

Past-paper walk-through

Nutrient cycles ■ 19.3

eXercise

Questions in this set

- 0610/21 N25 Q34 ■ 1 mark
- 0610/21 N25 Q35 ■ 1 mark
- 0610/22 N25 Q36 ■ 1 mark
- 0610/23 N25 Q35 ■ 1 mark
- 0610/23 N25 Q36 ■ 1 mark
- 0610/41 N25 Q3 ■ 19 marks
- 0610/22 J25 Q37 ■ 1 mark
- 0610/23 J25 Q37 ■ 1 mark
- 0610/22 M25 Q35 ■ 1 mark

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 34

0610/21 N25 ■ Q34 ■ 1 mark

34 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

Solution 34

Answer: **A**

Why

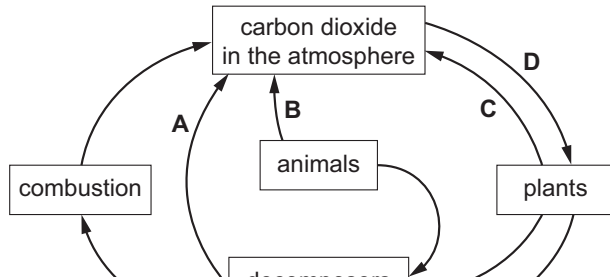
- Excess amino acids cannot be stored, so the amino group must be removed.
- Removing that amino group is deamination, which happens in the liver.
- Decomposition and denitrification are done by soil microorganisms, not inside a living animal.

Question 35

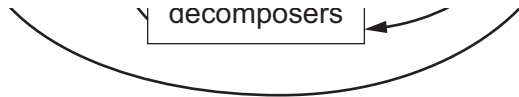
0610/21 N25 ■ Q35 ■ 1 mark

35 The diagram shows part of the carbon cycle.

Which arrow represents photosynthesis?



Question 35



Solution 35

Answer: **D**

Why

- Photosynthesis removes carbon dioxide from the air and fixes it into plant material.
- So the arrow must point *from* atmospheric carbon dioxide *to* the plants.
- Arrows going the other way are respiration, combustion or decomposition.

Question 36

0610/22 N25 ■ Q36 ■ 1 mark

36 Which process needs microorganisms to break down protein to produce ammonium ions?

- A** decomposition
- B** denitrification
- C** nitrification
- D** nitrogen fixation

Solution 36

Answer: **A**

Why

- Decomposers break down the protein in dead material and waste.
- Their action releases the nitrogen as ammonium ions.
- Nitrification then turns ammonium into nitrate, and nitrogen fixation works on nitrogen *gas*.

Question 35

0610/23 N25 ■ Q35 ■ 1 mark

35 Which process removes carbon dioxide from the atmosphere?

- A** combustion
- B** decomposition
- C** photosynthesis
- D** respiration

Solution 35

Answer: **C**

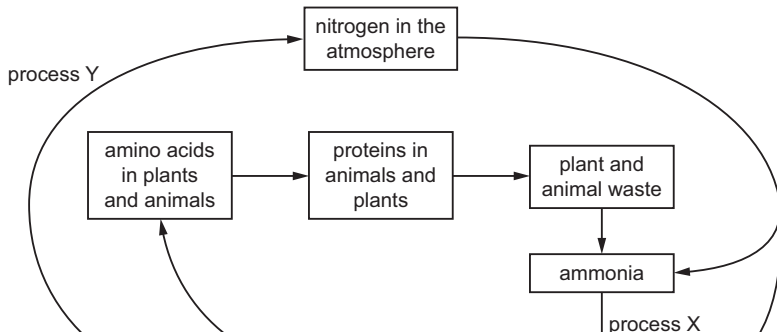
Why

- Photosynthesis takes carbon dioxide out of the air and fixes it into carbohydrate.
- Respiration, combustion and decomposition all *release* carbon dioxide.
- So photosynthesis is the only one of the four that removes it.

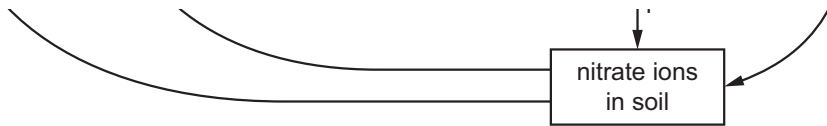
Question 36

0610/23 N25 ■ Q36 ■ 1 mark

36 The diagram shows part of the nitrogen cycle.



Question 36



What are the names of process X and process Y?

	X	Y
A	deamination	denitrification
B	nitrogen fixation	deamination
C	nitrogen fixation	nitrification
D	nitrification	denitrification

Solution 36

Answer: **D**

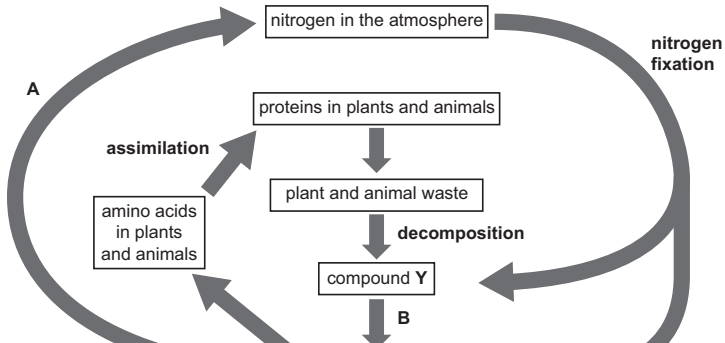
Why

- Follow the arrows and name each step by what it converts.
- Nitrogen fixation goes from nitrogen gas to a compound; nitrification from ammonia to nitrate.
- Denitrification runs the other way, converting nitrate back to nitrogen gas.

Question 3

0610/41 N25 ■ Q3 ■ 19 marks

3 Fig. 3.1 is a diagram of the nitrogen cycle.



Question 3

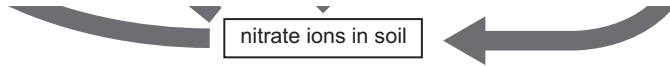


Fig. 3.1

- (a) (i) State the names of processes **A** and **B** in Fig. 3.1.

Question 3

Question 3

[2]

- (ii) State **two** ways that nitrogen fixation can occur.

Question 3

Question 3

[2]

- (iii) State the name of compound **Y** in Fig. 3.1.

Question 3

- (iv) State the name of an organ in animals, where assimilation **and** deamination of amino acids occurs.

Question 3

- (v) Describe the process of deamination.

Question 3

- (b)** Complete the sentences about pollution of the air by writing the appropriate words or phrases in the spaces provided.

Question 3

and climate change. Methane is released into the atmosphere from cattle and from the

Question 3

Question 3

Question 3

[5]

(c) Explain the process of eutrophication in aquatic ecosystems.

Question 3

[Total:19]

Solution 3

(a)(i)

Mark scheme

- A denitrification ;
- B nitrification ;
- 2

Solution 3

(a)(ii)

Mark scheme

- any two from:
- lightning ;
- bacteria ;
- AVP ;
- 2
- e.g. Haber process

Solution 3

(a)(iii)

Mark scheme

- ammonia / ammonium (ions) ;
- 1

(a)(iv)

Mark scheme

- liver ;
- 1

Solution 3

(a)(v)

Mark scheme

- removal of nitrogen containing part
- (of amino acids / protein) ;
- urea is formed ;
- 2

Solution 3

(b)

Mark scheme

- greenhouse effect ;
- rice ;
- carbon dioxide ;
- photosynthesis ;
- burning / combustion ;
- 5

Solution 3

(c) Mark scheme

- any six from:
- 1
- untreated sewage / fertiliser / nutrients ;
- 2
- increased availability of nitrates / ions / AW ;
- 3
- causing algal bloom / algae reproduction ;
- 4

Solution 3

- algae reduce (penetration of) sunlight (in the water) / AW ;
- 5
- (so rooted) plants unable to photosynthesise ;
- 6
- so plants die ;
- 7
- bacteria, decompose / feed, on dead, plants or algae ;
- 8
- so bacterial populations increase ;
- 9

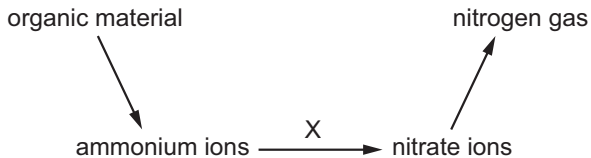
Solution 3

- bacteria respire aerobically ;
- 10 bacteria use up the oxygen in the water ;
- 11 organisms / fish , die / suffocate / migrate, due to lack of oxygen ;
- 6 A decomposers throughout for bacteria
- 0610/41
- October/November 2025
- Guidance

Question 37

0610/22 J25 ■ Q37 ■ 1 mark

37 The diagram shows part of the nitrogen cycle.



What is the process labelled X in the diagram?

- A** decomposition
- B** denitrification

Question 37

- C** nitrification
- D** nitrogen fixation

Solution 37

Answer: **C**

Why

- Nitrogen gas is unusable by most organisms, so it must first be combined into a compound.
- The step turning nitrogen gas into ammonium ions is nitrogen fixation.
- Nitrification converts ammonium to nitrate, and denitrification runs the other way, back to nitrogen gas.

Question 37

0610/23 J25 ■ Q37 ■ 1 mark

37 Which process in the nitrogen cycle can be caused by lightning and bacteria?

- A** deamination
- B** denitrification
- C** nitrification
- D** nitrogen fixation

Solution 37

Answer: **D**

Why

- Nitrogen fixation converts nitrogen *gas* into a usable compound.
- Lightning provides enough energy to combine nitrogen and oxygen in the air.
- Nitrogen-fixing bacteria in root nodules do the same thing biologically.

Question 35

0610/22 M25 ■ Q35 ■ 1 mark

35 The processes listed affect the concentration of carbon dioxide in the atmosphere.

- 1 increased deforestation
- 2 increased tree planting
- 3 decreased fossil fuel combustion
- 4 increased fossil fuel combustion

Which processes increase the concentration of carbon dioxide in the atmosphere?

A 1 and 3

B 1 and 4

C 2 and 3

D 2 and 4

Solution 35

Answer: **B**

Why

- Carbon dioxide rises when it is released faster than it is taken up.
- Deforestation removes trees that would absorb it, and burning more fossil fuel releases more.
- Planting trees and burning less fuel both *reduce* it, so those two do not belong.