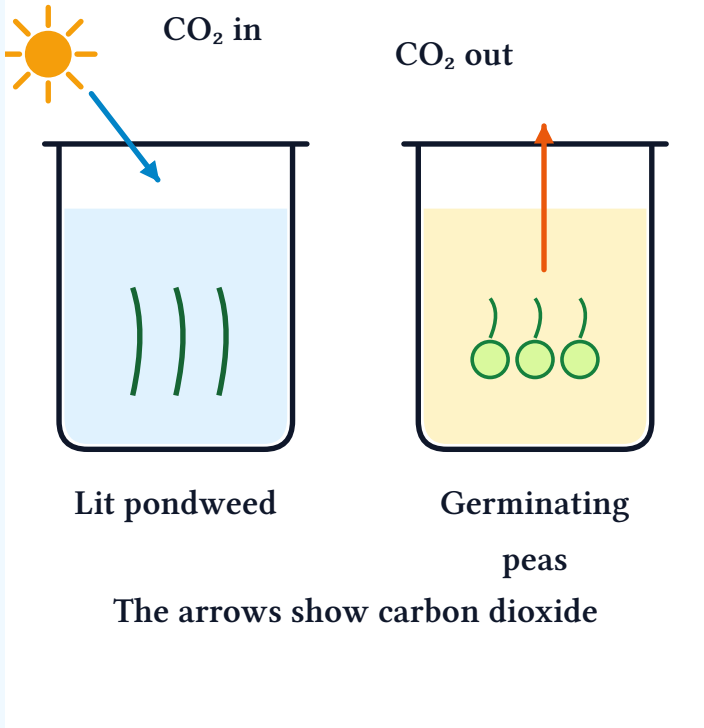
Biology 20

Unit A: Energy and matter in the biosphere

Biogeochemical cycles

Carbon from leaf to air

- Pond weed in a bright jar builds sugar from carbon dioxide in the water.
- Germinating peas in a dark jar release carbon dioxide as they respire.



Four element routes

- Carbon and oxygen move together through photosynthesis and cellular respiration.
- Nitrogen moves through bacteria that fix, convert, and return N_2.
- Phosphorus moves from rock and soil into organisms and back to sediment.

Key terms

carbon cycle

The movement of carbon atoms among air, water, organisms, and fossil stores.

nitrogen cycle

The movement of nitrogen from N_2 in air through soil bacteria, plants, and animals, and back to N_2.

phosphorus cycle

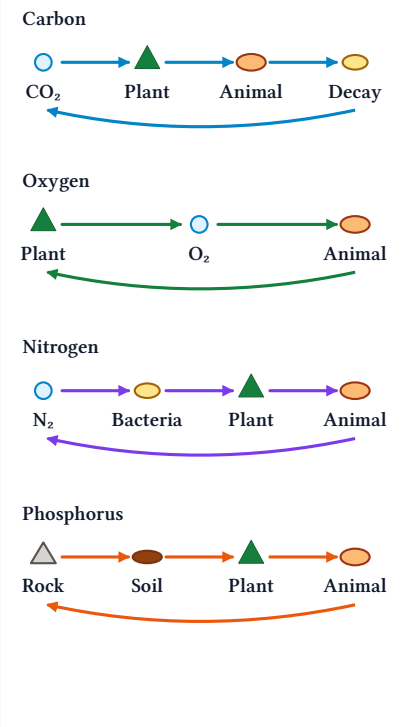
The movement of phosphorus from rock and soil into organisms and back to soil and sediment.

oxygen cycle

The movement of oxygen released by photosynthesis and used in cellular respiration.

Atoms return through each cycle

- Photosynthesis and respiration move carbon and oxygen in opposite directions.
- Bacteria open and close the nitrogen route between air and plants.
- Weathering and burial move phosphorus between rock and living tissue.



Plant and animal carbon test

- The question names pond weed and germinating peas as the two producers of a carbon dioxide record.
- The prediction says which jar raises the indicator faster in the dark.

One human change, several cycles

- Fertilizer adds nitrate and phosphate that crops absorb.
- Extra nutrients in runoff feed algae, and decay then changes oxygen in the water.



Four routes

- State the return path for carbon and for nitrogen.
- State where phosphorus enters living systems and one human change that speeds two cycles.

Water carries the dissolved load

- The next lesson treats water as the solvent that moves these nutrients.
- Hydrogen bonding explains why water holds and transports ions.

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