Your notes

GCSE Biology: revision notes

Carbon and water cycles, decomposition

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Cycling materials

- Materials in the living world are recycled to provide the building blocks for future organisms.
- **Decomposers** (bacteria and fungi) break down dead plants and animals. This returns carbon to the atmosphere as carbon dioxide and mineral ions to the soil.

The carbon cycle

- Photosynthesis removes carbon dioxide from the atmosphere; the carbon becomes part of glucose and other compounds in plants.
- Carbon passes along food chains when animals eat plants and other animals.
- Respiration by plants, animals and **decomposers** returns carbon dioxide to the atmosphere.
- **Combustion** of fossil fuels and wood also releases carbon dioxide. Fossil fuels formed from organisms that did not fully decay millions of years ago.

The water cycle

- Energy from the Sun evaporates water from seas and lakes, and plants lose water by transpiration.
- Water vapour cools and condenses to form clouds, then falls as **precipitation** (rain, snow).
- Water flows through the land to rivers and the sea. This provides fresh water for plants and animals on land.

Decay (separate sciences)

- The rate of decay depends on temperature, water and the availability of oxygen, because **decomposers** need these to grow and respire.
- Gardeners make **compost** by keeping dead plant material warm, moist and aerated so it decays quickly. **Compost** is used as natural fertiliser.
- **Anaerobic decay** produces methane gas. **Biogas** generators use this to make fuel.
- Required practical: the effect of temperature on the rate of decay can be measured by the fall in pH as lipase breaks down the fat in milk, using an indicator such as phenolphthalein.

Environmental change (separate sciences)

- Changes in the environment affect the distribution of species. They may be seasonal, geographic or caused by human activity.
- Important factors are temperature, water availability and the composition of atmospheric gases.

The nitrogen cycle (Edexcel and OCR)

- Plants need nitrates from the soil to make proteins. Nitrogen gas makes up about 78% of the air, but it is unreactive, so plants and animals cannot use it directly.
- **Nitrogen-fixing bacteria**, in the soil and in the root nodules of legumes such as peas, beans and clover, turn nitrogen gas into ammonium compounds. Lightning also fixes some nitrogen.
- **Decomposers** break down proteins in dead organisms, and urea in animal waste, into ammonium compounds.
- **Nitrifying bacteria** turn ammonium compounds into nitrites and then nitrates, which plants absorb through their roots.
- **Denitrifying bacteria** turn nitrates back into nitrogen gas. They live in waterlogged soil, where there is little oxygen.
- Farmers add nitrates with fertilisers (manure or artificial fertiliser) and by crop rotation, growing legumes in some years.

Key terms

Decomposer	An organism, such as a bacterium or fungus, that breaks down dead material.
Carbon cycle	The movement of carbon between the atmosphere, living things and fossil fuels.
Water cycle	The continuous movement of water by evaporation, condensation and precipitation.
Combustion	Burning, which releases carbon dioxide.
Precipitation	Water falling from clouds as rain, sleet, hail or snow.

Your notes

Compost	Decayed plant material used as a natural fertiliser.
Biogas	A fuel containing methane, made by anaerobic decay.
Anaerobic decay	Decay without oxygen, which produces methane.
Nitrogen-fixing bacteria	Bacteria that turn nitrogen gas from the air into compounds plants can use. (Edexcel and OCR)
Nitrifying bacteria	Bacteria that turn ammonium compounds into nitrates. (Edexcel and OCR)
Denitrifying bacteria	Bacteria that turn nitrates back into nitrogen gas. (Edexcel and OCR)

Your notes

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which process removes carbon dioxide from the atmosphere?
2. Which organisms are decomposers?
3. What do decomposers return to the soil?
4. How does burning fossil fuels affect the carbon cycle?
5. How does carbon pass from plants to animals?
6. What forms clouds in the water cycle?
7. Which gas is produced by anaerobic decay? (Separate sciences)
8. Why do compost heaps work best when warm and moist? (Separate sciences)

Answers

1. Photosynthesis
2. Bacteria and fungi
3. Mineral ions
4. It releases carbon dioxide into the atmosphere
5. Animals eat the plants
6. Water vapour condensing
7. Methane
8. Decomposers grow and respire faster

What to do next

Practise 13 questions on this topic

Try 6 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.