Biodiversity, Classification and Conservation

Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Biodiversity, Classification and Conservation
Sub Topic	
Booklet	Multiple Choice
Paper Type	Question Paper 1

Time Allowed : **44 minutes**

Score : **/ 36**

Percentage : **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 In an ecosystem, at which stage is most energy lost?

A sunlight → trophic level 1

B trophic level 1 → trophic level 2

C trophic level 2 → trophic level 3

D trophic level 3 → trophic level 4

2 Two species of animal are found in the same area of forest and grassland. In the spring and summer they eat the same plant food. However, in the autumn and winter one eats nuts in the forest and the other eats roots on the grassland.

Both species are preyed upon by the same predator. Numbers of root-eating animals are reduced most by this, but they recover faster since they reproduce faster.

What can be concluded about these two species of animals?

1 They are part of the same community.

2 They are at different trophic levels.

3 They occupy different habitats.

4 They have different niches.

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

3 An insect lives in and feeds on the tissue of oak tree leaves and is eaten by birds.

Which ecological terms are described in this information about the insect?

	habitat	niche	trophic level
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✓

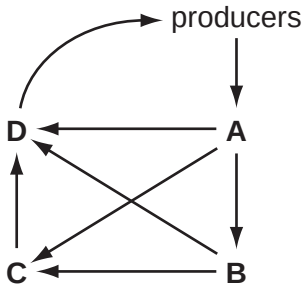
key

✓ = can be described

✗ = cannot be described

4 The flow of nutrients in an ecosystem is shown in the diagram.

Which letter represents decomposers?



5 An insect eats only the leaves of grass. This insect is eaten by carnivorous beetles.

Which ecological terms are described in this information about the insect?

1 habitat

2 niche

3 trophic level

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

6 A total of 3×10^6 kJ m^{-2} yr^{-1} is available from the producers in an ecosystem.

In theory, how much of this energy would be available to tertiary consumers?

A 3×10^4 kJ m^{-2} yr^{-1}

B 3×10^3 kJ m^{-2} yr^{-1}

C 3×10^2 kJ m^{-2} yr^{-1}

D 3×10^1 kJ m^{-2} yr^{-1}

7 Termites are insects that build large nests that contain millions of termites of the same species.

These nests are common in tropical savanna, which typically consists of grasses with widely spaced trees. Here, the termites feed on wood and other dead plant material.

Which statement is correct?

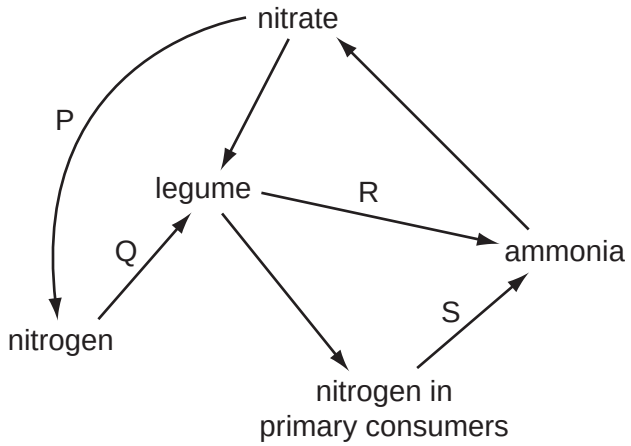
A The termites in the nest form a community, the savanna is the ecosystem and they feed as decomposers.

B The termites in the nest form a community, the savanna is the ecosystem and they feed as primary consumers.

C The termites in the nest form a population, the savanna is both the ecosystem and the habitat and they feed as primary consumers.

D The termites in the nest form a population, the savanna is their habitat and they feed as decomposers.

8 The diagram shows a simplified nitrogen cycle.



Which row shows the correct labels for P, Q, R and S?

	P	Q	R	S
A	denitrification by anaerobic bacteria	nitrogen fixation by nitrifying bacteria	decay of leaf tissue by saprotrophic bacteria	ammonification by saprotrophic fungi
B	lightning action on soil nitrates	nitrogen fixation by nitrogen fixing bacteria	decomposition using nitrogenase enzyme	decomposition by root nodule bacteria
C	nitrification by anaerobic bacteria	nitrification using nitrogenase enzyme	decay of leaf tissue by saprotrophic fungi	assimilation of organic nitrogen
D	reduction by anaerobic bacteria	nitrogen fixation by root nodule bacteria	decomposition of organic nitrogen	decay of urea by saprotrophic bacteria

9 Which statements about energy flow in ecosystems are correct?

1 All energy eventually leaves ecosystems in the form of heat.

2 The average energy transfer between trophic levels is 10 %.

3 The energy stored and lost from an ecosystem is equal to the energy input from the Sun.

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

10 In many freshwater ecosystems, the availability of inorganic nitrogen compounds is a limiting factor for growth. This means that producers cannot grow as quickly as they could even though no other factor is limiting.

Which statements about these ecosystems are correct?

1 Transfer of energy to higher trophic levels is also limited by availability of these nitrogen compounds.

2 Addition of excess nitrate compounds will benefit all organisms in the ecosystem.

3 The percentage of energy lost between trophic levels will be the same whether nitrogen compounds are limiting or not.

4 Addition of ammonium compounds will cause an increase in the numbers of nitrifying bacteria.

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

11 Two different ecosystems, X and Y, were compared. Both ecosystems are the same size and both have the same climate. The results of the comparison are shown in the table below.

ecosystem X	ecosystem Y
greater number of trophic levels	fewer number of trophic levels
lower proportion of decomposers	higher proportion of decomposers
dominant producer is smaller and non-woody	dominant producer is larger and woody
has a smaller fluctuation in environmental temperature	has a larger fluctuation in environmental temperature
has less oxygen	has more oxygen

Using the information in the table, which statements are a valid suggestion concerning X and Y?

1 A greater percentage of primary producers are likely to be consumed by primary consumers in X than in Y.

2 X could be a marine aquatic ecosystem and Y could be a terrestrial ecosystem.

3 Energy losses between trophic levels are likely to be lower for X than for Y.

4 There is likely to be a higher rate of photosynthesis and production of organic matter in X than in Y.

A 2 and 4 only

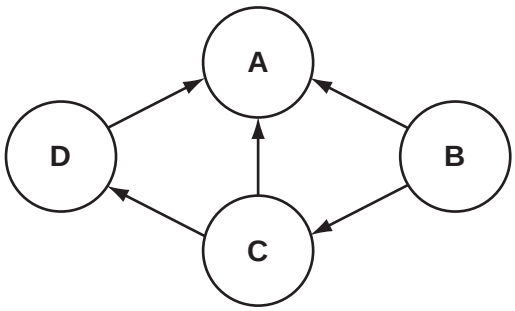
B 1, 2 and 3 only

C 1, 3 and 4 only

D 1, 2, 3 and 4

12 The diagram shows the flow of energy in a food web.

Which represents the decomposers?



13 What is the ecological definition of the term *community*?

A all the food webs in an ecosystem

B all the individuals of one species in an area

C all the organisms in an area

D the living organisms and their non-living environment

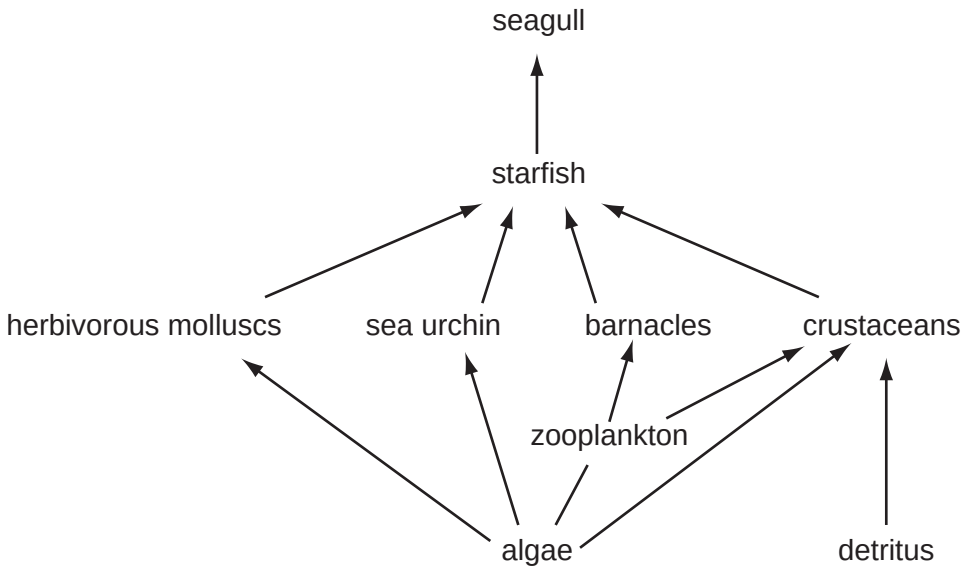
14 The table shows the results of a field study of four species in a food chain in an area of woodland.

species	number of individuals	biomass of one individual / arbitrary units	energy value per unit mass / arbitrary units
R	10 000	0.1	1.0
S	5	10.0	2.0
T	500	0.002	1.8
U	3	300 000.0	0.5

What is the energy flow in the food chain?

	from → to			
A	R	T	S	U
B	S	T	R	U
C	U	R	S	T
D	U	S	T	R

15 The diagram shows a food web.



How many trophic levels are represented in the food web?

A 3 **B** 4 **C** 5 **D** 6

16 What is the role of decomposers in the nitrogen cycle?

A They convert proteins to ammonium compounds.

B They fix atmospheric nitrogen.

C They oxidise ammonium compounds to nitrites.

D They oxidise nitrites to nitrates.

17 What name is given to all the organisms in an area and their interactions with their environment?

A community

B ecosystem

C habitat

D niche

18 What is the function of nitrifying bacteria in the soil?

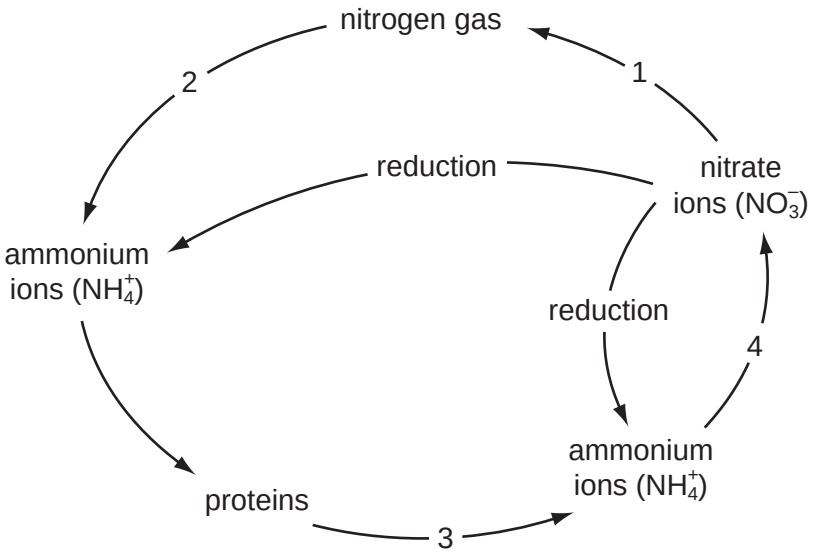
A oxidation of ammonium compounds to nitrates

B oxidation of nitrogen gas to nitrates

C reduction of ammonium compounds to nitrates

D reduction of nitrates to nitrites

19 The diagram shows part of the nitrogen cycle.



Which sequence of numbers correctly shows the roles of different types of microorganism in the nitrogen cycle?

	decomposing (putrefying) bacteria	denitrifying bacteria	nitrifying bacteria
A	2	4	3
B	3	1	2
C	3	1	4
D	4	2	1

20 Two species of animal are found in the same area of forest and grassland. In the spring and summer they eat the same plant food. However, in the autumn and winter one eats nuts in the forest and the other eats roots on the grassland.

Both species are preyed upon by the same predator. Numbers of root-eating animals are reduced most by this, but they recover faster since they reproduce faster.

What can be concluded about these two species of animals?

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4 They have different niches.

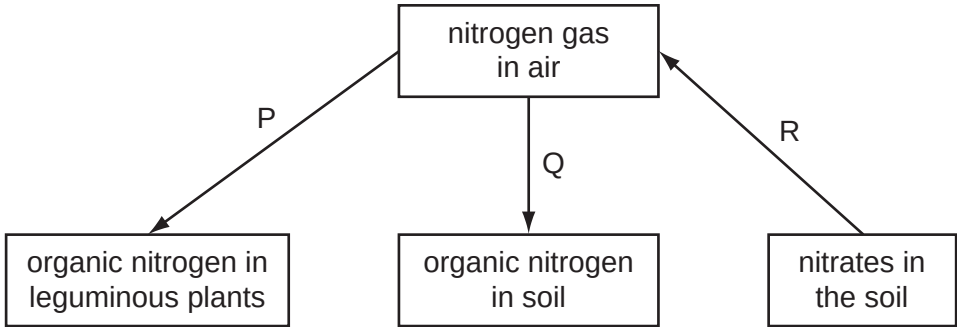
A 1 and 2 only

B 1 and 4 only

C 2, 3 and 4 only

D 1, 3 and 4 only

21 The diagram shows some chemical conversions during the nitrogen cycle.



Which conversions involve microorganisms?

stage	P	Q	R
A	✓	✗	✗
B	✓	✓	✓
C	✗	✓	✓
D	✗	✗	✗

key

✓ = involves microorganisms

✗ = does not involve microorganisms

22 What is the correct match of example to ecological term?

	community	ecosystem	population	niche
A	all lake organisms	freshwater lake	freshwater shrimps	pond weed as primary producer
B	freshwater shrimps	all lake organisms	pond weed as primary producer	freshwater lake
C	freshwater lake	pond weed as primary producer	freshwater shrimps	all lake organisms
D	freshwater shrimps	freshwater lake	all lake organisms	pond weed as primary producer

23 What limits the number of trophic levels in a food chain?

A biomass of the autotrophs

B efficiency of energy conversion between levels

C net productivity of the ecosystem

D species diversity in the ecosystem

24 The following are definitions of three ecological terms.

1 all of the organisms and their environment

2 group of individuals of one species living in an area

3 all of the organisms living in a habitat

What are the correct definitions of a community and a population?

	community	population
A	1	2
B	2	1
C	3	1
D	3	2

25 A tree carries out photosynthesis and provides organic compounds for other organisms in a forest. It takes carbon dioxide from and returns oxygen to the atmosphere. It takes water from the soil into its roots and its leaves lose water to the atmosphere. Many other organisms live in the tree.

Which of these terms applies to the description of the tree?

A community

B ecosystem

C habitat

D niche

26 What is the ecological definition of the term *community*?

A all the food webs in an ecosystem

B all the individuals of one species in an area

C all the organisms in an area

D the living organisms and their non-living environment

27 Which group could be a single population?

A all the animals and plants on an isolated island

B all the birds counted in one day in a garden

C all the bacteria in a colony of *Bacillus subtilis*

D all the insects occupying three hectares of farmland

28 Within an ecosystem, the top consumers in a food chain are few in number.

Which statement explains this?

A Energy losses occur at each trophic level.

B Energy losses occur within the consumers' digestive systems.

C Top consumers have a low reproductive rate.

D Top consumers are large in size.

29 What name is given to all the organisms in an area and their interactions with their environment?

A community

B ecosystem

C niche

D population

30 Which statement explains why two species **cannot** permanently occupy the same ecological niche?

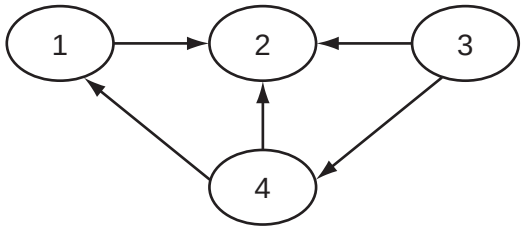
A The two species could not interbreed.

B The two species may be part of separate food webs.

C The two species would compete for the same resources.

D The two species would have different nutritional requirements.

31 The diagram shows the flow of energy between organisms in an ecosystem.

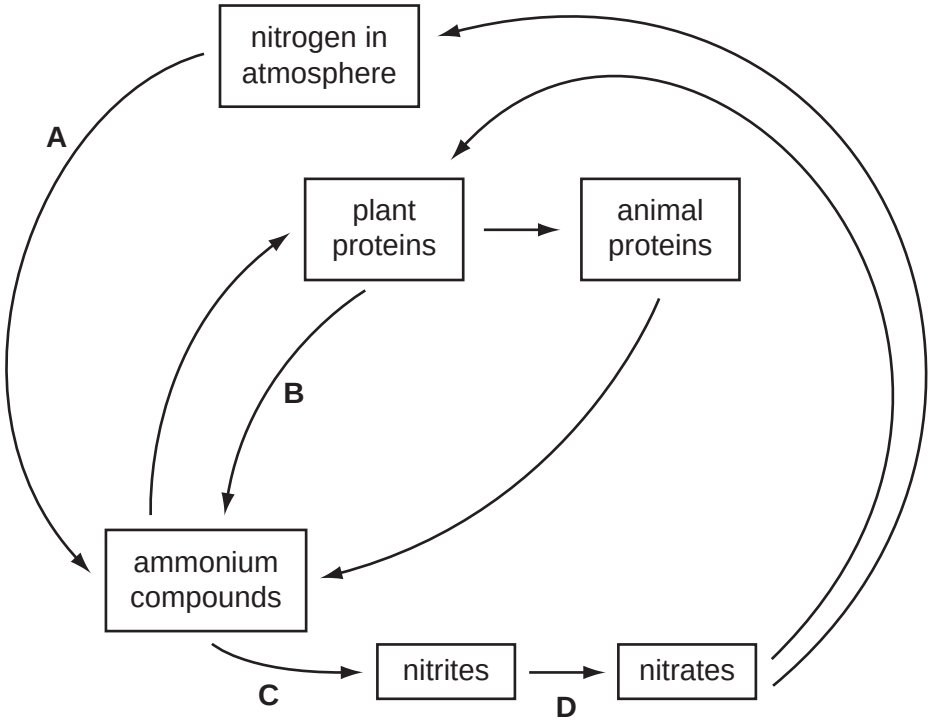


Which correctly identifies each organism in the ecosystem?

	1	2	3	4
A	primary consumers	decomposers	secondary consumers	producers
B	primary consumers	secondary consumers	producers	decomposers
C	secondary consumers	decomposers	producers	primary consumers
D	secondary consumers	primary consumers	decomposers	producers

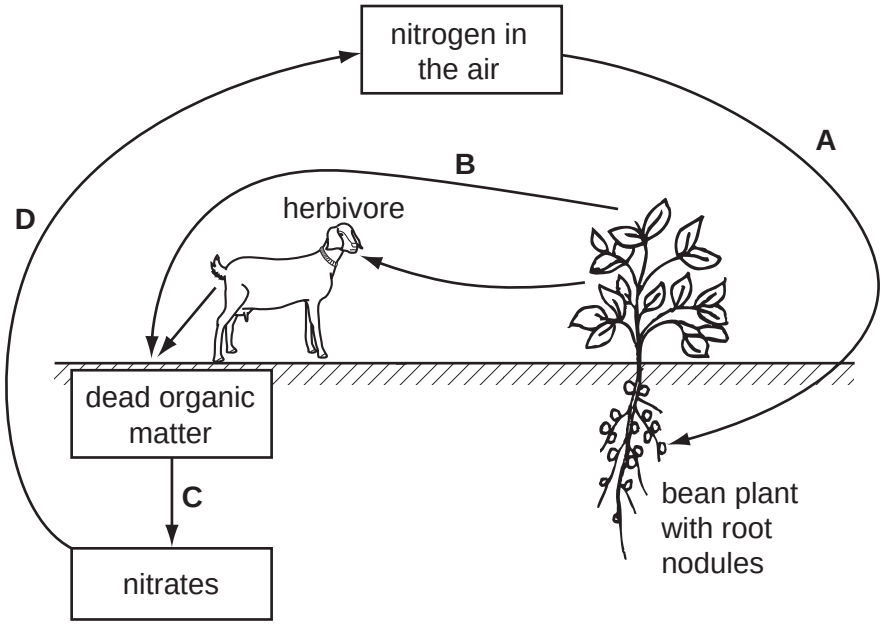
32 The diagram shows a simplified nitrogen cycle.

During which stage does decomposition take place?



33 The diagram shows part of the nitrogen cycle.

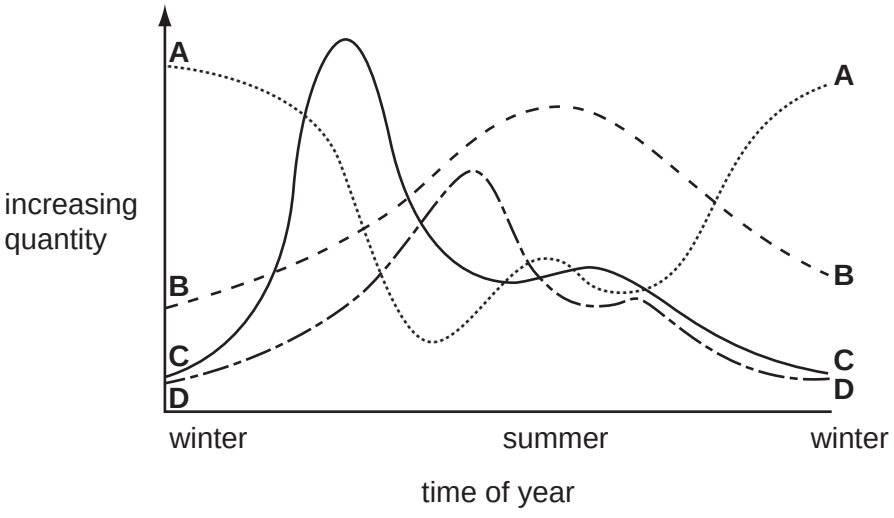
Which process is carried out by denitrifying bacteria?



34 The graph shows the annual changes of the following factors in a lake.

- intensity of light per day
- numbers of producers
- numbers of primary consumers
- quantity of nutrients

Which curve represents the numbers of primary consumers?



35 The graph shows the annual changes of the following factors in a lake.

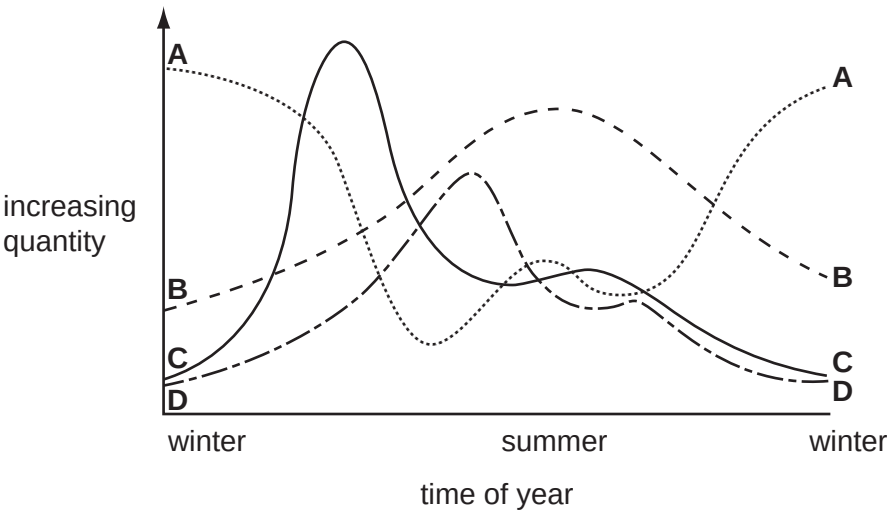
intensity of light per day

numbers of producers

numbers of primary consumers

quantity of nutrients

Which curve represents the numbers of producers?



36 Which events can occur in the nitrogen cycle?

1 Inorganic nitrogen in the atmosphere undergoes denitrification by specific prokaryotes.

2 Nitrate concentrations in the soil are increased by nitrifying bacteria in waterlogged soil.

3 Organic nitrogen in legumes passes into the soil where deamination and ammonification occurs.

4 Saprotrophic fungi living in the soil decompose organic nitrogen in faeces.

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