

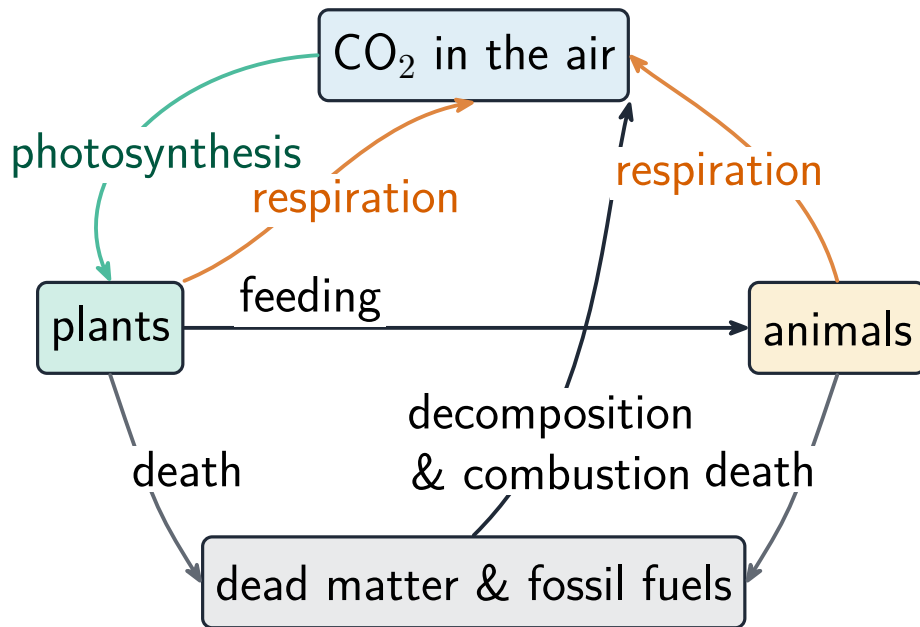
Exercise walk-through

19.3

Nutrient cycles

IGCSE Biology

The carbon cycle



Carbon is **recycled**:

- **photosynthesis** removes CO₂
- over millions of years dead organisms form **fossil fuels**, which return that carbon when burned
- **respiration & combustion** return it
- **decomposition** & fossil fuels too

The nitrogen cycle

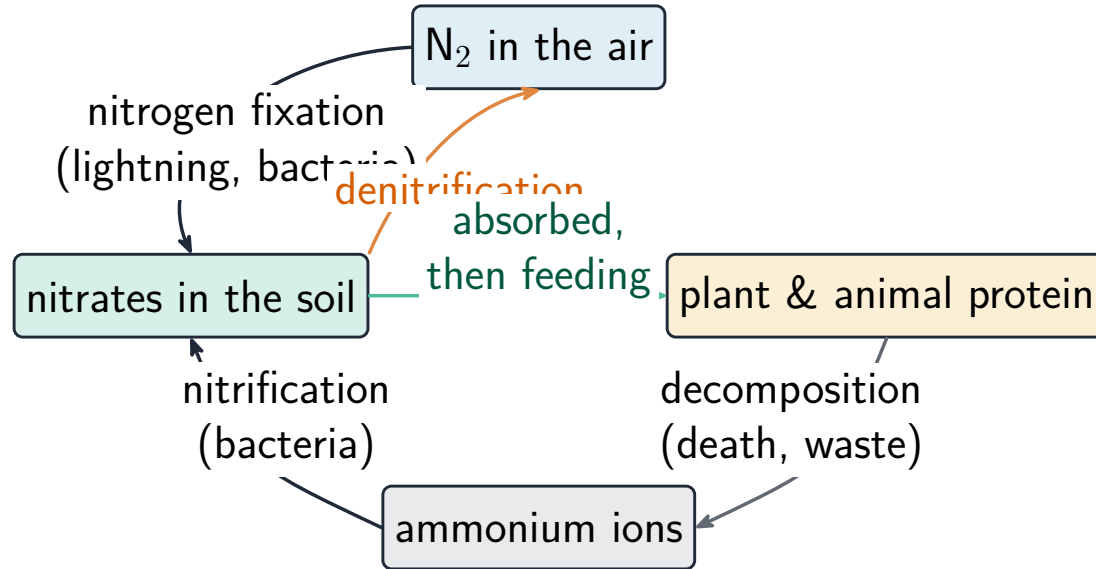
Microorganisms

move nitrogen:

- **nitrogen fixation** – N_2 into compounds plants can use
- **nitrification** – ammonium to nitrate
- **denitrification** – nitrate back to N_2
- **deamination** in the liver, and decomposition, release nitrogen compounds again

Plants absorb nitrates for protein.

The nitrogen cycle, in detail



The nitrogen cycle: microorganisms move nitrogen between the air, soil and living things

Four steps, four kinds of bacteria

Nitrogen fixation

Bacteria in root nodules and in the soil turn atmospheric N_2 into ammonium ions – lightning does a little too.

Nitrification

Bacteria change ammonium ions into **nitrate ions**, the form roots can absorb.

Assimilation

Plants absorb nitrate ions to make **amino acids** and proteins; animals get theirs by feeding and **digestion**.

Decay and denitrification

Decomposers return nitrogen from dead matter as ammonium; denitrifying bacteria return N_2 to the air.

Name the bacteria *and* the ion at each step. “Bacteria change it” is the answer that scores nothing.

Exercises 2.1·2.2

2.1 Name the process that removes carbon dioxide from the air, and name one process that returns it. [2]

2.2 Name two processes that return carbon dioxide to the air. [2]

Exercises 2.1·2.2

2.1 Name the process that removes carbon dioxide from the air, and name one process that returns it. [2]

2.1

- removes CO₂: **photosynthesis**
 - returns it: **respiration**, combustion or decomposition
-

2.2 Name two processes that return carbon dioxide to the air. [2]

2.2

- **respiration** and **combustion** (burning)

Exercise 3.1

3.1 In the nitrogen cycle, bacteria that turn ammonium ions into nitrate ions carry out:[1]

☐

A nitrogen fixation

B nitrification

C denitrification

D decomposition

Exercise 3.1

3.1 In the nitrogen cycle, bacteria that turn ammonium ions into nitrate ions carry out:[1]

☐

A nitrogen fixation

B nitrification

C denitrification

D decomposition

3.1 B

- ammonium $\rightarrow$ nitrate is **nitrification**
- A is $N_2 \rightarrow$ ammonium; C is nitrate $\rightarrow N_2$; D is rotting

Exercise 3.2 (a)

3.2 The carbon cycle keeps carbon moving.

(a) Describe how carbon passes from a plant to a consumer.

[1]

Exercise 3.2 (a)

3.2 The carbon cycle keeps carbon moving.

(a) Describe how carbon passes from a plant to a consumer.

[1]

(a)

- carbon passes from plant to consumer when the consumer **eats the plant**

Exercise 3.2 (b)

3.2 The carbon cycle keeps carbon moving.

(b) Explain how burning fossil fuels affects the carbon cycle.

[2]

Exercise 3.2 (b)

3.2 The carbon cycle keeps carbon moving.

(b) Explain how burning fossil fuels affects the carbon cycle.

[2]

(b)

- burning fossil fuels **releases** CO_2 into the air
- **adding** to the amount in the atmosphere