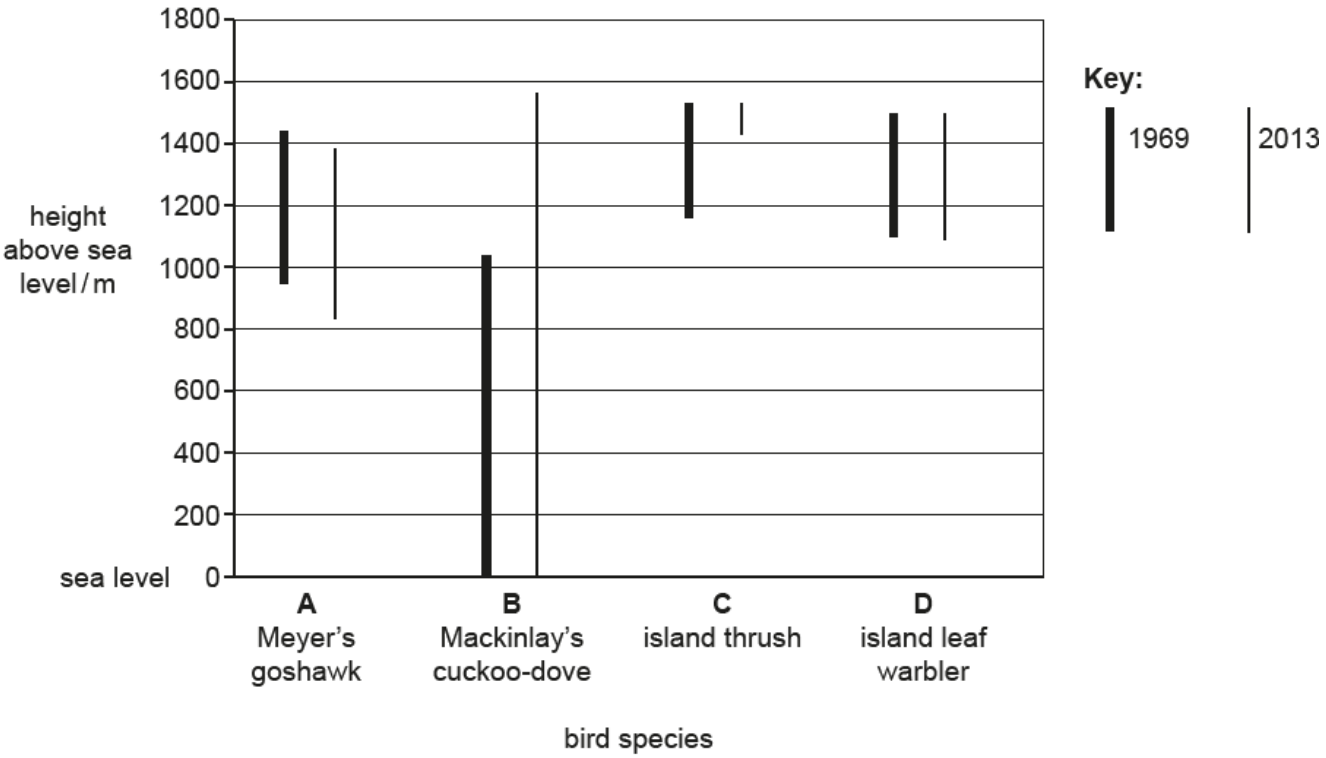


Fig. 5.2

(i) Compare the range in 1969 with the range in 2013 for each of the bird species shown in Fig. 5.2.

A .....

.....

B .....

.....

C .....

.....

D .....

.....

[4]

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(ii) Using the information in Fig. 5.2, suggest reasons for the change in the range of the island thrush (**C**) on Karkar Island.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Small oceanic islands are often inhabited by species of birds that are found nowhere else. Many of these species have decreasing populations and are often endangered.

Explain the risks to these species of birds that have decreasing populations.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 13]

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Organisms and their environment – 2022 June IGCSE 0610

1. June/2022/Paper_ 11/No.36

Which process uses the principal source of energy input to biological systems?

A ingestion

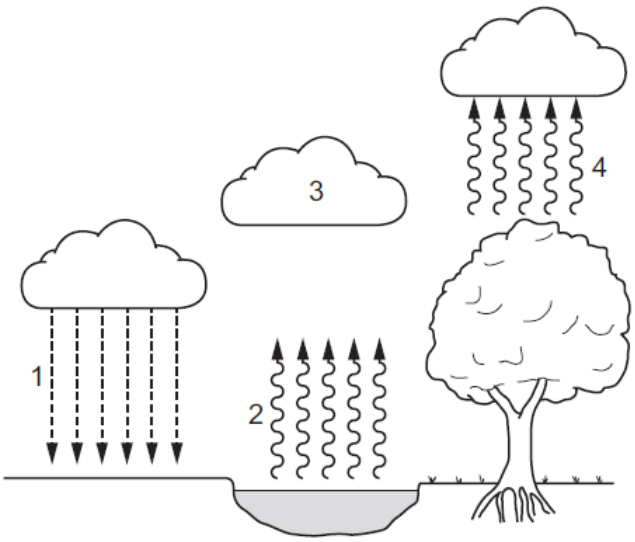
B decomposition

C photosynthesis

D respiration

2. June/2022/Paper_ 11/No.37

The diagram shows the water cycle. Four different processes are numbered.



Which row identifies the processes correctly?

	condensation	evaporation	precipitation	transpiration
A	1	4	3	2
B	2	1	4	3
C	3	2	1	4
D	4	3	2	1

3. June/2022/Paper_ 11/No.38

A herd of red deer live in a forest that contains snakes and a large variety of birds.

Which group of organisms is an example of a population?

A all the animals in the forest

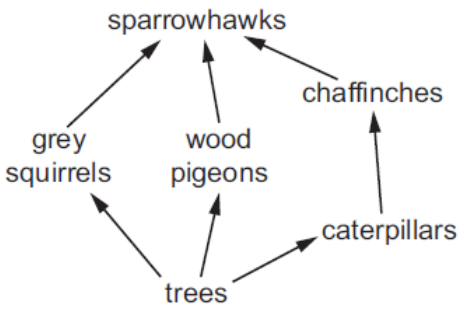
B all the red deer in the forest

C all the organisms in the forest

D all the plants in the forest

4. June/2022/Paper_ 11/No.40

The food web shows the feeding relationships in a woodland.



If all the chaffinches in the food web die, which effect would this have?

A The amount of damage to trees will increase.

B The food supply for grey squirrels will increase.

C The number of wood pigeons will increase.

D The population of caterpillars will decrease.

5. June/2022/Paper_ 12/No.36

Which process uses the principal source of energy input to biological systems?

A ingestion

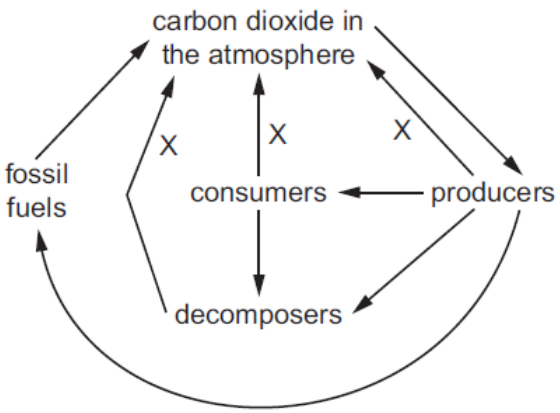
B decomposition

C photosynthesis

D respiration

6. June/2022/Paper_ 12/No.37

The diagram shows part of the carbon cycle.



Which process is shown by the arrows labelled X?

A combustion

B fossilisation

C photosynthesis

D respiration

7. June/2022/Paper_ 12/No.38

A herd of red deer live in a forest that contains snakes and a large variety of birds.

Which group of organisms is an example of a population?

A all the animals in the forest

B all the red deer in the forest

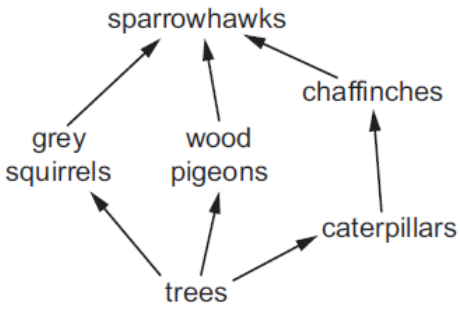
C all the organisms in the forest

D all the plants in the forest

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8. June/2022/Paper_ 12/No.40

The food web shows the feeding relationships in a woodland.



If all the chaffinches in the food web die, which effect would this have?

A The amount of damage to trees will increase.

B The food supply for grey squirrels will increase.

C The number of wood pigeons will increase.

D The population of caterpillars will decrease.

9. June/2022/Paper_ 13/No.36

Which process uses the principal source of energy input to biological systems?

A ingestion

B decomposition

C photosynthesis

D respiration

10. June/2022/Paper_ 13/No.37

What is the name of an organism that obtains its energy from dead organic material?

A carnivore

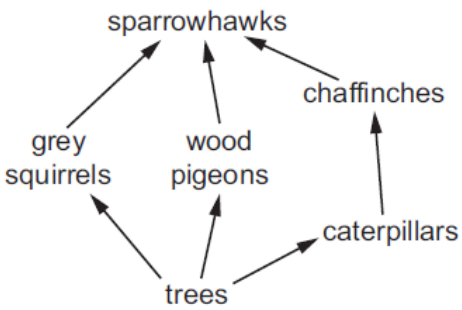
B consumer

C decomposer

D herbivore

11. June/2022/Paper_ 13/No.40

The food web shows the feeding relationships in a woodland.



If all the chaffinches in the food web die, which effect would this have?

A The amount of damage to trees will increase.

B The food supply for grey squirrels will increase.

C The number of wood pigeons will increase.

D The population of caterpillars will decrease.

12. June/2022/Paper_ 21/No.32

Which adaptation is shown in the leaves of hydrophytes?

A hairs present on the upper and lower surfaces

B contain large air spaces

C stomata present on the lower surface only

D thick cuticle present on the upper and lower surfaces

13. June/2022/Paper_ 21/No.36

A herd of red deer live in a forest that contains snakes and a large variety of birds.

Which group of organisms is an example of a population?

A all the animals in the forest

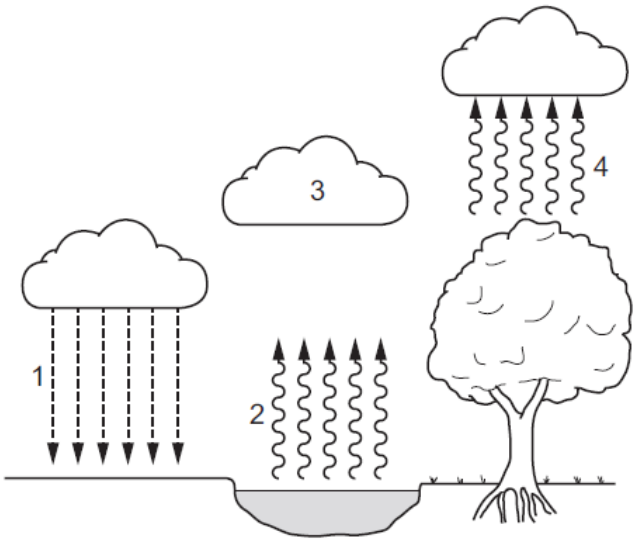
B all the red deer in the forest

C all the organisms in the forest

D all the plants in the forest

14. June/2022/Paper_ 21/No.35

The diagram shows the water cycle. Four different processes are numbered.

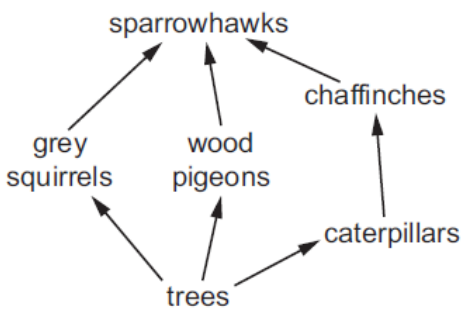


Which row identifies the processes correctly?

	condensation	evaporation	precipitation	transpiration
A	1	4	3	2
B	2	1	4	3
C	3	2	1	4
D	4	3	2	1

15. June/2022/Paper_ 21/No.40

The food web shows the feeding relationships in a woodland.



If all the chaffinches in the food web die, which effect would this have?

A The amount of damage to trees will increase.

B The food supply for grey squirrels will increase.

C The number of wood pigeons will increase.

D The population of caterpillars will decrease.

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16. June/2022/Paper_ 23/No.36

A herd of red deer live in a forest that contains snakes and a large variety of birds.

Which group of organisms is an example of a population?

A all the animals in the forest

B all the red deer in the forest

C all the organisms in the forest

D all the plants in the forest

17. June/2022/Paper_ 23/No.39

What is a reason for conserving plant species?

A to absorb oxygen from the air

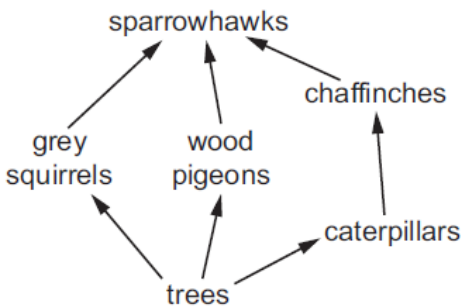
B to decrease rainfall

C to obtain drugs for medicinal use

D to release carbon dioxide into the air

18. June/2022/Paper_ 23/No.40

The food web shows the feeding relationships in a woodland.



If all the chaffinches in the food web die, which effect would this have?

A The amount of damage to trees will increase.

B The food supply for grey squirrels will increase.

C The number of wood pigeons will increase.

D The population of caterpillars will decrease.

19. June/2022/Paper_ 31/No.8(a_ c)

(a) Fig. 8.1 is a diagram showing part of the carbon cycle.

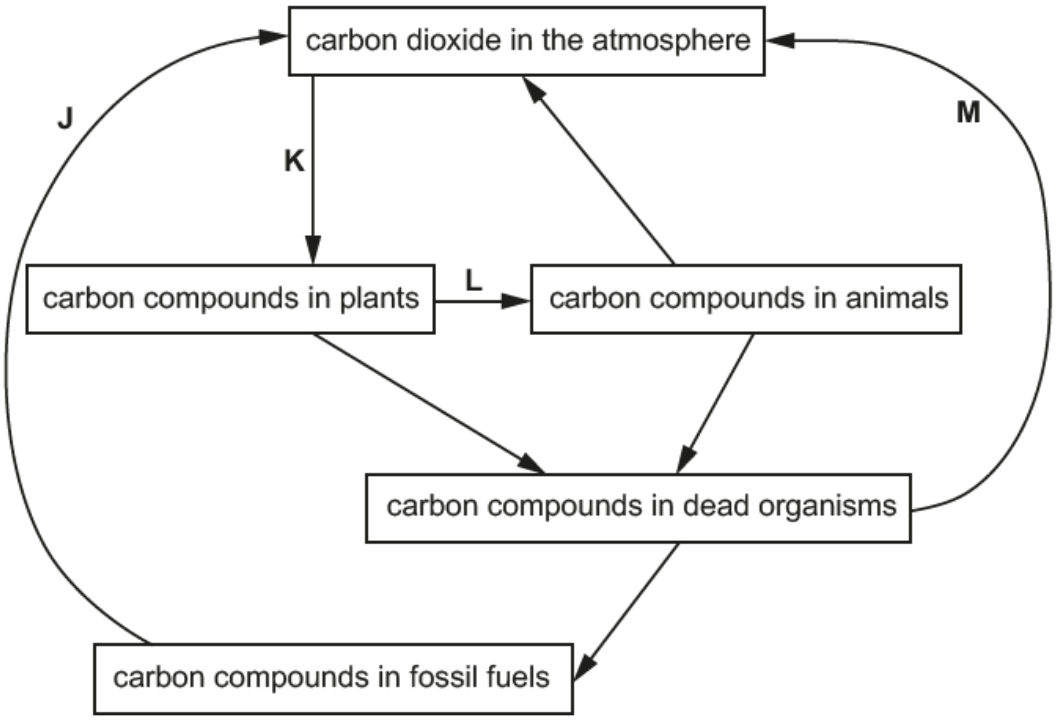


Fig. 8.1

(i) Draw **one** arrow **on Fig. 8.1** to represent respiration in plants. [1]

(ii) Identify the processes labelled **J**, **L** and **M** in Fig. 8.1.

J .....

L .....

M .....

[3]

(b) Photosynthesis is the process occurring at **K** in Fig. 8.1.

State the **two** products of photosynthesis.

1 .....

2 .....

[2]

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(c) Explain the effect of deforestation on the concentration of carbon dioxide in the atmosphere.

.....

.....

.....

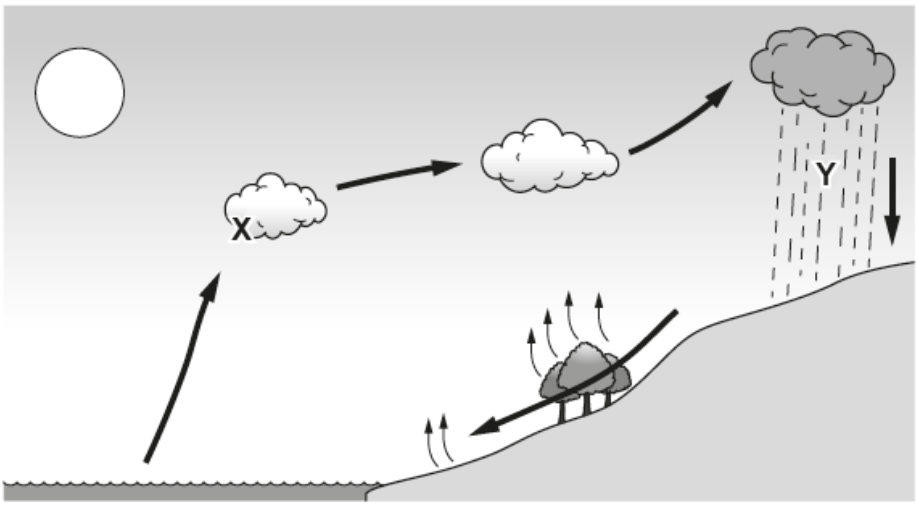
.....

..... [2]

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20. June/2022/Paper_ 32/No.1(d)

(d) Fig. 1.3 is a diagram of the water cycle.



not to scale

Fig. 1.3

Identify processes **X** and **Y** in Fig. 1.3.

X .....

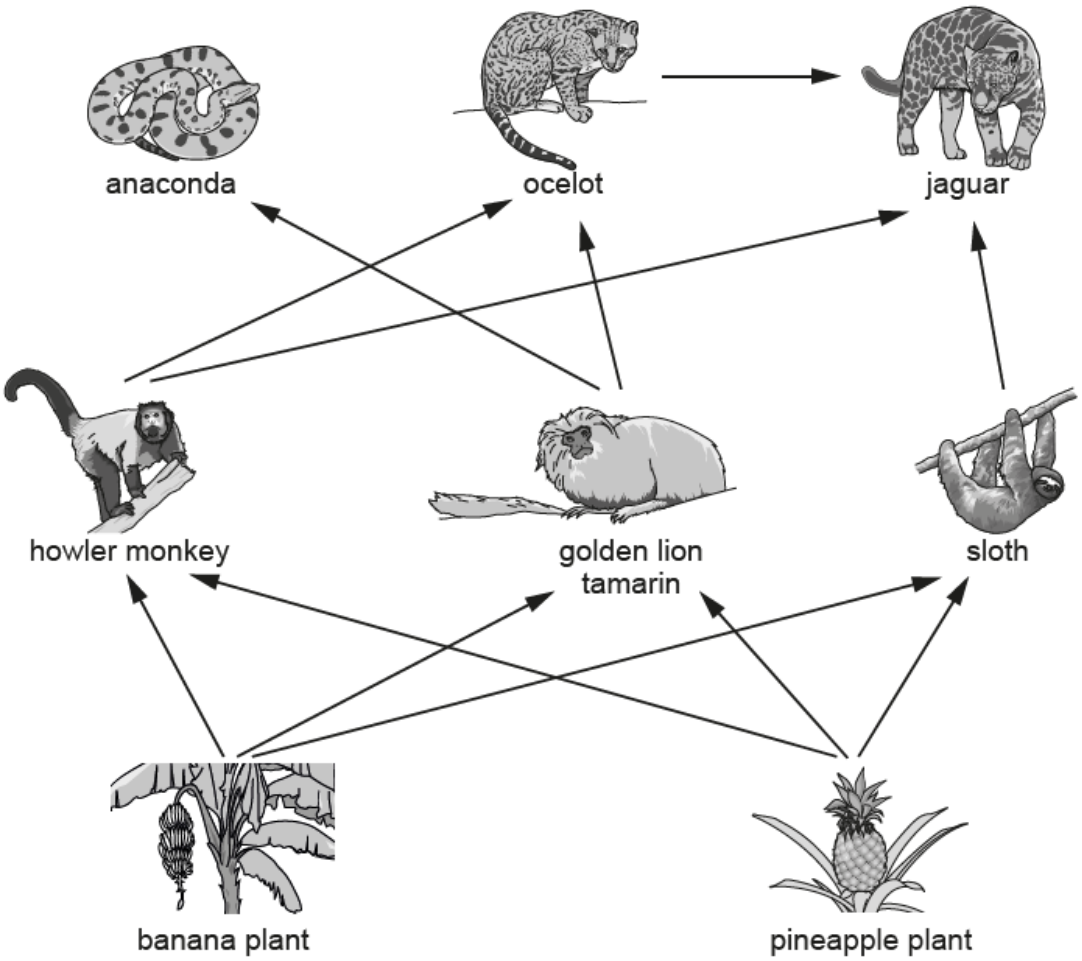
Y .....

[2]

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21. June/2022/Paper_ 32/No.4(a)

Fig. 4.1 is a drawing of a rainforest food web.



not to scale

Fig. 4.1

(a) (i) State the name of **one** producer shown in Fig. 4.1.

..... [1]

(ii) State the name of **one** herbivore shown in Fig. 4.1.

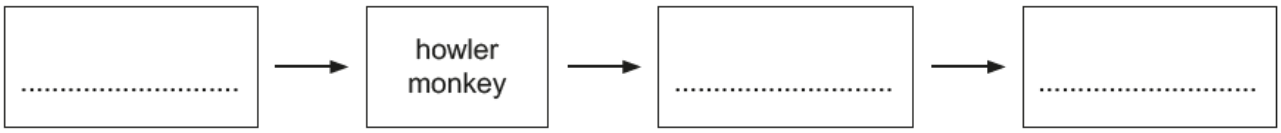
..... [1]

(iii) State the number of carnivore species shown in Fig. 4.1.

..... [1]

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(iv) Use the information in Fig. 4.1 to complete the food chain that contains the howler monkey and three other organisms.



[2]

(v) Overhunting of golden lion tamarins caused the population of anacondas and sloths to change.

Explain why the populations of:

- anacondas decrease
- sloths increase.

anacondas .....

.....

.....

sloths .....

.....

.....

[2]

(vi) State the principal source of energy for food webs.

..... [1]

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22. June/2022/Paper_ 42/No.4(a_ c)

Coral reefs are important ecosystems.

(a) Complete the sentence about ecosystems.

An ecosystem can be defined as a unit containing the ..... of organisms and their ....., interacting together.

[2]

Fig. 6.1 is a photograph of a coral reef.



Fig. 6.1

(b) Fig. 6.2 is part of a food web for a coral reef ecosystem which is similar to the one shown in Fig. 6.1.

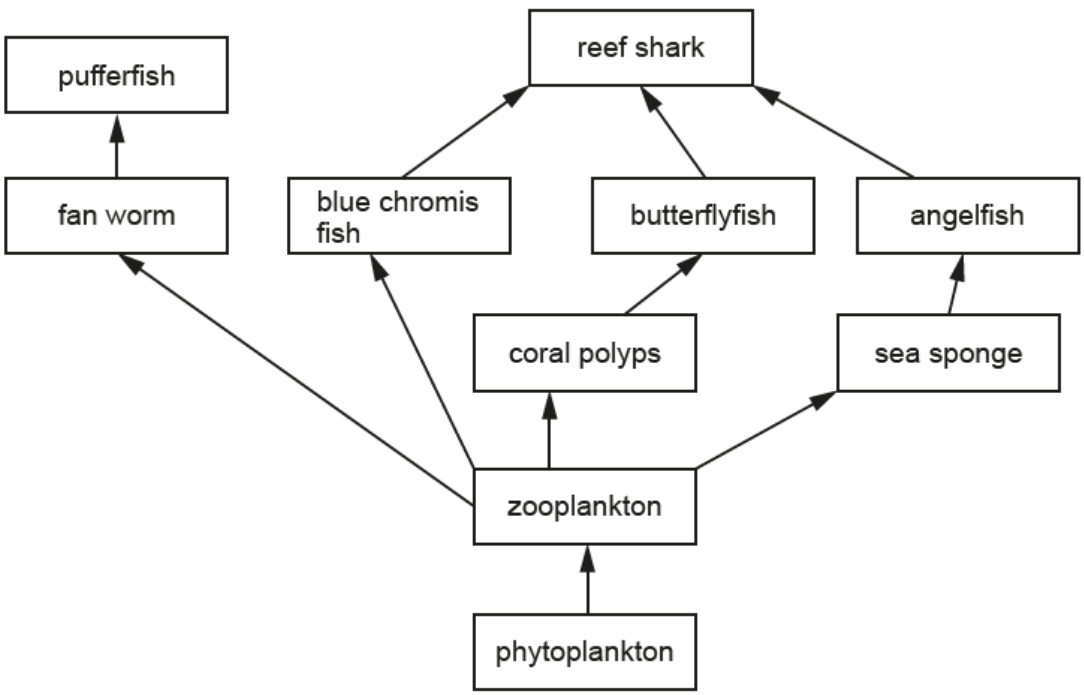


Fig. 6.2

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(i) State the number of secondary consumers shown in Fig. 6.2.

..... [1]

(ii) State the name of a species that feeds at more than one trophic level in Fig. 6.2.

..... [1]

(iii) State the number of different organisms in the shortest food chain in Fig. 6.2.

..... [1]

(iv) State the evidence from the food web in Fig. 6.2, that phytoplankton are producers.

..... [1]

(v) It is rare for there to be more than five trophic levels in an ecosystem.

Explain what limits the number of trophic levels in food webs.

.....

.....

.....

.....

.....

.....

..... [3]

(c) One threat to aquatic ecosystems, such as coral reefs, is global climate change.

Discuss the threats to aquatic ecosystems, **other** than climate change.

.....

.....

.....

.....

.....

.....

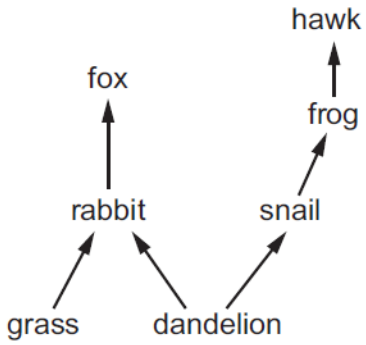
..... [3]

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Organisms and their environment – 2021 IGCSE 0610

1. Nov/2021/Paper_11/No.36

The diagram shows a woodland food web.



Which statement is **not** correct?

A Dandelions and grass are both producers.

B The fox and the hawk are both tertiary consumers.

C The frog is a secondary consumer.

D The rabbit and the snail are both primary consumers.

2. Nov/2021/Paper_11/No.37

Which organism makes its own organic nutrients using light energy?

A producer

B consumer

C herbivore

D carnivore

3. Nov/2021/Paper_11/No.38

Which process releases carbon dioxide into the atmosphere?

A decomposition

B fossilisation

C photosynthesis

D transpiration

4. Nov/2021/Paper_11/No.39

Which row shows what is used to make biofuel, bread and fruit juice?

	biofuel	bread	fruit juice
A	pectinase	pectinase	yeast
B	pectinase	yeast	pectinase
C	yeast	pectinase	yeast
D	yeast	yeast	pectinase

5. Nov/2021/Paper_12/No.36

The diagram shows a food chain.

grass → grasshopper → frog → snake → hawk

What is the tertiary consumer in this food chain?

A frog

B grasshopper

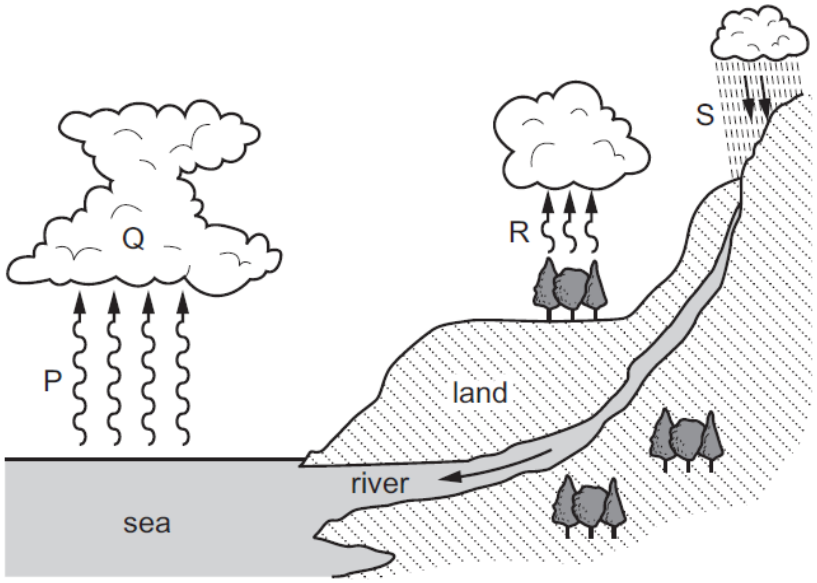
C hawk

D snake

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6. Nov/2021/Paper_12/No.37

The diagram shows the water cycle.



The table shows the processes involved in the water cycle.

Which row is correct?

	condensation	evaporation	precipitation	transpiration
A	P	Q	R	S
B	R	S	Q	P
C	S	R	P	Q
D	Q	P	S	R

7. Nov/2021/Paper_12/No.40

What are reasons why species become endangered?

A habitat destruction, hunting and introduced species

B habitat protection, introduced species and monitoring

C habitat destruction, hunting and captive breeding programmes

D hunting, pollution and seed banks

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8. Nov/2021/Paper_21/No.35

A species of insect usually has pale-coloured wings. This helps to camouflage them on pale-coloured tree trunks. A few of the insects in this species have darker coloured wings.

After a number of years the tree trunks become darker in colour due to environmental changes. The insects with dark-coloured wings become more common than insects with pale-coloured wings in this species.

Which process causes this change in the proportion of insects with dark-coloured wings?

A biotechnology

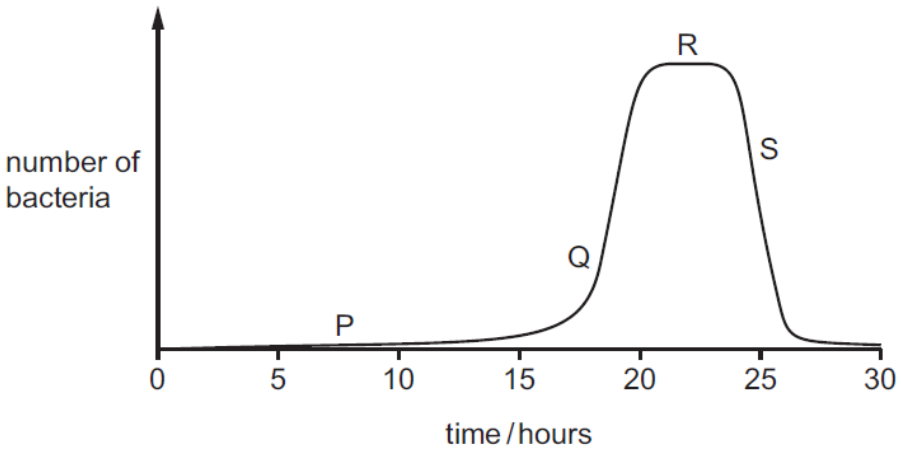
B conservation

C natural selection

D selective breeding

9. Nov/2021/Paper_21/No.36

The graph shows the growth curve for a population of bacteria.



The table identifies each phase shown in the graph.

Which row is correct?

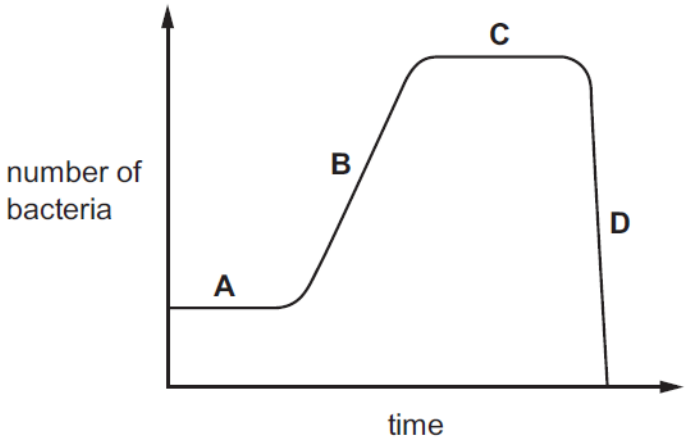
	death phase	exponential (log) phase	lag phase	stationary phase
A	P	Q	R	S
B	S	Q	P	R
C	S	P	Q	R
D	P	S	R	Q

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10. Nov/2021/Paper_22/No.34

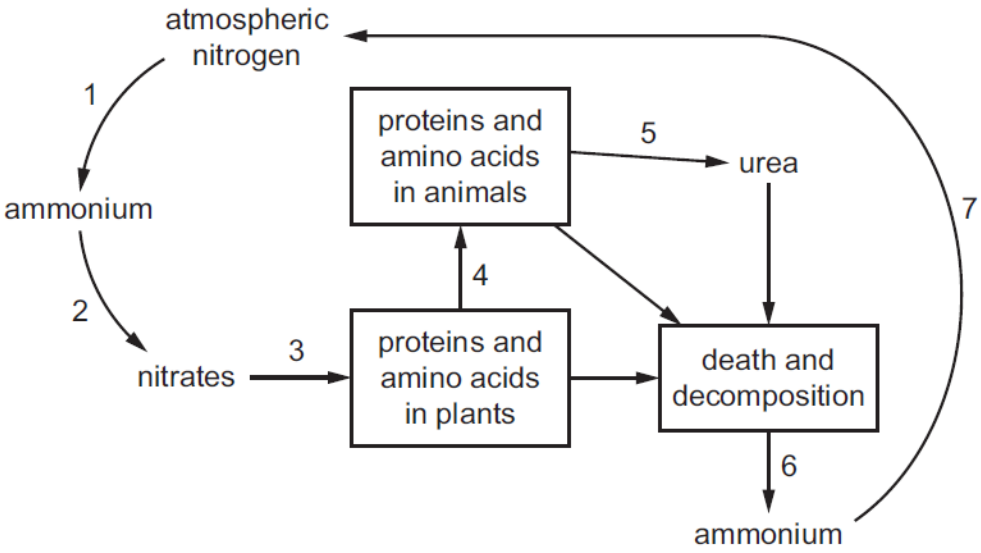
The graph shows the growth of a bacterial population.

Which section represents the exponential (log) phase?



11. Nov/2021/Paper_22/No.36

The diagram shows part of the nitrogen cycle.



Which processes are carried out by bacteria?

A 1, 2, 3 and 4

B 1, 2, 4 and 5

C 1, 2, 5 and 6

D 1, 2, 6 and 7

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12. Nov/2021/Paper_22/No.39

What are reasons why species become endangered?

A habitat destruction, hunting and introduced species

B habitat protection, introduced species and monitoring

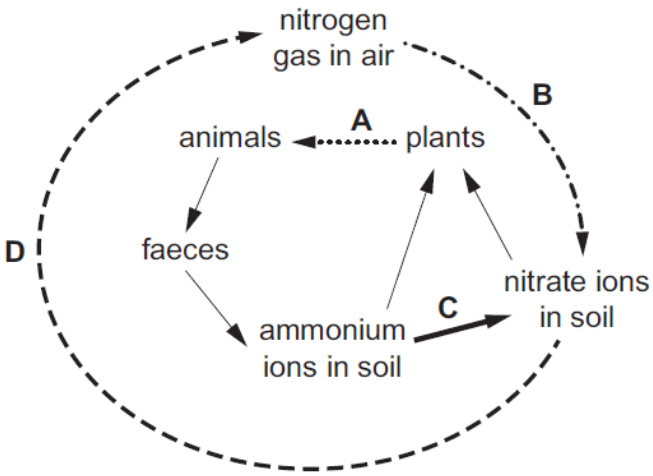
C habitat destruction, hunting and captive breeding programmes

D hunting, pollution and seed banks

13. Nov/2021/Paper_23/No.36

The diagram shows part of the nitrogen cycle.

Which letter represents denitrification?



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14. Nov/2021/Paper_32/No.8

(a) Define the term population by completing the sentence.

A population is a group of organisms of one ....., living in the same ....., at the same ..... . [3]

(b) The human population size of one country was monitored between 1950 and 2010.

Fig. 8.1 shows the results.

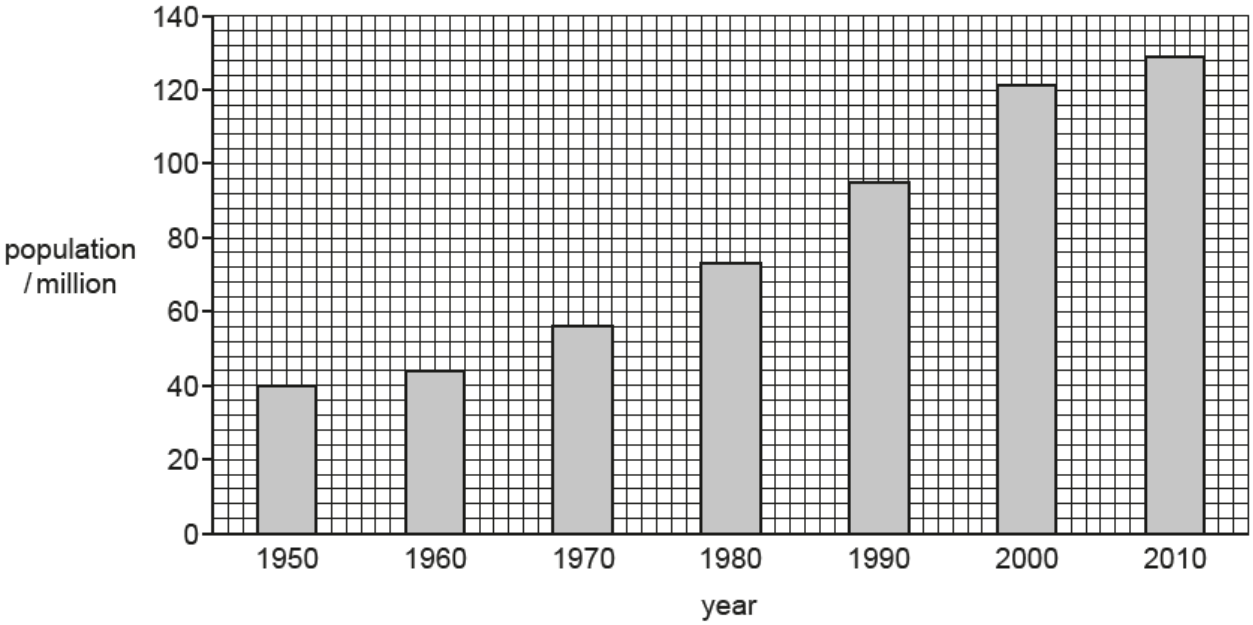


Fig. 8.1

(i) Calculate the difference in population size between 1950 and 2010.

..... million [1]

(ii) State the year when the population size was 56 million.

..... [1]

(c) State **three** factors that can cause an increase in population size.

1 .....

2 .....

3 .....

[3]

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(d) Discuss the negative impacts on the environment of a continual increase in the size of the human population.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 12]

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15. Nov/2021/Paper_33/No.6

Carbon is a part of many biological molecules.

(a) Fig. 6.1 is a diagram of part of the carbon cycle.

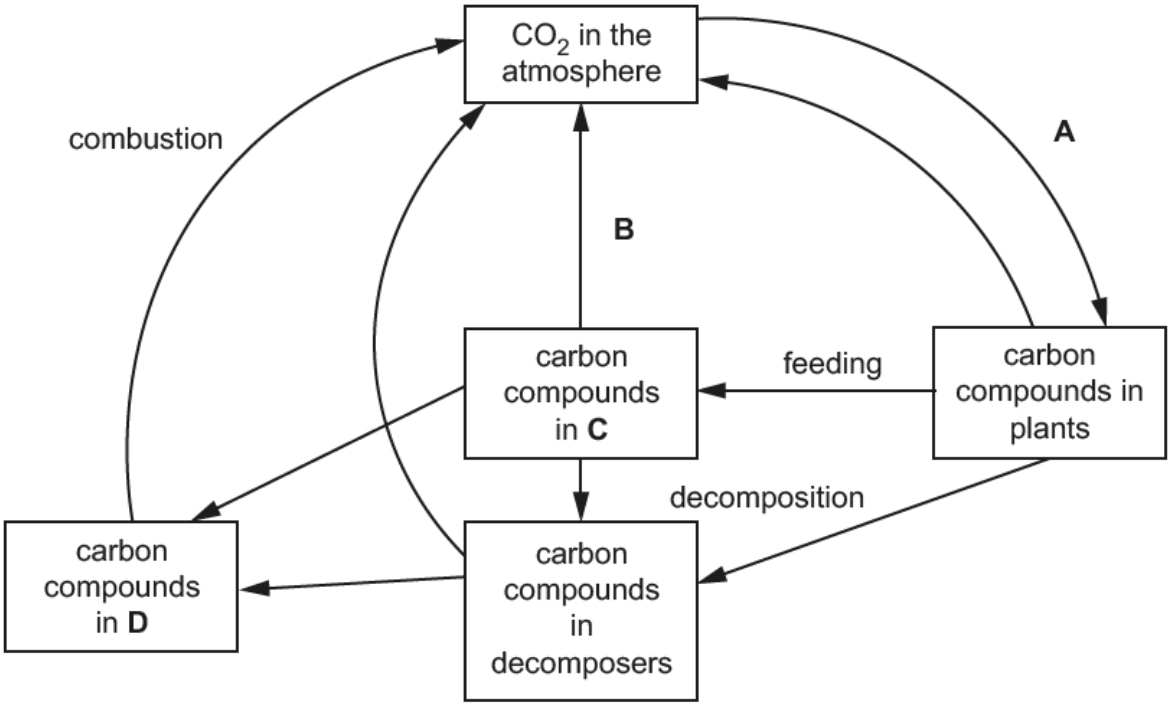


Fig. 6.1

(i) State the name of the process labelled **A**.

..... [1]

(ii) State the name of the process labelled **B**.

..... [1]

(iii) State the name of **C**.

..... [1]

(iv) State the name of **D**.

..... [1]

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(b) Describe the undesirable effects of deforestation.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Methane is a gas that pollutes the atmosphere.

(i) State **one** source of the methane that pollutes the atmosphere.

..... [1]

(ii) State the effects of an increased concentration of methane in the atmosphere.

.....

.....

.....

.....

..... [2]

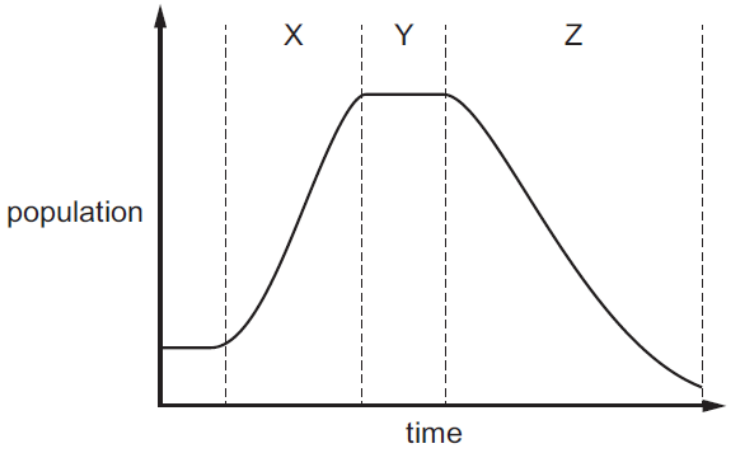
[Total: 10]

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Organisms and their environment – 2021 IGCSE 0610

1. March/2021/Paper_22/No.37

The graph shows the change in population of an organism over time in an ecosystem.



Which row correctly identifies each phase of the population graph?

	X	Y	Z
A	lag	exponential (log)	stationary
B	lag	stationary	death
C	exponential (log)	death	stationary
D	exponential (log)	stationary	death

2. March/2021/Paper_22/No.40

The action of which type of bacteria would cause soil to be lacking in nitrates?

A aerobic

B denitrifying

C nitrifying

D nitrogen fixing

3. March/2021/Paper_32/No.3

Fig. 3.1 shows a food web.

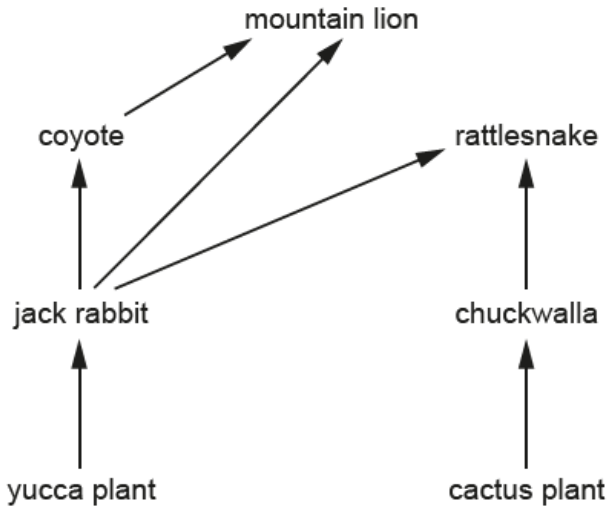


Fig. 3.1

(a) A scientist found that chuckwallas were also eaten by coyotes.

Draw an arrow **on Fig. 3.1** to show this information. [1]

(b) Table 3.1 shows some of the terms used to describe the organisms in Fig. 3.1.

Place tick(s) (✓) in all the boxes in Table 3.1 that correctly describe each organism.

Table 3.1

	producer	consumer	herbivore	carnivore
coyote				
jack rabbit				
rattlesnake				
yucca plant				

[4]

(c) State the name of the organism in Fig. 3.1 that is both a secondary and a tertiary consumer.

..... [1]

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(d) A new organism that eats cactus plants was introduced to the food web in Fig. 3.1.

Predict **and** explain the effect this would have on the chuckwalla population.

.....

.....

.....

.....

..... [2]

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(e) Chuckwallas are a type of lizard.

They have adapted to be able to lose part of their tail if they are caught by predators.

Fig. 3.2 is a photograph of a chuckwalla.

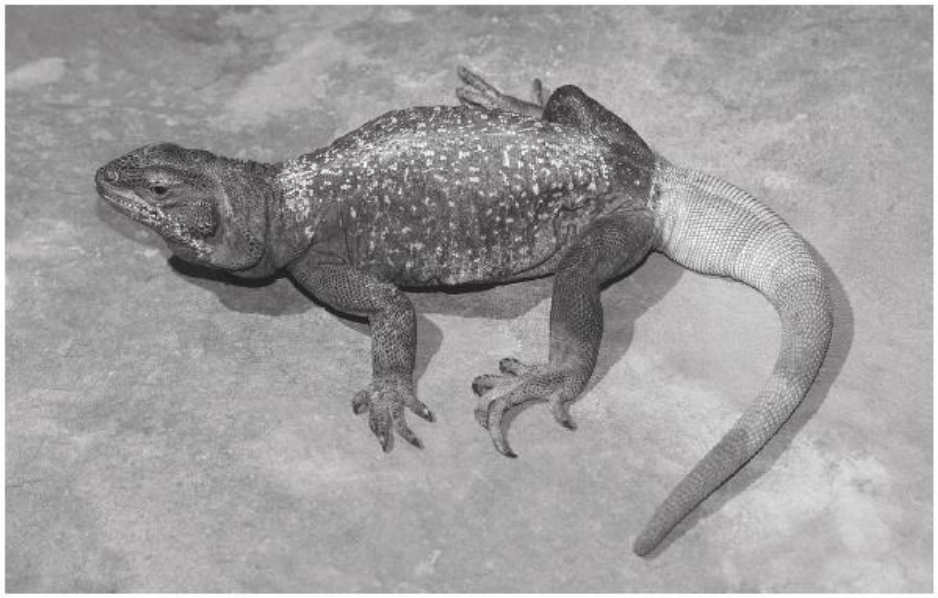


Fig. 3.2

Complete the sentences using words from the list to describe how chuckwallas have evolved the ability to lose part of their tails by natural selection.

Each word may be used once, more than once or not at all.

all	**alleles**	**behaviour**	**none**
offspring	**parents**	**predators**	**some**

A mutation caused some of the population of chuckwallas to be able to lose part of their tail.

Chuckwallas that could lose their tail were able to escape ..... .

These chuckwallas survived long enough to breed and pass their .....

on to their ..... .

Eventually ..... of the chuckwallas had the ability to lose their tails.

[4]

[Total: 12]

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4. March/2021/Paper_42/No.6

(a) Fig. 6.1 shows a food web.

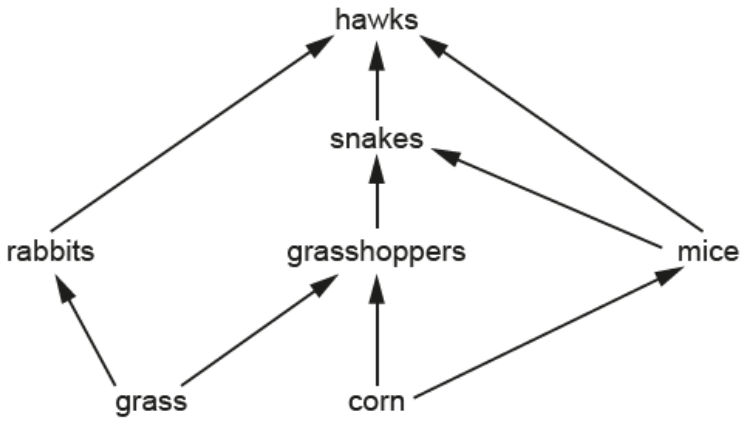


Fig. 6.1

(i) State the number of trophic levels in the food web in Fig. 6.1.

..... [1]

(ii) State the name of **one** organism that feeds at both the third and fourth trophic levels from Fig. 6.1.

..... [1]

(iii) State the name of the type of energy that is transferred between trophic levels.

..... [1]

(b) The total biomass of the snakes is much less than the total biomass of the mice in the food web shown in Fig. 6.1.

Explain why the total biomass of the snakes is less than the total biomass of the mice.

Use the term **energy** in your answer.

.....

.....

.....

.....

.....

.....

..... [3]

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(c) Food shortages that result in famine can be caused by many factors.

Describe how drought can contribute to famine.

.....

.....

.....

.....

.....

.....

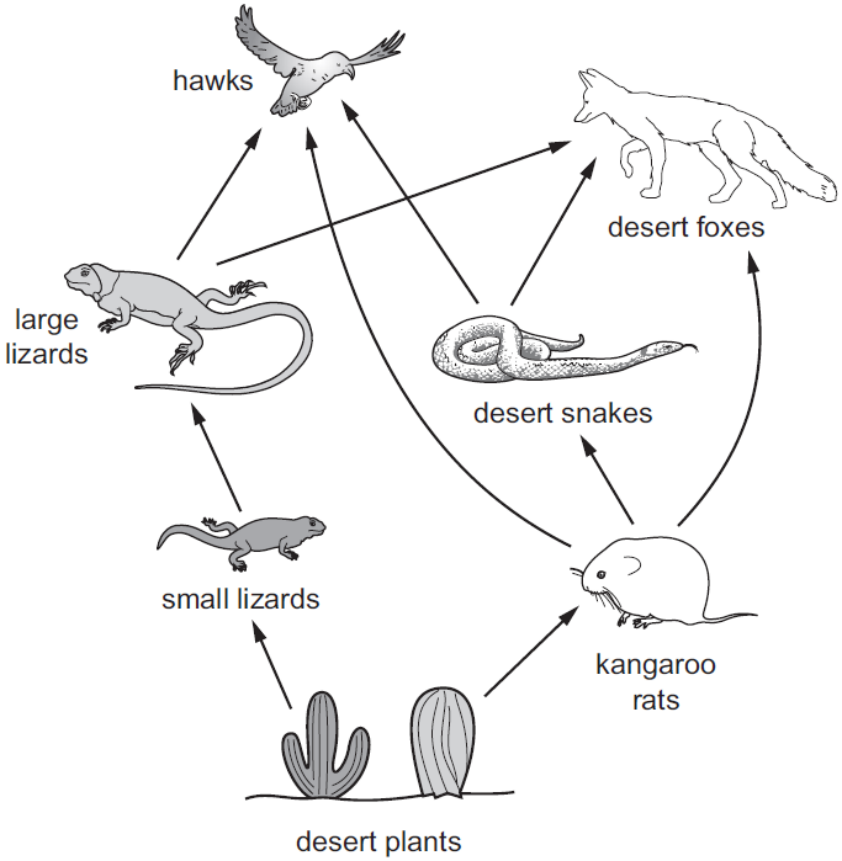
..... [3]

[Total: 9]

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5. June/2021/Paper_11/No.36

The diagram shows a food web in a desert.



Which organisms are **all** secondary consumers?

A desert foxes, hawks, large lizards and desert snakes

B desert foxes and hawks only

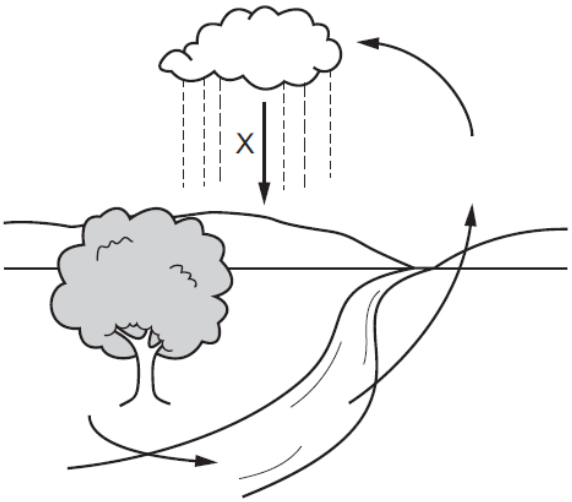
C kangaroo rats and small lizards

D large lizards and desert snakes only

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6. June/2021/Paper_11/No.37

The diagram shows stages in the water cycle.



Which process is represented by the letter X?

A condensation

B evaporation

C precipitation

D transpiration

7. June/2021/Paper_11/No.38

What is an example of a population?

A all the arthropods in a pond

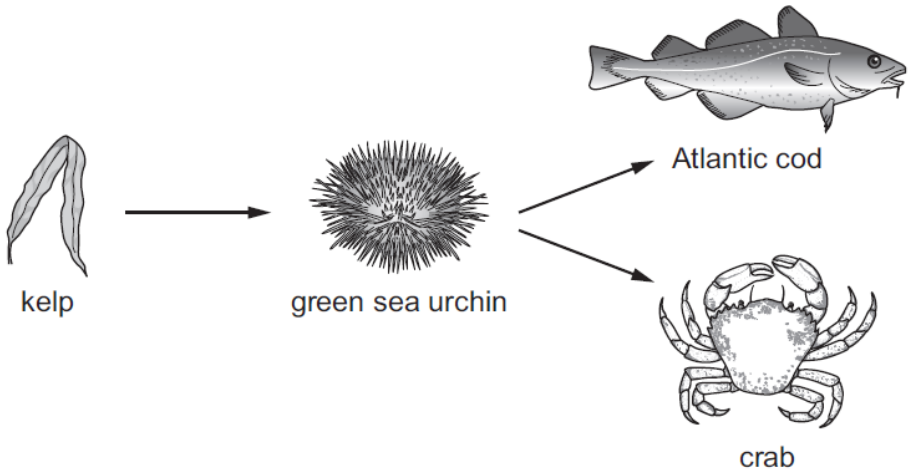
B all the crocodiles in a river

C all the plants in a wood

D all the zebras that lived from 1990–2010

8. June/2021/Paper_12/No.36

The diagram shows a food web.



What is the principal source of energy input into this food web?

A green sea urchins

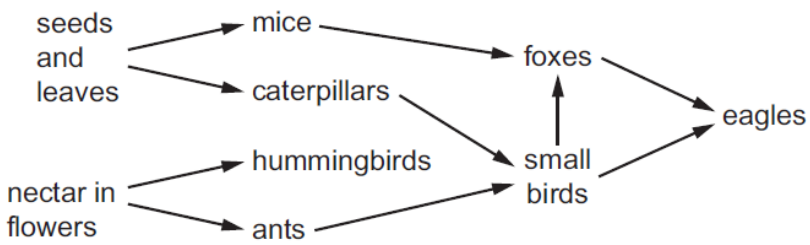
B kelp

C the sea

D the Sun

9. June/2021/Paper_12/No.37

The diagram shows a food web.



Which statement is correct?

A Eagles obtain all their energy by eating foxes.

B If the hummingbirds all die the caterpillars will have more food.

C The food chain nectar in flowers → ants → small birds → foxes is part of this food web.

D The mice and caterpillars are the only examples of herbivores in this food web.

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10. June/2021/Paper_12/No.38

Which process in the water cycle only involves living organisms?

A condensation

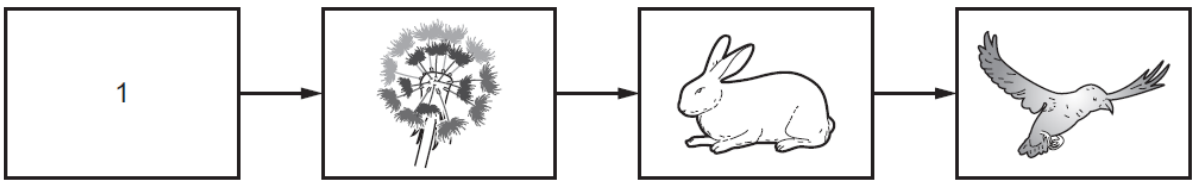
B evaporation

C precipitation

D transpiration

11. June/2021/Paper_13/No.36

The diagram shows the energy flow through part of a biological system.



What should be in the box labelled 1?

A heat

B consumer

C producer

D the Sun

12. June/2021/Paper_13/No.38

Which description of a population is correct?

A all the birds in a rainforest

B all the arachnids in a garden

C all the arthropods in the world

D all the red deer in a forest

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13. June/2021/Paper_21/No.37

The diagram shows the flow of energy.

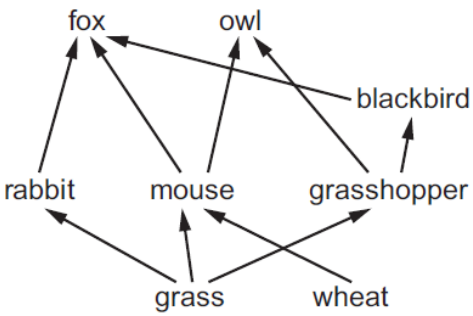


Which form of energy is transferred at points 1 and 3 in the diagram?

	1	3
A	chemical	chemical
B	heat	light
C	light	chemical
D	light	heat

14. June/2021/Paper_21/No.38

The diagram shows the feeding relationships in a food web.



Which organism may feed as both a secondary and a tertiary consumer?

A fox

B owl

C blackbird

D rabbit

15. June/2021/Paper_22/No.35

Which feature would help a plant to survive in a dry environment?

A large leaves

B many stomata

C small roots

D thick waxy cuticle

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16. June/2021/Paper_22/No.37

Which type of energy is passed from organism to organism in a food chain?

A light

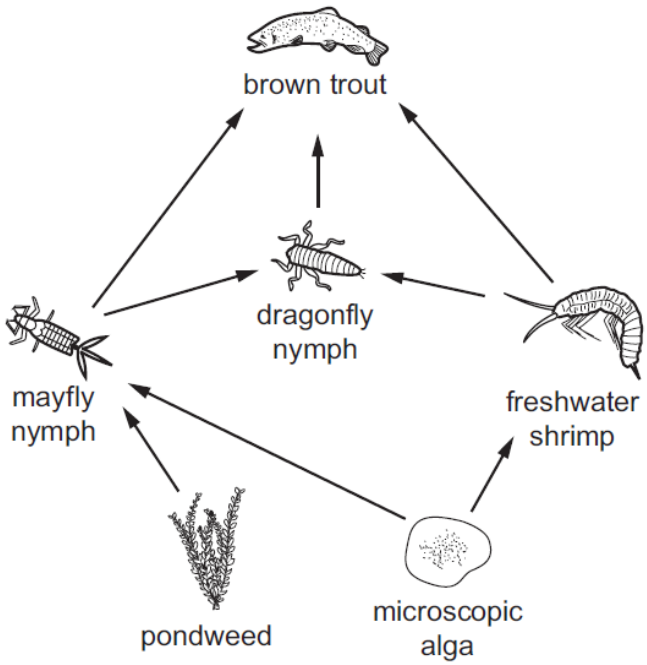
B chemical

C heat

D kinetic

17. June/2021/Paper_22/No.38

The diagram shows a food web.



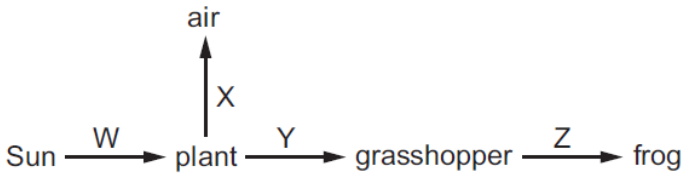
How many organisms feed at more than one trophic level?

A 0 **B** 1 **C** 2 **D** 3

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18. June/2021/Paper_23/No.37

The diagram shows energy transfer through a food chain. The labelled arrows represent the energy transfers.



Which energy transfers are shown by the labelled arrows?

A X is heat energy transfer and Z is chemical energy transfer.

B Y is chemical energy transfer and X is light energy transfer.

C X is chemical energy transfer and Y is heat energy transfer.

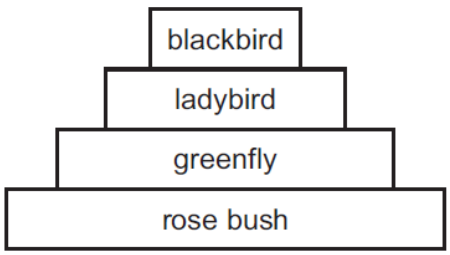
D Z is heat energy transfer and W is light energy transfer.

19. June/2021/Paper_23/No.38

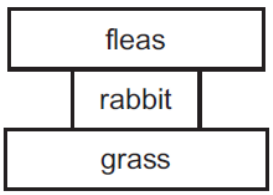
The organisms in a food chain can be represented by pyramids of numbers or pyramids of biomass.

Which diagram represents a pyramid of numbers?

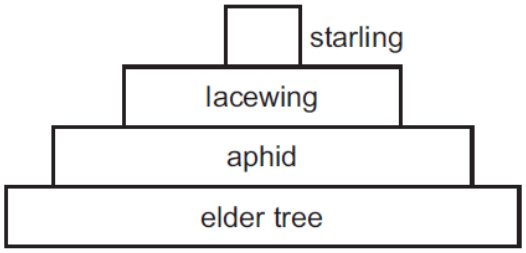
A



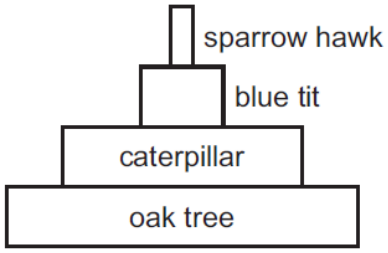
B



C



D



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20. June/2021/Paper_23/No.39

Scientists wanted to know which one of four different varieties of bacteria, **A**, **B**, **C** or **D**, would be the best to use to make a protein.

They grew the bacteria for five days using the same starting mass of each bacterium. They then measured the mass of bacteria and the mass of protein produced per gram of bacteria.

The results are shown in the table.

Which variety of bacteria should the scientists choose?

	mass of bacteria at the start / g	mass of bacteria after five days / g	mass of protein / mg protein per g of bacteria
A	2	200	10
B	2	800	1
C	2	100	12
D	2	100	6

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21. June2021/Paper_33/No.7

(a) Define the terms herbivore and carnivore.

herbivore .....

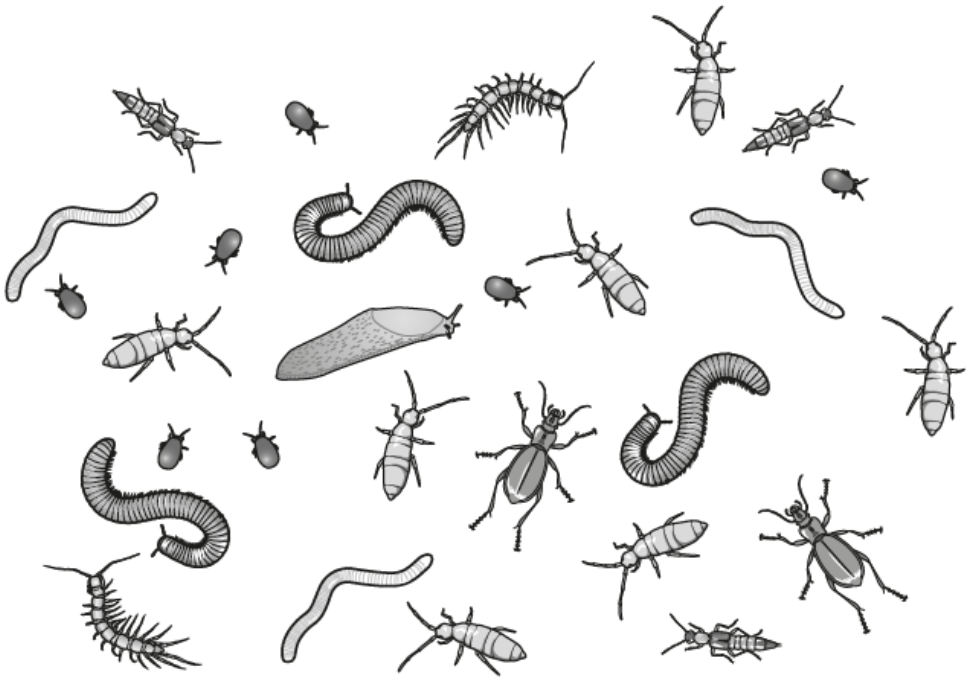
.....

carnivore .....

.....

[2]

(b) Fig. 7.1 shows some organisms collected from underneath a rotting log.

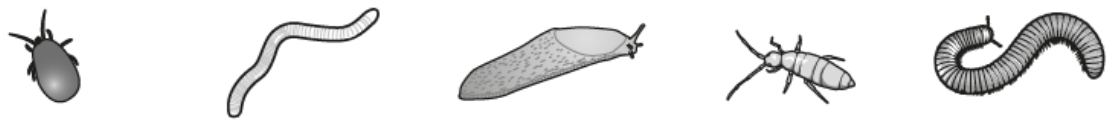


not to scale

Fig. 7.1

Fig. 7.2 can be used to identify these organisms.

herbivores



soil mite | potworm | slug | springtail | millipede

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carnivores



centipede



ground beetle



rove beetle

not to scale

Fig. 7.2

Some students used Fig. 7.2 to identify and count the numbers of each soil organism.

Some of their results are shown in Table 7.1.

Table 7.1

	herbivores					carnivores		
names of organisms	millipedes	potworms	slugs	soil mites	springtails	centipedes	ground beetles	rove beetles
number of organisms	.....	3	1	.....	7	2	.....	.....
total number of organisms	21					7		

(i) Complete Table 7.1 by identifying and counting the **four** remaining named organisms in Fig. 7.1.

Write your answers in the four spaces in Table 7.1.

[2]

(ii) Use the information in Table 7.1 to draw a pyramid of numbers in Fig. 7.3.

Write the names of the **two** types of organism in the spaces at the side.

The row for the rotting log (the producer) has been done for you.

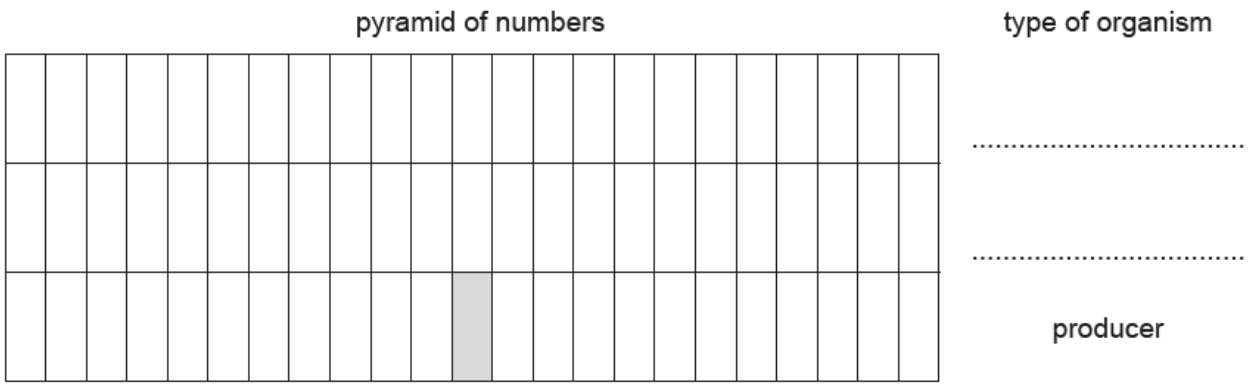


Fig. 7.3

[3]

[Total: 7]

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Organisms and their environment – 2020 IGCSE 0610

1. Nov/2020/Paper_11/No.36

The diagram shows a food chain.

clover plant → rabbit → fox

Which terms can be used to describe the fox in this food chain?

A carnivore and primary consumer

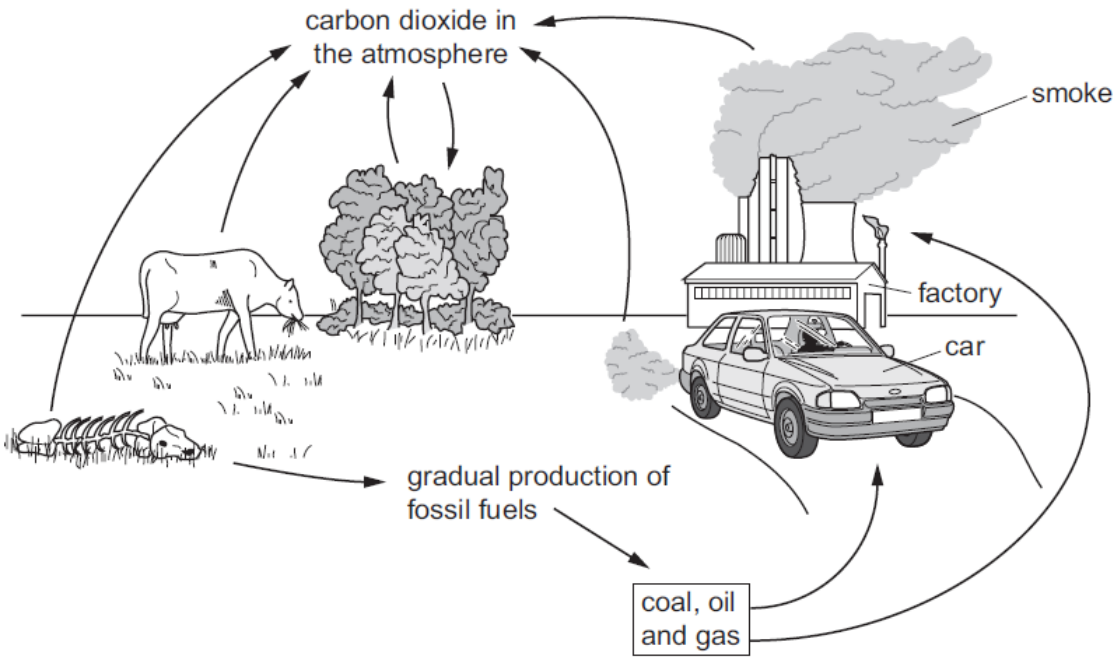
B carnivore and secondary consumer

C carnivore and tertiary consumer

D carnivore only

2. Nov/2020/Paper_11/No.37

The diagram represents the carbon cycle.



Which process produces the carbon dioxide from the factory and the car?

A combustion

B condensation

C decomposition

D precipitation

3. Nov/2020/Paper_11/No.38

In the water cycle, which stage is **only** carried out by plants?

A condensation

B evaporation

C precipitation

D transpiration

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4. Nov/2020/Paper_12/No.35

A food chain is shown.

potato plant → slug → hedgehog

By which process is energy transferred from the slug to the hedgehog?

A egestion

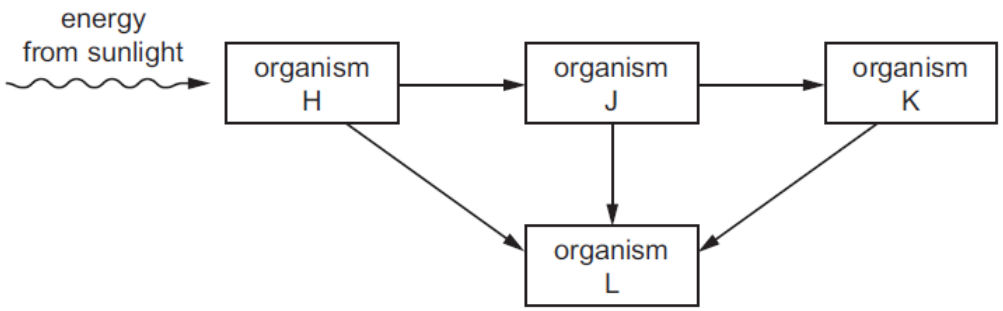
B excretion

C ingestion

D photosynthesis

5. Nov/2020/Paper_12/No.36

The diagram shows a food web.



What is organism L?

A a carnivore

B a decomposer

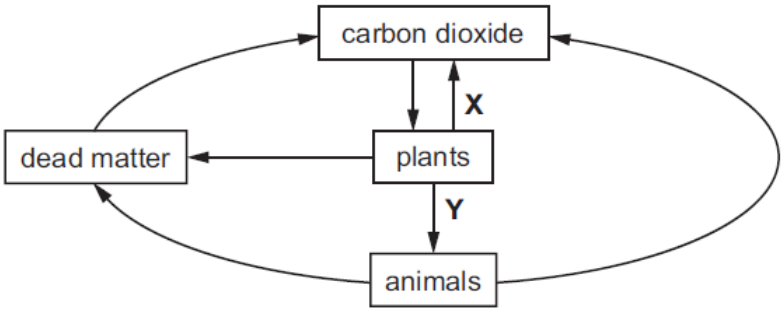
C a herbivore

D a producer

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6. Nov/2020/Paper_12/No.37

The diagram shows part of the carbon cycle.



What do arrows **X** and **Y** represent?

A decay and respiration

B feeding and photosynthesis

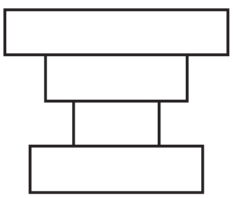
C photosynthesis and respiration

D respiration and feeding

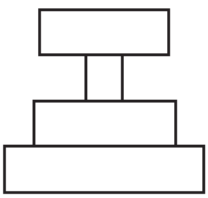
7. Nov/2020/Paper_13/No.35

Which pyramid of numbers has more tertiary consumers than producers?

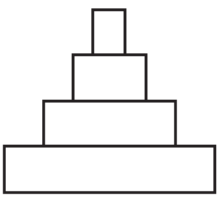
A



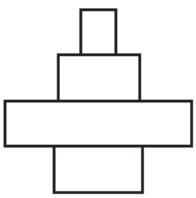
B



C



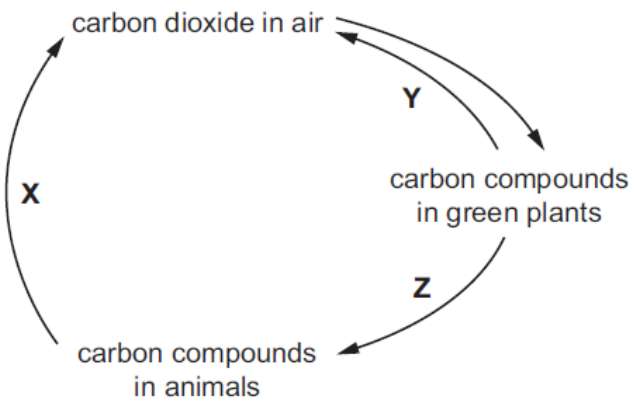
D



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8. Nov/2020/Paper_13/No.36

The diagram represents part of the carbon cycle.

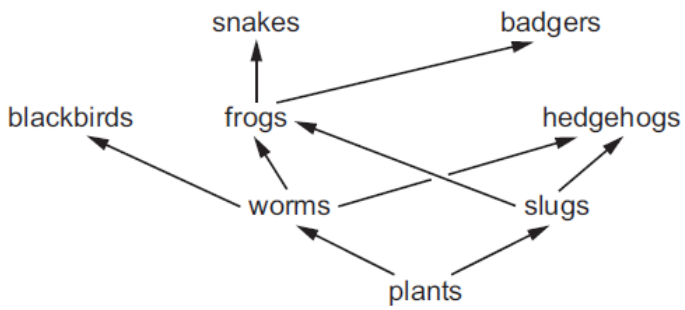


Which processes are represented by **X**, **Y** and **Z**?

	X	Y	Z
A	photosynthesis	feeding	combustion
B	respiration	respiration	feeding
C	combustion	feeding	photosynthesis
D	feeding	respiration	combustion

9. Nov/2020/Paper_13/No.37

The diagram shows part of a food web.



What is most likely to decrease the size of the frog population?

A fewer badgers

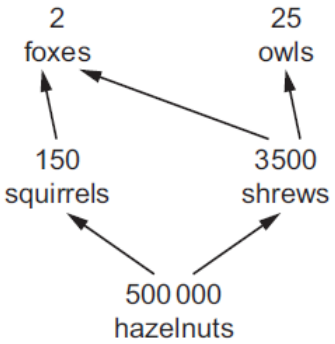
B fewer slugs

C more plants

D more worms

10. Nov/2020/Paper_21/No.35

The diagram contains information about the number and mass of organisms in a food web.



organism	average mass / g
fox	13 000
hazelnut	3
shrew	20
owl	600
squirrel	400

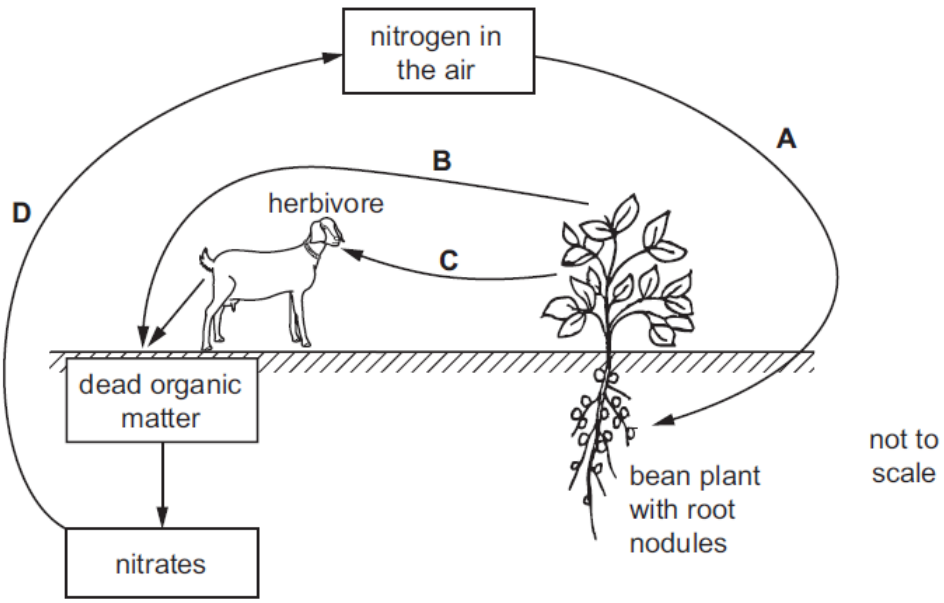
What is the total biomass of all the primary consumers in this food web?

A 130 kg **B** 420 kg **C** 3650 kg **D** 130 000 kg

11. Nov/2020/Paper_21/No.36

The diagram shows some of the stages in the nitrogen cycle.

Which arrow represents the process of nitrogen fixation?



12. Nov/2020/Paper_21/No.37

Which term is used to describe the phase of fastest growth in a population of bacteria?

A stationary

B lag

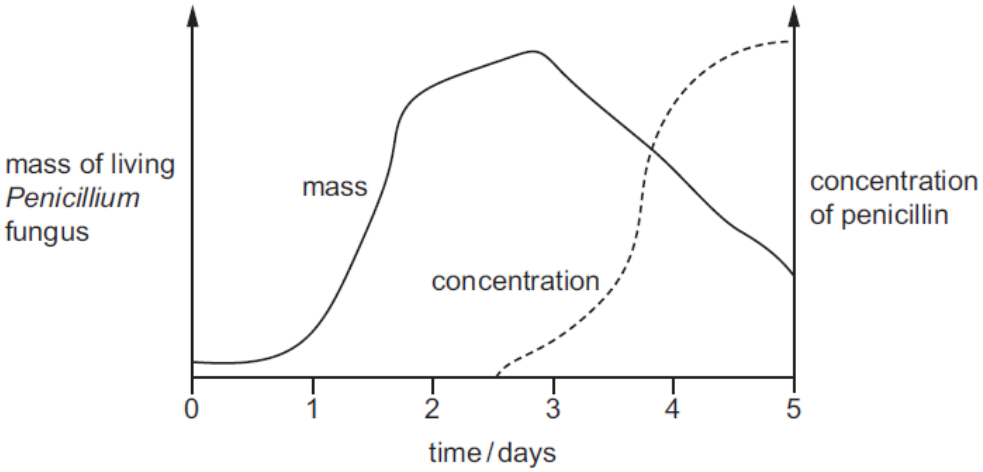
C exponential

D sigmoid

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13. Nov/2020/Paper_21/No.39

Penicillin is produced in a fermenter by growing the fungus *Penicillium*. The graph shows how the mass of living *Penicillium* fungus and the concentration of penicillin changed over time.



When is the best time to collect the penicillin?

A at 1.5 days

B at 3 days

C at 3.5 days

D at 5 days

14. Nov/2020/Paper_22/No.40

The hormones from the female contraceptive pill can pollute water courses.

What effect do they have?

A decrease the amount of oxygen for fish

B decrease the sperm count of men

C increase the growth of producers

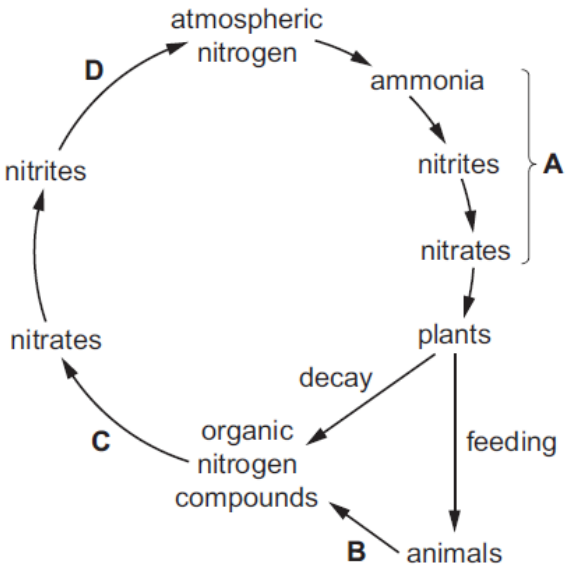
D increase the number of decomposers

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15. Nov/2020/Paper_23/No.35

The diagram shows part of the nitrogen cycle.

Which letter represents denitrification?



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16. Nov/2020/Paper_32/No.5

Fig. 5.1 shows a food web.

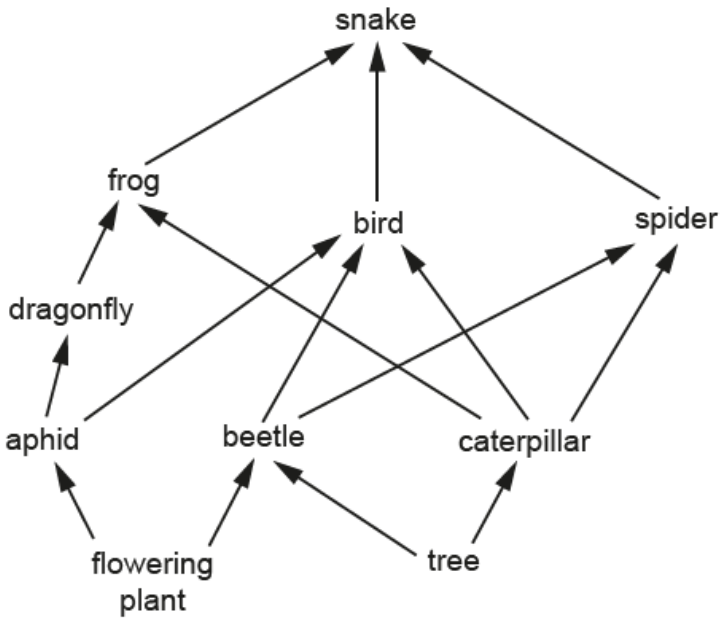


Fig. 5.1

(a) (i) Complete Table 5.1 using the information in Fig. 5.1.

One has been done for you.

Table 5.1

	number shown in Fig. 5.1
producers	2
herbivores	
primary consumers	
carnivores	

[3]

(ii) State the name of **one** organism in Fig. 5.1 which obtains its energy from eating three different organisms.

..... [1]

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(b) A disease killed most of the snakes in the food web in Fig. 5.1.

Complete the sentences by circling the correct words **in bold**.

The first one has been done for you.

The population of snakes **increases** / (**decreases**) / **stays the same** .

The population of spiders **increases / decreases / stays the same** because there is less **predation / food / competition** .

The population of caterpillars **increases / decreases / stays the same** because there is more **predation / food / competition** .

[2]

(c) Decomposers are not shown in the food web in Fig. 5.1.

Complete the definition of the term decomposer.

A decomposer is an organism that gets its ..... from dead or waste ..... material.

[2]

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(d) Fig. 5.2 shows a food chain.



Fig. 5.2

Table 5.2 shows the number of organisms in this food chain and some of the information needed to draw a pyramid of numbers.

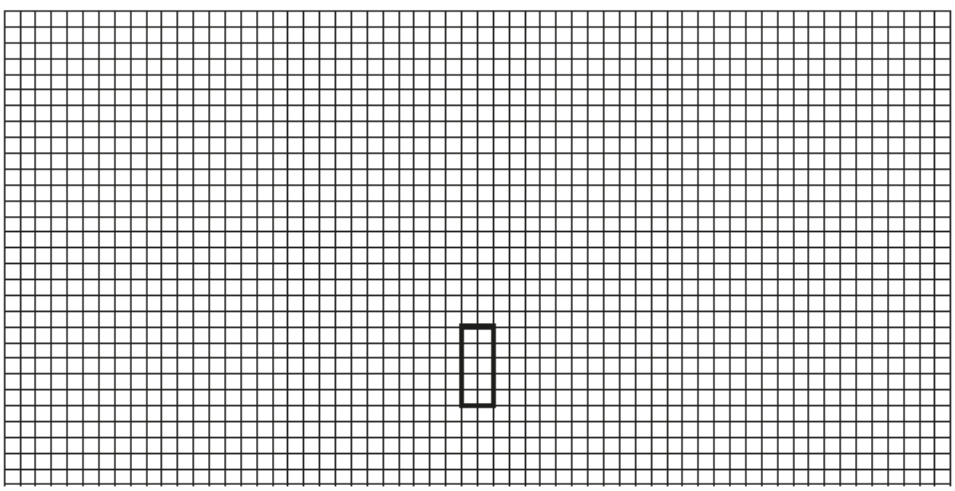
Table 5.2

organism	number of organisms	width of bar in pyramid /mm
bird	2	
caterpillar	20	80
cabbage	1	4

(i) Complete Table 5.2 by calculating the missing value and writing it in the table. [1]

(ii) Complete the pyramid of numbers on the grid for the food chain shown in Fig. 5.2 using the information in Table 5.2. The bar for the cabbage has been done for you.

Label the organisms on the pyramid of numbers.



[3]

[Total: 12]

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17. Nov/2020/Paper_33/No.3

(a) Fig. 3.1 is a photograph of a butterfly.

Butterflies are arthropods.



Fig. 3.1

State the group of arthropods that the butterfly belongs to and describe **one** feature visible in Fig. 3.1 that is characteristic of this group.

group .....

feature .....

[2]

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(b) Many butterfly species are endangered.

Fig. 3.2 shows the size of the area in which five species of butterfly were found in 1992 and 2017.

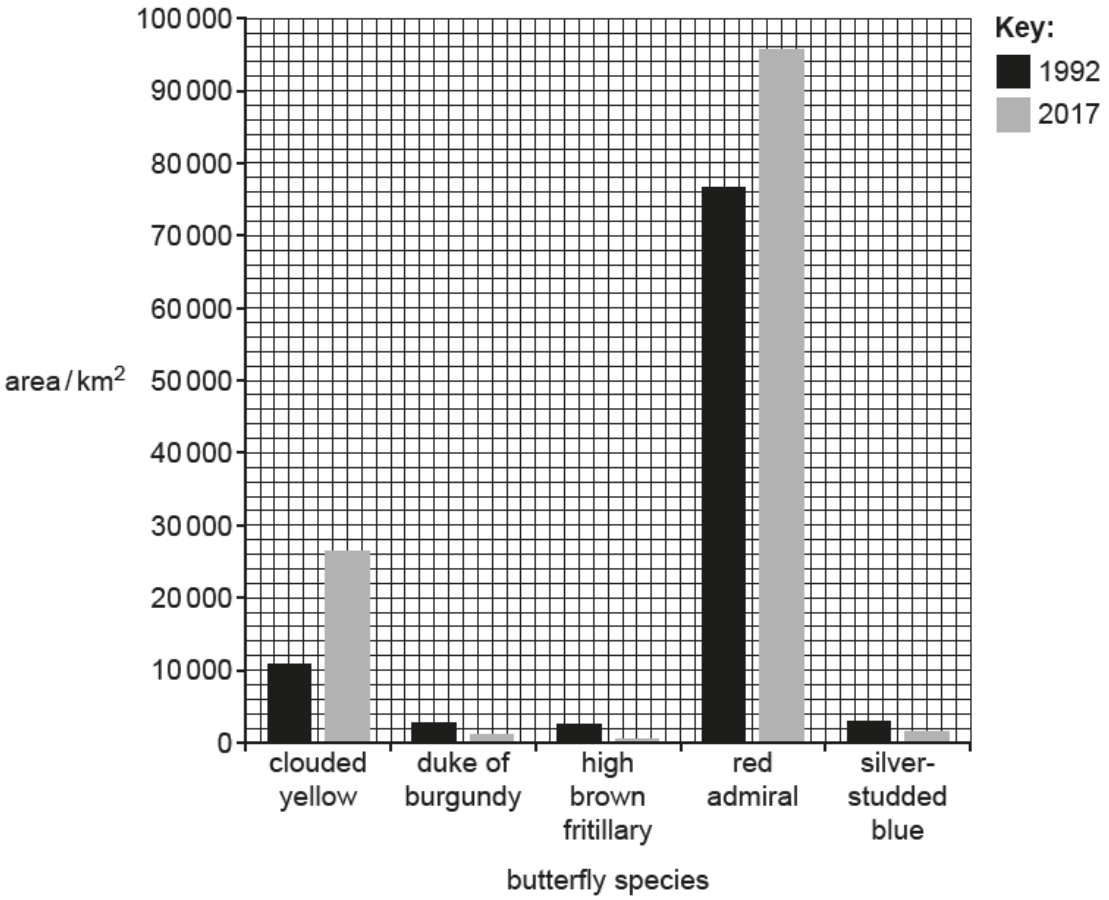


Fig. 3.2

(i) State the name of **one** species that was found in a larger area in 2017 than in 1992.

..... [1]

(ii) Use the information in Fig. 3.2 to suggest the name of the butterfly species that is the most endangered.

Give a reason for your choice.

name .....

reason .....

.....

[2]

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(iii) Describe how endangered species such as butterflies can be conserved.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 9]

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18. Nov/2020/Paper_42/No.3

(b) Fig. 3.2 shows the flow of energy through a food chain. The size of each box represents the energy available in each trophic level, numbered 1, 2, 3 and 4.

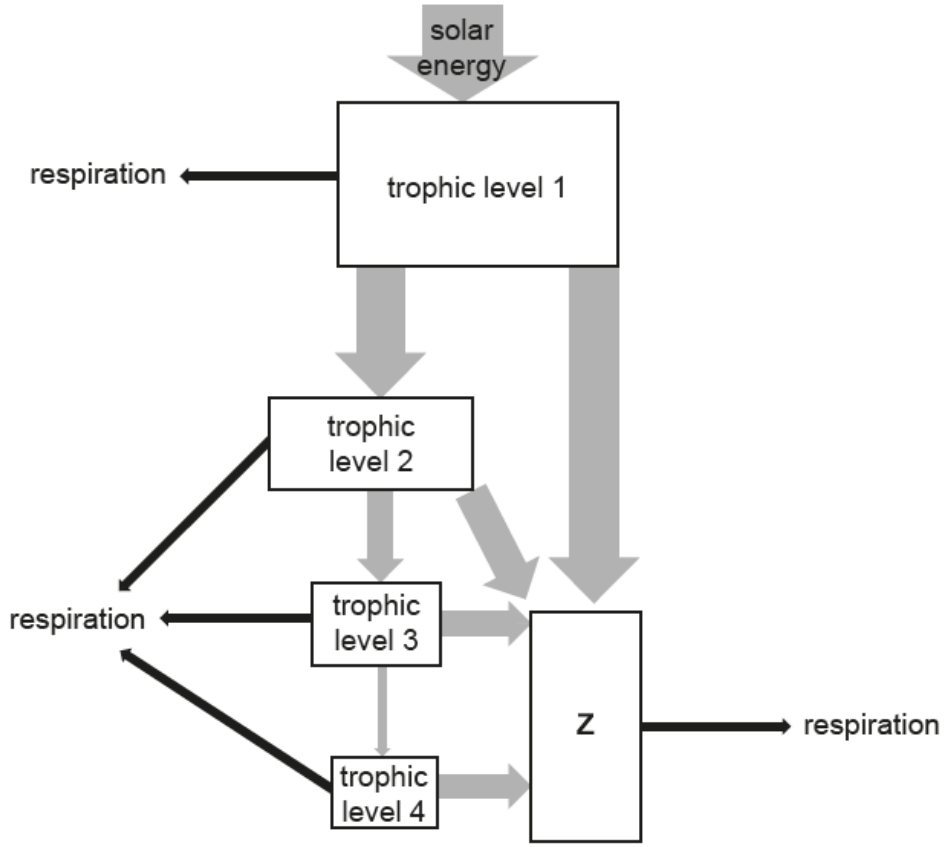


Fig. 3.2

(i) State the term given to the group of organisms represented by **Z** in Fig. 3.2.

..... [1]

(ii) Explain, with reference to Fig. 3.2, why food chains usually have fewer than five trophic levels.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

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(c) Intensive livestock production can be damaging to natural ecosystems.

Fig. 3.3 shows intensive farming of chickens.

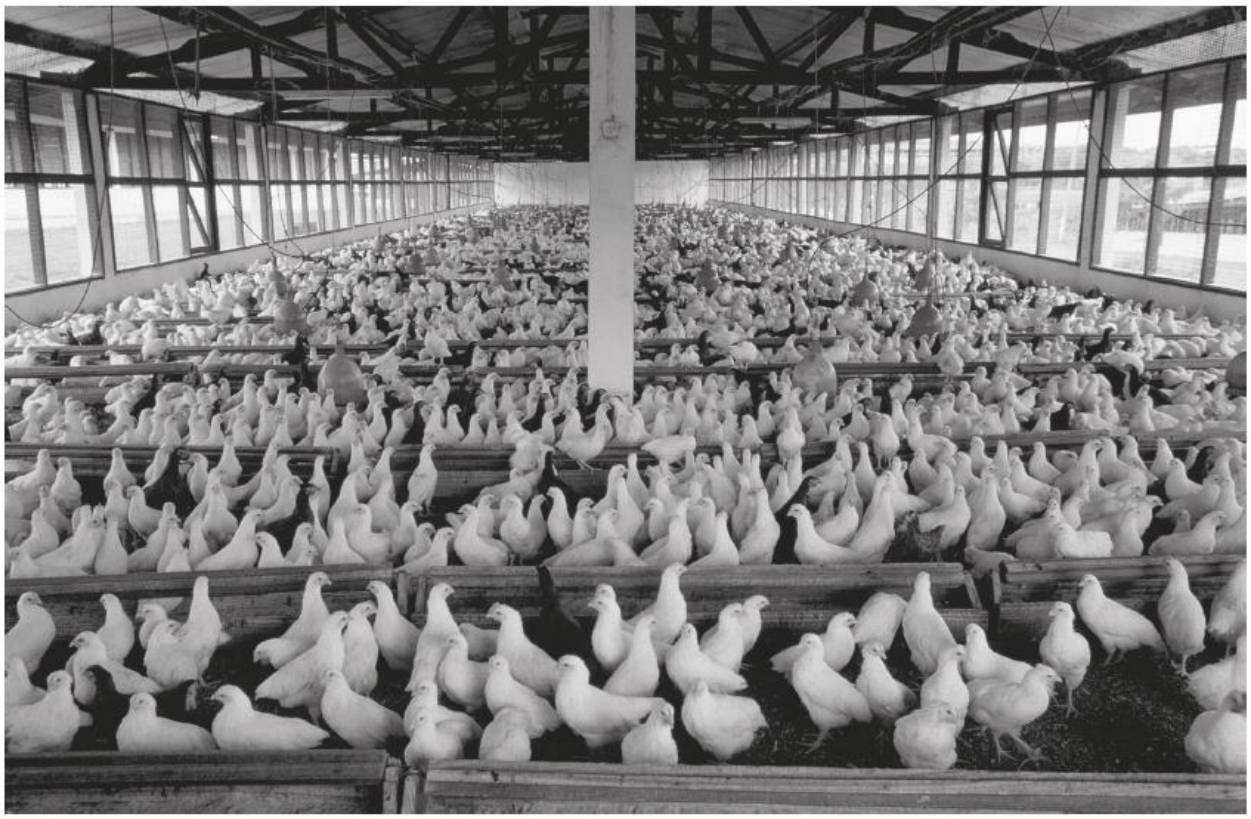


Fig. 3.3

(i) Describe the negative impact on an ecosystem of the intensive production of livestock, such as chickens.

.....

.....

.....

.....

.....

.....

.....

..... [3]

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(ii) Forests are cleared for farmland. Deforestation can lead to a loss of soil (soil erosion).

Explain the effects of soil erosion on ecosystems.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 15]

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19. Nov/2020/Paper_43/No.3

(a) A person ate a meal containing starch and fat.

Fig. 2.1 shows some events that occurred after ingesting this meal.

P	absorption of nutrients in the villi
Q	assimilation of fatty acids in the liver
R	breakdown of large food particles by the teeth
S	movement of small food particles through the oesophagus
T	secretion of amylase from the salivary glands

Fig. 2.1

Put the events in Fig. 2.1 into the correct sequence. One has been done for you.

R				

[2]

(b) The stomach lining contains cells that secrete proteins.

(i) State the names of **two** cell structures that are involved in making or secreting proteins.

1 .....

2 .....

[2]

(ii) State the name of **one** component of gastric juice **and** describe its functions.

.....

.....

.....

.....

.....

.....

.....

[3]

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(iii) There are goblet cells in many parts of the alimentary canal.

State the substance that goblet cells secrete.

..... [1]

(c) Emulsification of fats occurs in the alimentary canal.

(i) Describe the process of emulsification of fats.

.....

.....

.....

.....

..... [2]

(ii) State the name of the organ in the alimentary canal where fats are emulsified.

..... [1]

(iii) State the name of the structure in the villi where digested fats are absorbed.

..... [1]

[Total: 12]

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Organisms and their environment – 2020 IGCSE 0610

1. March/2020/Paper_12/No.35

What is the principal source of energy for living organisms?

A herbivores

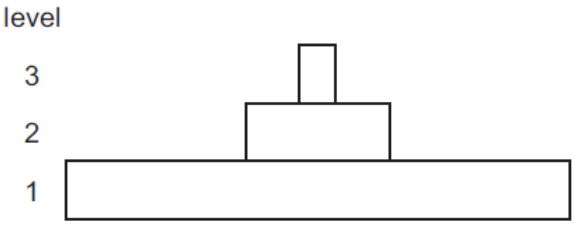
B plants

C photosynthesis

D the Sun

2. March/2020/Paper_12/No.36

The diagram shows a pyramid of numbers.



Which type of organism is found at level 1?

A carnivore

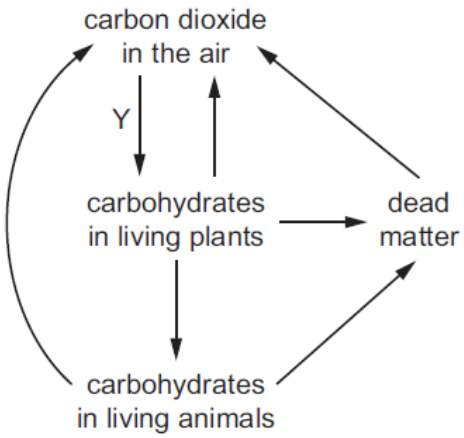
B decomposer

C herbivore

D producer

3. March/2020/Paper_12/No.37

The diagram shows part of the carbon cycle.



Which process occurs at Y?

A combustion

B decay

C photosynthesis

D respiration

4. March/2020/Paper_32/No.5

(a) Fig. 5.1 is a photograph of a giant panda.



Fig. 5.1

State the name of the vertebrate group that giant pandas belong to.

..... [1]

(b) Giant pandas live in mountainous regions in central China.

Researchers estimated the numbers of giant pandas in these areas over several years.

The results are shown in Fig. 5.2.

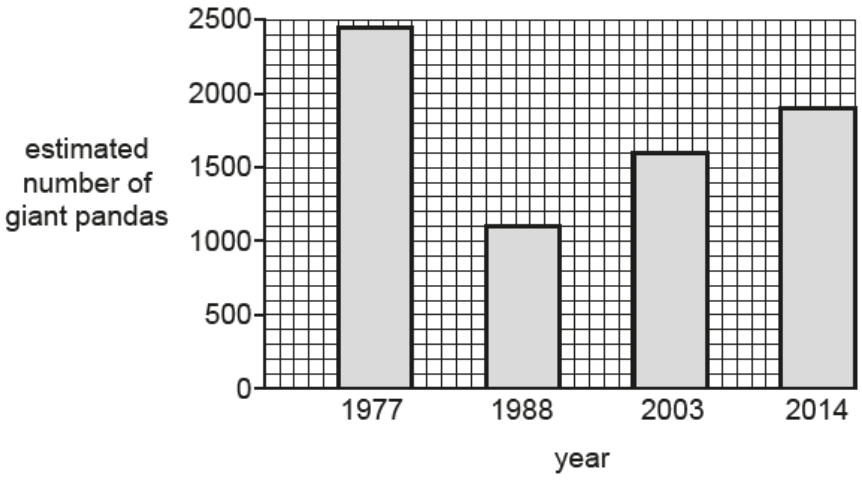


Fig. 5.2

The population of giant pandas was at its lowest in 1988.

(i) State the estimated number of giant pandas in 1988.

..... [1]

(ii) Calculate the change in population size of giant pandas between 1977 and 2014.

..... [1]

(c) In 1988 the population size became so low that giant pandas were considered an endangered species.

Suggest reasons why species such as the giant panda become endangered.

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..... [4]

(d) Giant pandas are no longer endangered due to successful conservation programmes.

Suggest how conservation programmes have helped to increase numbers of giant pandas.

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..... [3]

[Total: 10]

5. June/2020/Paper_11/No.35

The diagram shows a simple food chain.

grass → gazelle → lion

The arrows show the energy flow through the food chain.

Where does the grass obtain its energy?

A oxygen from air

B water

C minerals in soil

D the Sun

6. June/2020/Paper_11/No.36

The diagram shows a food chain in a rock pool.

seaweed → whelks → crabs → seagulls

What will happen if the number of secondary consumers increases?

There will be

A fewer crabs.

B fewer seagulls.

C fewer whelks.

D less seaweed.

7. June/2020/Paper_12/No.31

The photograph shows a tiger.



Which visible adaptive feature makes the tiger a good predator?

A large teeth

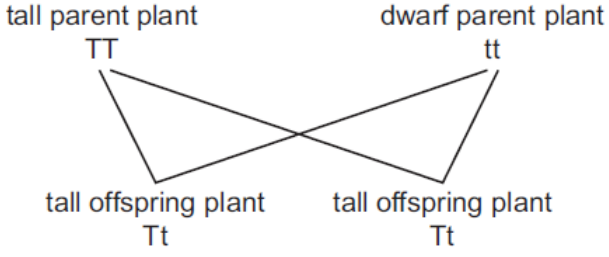
B long whiskers

C small ears

D thick fur

8. June/2020/Paper_12/No.33

The diagram shows the inheritance of height in pea plants.



Which plants have a heterozygous genotype?

A both parent plants

B dwarf parent plant only

C both offspring plants

D tall parent plant only

9. June/2020/Paper_12/No.35

Which is an example of a population?

A all the animals and plants living in a lake

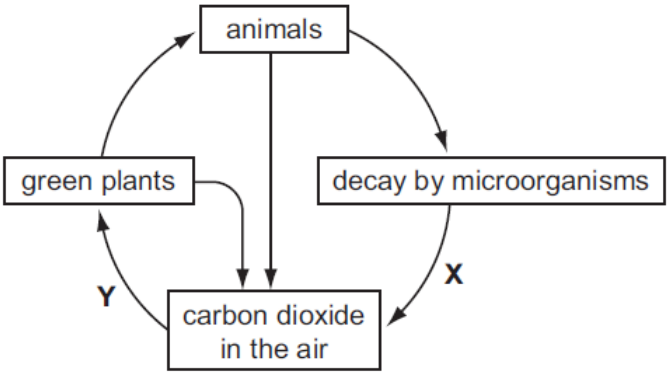
B all the different herbivores in a forest

C all the mahogany trees growing in a forest

D all the species of animals in Africa

10. June/2020/Paper_13/No.35

The diagram shows part of the carbon cycle.



What do **X** and **Y** represent?

	X	Y
A	photosynthesis	respiration
B	photosynthesis	decomposition
C	respiration	decomposition
D	respiration	photosynthesis

11. June/2020/Paper_13/No.36

The diagram shows a food chain in a rock pool.

seaweed → whelks → crabs → seagulls

What will happen if the number of secondary consumers increases?

There will be

A fewer crabs.

B fewer seagulls.

C fewer whelks.

D less seaweed.

12. June/2020/Paper_21/No.35

The diagram shows a food chain in a rock pool.

seaweed → whelks → crabs → seagulls

What will happen if the number of secondary consumers increases?

There will be

A fewer crabs.

B fewer seagulls.

C fewer whelks.

D less seaweed.

13. June/2020/Paper_21/No.36

What is defined as 'all of the populations of different species in an ecosystem'?

A community

B environment

C habitat

D trophic level

14. June/2020/Paper_21/No.39

Which process in the nitrogen cycle is involved in the breakdown of amino acids in living organisms?

A deamination

B decomposition

C denitrification

D digestion

15. June/2020/Paper_22/No.35

The diagram shows a food chain in a rock pool.

seaweed → whelks → crabs → seagulls

What will happen if the number of secondary consumers increases?

There will be

A fewer crabs.

B fewer seagulls.

C fewer whelks.

D less seaweed.

16. June/2020/Paper_22/No.36

What is defined as 'all of the populations of different species in an ecosystem'?

A community

B environment

C habitat

D trophic level

17. June/2020/Paper_23/No.35

The diagram shows a food chain in a rock pool.

seaweed → whelks → crabs → seagulls

What will happen if the number of secondary consumers increases?

There will be

A fewer crabs.

B fewer seagulls.

C fewer whelks.

D less seaweed.

18. June/2020/Paper_43/No.2

(a) Fig. 2.1 shows the human population of a country between 1910 and 2020.

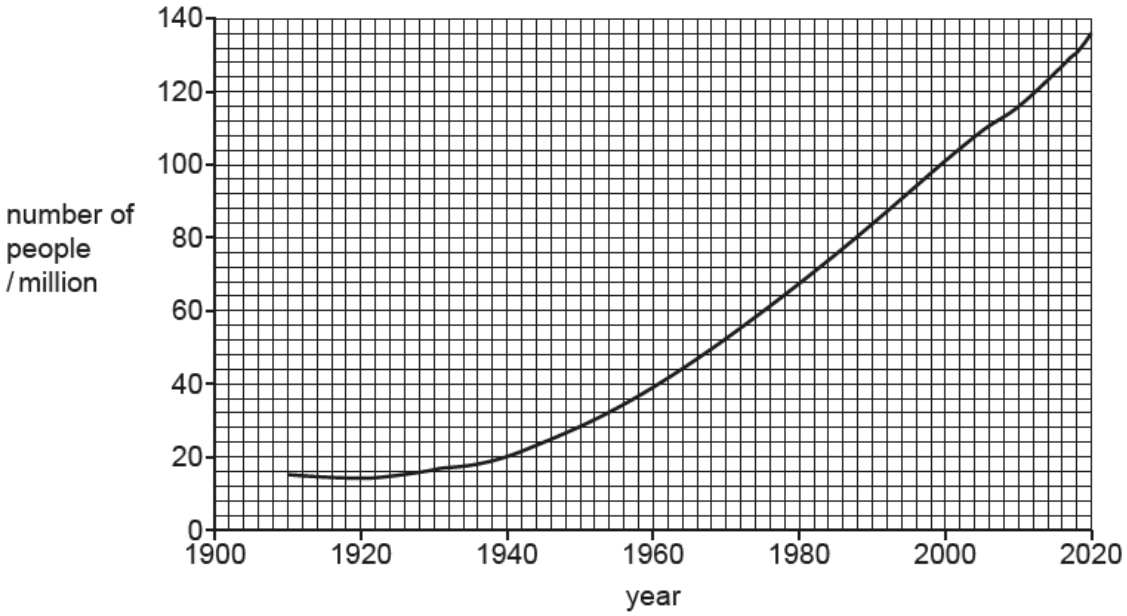


Fig. 2.1

(i) Calculate the percentage increase in the population of the country between 1940 and 2020.

Space for working.

.....%
[3]

(ii) Describe the factors that could cause the change in the population size between 1940 and 2020, shown in Fig. 2.1.

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..... [3]

(b) Some countries have invested in biofuels such as ethanol, biomass and biodiesel.

(i) Describe how ethanol can be made by microorganisms.

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..... [2]

(ii) Some countries use large areas of land to grow maize plants. This crop plant can be used to produce biofuels.

Discuss the negative impact on the **environment** of growing large-scale monocultures of crop plants such as maize.

.....

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..... [4]

[Total: 12]

15. Relationships of organisms with one another and with the environment

Content

15.1 Energy flow
15.2 Food chains and food webs
15.3 Carbon cycle
15.4 Nitrogen cycle
15.5 Parasitism
15.6 Effects of humans on the ecosystem
15.7 Pollution
15.8 Conservation

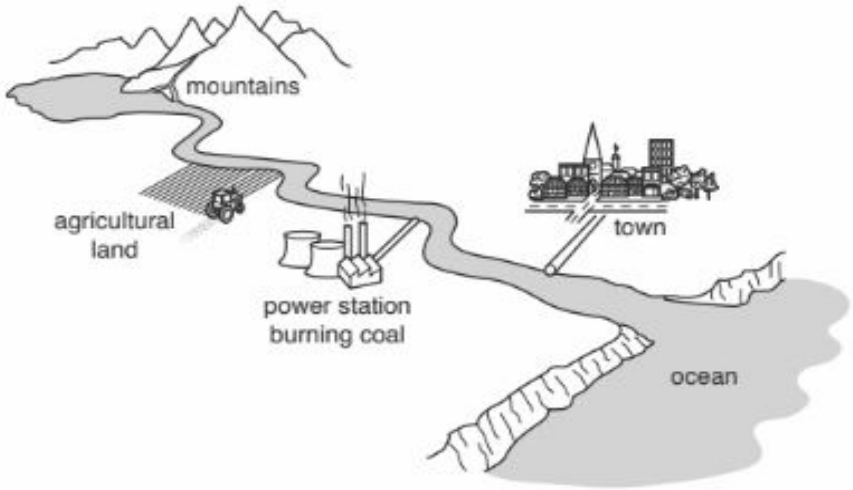
Learning outcomes

Candidates should be able to:

(a) state that the Sun is the principal source of energy input to biological systems
(b) describe the non-cyclical nature of energy flow
(c) define the following terms and establish the relationship of each in food webs:
• *producer* – an organism that makes its own organic nutrients, usually using energy from sunlight through photosynthesis
• *consumer* – an organism that gets its energy by feeding on other organisms
• *herbivore* – an animal that obtains its energy by eating plants
• *carnivore* – an animal that obtains its energy by eating other animals
• *decomposer* – an organism that obtains its energy from dead or waste organic matter
• *food chain* – a chart showing the flow of energy (food) from one organism to the next, beginning with the producer (e.g. mahogany tree → caterpillar → songbird → hawk)
(d) describe energy losses between trophic levels and infer the advantages of short food chains
(e) describe and interpret pyramids of numbers and of biomass
(f) describe and state the importance of the carbon cycle
(g) describe the nitrogen cycle in making available nitrogen for plant and animal protein, including the role of
bacteria in nitrogen fixation, decomposition and nitrification (details of denitrification and the names of individual bacteria are **not** required)
(h) understand the role of the mosquito as a vector of disease
(i) describe the malarial pathogen as an example of a parasite and describe the transmission and control of
the malarial pathogen (details of the life cycle of the pathogen are **not** required)
(j) describe the effects of humans on the ecosystem with emphasis on examples of international importance (tropical rainforests, oceans and important rivers)
(k) describe the consequences of deforestation in terms of its effects on soil stability, climate and local human populations
(l) evaluate the effects of:
water pollution by sewage, by inorganic waste and by nitrogen-containing fertilisers
air pollution by greenhouse gases (carbon dioxide and methane), contributing to global warming
air pollution by acidic gases (sulfur dioxide and oxides of nitrogen), contributing to acid rain
pollution due to insecticides
(m) discuss reasons for conservation of species with reference to maintenance of biodiversity, management
of fisheries and management of timber production
(n) discuss reasons for recycling materials, with reference to **named** examples.

O/N18/21/Q6

The diagram shows the location of several features close to a river that runs from mountains into the ocean.



(a) Describe and explain the possible harmful effects of human activity on the environment at each of the following locations:

the agricultural land, ...

.....

.....

.....

.....

the power station. .....

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..... [6]

(b) Suggest ways in which people in the town could make changes to their activities in order to reduce the harmful impact that they have on the environment.

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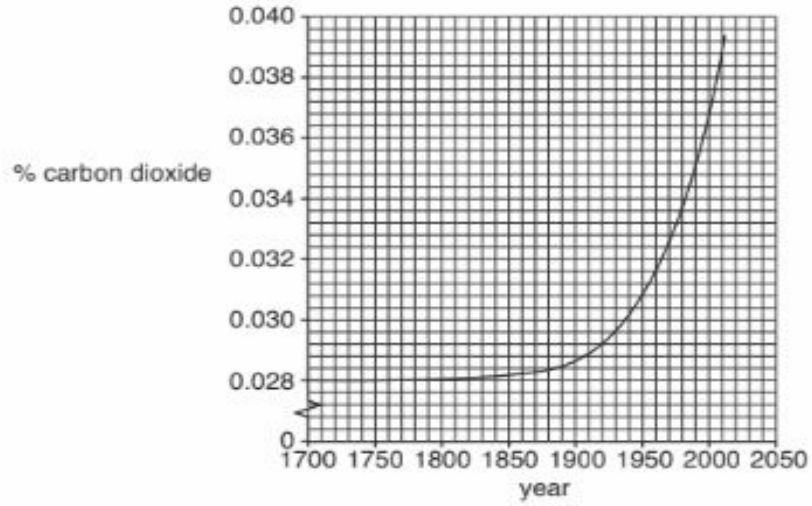
..... [4]

[Total: 10]

ECOSYSTEM AND THE ENVIRONMENT P2 QUESTIONS

O/N18/22/Q6

The graph shows how the percentage of carbon dioxide in the atmosphere has changed since the year 1700.



(a) Explain how human activity is likely to have contributed to the change in the percentage of carbon dioxide.

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.....[5]

(b) Describe and evaluate the effects of this change in the percentage of carbon dioxide.

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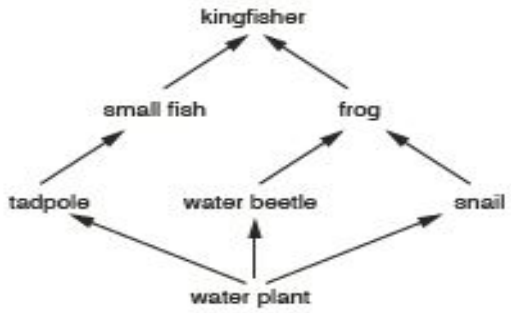
.....[5]

[Total: 10]

ECOSYSTEM AND THE ENVIRONMENT P2 QUESTIONS

M/J18/21/Q1

The diagram shows a food web in a pond.



(a) (i) Complete the table by writing the correct number of organisms for each statement about the food web. The first number has been written for you.

statement	number
the number of producers	1
the number of consumers	
the number of herbivores	
the number of carnivores	
the number of food chains	

[4]

(ii) Draw and label a pyramid of biomass for one food chain from the food web.

[2]

(b) The pond may become polluted by fertilisers containing nitrogen.

Explain how this pollution might affect the population of frogs in the pond.

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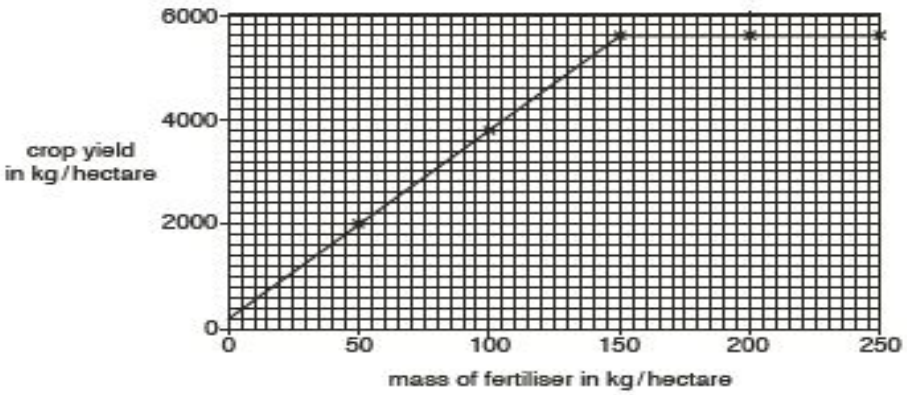
.....

.....[4]

[Total: 10]

M/J18/22/Q4

The graph shows the effect on crop yield (amount harvested) of using fertilisers that contain nitrogen.



(a) (i) Use the information in the graph to describe the effect on crop yield of using an increasing mass of fertiliser.

.....

.....

.....[3]

(ii) The nitrogen in the fertiliser is in the form of nitrates.

Describe how the nitrogen in the fertiliser is absorbed by crop plants and used to give an increased yield.

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.....[3]

(iii) Suggest and explain why a farmer may decide to use a mass of fertiliser per hectare which is less than that needed for a maximum crop yield.

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.....

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.....[3]

(b) Name one type of mineral ion, other than nitrate, that is required by a plant and state its importance to the plant.

type of mineral ion .....

importance to plant .....

.....

[2]

[Total: 11]

O/N17/21/Q3

Fig. 3.1 shows the flow of energy within a biological system.

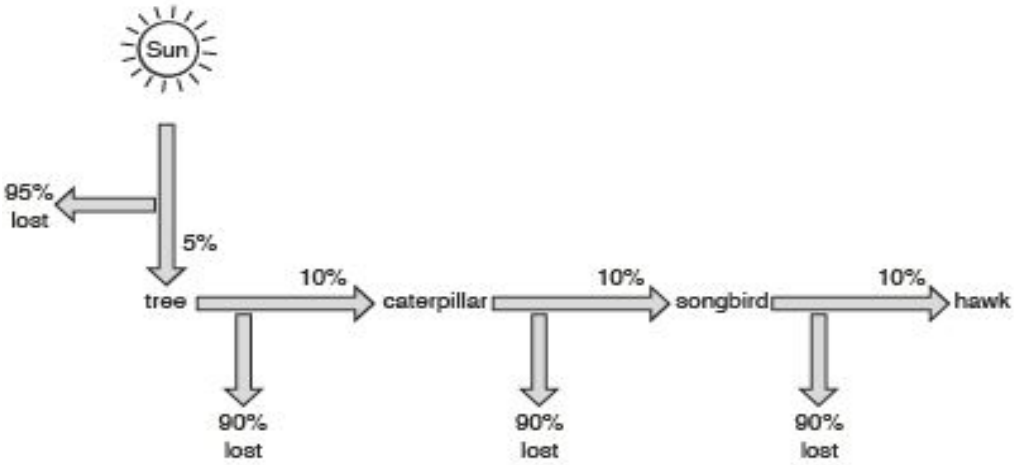


Fig. 3.1

(a) (i) Name the type of chart shown in Fig. 3.1.

.....

[1]

(ii) Name one example, shown in Fig. 3.1, of each of the following types of organism.

producer .....

carnivore .....

[2]

(b) (i) Suggest why only 5% of the energy from the Sun passes to the tree.

.....

.....

.....

.....[2]

(ii) Describe how energy is lost between the songbird and the hawk.

.....

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.....[3]

(c) Fig. 3.2 shows two possible uses of the same area of land to produce food.

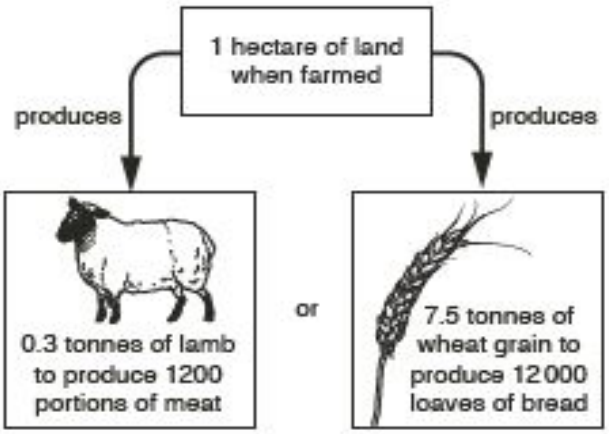


Fig. 3.2

Use the information in Fig. 3.1 and Fig. 3.2, and your own knowledge, to explain why it is possible to feed a greater number of people if the area of land is used to farm crops rather than to farm animals.

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.....[5]

[Total: 13]

O/N17/22/Q4

4 Fig. 4.1 shows the relationships between a number of organisms living together in a South American rainforest.

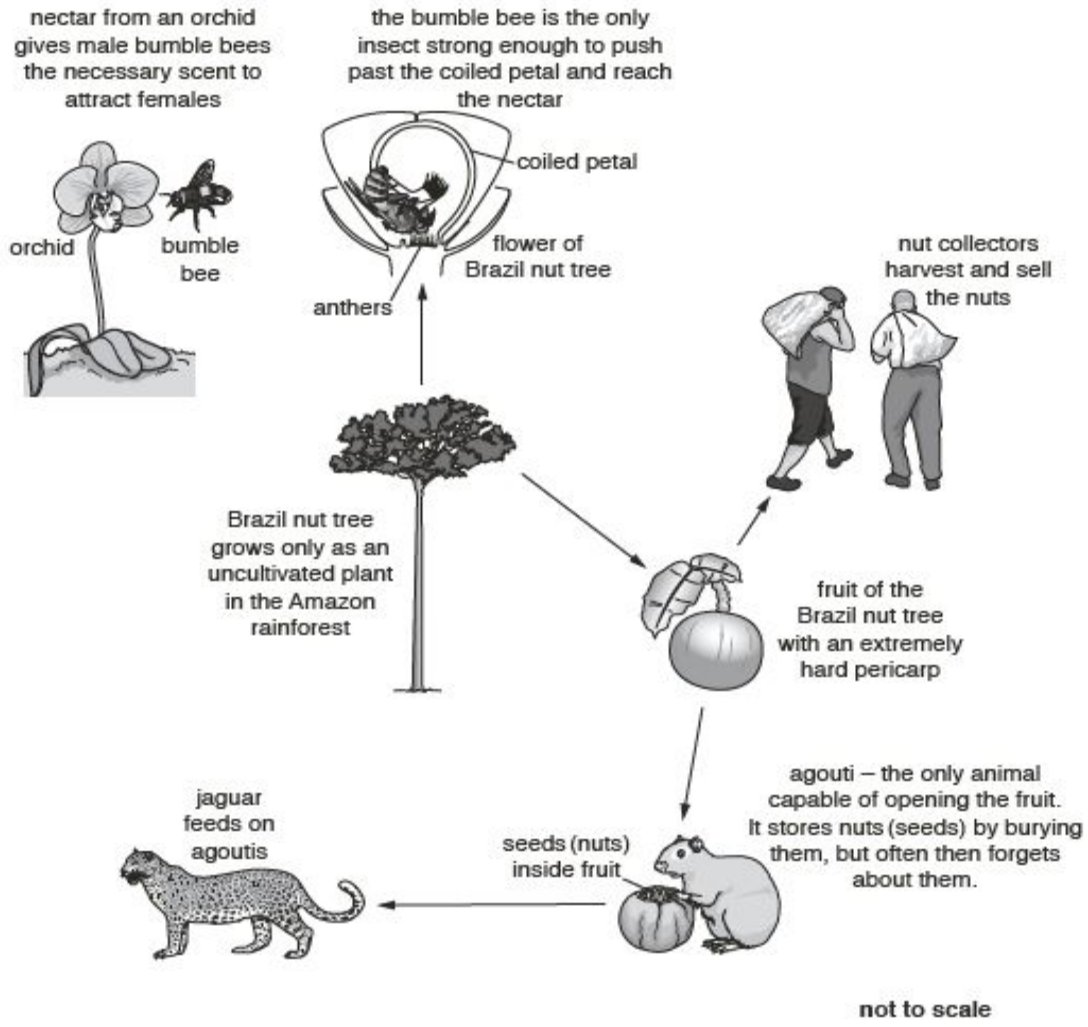


Fig. 4.1

(a) Fig. 4.2 is an incomplete food web for these organisms. Complete Fig. 4.2 by:

- writing the name of an organism in each box,
- completing the arrows to show the flow of energy.

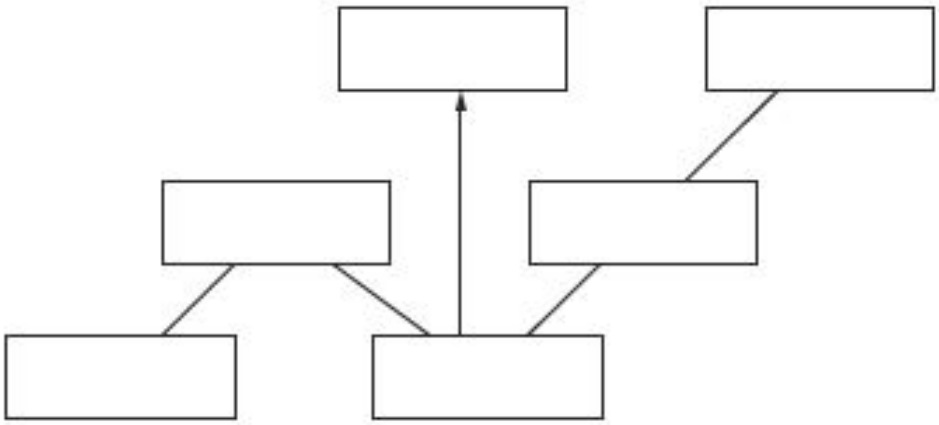


Fig. 4.2

[4]

(b) Name the type of seed dispersal found in the Brazil nut tree. Give a reason for your answer.

.....

.....[2]

(c) Suggest the possible effects on the community in the rainforest if the orchids were killed by disease.

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.....[6]

[Total: 12]

M/J17/22/Q8

This is a simple food chain:

tree → insect → bird → fox

(a) Draw and label a pyramid of biomass for this food chain.

[2]

(b) Explain why only a small proportion of the energy in the insects passes to the birds.

.....

.....

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.....

.....

.....[4]

(c) The foxes are infested with fleas (small, blood-sucking insects).

Draw and label a pyramid of numbers for the complete food chain **including** the fleas.

[4]

[Total: 10]

M/J17/22/Q9

(a) Explain the measures taken, excluding the use of drugs, to reduce the spread of malaria.

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.....[6]

(b) Quinine was the only drug that was successfully used to protect against malaria until the 1920s.

Suggest why quinine has largely been replaced by more recently-discovered drugs.

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.....[4]

[Total: 10]

O/N16/21/Q9

(a) Discuss reasons for the conservation of species with reference to the management of fisheries.

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..... [4]

(b) Describe the consequences of deforestation.

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..... [6]

[Total: 10]

O/N16/22/Q5

Sweet clover is a member of the pea and bean family (leguminous plants) that grows amongst grass in fields used for cattle feed.

(a) Explain how sweet clover can improve the soil in which it grows.

.....

.....

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.....[2]

(b) As sweet clover dries, fungi that grow on it produce a chemical (dicoumarol) that prevents blood from clotting.

Suggest a protein that cattle which eat sweet clover affected by such fungi might be unable to produce.

..... [1]

(c) Dicoumarol has been used for many years as a constituent in a form of rat poison.
Fig. 5.1 shows the change in the LD_{50} for dicoumarol in rats from 2000 to 2015.
The LD_{50} is a measure of the amount of poison that will kill 50% of the rats that consume it.

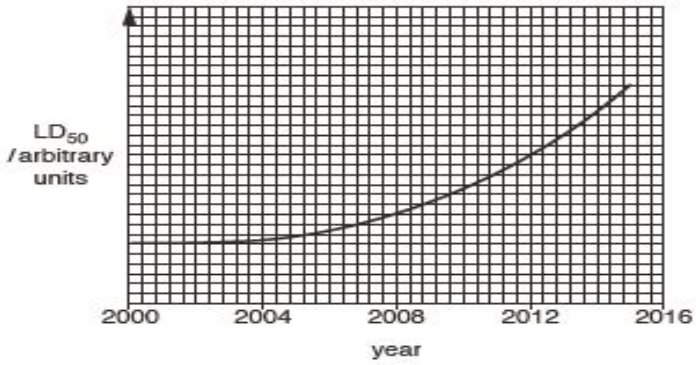


Fig. 5.1

(i) Describe the change in the LD_{50} for dicoumarol in rats from 2000 to 2015.

.....

.....

.....

.....[2]

(ii) Suggest an explanation for the change you have described.

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.....[4]

[Total: 9]

M/J16/21/Q5

Malaria is a disease caused by a parasite that is transmitted from one person to another by a vector.

(a) Name the vector of the parasite that causes malaria.

..... [1]

(b) **(i)** Spread of the vector may be controlled by using an insecticide.

State **two** other ways of controlling the spread of the vector.

1 .....

.....

2 .....

..... [2]

(ii) Resistance to the insecticide can appear in the vector population.

Describe how the process of natural selection may bring about resistance of the vector to insecticide.

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..... [4]

[Total: 7]

M/J16/21/Q7

(a) Describe how the nitrogen cycle makes nitrogen in the air available for both plant and animal protein.

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..... [6]

(b) Nitrogen can also be made available in the form of nitrogen-containing fertilisers. Describe the possible effects of using nitrogen-containing fertilisers on each of the following:

the production of crops by farmers,

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the environment.

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..... [6]

[Total: 10]

O/N15/22/Q2

Fig. 2.1 shows a sloth. The sloth is a mammal that lives in the trees of the South American rainforests.



Fig. 2.1

Sloths have the following features:

- They are extremely slow moving.
- Some tear leaves from trees using their lips and the teeth at the back of their mouths.
- They have no front teeth.
- They climb down the tree to deposit their faeces in a hole they dig near the foot of the tree.
- They lose over a quarter of their body weight when they defaecate, which may be once every 6–8 days.
- Their fur is often green since it contains single-celled, plant-like organisms (algae).
- Their fur also contains blood-sucking mosquitoes and many small animals such as adult moths that feed on the algae and on the hair of the sloth.
- Moths lay their eggs in the faeces of the sloth on which the moth larvae feed.
- The major predators of the sloth are jungle cats and the harpy eagle.

(a) The structure and functions of the regions of the sloth's alimentary canal are generally similar to those of a human.

(i) Suggest which type of front teeth are likely to be absent in the mouth of the sloth.

.....[1]

(ii) One region of the sloth's alimentary canal is proportionally much larger than the same part in humans. Suggest which part and give a reason for your answer.

part .....

reason .....

.....

.....[2]

(b) Complete the food web in Fig. 2.2 to show the feeding relationships of the organisms mentioned on page 4.

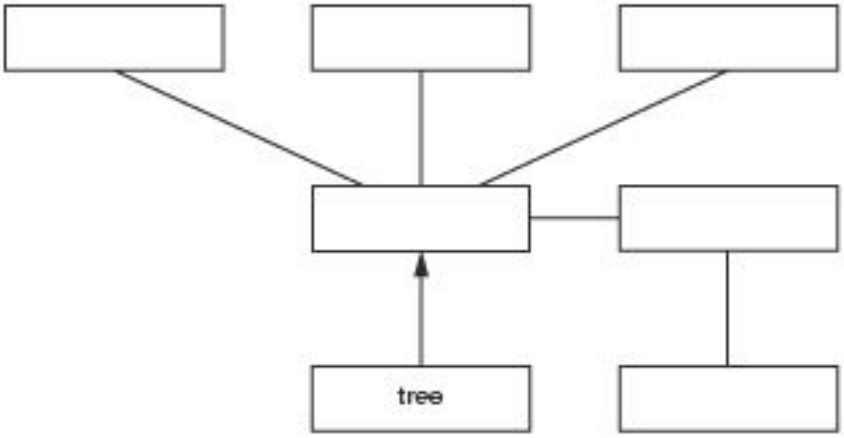


Fig. 2.2

[4]

(c) Suggest and explain an advantage to the slothe of each of the following:

(I) the algae that live in their fur

.....

.....

.....

.....[2]

(II) burying their faeces at the foot of the trees in which they live.

.....

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.....

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.....[3]

[Total: 12]

O/N15/22/Q5

Fig. 5.1 shows some human activities that have an effect on the environment.

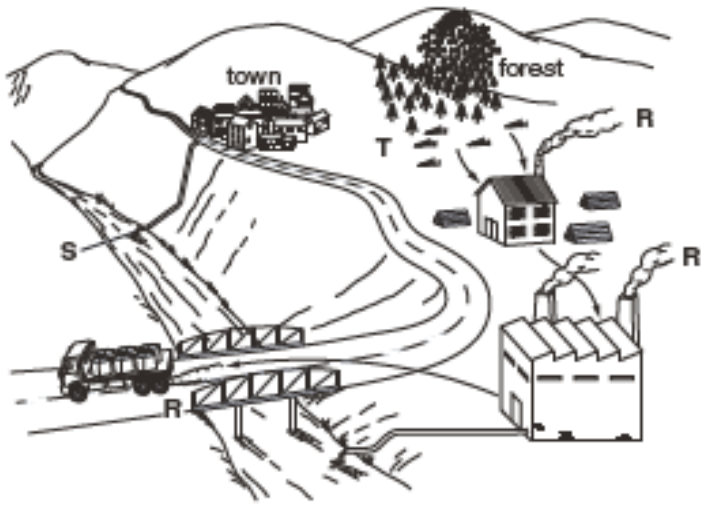


Fig. 5.1

(a) Name **two** gases, other than carbon dioxide, released at **R** that are harmful to the environment. For each gas, state the harm that it causes.

gas 1 .....

harm caused .....

.....

gas 2 .....

harm caused .....

.....[4]

(b) Explain how recycling could prevent the damage caused to the environment at **S** and **T**.

at **S** .....

.....

.....

at **T** .....

.....

.....[3]

[Total: 7]

M/J15/21/Q5

Fig. 5.1 shows some of the interactions that take place in an aquatic ecosystem.

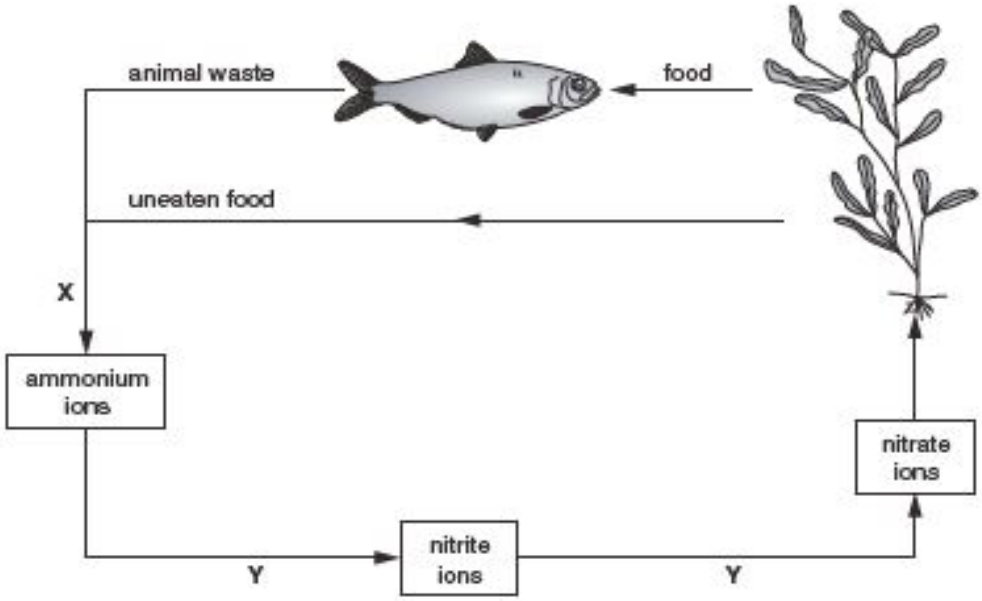


Fig. 5.1

(a) (I) Use the information in Fig. 5.1 to state each of the following:

the trophic level of the aquatic plant

.....

the trophic level of the fish

.....

the chemical element being cycled in this ecosystem.

..... [3]

(II) Explain **one** way, other than for food, that the fish may depend on the aquatic plant.

.....

.....

.....

..... [2]

(b) (I) Name each of the processes represented by the letters **X** and **Y**.

process **X** .....

process **Y** ..... [2]

(II) Name **one** type of microorganism that will carry out **both** process **X** and process **Y**.

..... [1]

(III) Explain how aquatic plants take up nitrate ions from their surroundings.

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..... [3]

(c) Suggest what effect pollution by nitrogen-containing fertilisers might have on this ecosystem.

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..... [2]

[Total: 13]

O/N14/22/Q8

(a) (I) Give an example of a food chain involving **four** named organisms.

(II) Draw and label a pyramid of numbers for your food chain.

[4]

(b) Explain how energy is lost along a food chain.

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..... [6]

[Total: 10]

M/J14/21/Q5

Fig. 5.1 shows a food chain.



Fig. 5.1

(a) (I) Name the trophic level of each of the following organisms in the food chain shown in Fig. 5.1.

tree .....

caterpillar..... [2]

(II) In the space below, draw a pyramid of biomass for the food chain shown in Fig. 5.1. Label each of the trophic levels.

[2]

(III) Describe how the pyramid of numbers for the food chain shown in Fig. 5.1 would differ from the pyramid of biomass. Give an explanation for your answer.

.....

.....

.....

.....[2]

(b) Some farmers keep animals that they will sell for people to eat. Suggest why these farmers may restrict the activity of these animals and keep the surrounding temperature close to the body temperature of the animals.

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.....[4]

[Total: 10]

O/N13/21/Q4

Fig. 4.1 shows a field near an industrial site.

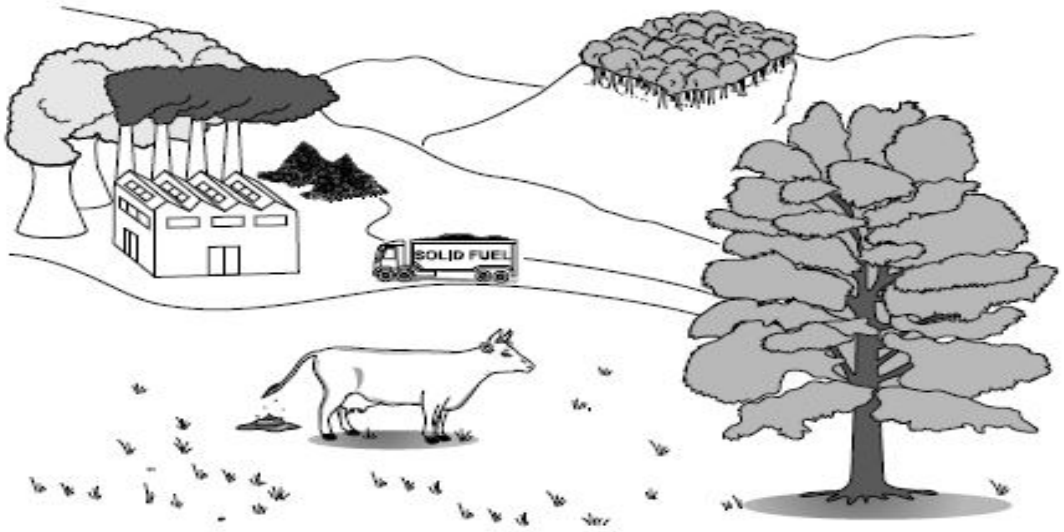


Fig. 4.1

(a) State **two** products released from the factory into the air, that form part of the carbon cycle.

1 .....

2 ..... [2]

(b) Suggest the part played by the trees and the grass in the recycling of water.

.....

.....

.....

.....

.....

..... [3]

(c) Suggest how the cow and the factory are involved in returning nitrates to the soil.

the cow .....

.....

.....

.....

.....

the factory .....

.....

.....

.....

..... [4]

[Total: 9]

O/N13/21/Q9

(a) Describe how pyramids of numbers differ from pyramids of biomass.

.....

.....

.....

.....

.....

.....

.....

..... [3]

(b) Describe the ways in which energy is gained and lost between members of a food chain.

energy gained .....

.....

.....

.....

.....

.....

energy lost .....

.....

.....

.....

.....

..... [7]

[Total: 10]

M/J13/21/Q9

(a) Malaria is a disease caused by a parasite called *Plasmodium*. The mosquito is the vector of this parasite.

Define the terms *parasite* and *vector*.

parasite

.....

.....

.....

.....

vector

.....

.....

.....

.....

[4]

(b) Explain how the spread of malaria may be controlled. Refer to **both** *Plasmodium* and the mosquito in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

[Total: 10]

O/N12/22/Q9

(a) Explain what is shown by a pyramid of biomass.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

(b) Explain how, for the same organisms, a pyramid of numbers can differ from a pyramid of biomass.

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 10]

M/J12/21/Q8

(a) Describe ways in which farmers can reduce the risk of water pollution.

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(b) With reference to **named** examples, describe the reasons for recycling materials.

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

[Total: 10]

M/J12/22/Q7

(a) Explain what is meant by the term *pyramid of numbers*.

[4]

(b) Explain the fact that energy flow is non-cyclical.

[6]

[Total: 10]

O/N11/21/Q4

Fig. 4.1 shows the percentage of plants surviving over many thousands of years. During that time, the environment was becoming drier.

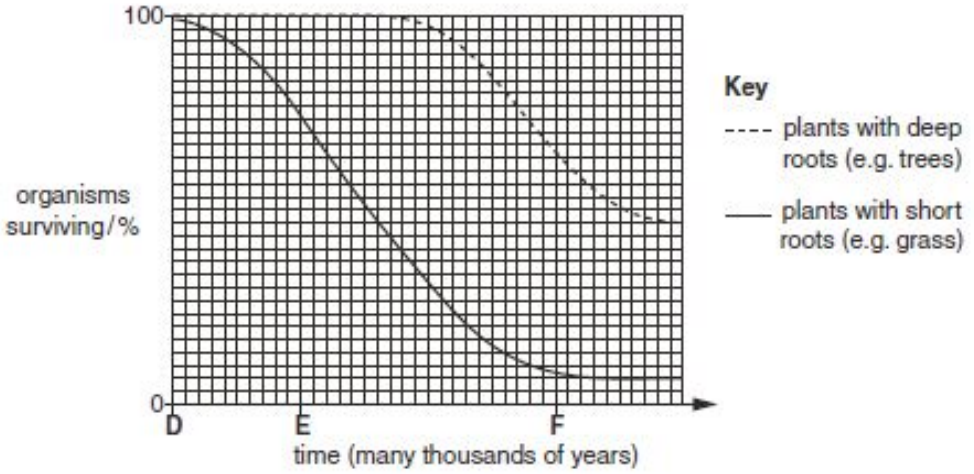


Fig. 4.1

(a) Explain why the number of grass plants is declining more rapidly than the trees at time **E**.

.....

.....

.....

.....[4]

(b) Explain why the variety of types of herbivore was greatest at time **D**.

.....

.....

.....

.....[2]

Fig. 4.2 shows the lengths of the necks of a particular species of herbivore at times **E** and **F**.

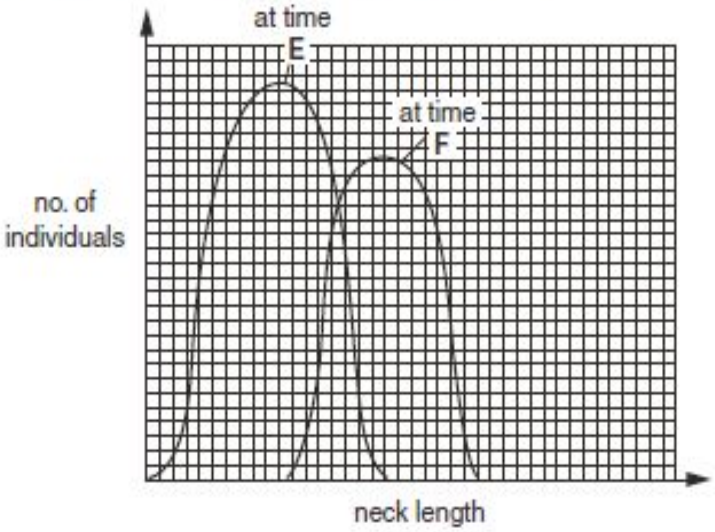


Fig. 4.2

(c) (i) Describe what the graph shows about the herbivores at time **F** compared with those at time **E**.

.....

.....

.....[2]

(ii) Suggest an explanation for the change in neck length of the herbivore between times **E** and **F**.

.....

.....

.....

.....

.....

.....

.....[1]

[Total: 9]

ECOSYSTEM AND THE ENVIRONMENT P2 QUESTIONS

M/J11/21/Q7

(a) Describe how processes that occur in a green leaf play a part in the carbon cycle.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[7]

(b) Explain why varying the light intensity does not always alter the rate of photosynthesis in a plant.

.....

.....

.....

.....

.....

.....[3]

[Total: 10]

M/J11/22/Q3

Fig. 3.1 shows energy flow in a habitat.

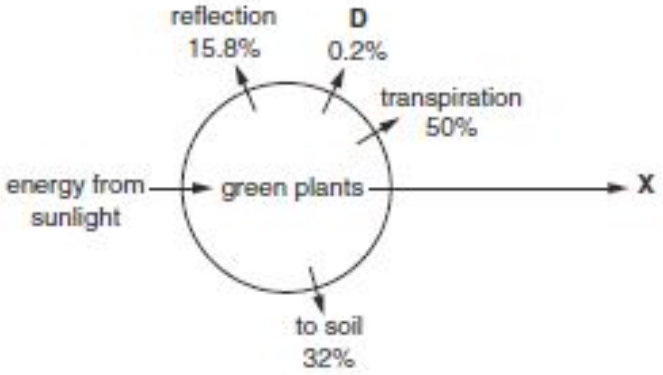


Fig. 3.1

(a) (I) Suggest the identity of **X** in Fig. 3.1. .....[1]

(II) State the form in which energy passes from the green plants to **X**.

.....[1]

(III) Calculate the percentage of energy passing to **X**.

.....[1]

(b) State the name of the process **D** in Fig. 3.1 .....[1]

(c) (I) Describe how energy passes into the soil and is then released.

.....

.....

.....

.....

.....[3]

(II) Suggest how the release of this energy is useful to seeds in the soil.

.....

.....

.....

.....[2]

[Total: 9]

ECOSYSTEM AND THE ENVIRONMENT P2 QUESTIONS

Mark schemes will use these abbreviations:

; separates marking points

/ alternatives

() contents of brackets are not required but should be implied

R reject

A accept (for answers correctly cued by the question, or guidance for examiners)

Ig ignore (for incorrect but irrelevant responses)

AW alternative wording (where responses vary more than usual)

AVP alternative valid point (where a greater than usual variety of responses is expected)

ORA or reverse argument

underline actual word underlined must be used by candidate

+ statements on both sides of the

+ are needed for that mark

O/N18/21/Q6

6(a) (agricultural land) max 4 marks from

insecticides / pesticides / fertilisers ;

into river / ocean / water ;

eutrophication AW ;

contamination of drinking water ;

soil erosion / leaching / run-off ;

* burning

+ fossil fuels / named fossil fuel ;

* release of carbon dioxide / monoxide ;

* global warming / greenhouse effect or gas ;

* death of river or marine life ;

(power station) max 4 marks from

* burning

+ fossil fuels / named fossil fuel ;

* release of carbon dioxide / monoxide ;

* global warming / greenhouse effect or gas ;

* death of river or marine life ;

release of sulfur dioxide / oxides of nitrogen ;

acid rain ;

increase in water temperature ;

* A once only for agricultural land or power

station

6(b) reduce / recycle / re-use ;

max 3 marks from list of examples

glass / metal / plastic / water / fishing / use of cars or catalytic converters /

effluent / carrier bags / greenhouse emissions / fossil fuels / oil / sewage / plant

trees / renewable energy ;

O/N18/22/Q6

6(a) rise in population ;

any named human invention requiring an energy supply ;

burning / combustion ;

fossil fuels / coal / oil / gas ;

production / release+ of carbon dioxide ;

deforestation / fewer trees / fewer plants ;

less / no+ absorption / uptake / use

+ of carbon dioxide ;

less / no+ photosynthesis ;

decomposition / decay ;respiration

6(b) greenhouse+ gas / effect ;global warming ;any three further marks from:

• extreme weather AW / flood / drought / storms AW / heat waves ;

• loss of+ homes / habitat / life / crops / land / soil / food / income ;

• ice melting ;

• rise in sea levels ;

• migration ;

• invasive species more successful ;

• extinction ;

• water AW

+ warms / changed currents / acidified / oxygen depletion ;

• hanged distribution

+ disease / vectors of disease (e.g. mosquito) ;

M/J18/21/Q1

1(a)(i) (1)
6 **;**
3 **;**
3 **;**
3 **;**
4
1(a)(ii) correct shape **;**
correct labels **;**
2
1(b)
more plants / growth of plants / more leaves / algal bloom **AW ;**
eutrophication **;**
reference to nitrate production for
protein **;**
decomposition **/** O_2 used **or**
respiration by bacteria **;**
more food for water beetle / snail **;** less food for water beetle / snail **;**
more food for frogs **;** less food for frogs **;**
population of frogs increases **;** population of frogs decreases **;**
4

M/J18/22/Q4

4(a)(i) **1** no fertiliser **+** yield is 200 (kg / hectare crop yield) **;**
2 increased / more crop yield **;**
3 reference to 150 (kg / hectare fertiliser) **or** 5600 (kg / hectare crop yield) **;**
4 high fertiliser / above 150 **+** no increase in crop yield **;**
3
4(a)(ii) **1** root hair **;**

2 active transport / against concentration gradient / diffusion / down concentration gradient **;**
3 production **AW** of **+** amino acids / protein **;**
4 increased **AW +** growth **;**
3
4(a)(iii) **1** run-off / leaching **AW ;**
2 eutrophication **or** correct description of process **;**
3 harm to animals **;**
4 high cost / expensive **;**
5 possible economic return not beneficial over increased cost **AW ;**
3
A harm to named animal / 'aquatic life'

O/N17/21/Q3

3(a)(i) food chain **; 1**
3(a)(ii) tree **;**
songbird / hawk **;**
2 A named tree
3(b)(i) doesn't hit leaves / tree **OR** intercepted by other objects **;**
reflected (off leaves) **;**
not used in photosynthesis **;**
2
3(b)(ii) movement / flight **;**
excretion **;**
egestion / faeces **;**
sound / singing **;**
heat / maintaining body temp / warm blooded **;**
respiration **;**
hawk doesn't eat / digest all of songbird(s) **OR**
songbird(s) decay(s) **;**
3
3(c) more food produced **;**
comparative data manipulation **;**
fewer levels in food chain **AW ;**
correct reference to herbivore / carnivore **+** human **;**
correct reference to primary / secondary **+** consumer **;**
less energy lost / more efficient **;**
example of energy not lost (e.g. through movement) **ORA ;**
5 A quote from Fig. 3.2 (e.g. 12 000 loaves vs. 1200 portions of meat)
A 25· more mass / 10· more food products (for wheat)

O/N17/22/Q4

4(a) **Top line** (LHS) humans **AW** / nut collectors **+** (RHS) jaguars **;**
Middle line (LHS) bees **+** (RHS) agoutis **;**
Lower line (LHS) orchids **+** (RHS) (brazil nut) tree **;**
4 four arrow heads drawn **+** all pointing upwards **;**
4 A singular or plural for all names
LHS = Left Hand Side
RHS = Right Hand Side
Ig contents of boxes for point **4**
4(b) animal **;**

agoutis / humans **AW** / nut collectors **;**
2
4(c) **1** less nectar **;**
2 male bees **+** lack scent **;**
3 female bees **+** not attracted **;**
4 less reproduction of bees **;**
5 less pollination **+** of trees **;**
6 less trees **;**
7 less nut / fruit production **;**
8 loss of jobs (for humans) / negative economic impact **AW ;**
9 less food for agoutis **;**
10 death / reduced population **+** of agoutis **OR** agoutis seek other food **;**
11 less food for jaguars **;**
12 death / reduced population **+** of jaguars **OR** jaguars seek other food **;**

M/J17/22/Q8

8(a) standard pyramid shape with 4 levels **;**
correctly labelled 'tree' **+** 'insect' **+** 'bird' **+** 'fox' **;**
2
8(b) **1** not all insects / not all parts of insect **+** eaten (by birds) **;**
2 (therefore) energy remains in insects (not eaten) **;**
3 not all parts of insect digested / some lost as faeces / egested (by birds) **;**
4 (insects) release **AW** energy in respiration **;**
any **two** uses of energy (by insects) from the following:
5 (electrical) impulses **;**
6 active transport **;**
7 movement / muscle contraction **;**
8 heat (production / loss) **;**
4
8(c) **1** pyramid with 5 levels **+** 'flea' level at top **;**
2 'flea' level larger than **+** immediately above 'fox' level **;**
3 'fox' level smaller than **+** immediately above 'bird' level **;**
4 'bird' level smaller than **+** immediately above 'insect' level **;**
5 'tree' level at bottom **+** of smallest width **;**
4 each level referred to in a marking point
must be labelled to gain credit

M/J17/22/Q9

9(a) (to discourage insects from biting)
1 insect repellent **;**
2 long-(sleeved) clothes **;**
3 nets on / close **+** doors / windows **;**
4 nets **+** over beds / while sleeping **;**
5 paint walls white **;**
(to kill insects / mosquitoes)
6 insecticides / pesticides / reference to fogging / electric insect killer **;**
7* mosquito coils **;**
8 irradiated / sterile male mosquitoes **;**
(to prevent mosquitoes laying eggs / reproducing **OR** to kill larvae)
9 drain ponds / remove stagnant **AW** water / use closed water tanks **;**

10 (spray) oil / insecticide on ponds **;**
11 stock ponds / lakes with fish **;**
12 use of Bti / *Bacillus thuringiensis (israelensis)* **;**
6
9(b) **1** exposure to / used for **+** a long time / years / decades **;**
2 mutation **;**
3 natural selection **;**
4 resistance (to quinine) **;**
5 (quinine) no longer as effective / recent drugs more effective **;**
6 reference to plasmodium / parasite **;**
7 new drugs cheaper / more easily available / fewer side effects **;**

O/N16/21/Q9

9(a) (to maintain) food stocks (of that species) **;**
farming / maintaining a particular species **;**
provides employment / for financial benefit **AW ;**
reference to maintenance of
biodiversity **/** interrelationship between organisms **;**
reduction in over-fishing of particular species in the
wild **;**
prevent extinction **;**
for re-stocking natural
populations / sustainability / continuity of availability of
supply **;**

9(b) fewer trees **;**
less photosynthesis **;**
less carbon dioxide absorbed / more carbon dioxide
remains in atmosphere **;**
(carbon dioxide is a) greenhouse gas **;**
global warming / correct named outcome of global
warming **;**
less oxygen produced (by photosynthesis) **;**
destruction of habitat / species extinction **;**
loss of soil stability / erosion / leaching **;**
effect on water cycle **;**
adverse effect on recreation value of forest **;**
effect on local human population **;**
medicinal value of plant species **;**
6
A greenhouse effect
e.g. sea levels rise / ice caps melt
e.g. desertification
e.g. loss of homes / loss of employment
Total: 10

O/N16/22/Q5

5(a) 1 bacteria (or correctly named) **+** roots / nodules **;**
2 fix / convert / turn **+** nitrogen **;**
3 ploughing / digging into soil **;**
4 decay / decompose **;**
5 (which produces) nitrates / nitrites / ammonium **;**
2

Ig ammonia
5(b) fibrinogen / fibrin **; 1 A** thrombin / prothrombin / (pro)thrombokinase / factor VIII
5(c)(i) increase **;**
no change **+** (from 2000) to 2002 / 3 / 4 / first 2 years / first 3 years / first four years **;**
exponential or described / more quickly **AW ;**
2
5(c)(ii) 1 mutation / change / variation **;**
2 reference to genes / DNA **;**
3 resistance (to poison) / better adapted **;**
4 survival **;**
5 breeding / reproduction / produce offspring **;**
6 natural selection / evolution **;**
7 greater amount (of dicoumarol) now required to kill / used to kill / the LD_{50} must be increased **;**

M/J16/21/Q5

5 (a) mosquito / Anopheles ; [1]
(b) (i) drain swamps / prevent stagnation of water AW ;
add oil on water ;
reference to biological control / fish or bacteria into ponds ;
release irradiated males ;
[max 2]
(ii) (resistant) reproduce ;
reference to (resistant) allele / gene ;
inherited / passed on ;
reference to repetition over many generations ;
(resistant) become more common ;
reference to evolution ;
A ORA for each marking point [max 4]
[Total: 7]

M/J16/21/Q7

7 (a) fix / convert / change / turn (nitrogen in air) ;
reference to lightning ;
reference to bacteria ;
legumes (peas / beans) / root nodules ;
to ammonium ;
to nitrates ;
(nitrates) absorbed + by plants ;
reference to amino acids (in either plants or animals) ;
plants + eaten by animals ;
protein digested (in animals) ;
[max 5]

(b) production of crops:
increases / increased yield ;
(due to) improved growth ;
increased profit / AW ;
environment:
reference to positive effect on
environment e.g. more
photosynthesis reduces
CO_2 / increases O_2 / more wild
plants for insects ;
growth of weeds ;
leaching (into water sources)
AW ;
eutrophication or process
described ;
death of aquatic life ;
possible contamination / pollution
of (drinking) water ;
[max 5]
[Total: 10]

O/N15/22/Q2

Question Expected Answer Mark Additional guidance
2 (a) (i) incisors / canines ; [1]
(ii)
rectum / colon / large intestine ;
stores faeces / infrequent defaecation AW ;
OR
stomach ;
storing food (ref. defaecation every 6-8 days) ;
OR
ileum / small intestine ;
slower digestion ; [2]
max 1 mark if function does not
match structure
(b) top: harpy / eagle + (jungle) cat + mosquito ;
middle: sloth (left) + moth (right) ;
bottom: (tree) + algae ;
any 4 arrow heads correct ;
[4]
in any order
(c) (i) camouflage / less easily seen ;
so not eaten / escape predators (or named) AW ;
slow moving / cannot escape quickly ; [max 2]
I insulation, source of nutrition
(ii) faeces decay / decompose / broken down / act as fertiliser ;

ions / CO_2 / salts (or named) / nutrients / minerals ;
absorbed by tree / plant ;
used by tree (e.g. growth) ;
provides food / habitat for sloth ;
to hide faeces from predators ; [max 3]
[Total: 12]

O/N15/22/Q55 (a)

any 2 from :
oxides of sulfur ;
acid rain ;
OR
oxides of nitrogen ;
acid rain / greenhouse gas / ref. global warming ;
OR
carbon monoxide ;
effect on O_2 carriage by blood AW / greenhouse gas /
ref. global warming ;
breathing difficulties (related to any correct gas) ; [max 4]
I CFCs, hydrocarbons (methane),
ozone, chlorine
R harm caused if gas incorrect
A plausible harm caused if no gas
named
(b) (S)
recycling of water AW ;
sewage treatment / water treatment / use as fertliliser / use in an
anaerobic digester ;
reduce amount of pollutants entering water ;
prevention of disease / eutrophication / death of or harm to organisms ;
(T)
recycling of paper / tree-based products ;
prevents deforestation ;
prevents named consequence of deforestation e.g. soil erosion,
flooding ;
fewer harmful emissions / less air pollution ;
[max 3]
max 2 marks available for either S
or T
[Total: 7]

M/J15/21/Q5

5 (a) (i) producer / 1st / 1 ;
(primary) consumer / herbivore / 2nd / 2 ;
nitrogen / N ;
[3]
(ii) plant releases oxygen ;
fish uses this (oxygen) for (aerobic)
respiration ;
lay eggs on weed / provides
cover / nesting ;
appropriate explanation for above
point ;

[max 2]

Question Expected answers Additional guidance Marks
(b) (i) (X) decomposition ;
(Y) nitrification ;
Ig excretion
A ammonification
[2]
(ii) bacteria ; R named bacteria [1]
(iii) active transport ;
ref. use of energy (if active transport
given) ;
diffusion ;
correct ref. concentration gradient ;
ref. roots ;
[max 3]
(c) eutrophication ;
better growth of plants ;
more food for fish ;
increased decay (of plants / waste
products of fish) ;
increased numbers of bacteria ;
more oxygen used / ref. (bacteria)
respiration ;
ref. death of fish / animals ;

O/N14/22/Q8

8 (a) (i) starting with a producer ;
plausible food chain with 3 consumers + arrows in correct direction ;
[max. 4]
I ref to the Sun
(ii) labelled pyramid with organisms named in food chain ;
in correct order with named producer labelled at bottom ;
pyramid of correct proportions for given food chain ;
(b) some organisms / parts remain uneaten ;
energy lost in faeces / undigested food ;
urine / excretory products / excretion ;
respiration ;
energy lost as heat ;
homeostasis / named example ;
in movement / muscular contraction (or any e.g. of same) ;
in nervous impulses ;
catabolic reactions / named ;
active transport ;
ref. decomposition / decay
[max. 6]

M/J14/21/Q5

5 (a) (i) tree: producer / 1st / 1 ;

caterpillar: (primary / 1st order) consumer / herbivore / 2nd / 2 ;
[2]
(ii) correct shape ;
correctly labelled with names of organisms / trophic levels ;
[2]
(iii) base (of pyramid) narrower / correct shape drawn ;
ref. relative numbers of consumers ;
one tree ;
[2] A labelled on diagram
(b) Accept reverse arguments for marking points.
less energy required ;
to raise body temperature / keep body warm /
thermoregulation ;
ref. movement ;
ref. less muscle activity/use ;
ref. respiration ;
more energy available + increase biomass/grow ;
(farmer) increased productivity / profit / lower feeding costs /
(consumer) lower cost to buy ;
[4] Ig ref to predators / disease
Ig ref. energy production
animals grow faster AW
Total [10]

O/N13/21/Q4

4 (a) Carbon dioxide / CO_2;
carbon monoxide / CO;
soot / particulates / carbon;
[max 2]
(b) water present in soil;
absorbed by root;
ref xylem;
lost to atmosphere + from leaves / aerial parts
or ref to evaporation / transpiration / diffusion ;
released / produced from respiration (or described);
[max 3]
A ground, ref to water table
A forms clouds AW + water vapour
released
(c) (the cow)
excretion;
urea;
ref to faeces ;
decomposition
ref to nitrification;
(max.3)
(the factory)
oxides of nitrogen or named;
dissolved (in rainwater) / ref to acid rain ;
[max 4]
A other named nitrogen excretory
products. I urine
A forms ammonia , nitrite, nitrate
I names of bacteria

R refs to denitrification and
nitrogen fixation
[Total 9]

O/N13/21/Q9

9 (a) ref. to an ecosystem / food chain / web;
total number v. total mass of organisms (at each trophic level);
biomass pyramids usually pyramid-shaped;
numbers pyramids variable in shape
pyramid of numbers takes no account of size/mass of organism) AW;
[max 3]
A on a diagram with all trophic levels credibly named.
A clear diagrams with correct shape
A clear diagrams with nonpyramidal shape
(b) (energy gained)
by photosynthesis in plants / producers;
from (sun)light;
correct ref. light energy + chemical energy;
eaten by animals;
named food molecule consumed AW;
(energy lost)
as heat;
electrical / nerve impulses;
growth / reproduction;
movement / muscle contraction;
excretion;
[max 7]
[Total 10]

M/J13/21/Q9

9 (a)
parasite:
(an organism) that grows / feeds on or in;
another organism/host;
harms its host;
vector:

(an animal that) transmits a pathogen / named ;
from one host A/W to another;
[max 4]
Reject "lives off"
(b) take an anti-malaria drug ;
(control of mosquito vector)
kill the mosquito ;
mosquito coils ;
insecticides ;
long lasting chemical sprays ;
screens / nets (bed) ;
repellent spray / DEET on skin ;
clothing + to cover skin / prevent bites ;
sterile males
Modify environment
draining marshes / covering water containers etc a/w.;
oil on surface of water ;
introduce fish to feed on larvae / pupae;
Introduction of Bacillus to kill larvae /
[1]
[max 5]
A correct named drug e.g. Quinine,
Paludrin, Larium, Malarone
A named pesticide e.g. DDT
Accept any refs to removing
standing water
[Total: 10]

O/N12/22/Q9

9 (a) it is a diagram;
of traditional pyramid shape/wider at the bottom;
(showing) mass/weight;
of organisms/living things/plants + animals;
the larger the block the greater the mass;
at each trophic level;
ref. producers;
consumers/herbivores/carnivores;
in an ecosystem/food web/food chain;
shows change in mass/is relative; [Max 6]

(b) represents number;
of individual (organisms);
different organisms differ in mass;
one organism may have many others (feeding) on it;
*thus shape may be different;
not that of a pyramid;
plausible drawing; [Max 4]
[Total: 10]

M/J12/21/Q8

8 (a) ref. use of manures / compost;
prevent animal sewage entering water source;
prevention of run-off from fields;

any ref. controlled use of fertilizers / nitrates or other named;
example of control method (e.g. only on growing crops, not when rain forecast, no disposal of
waste into water sources, use crop rotation);
use degradable pesticides;
use biological pest control;
grow crops genetically modified to be pest resistant; [5]
(b) making (scarce) resources last longer;
paper + reduction in deforestation;
glass / metal + requires less energy than new production;
plastics + reduction in fossil fuel use;
reduces need for waste disposal / landfill;
ref. non-biodegradability of plastics / glass;
specific e.g. of reuse (as a method of recycling)
(carrier bags, glass bottles, paper, clothes);
ref. to composting / producing animal feed from food waste
+ a valid reason; [5]
[Total: 10]

M/J12/22/Q7

7 (a) (Marking points are available on an annotated drawing)
shows the number of organisms at each (trophic) or named level ;
(R species)
width / length of band indicates the number;
number of organisms decreases towards the top of the pyramid;
correct ref. to two technical terms from the following :
producers / consumers / herbivores / carnivores / trophic level;
(R named example)
in food chain / web / ecosystem (R habitat / named e.g. of a food web);
ref. to an anomalous situation (e.g. trees / single tree); [max. 4]

(b) ref. Sun;
light (energy) to chemical energy;
absorbed by / inside plants or producers / photosynthesis;
named photosynthetic product;
food for / eaten by + animals / herbivores / consumers / decomposers;
lost as heat;
(from) respiration / ref ATP;
any *two uses of energy (for two marks);;
*Any two from: active transport, muscle contraction / movement / locomotion, e.g. of anabolism / protein synthesis / making large molecules, temperature control, nervous impulses, growth, cell division / mitosis / meiosis
does not pass back to producers / plants / Sun; [max. 6]

O/N11/21/Q4

4 (a) no/less water near soil surface;
no/less water for photosynthesis;
no/less* carbohydrate manufacture;
no/less water for salts or named to dissolve/be absorbed/cell sap;
no/fewer proteins*/chlorophyll made (*Accept ‘food’ for ONE mark);
roots too short to reach water;
more herbivores to eat grass;
trees can lose leaves in times of stress; [max 4]

(b) more food/vegetation in abundance AW;
more different types of habitat;
less competition; [max 2]
(c) (i) (ORA) longer necks;
fewer of them; [2]
(ii) any ONE from: more foliage found higher up/have to eat leaves, mutation, those with shorter necks die/do not breed AW (ORA), natural selection; [1]
[Total: 9]

M/J11/21/Q7

7 (a) carbon dioxide A on equation;
combines with water A on equation;
during photosynthesis;
to make named carbohydrate/protein;
eaten by/passed to consumers/animals;
respiration;
in any 2 named groups of different types of organism;
releases carbon dioxide A with ref to combustion;
leaves decomposed/decay/ refs to methane/fossil fuels
A refs to decomposition in animals/faeces etc if phs mark scored; [max 7]
(b) another named requirement (CO_2/temperature);
in short supply AW;
use of syllabus term limiting factor; [3]
[Total: 10]

M/J11/22/Q3

3 (a) (i) herbivore / named herbivore / consumer / omnivore; [1]
(ii) chemical (energy); [1]
(iii) 2 (%); [1]
(b) respiration; [1]
(c) (i) respiration;
bacteria / fungi / decomposers (N.B. look for idea of organism);
(R the process)
organic or dead matter / organic molecules or named;
energy released + when broken down / decomposed (A acted on by decomposers) / decayed AW / when fossil fuel burnt; [max. 3]
(ii) makes soil warmer / heat released;
for germination;
increases AW rate of enzyme action;
faster AW growth (of radical / plumule); [max. 2]
(R 'for' growth / helps growth)
(R any reference to a seedling / plant)
[Total: 9]

1. Sewage treatment works receive raw sewage.

This sewage contains food molecules, such as cellulose, starch, protein and fat.

(b) Explain how bacteria breakdown these nutrient molecules.

.....

.....

.....

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.....

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.....

..... [4]

The concentration of nitrate ions is often very high in the water leaving a sewage treatment works.

In some places, the water passes through a series of reed beds as shown in Fig. 5.2.

The water leaving the reed beds and entering the river contains very low concentrations of nitrate ions.

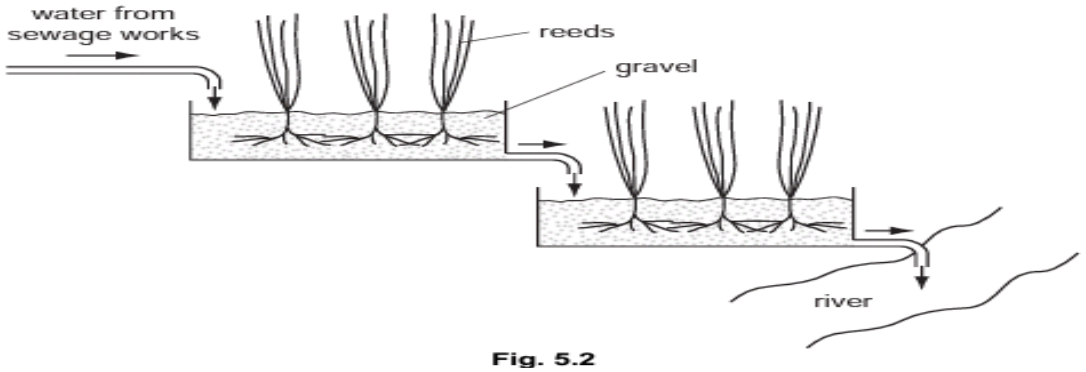


Fig. 5.2

(c) Explain **two** ways in which the concentration of nitrate ions may be reduced as the water flows through the reed beds.

.....

.....

.....

.....

.....

..... [3]

(d) Some bacteria that live in reed beds release methane. Other sources of methane are cattle and flooded rice fields.

Explain the environmental consequences of an increase in the methane concentration in the atmosphere.

.....

.....

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..... [3]

(c) Some pesticides used against insects kill them on contact. Others are systemic pesticides.

Explain how these systemic pesticides kill insects.

.....

.....

.....

..... [2]

The membranes of root hair cells contain proteins for the absorption of ions.

(b) Describe how root hair cells are adapted for the absorption of ions.

.....

.....

.....

.....

.....

..... [3]

2. Sweet potato plants produce flowers to reproduce sexually. Sweet potato plants also reproduce asexually when shoots grow from the storage roots to form new plants.

Fig. 3.2 shows the life cycle of sweet potato. The diploid number of this species is 90.

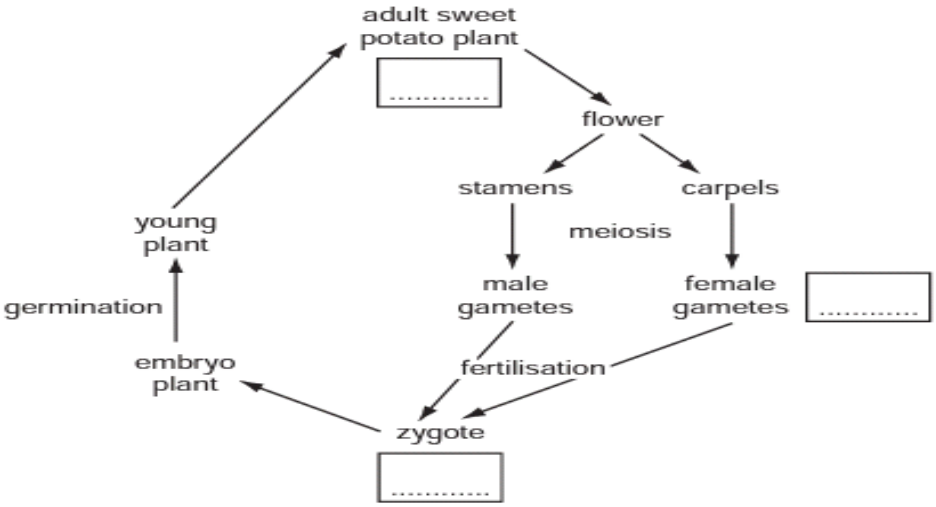


Fig. 3.2

(c) Complete Fig. 3.2 by writing the number of chromosomes in the three boxes. [2]

(d) State **two** advantages and **one** disadvantage of **asexual** reproduction for plants, such as sweet potato.

advantage 1 .....

.....

advantage 2 .....

.....

disadvantage .....

..... [3]

3. Sewage disposal involves the removal of human waste in pipes from houses to sewage treatment works.

Fig. 6.1 is a diagram that shows how sewage is treated.

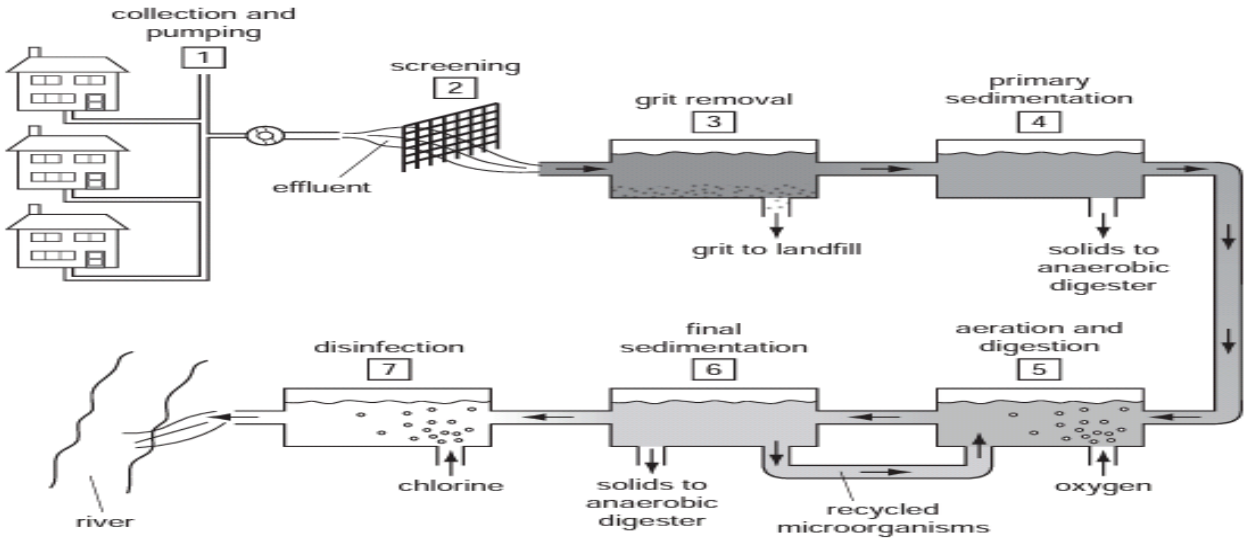


Fig. 6.1

(b) State why it is important that sewage is treated.

.....

.....

..... [1]

(c) At stage **5** in Fig. 6.1, oxygen and microorganisms are added.

Explain why oxygen is bubbled through the tank at this stage.

.....

.....

.....

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.....

..... [4]

(d) Suggest **and** explain the advantage of recycling microorganisms from stage **6** to stage **5** as shown in Fig. 6.1.

.....

.....

.....

.....

.....

..... [3]

(a) During stage **5** microorganisms break down organic matter consisting of cellulose, starch, protein and lipid (fat). The microorganisms multiply during this stage and are recycled.

Complete Fig. 6.2 by writing in the boxes the names of the enzymes used to catalyse the reactions shown. The first box has been completed for you.



Fig. 6.2 [3]

(d) Suggest **and** explain the advantage of recycling microorganisms from stage **6** to stage **5** as shown in Fig. 6.1.

.....

.....

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.....

.....

..... [3]

(e) Explain why chlorine is added at stage **7**.

.....

.....

.....

..... [2]

[Total: 13]

4. Nitrogen is one of the most important chemical elements in the biosphere.
Nitrogen must be continually recycled if life is to continue on Earth.

Savanna grasslands are an important ecosystem in Africa.
Fig. 6.1 shows part of the nitrogen cycle in a grassland ecosystem in southern Africa.

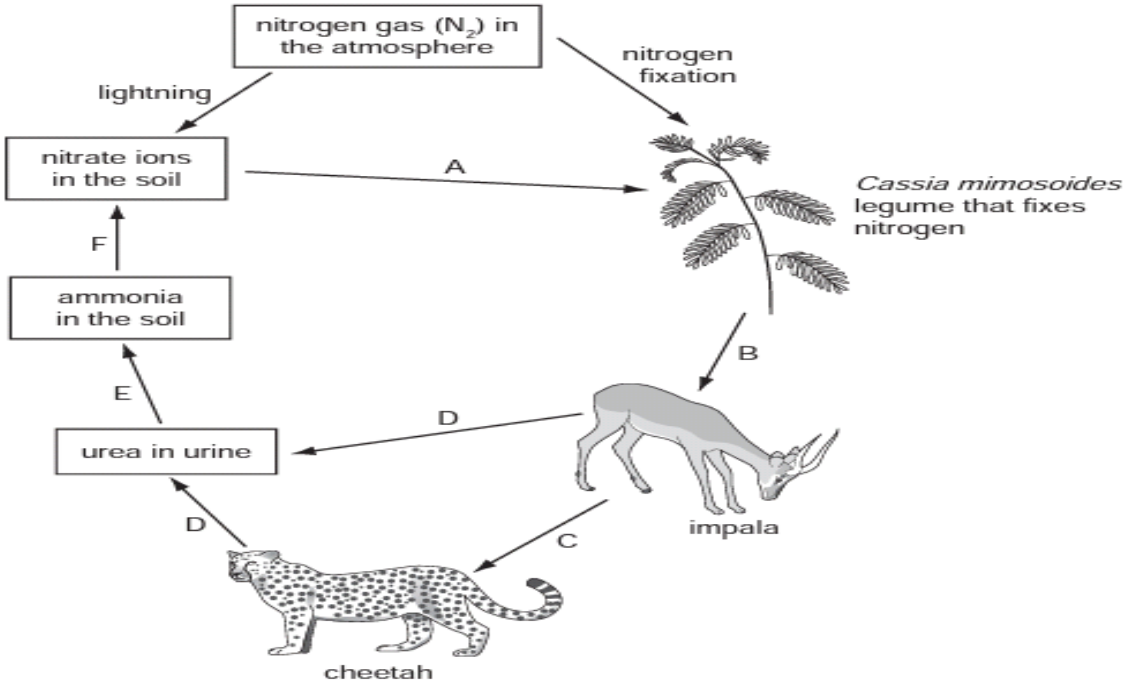


Fig. 6.1

(a) Name:

(i) a type of nitrogen-containing compound that is made by *Cassia mimosoides*, eaten by the impala and by the cheetah;

..... [1]

(ii) the type of consumer as represented by the cheetah;

..... [1]

(iii) the process by which urea is removed from the body of the animals as shown by **D**;

.....

[1]

(iv) process **F**.

.....

[1]

(b) Explain the importance of recycling nitrogen in ecosystems, such as the African savanna.

.....

.....

.....

.....

.....

.....

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[3]

(c) The most common plants that grow in the African savanna are grasses. There are very few legume plants, such as *C. mimosoides*.

Suggest reasons why *C. mimosoides* is a rare plant in the African savanna.

.....

.....

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[3]

(d) Explain why there are far fewer cheetah than impala.

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.....

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.....

.....

.....

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.....

.....

[4]

(e) The cheetah is an endangered species.

It is important to conserve their food supply and all the species that inhabit their ecosystem.

Explain why.

.....

.....

.....

.....

.....

.....

.....

[3]

[Total: 17]

5 Marine conservationists are concerned that fish stocks in the sea are decreasing. Drastic measures will have to be taken to stop the extinction of many fish species.

Fig. 5.1 shows a marine food web. Tuna are large carnivorous fish that are an important human food. Dolphins may be caught in fishermen's nets and die.

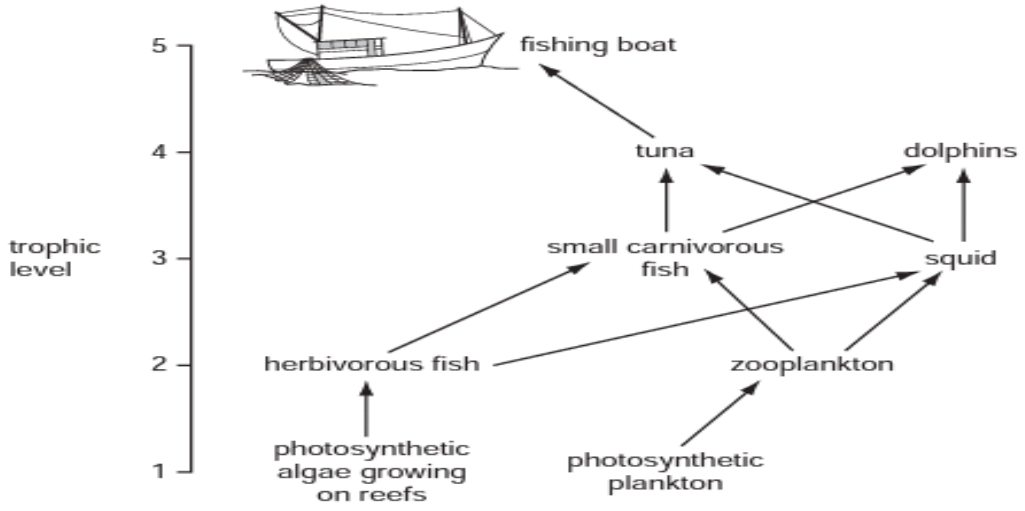


Fig. 5.1

(a) State the names given to trophic levels **1** and **3**.

1 .....

3 ..... [2]

(b) Explain why it is more energy efficient for humans to eat herbivorous fish rather than tuna.

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

(c) Explain why it is necessary to conserve animals, such as tuna and dolphins, which are at trophic level 4.

.....

.....

.....

.....

.....

.....

..... [4]

(d) Many seas are polluted by non-biodegradable plastics.

Suggest the likely effects of this pollutant on the marine environment.

.....

.....

.....

..... [2]

[Total: 11]

6 Lake Victoria is the largest tropical lake in the world. Until the 1960s it provided an ecosystem with habitats for 500 species of small cichlid fish. They feed on algae (aquatic plants). Prawns also feed on algae.
Nile perch were introduced into the lake. These fish are excellent food for humans, as well as providing sport for tourists. The Nile perch eat cichlids.
Deforestation of the lake shore and pollution by humans caused eutrophication and resulted in a huge reduction in cichlid numbers. However, the Nile perch are able to survive in poor quality water, even when the oxygen level is low. As the cichlid population dropped, prawn numbers increased and Nile perch now eat them.

(a) Define the term *ecosystem*.

.....

..... [2]

(b) Using information in the text above, state two reasons why Nile perch were introduced into Lake Victoria.

1. .....

.....

2. .....

..... [2]

(c) Complete the table to identify at which trophic level each of the organisms named in the text are feeding.

algae **cichlid fish** **human** **Nile perch** **prawn**

trophic level	**organism(s)**
producer	
herbivore	
carnivore	

[3]

(d) Explain how eutrophication could have resulted in a reduction in the numbers of cichlid fish.

.....

.....

.....

.....

..... [4]

[Total: 11]

7. Toads are amphibians. Only two species are native to Britain, the Common toad (*Bufo bufo*) and the Natterjack toad (*Bufo calamita*).
Natterjack toads like warm sandy soil in open and sunny habitats, with shallow pools for breeding. Examples of these habitats are heathland and sand dunes.
Common toads like cooler, more shady habitats, such as woodland.
Many areas of sand dunes are being developed for camp sites. Heathland can easily change to woodland as trees grow on it. In the summer, woodland is colder than heathland due to the shade the trees create.
These conditions suit the Common toad, but not the Natterjack. As a result of the changing habitats the Natterjack toad is becoming an endangered species.

(a) (i) Name **one** external feature that identifies an animal as an amphibian.

.....[1]

(ii) Amphibians are a class of vertebrate.
Name two other vertebrate classes.

1. .....
2. .....[2]

(b) State **one** piece of information from the passage to show that the Common toad and Natterjack toad are closely related species.

.....
.....[1]

(c) From the information provided, state two reasons why Natterjack toads are becoming endangered.

1. .....
.....
2. .....
.....[2]

(d) Suggest measures that could be taken to protect the Natterjack toad from extinction.

.....
.....
.....[2]

Fig. 1.1 shows a food web for British toads.

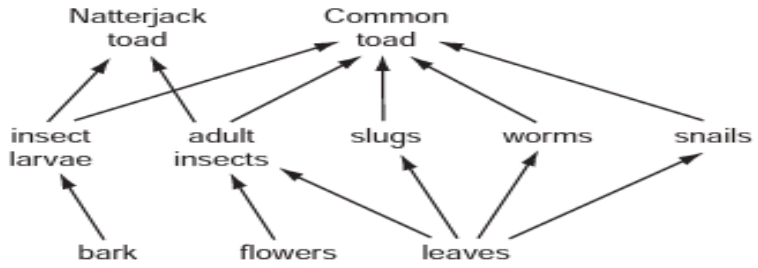


Fig. 1.1

(e) (i) State the trophic level of toads.

.....[1]

(ii) State which foods the two species of toad both eat.

.....[1]

(iii) With reference **only** to food, suggest why the Common toad is more likely to survive when the two species are in competition.

.....
.....[1]

[Total: 11]

8. In 2003, 25 000 square kilometres of Amazon rainforest were cut down and cleared. The land was then used for agriculture, producing beef and soya beans for export. However, within three years the land was no longer suitable for agriculture and had to be abandoned.

(a) (i) State the term used for cutting down and clearing areas of forest.

..... [1]

(ii) Complete Table 3.1, to state different reasons why forests are cut down. The first has been done for you.

Table 3.1

	reason
1	for agricultural land
2	
3	

[2]

(iii) Outline and explain the likely effects of clearing forests.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(b) Soya beans and beef produced on the land are both good sources of protein. Table 3.2 shows the nutritional content of products made from soya and beef.

Table 3.2

	nutritional content per 100 g of product			
product	energy / kJ	protein / g	saturated fat / g	fibre / g
corned beef	905	26.9	12.1	0.0
soya sausages	1128	19.0	2.1	2.0

(i) Using data from Table 3.2, state and explain two reasons why soya sausages may be healthier than corned beef as a major item in the diet.

1 .....

.....

.....

2 .....

.....

..... [4]

(ii) Soya beans are harvested from plants. Corned beef is produced from cattle that have fed on grass.

Explain why it is more energy efficient for humans to eat soya products as a source of protein than corned beef. Use the food chains involved to support your answer.

.....

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.....

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.....

.....

..... [4]

[Total: 17]

9. Fig. 1.1 shows a food web in an ecosystem.

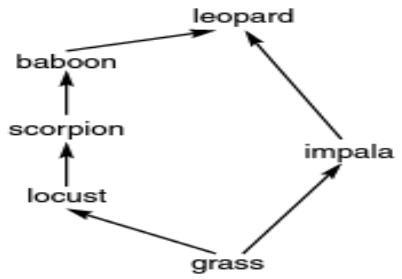


Fig. 1.1

(a) Define the following terms:

(i) *ecosystem*;

.....

.....[1]

(ii) *food web*.

.....

.....

.....[2]

(b) **(i)** Name the herbivores shown in the food web.

.....[1]

(ii) Suggest why it is difficult to state the trophic level to which the leopard belongs in this food web.

.....

.....[1]

(c) In some years, there are plagues of locusts.

State and explain the effect such a plague might have on numbers of

(i) impala;

.....

.....[1]

(ii) scorpions.

.....

.....[1]

(d) During one locust plague, although the baboons had more food, their numbers subsequently dropped.

(i) In terms of the food web, explain how this happened.

.....

.....

.....[2]

(ii) Suggest another reason, **not** related to the food web or hunting, for the drop in baboon numbers.

.....

.....[1]

(e) Leopards are sometimes hunted for their fur and other uses.

Suggest two reasons for banning the hunting of leopards.

1. .....

.....

2. .....

.....[2]

[Total : 12]

10. Fig. 2.1 shows pie charts of the diets of two twelve year old girls, one from Europe and one from Africa.



Fig. 2.1

(a) Using information from Fig. 2.1, complete the table to compare the African diet with that of the European diet.
In each box, write ***more*** or ***less*** or ***the same***.

	dairy products	cereals	meat, eggs, fish	sugar, sweets	vegetables, fruit
African diet contains					

[1]

(b) The daily energy intake is provided mainly by carbohydrates and fats.
Select **one** of the food groups from Fig. 2.1 that would provide a good source of:

(i) carbohydrates; .....

(ii) fats. .....[2]

(c) With reference to the pie charts:

(i) suggest why the African girl may not grow as fast as the European girl;

.....

.....[1]

(ii) suggest why the European girl is more likely to suffer from scurvy than the African girl;

.....

.....

.....[2]

(iii) suggest why the European girl is more likely to suffer from constipation and colon cancer than the African girl.

.....

.....

.....

.....[3]

[Total: 9]

11. Fig. 3.1 is a diagram of the water cycle.

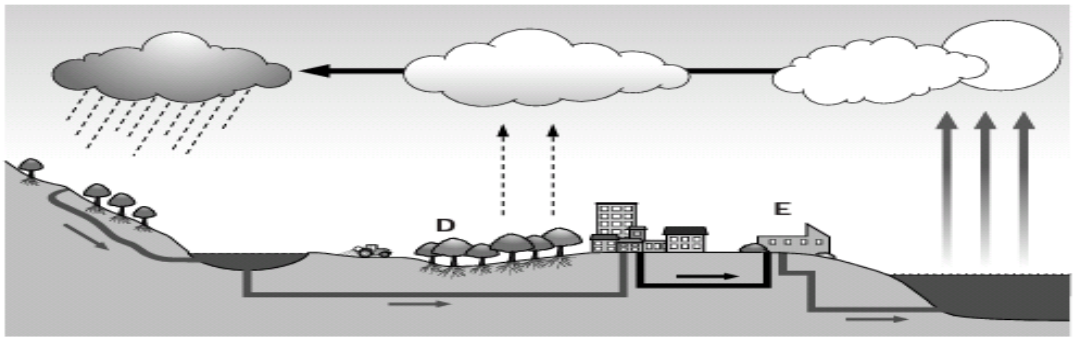


Fig. 3.1

(a) Water is a large component of the cells in the leaves of trees, as labelled **D** on Fig. 3.1.

Explain how water passes from a leaf cell to the atmosphere.

.....

.....

.....

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.....

.....

..... [4]

(b) Explain how the loss of water from the leaves helps to move water from the roots to the leaves.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Explain how water enters the roots of the trees from the soil.

.....

.....

.....

.....

.....

..... [3]

(d) Fig. 3.1 shows a sewage treatment works, labelled **E**.

Describe **three** processes used in the treatment of sewage.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(e) Herbicides are used by farmers to control weeds.

Explain the environmental damage that may be caused by herbicides.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 17]

12. Sulfur dioxide (SO_2) can cause acid rain.

(a) Name **one** other pollutant that can cause acid rain.

.....[1]

(b) Describe the effects of acid rain on the environment.

.....

.....

.....

.....

.....

.....

.....[3]

(c) State **three** methods to reduce atmospheric SO_2 pollution.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

13. Moose, *Alces americanus*, shown in Fig. 6.1, are large herbivores that primarily live in northern parts of North America. They have a varied diet that includes young shoots of willow trees and aquatic plants.



Fig. 6.1

Isle Royale is a large island in Lake Superior in the United States where there is a population of moose that has been studied by ecologists for a long time. The animals' only predator is the wolf. The island has a population of wolves that has changed in numbers over the years.

(a) (i) Draw a food chain for the organisms in the passages above.

[2]

(ii) Complete Table 6.1 by stating the name and identifying the trophic level of each organism in the food chain.

Table 6.1

name of organism	trophic level

[3]

(iii) State **two** factors that influence the numbers of a top predator, such as wolves.

1 .....

2 .....

[2]

(b) In the 1970s, the American ecologist Paul Colinvaux investigated the energy flow between moose and wolves.

His results are summarised in Table 6.2.

Table 6.2

energy input or output or energy flow	energy / MJ
consumed by moose	4 320 000
respiration of moose	380 000
consumed by wolves	56 000
respiration of wolves	53 000

(i) Calculate the percentage of the energy obtained by the moose that is consumed by the wolves. Show your working.

..... % [2]

(ii) Explain why the number of wolves on Isle Royale has never risen above 50 while the highest number of moose recorded is 2450.

.....

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.....[5]

[Total: 14]

14. Fig. 6.2 shows the causes of severe food shortages in the 1980s, 1990s and 2000s.

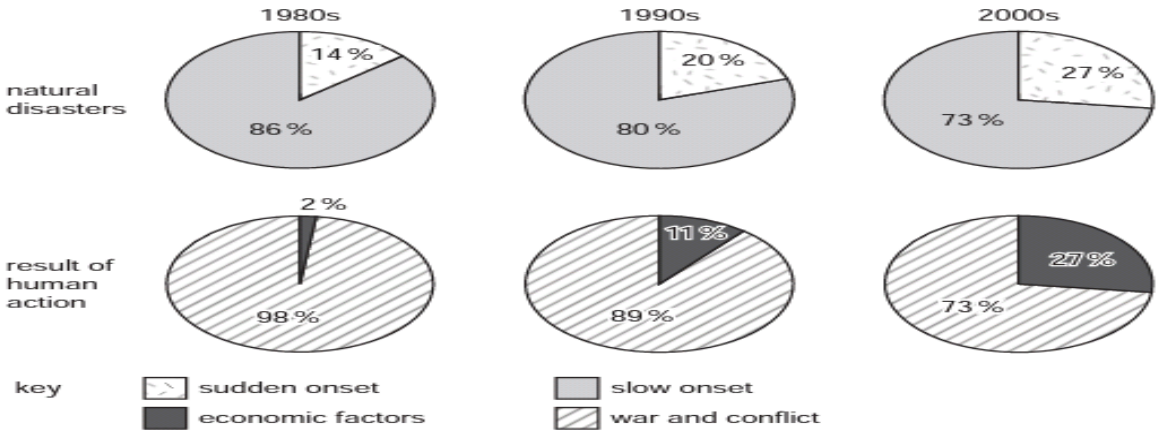


Fig. 6.2

(a) **(i)** State two types of natural disaster that occur suddenly and may lead to severe food shortages.

1. .....

2. ..... [2]

(ii) State **one** type of natural disaster that may take several years to develop.

..... [1]

(b) Use the information in Fig. 6.1 and Fig. 6.2 to **describe** the changes in food shortages between 1981 and 2007.

.....

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.....

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..... [5]

(c) Explain how the increase in the human population may contribute to severe food shortages.

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..... [3]

The quality and quantity of food available worldwide has been improved by artificial selection (selective breeding) and genetic engineering.

(d) Use a **named** example to outline how artificial selection is used to improve the quantity or quality of food.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(e) Define the term *genetic engineering*.

.....

..... [1]

[Total: 16]

15. Some information about pollutants, their sources and their effects on the environment are shown in Table 1.1.

Table 1.1

pollutant	source	effect on the environment
heavy metals in chemical waste		disrupts functioning of plants, causes brain damage
phosphate		eutrophication of streams, rivers and lakes
sulfur dioxide		damage to trees, e.g. death of leaves
ionising radiation		
DDT	pesticide sprays	accumulates in tissues of animals

(a) Complete Table 1.1. [5]

(b) Explain what happens in streams, lakes and rivers when eutrophication occurs.

.....

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.....

.....

.....[5]

(c) Sulfur dioxide dissolves in rain water to form acid rain.

Describe **two** measures that can be taken to reduce the effects of acid rain.

1 .....

.....

2 .....

.....

[2]

[Total: 12]

16. Acid rain is a serious environmental problem in some areas of the world. Lakes in Canada, Norway and Scotland are highly acidic as a result of acid rain.

Fig. 4.1 shows a cause of acid rain.

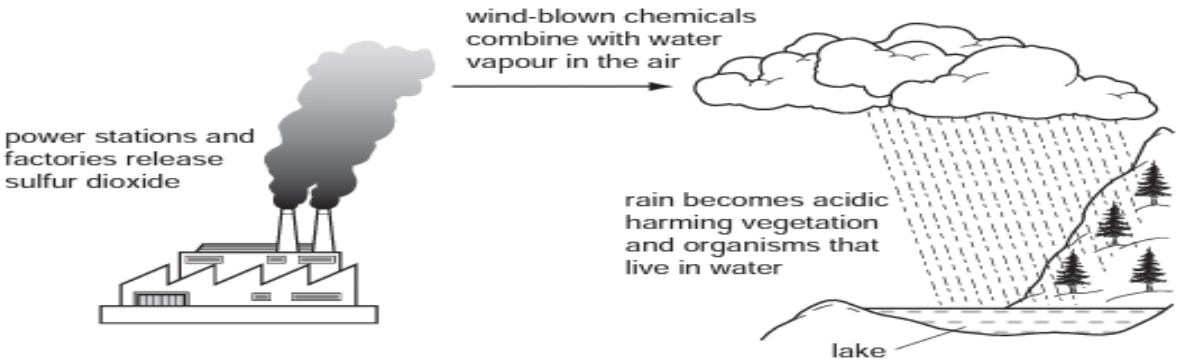


Fig. 4.1

(a) (i) State **one** cause of acid rain **other than that shown in Fig. 4.1**.

.....

.....

.....

18. **(a)** Explain why it is important to recycle paper rather than burn it.

.....

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..... [3]

When paper is recycled printing ink has to be removed.

Printing ink contains lipid-based compounds. The ink is removed by making the paper into a pulp and mixing it with lipase for several hours.

Scientists in India discovered that the marine bacterium, *Vibrio alginolyticus*, produces lipase. They carried out an investigation to find out whether using *V. alginolyticus* to remove ink from paper pulp was as effective as mixing it with a solution of lipase.

(b) The bacteria were found to be more effective at removing the ink from the paper pulp than using the solution of lipase.

Suggest why.

.....

.....

.....

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.....

.....

..... [3]

(c) The scientists also investigated the effect of temperature on the ability of the bacteria to remove ink from paper pulp. They found that bacteria kept at high temperatures did not remove ink from the paper pulp.

Explain why.

.....

.....

.....

.....

..... [2]

[Total: 8]

19. In some countries forests are cleared by burning. This produces carbon dioxide and ash.

(a) Outline the environmental effects of an increase in carbon dioxide in the atmosphere as a result of burning forests.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) The ash helps crops to grow because it is rich in minerals, such as magnesium ions, but it is deficient in nitrate ions.

Explain why nitrate ions and magnesium ions are important for plants.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) When mineral ions from soils are washed into streams and rivers there is often a rapid growth of algae.

(i) State the name of the effect that is caused by adding mineral ions to streams and rivers.

.....

[1]

(ii) These streams and rivers often have low concentrations of dissolved oxygen. Explain why.

.....

.....

.....

.....

[2]

(d) Untreated domestic sewage contains organic waste as well as dissolved minerals.

Outline how sewage is treated so that the water may be recycled as drinking water.

.....

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.....

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.....

[3]

[Total: 14]

20. An agricultural student investigated nutrient cycles on a farm where cattle are kept for milk. The farmer grows grass and clover as food for the cattle. Clover is a plant that has bacteria in nodules in its roots.

Fig. 6.1 shows the flow of nitrogen on the farm as discovered by the student. The figures represent the flow of nitrogen in kg per hectare per year. (A hectare is 10000 m^2.)

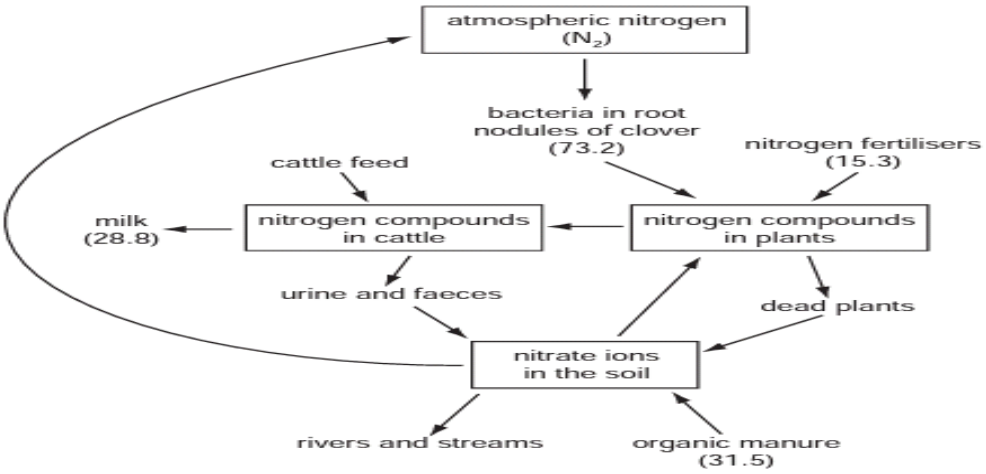


Fig. 6.1

(a) **(i)** Name the process in which bacteria convert atmospheric nitrogen into a form that is available to clover plants.

..... [1]

(ii) Name **two** processes that convert nitrogen compounds in dead plants into nitrate ions that can be absorbed by grass.

..... and ..... [2]

(b) The total quantity of nitrogen added to the farmer's fields is 120 kg per hectare per year.

Calculate the percentage of this nitrogen that is present in the milk.

Show your working.

Answer = ...% [2]

(c) State two ways in which the nitrogen compounds in the cattle's diet are used by the animals **other than to produce milk**.

1. .....

2. ..... [2]

(d) The student found that a large quantity of the nitrogen compounds made available to the farmer's fields was not present in the milk or in the cattle.

Use the information in Fig. 6.1 to suggest what is likely to happen to the nitrogen compounds that are eaten by the cattle, but are **not** present in compounds in the milk or in their bodies.

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[5]

(e) The carbon dioxide concentration in the atmosphere has increased significantly over the past 150 years.

Explain why this has happened.

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.....

.....

..... [2]

[Total: 14]

30. The red slender loris, *Loris tardigradus*, is a nocturnal mammal that feeds at night on flowers, fruit and a variety of small animals. It is found in forest ecosystems in South Asia.

Fig. 3.1 shows a red slender loris.



Fig. 3.1

(a) Explain the meaning of the term *ecosystem*.

.....

.....

.....

..... [2]

(b) State three ways in which mammals, such as the red slender loris, differ from other groups of vertebrates.

1 .....

2 .....

3 ..... [3]

(c) The large eyes of the red slender loris show that it is well adapted for a nocturnal way of life.

Suggest other features that the animal is likely to have that are adaptations to being active at night.

.....

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.....

.....

..... [2]

Two species of slender loris are found in Sri Lanka, the grey slender loris, *L. lydekkerianus*, and *L. tardigradus*.

The International Union for Conservation of Nature describes the red slender loris as endangered. Horton Plains National Park in Sri Lanka is one of the few places where *L. tardigradus* is found.

(d) Discuss why areas of land, such as the Horton Plains National Park, must be conserved.

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..... [4]

(e) State how scientists could show that two populations of slender loris belong to the same species or to two different species.

.....

.....

..... [1]

[Total: 12]

31. Fig. 5.1 shows vehicles driving past a power station in Namibia and women carrying firewood they have cut.



Fig. 5.1

(a) Describe how an increase of carbon dioxide in the atmosphere can affect the environment.

.....

.....

.....[2]

(b) Without further reference to carbon dioxide, explain how each of the following may have undesirable effects on the environment:

(i) the power station;

.....

.....

.....

.....[3]

(ii) cutting down trees and burning the wood;

.....

.....

.....

.....[3]

(iii) running motor vehicles such as the van or car.

.....

.....

.....

.....[3]

[Total : 11]