

Exercise walk-through

1.4

The Carbon Cycle

AP Environmental Science

The carbon cycle

Carbon moves through a **biogeochemical cycle** :

- **photosynthesis** pulls CO_2 in
- **respiration** & **combustion** return it

Burning **fossil fuels** moves ancient carbon to the air far faster than nature removes it.

Exam tips

- Remember **energy flows and is lost** (the 10% rule) while **matter cycles** (carbon, nitrogen, phosphorus, water).
- Apply the 10% rule down a food chain and know **$\text{NPP} = \text{GPP} - \text{respiration}$** (only NPP is available to consumers).
- Learn each biogeochemical cycle's stores and how humans disturb it (burning fossil fuels adds CO_2 ; fertiliser adds nitrogen/phosphorus).
- Producers are most abundant because so little energy reaches the top.
- Use correct units and show your arithmetic on the free-response math questions (no calculator – keep numbers round).

Unit 1 – key takeaways

1

Ecosystems

biotic + abiotic; niche; competitive exclusion; symbiosis

2

Cycles

carbon, nitrogen, water recycle matter; P has no gas phase

3

Productivity

$NPP = GPP - R$ sets the food supply

4

Energy flow

~10% per level; food webs + keystone species

Exercises 2.1-2.3

2.1 Which process removes CO_2 from the atmosphere? [1]

2.2 Name two processes that return CO_2 to the atmosphere. [2]

2.3 Name the largest, slowest carbon reservoir. [1]

Exercises 2.1-2.3

2.1 Which process removes CO₂ from the atmosphere? [1]

2.1

- Photosynthesis
-

2.2 Name two processes that return CO₂ to the atmosphere. [2]

2.2

- Any two: respiration, decomposition, combustion
-

2.3 Name the largest, slowest carbon reservoir. [1]

2.3

- Rocks / fossil fuels (sediments)

Exercise 3.1

3.1 The process that removes carbon dioxide from the air is

[1]

☐

A respiration

B combustion

C photosynthesis

D decomposition

Exercise 3.1

3.1 The process that removes carbon dioxide from the air is

[1]

☐

A respiration

B combustion

C photosynthesis

D decomposition

3.1 C

- photosynthesis

Exercise 3.2 (a)

3.2 Humans burn large amounts of fossil fuels.

(a) Explain how this disturbs the carbon cycle.

[2]

Exercise 3.2 (a)

3.2 Humans burn large amounts of fossil fuels.

(a) Explain how this disturbs the carbon cycle.

[2]

(a)

- Burning fossil fuels releases stored carbon as CO_2 far faster than natural processes remove it, raising atmospheric CO_2

Exercise 3.2 (b)

3.2 Humans burn large amounts of fossil fuels.

(b) State one other human activity that affects the cycle.

[1]

Exercise 3.2 (b)

3.2 Humans burn large amounts of fossil fuels.

(b) State one other human activity that affects the cycle.

[1]

(b)

- Deforestation (reduces CO₂ uptake)

Exercise 3.3

3.3 Explain why atmospheric CO₂ is rising even though photosynthesis removes CO₂. [2]

Exercise 3.3

3.3 Explain why atmospheric CO_2 is rising even though photosynthesis removes CO_2 . [2]

3.3

- Humans release CO_2 (burning fossil fuels, deforestation) faster than photosynthesis and the oceans can absorb it, so the net amount in the atmosphere increases