

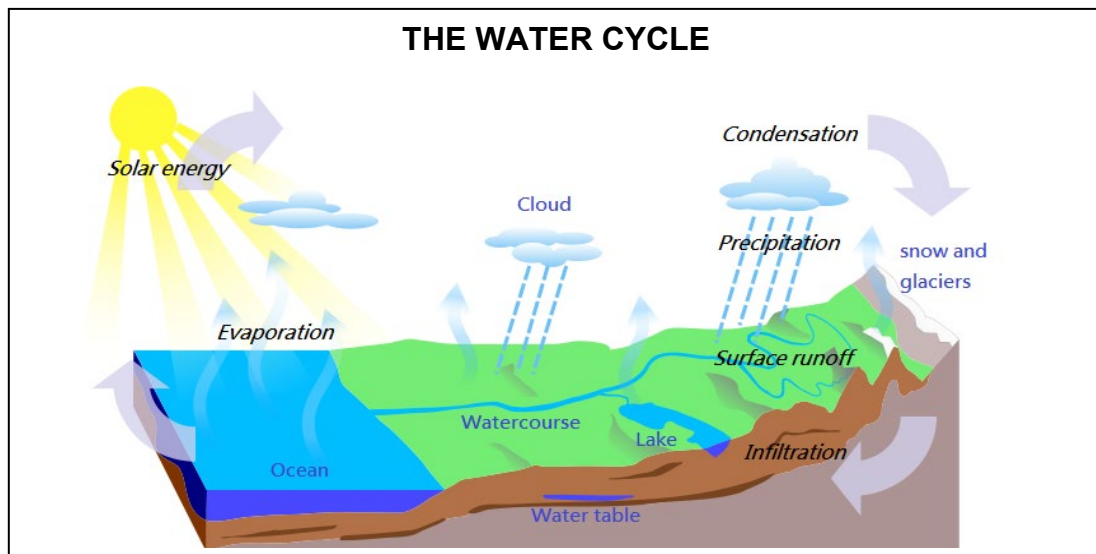
CYCLES IN NATURE

WHAT IS A CYCLE?

A cycle shows the _____ of certain elements and compounds (e.g. water, carbon, oxygen, nitrogen, phosphorus) in different forms in ecosystems.

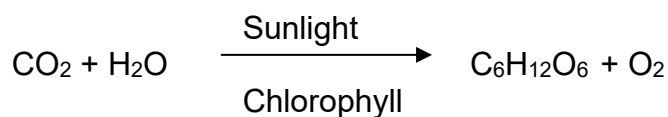
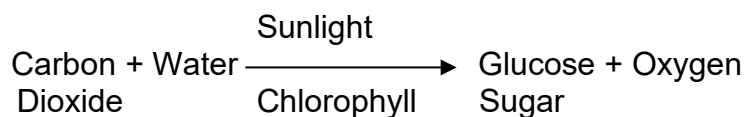
WATER CYCLE

- The _____ provides the heat energy required for the cycle to continue.
- The oceans and _____ are the main reservoirs of water.
- In the space below, sketch the water cycle. Draw labelled arrows showing **evaporation**, **condensation**, **precipitation** (e.g. rain) and **transpiration**.

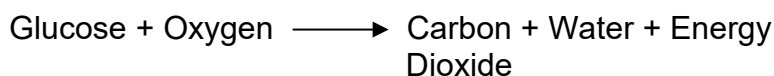


CARBON AND OXYGEN CYCLES

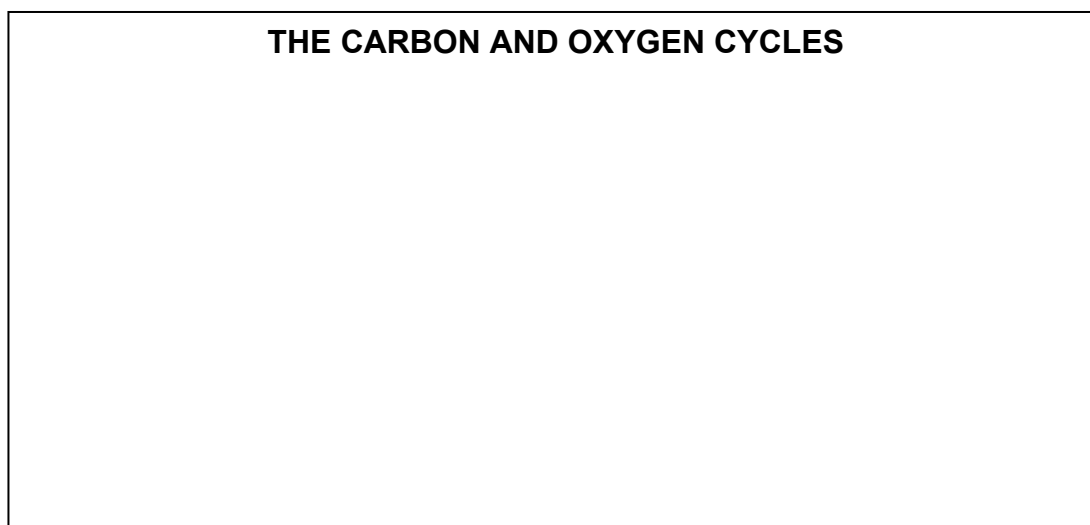
- **Carbon** occurs in all living organisms in the forms of carbon dioxide, carbohydrates (sugars and starches), proteins and _____.
- **Oxygen** occurs in all living organisms in the forms of oxygen gas, water, carbon dioxide, _____ (sugars and starches), proteins and fats.
- **Photosynthesis** – Photosynthesis is the process used by _____ containing green chlorophyll to utilise sunlight, carbon dioxide and water to form sugar (as glucose) and oxygen.



- **Respiration** – Respiration is the process that most living organisms (including animals, plants, fungi and _____) use to obtain energy from glucose sugar and _____. The wastes formed are carbon dioxide and water.



- **Nutrition** – Living organisms contain a large quantity of carbon in the form of carbohydrates, proteins and so on. When one organism _____ another, that carbon is passed from one organism to another.
- **Decomposition** – Almost all living organisms require oxygen. When decomposing bacteria and _____ break down dead organisms and their wastes such as _____, they take in oxygen and release carbon dioxide into the _____.
- **Combustion** – The _____ of living matter produces carbon dioxide and water.
- In the space below, sketch the carbon and oxygen cycles. Draw labelled arrows showing **respiration**, **photosynthesis**, **decomposition** and **combustion**.



NITROGEN CYCLE

There are two interrelated parts of the Nitrogen Cycle.

First Part of the Nitrogen Cycle

- **Nitrogen gas** forms about ___% of the atmosphere. However, no animals and few plants can utilise nitrogen in this gaseous form.
- **Nitrogen-Fixing Bacteria** converts atmospheric _____ to amino acids, which are the components of _____. Examples of nitrogen-fixing bacteria are the cyanobacteria *Nostoc*, soil bacteria *Azotobacter* and *Clostridium*, and the legume root bacteria *Rhizobium*. Examples of legumes are pea and _____ plants. These plants add natural _____ to the soil.

- **Atmospheric nitrogen** can also be fixed or converted to a more solid form by **lightning**.
- In reverse, **Denitrifying Bacteria** in the _____ convert **ammonia**, a nitrogenous waste in urine, back to atmospheric nitrogen.

Second Part of the Nitrogen Cycle

- Nitrogen in animals and plants is in the form of **amino acids and proteins**. As one organism eats another along the food _____, the nitrogen passes from one organism to another.
- Animals also excrete nitrogenous wastes in urine as **urea, uric acid or ammonia**. This passes down to the _____.
- When animals and plants die, **Putrefactive Bacteria** in the soil converts the body amino acids and proteins to ammonia in the soil. These __ bacteria also convert urea and uric acid to ammonia in the soil.
- **Nitrite Bacteria** in the soil convert ammonia to nitrites in the soil.
- **Nitrate Bacteria** in the soil convert those nitrites to nitrates in the soil. These are used by the plants as fertilisers.

PHOSPHORUS CYCLE

- **Phosphorus** is an essential component of many chemicals within living organisms. Examples include the energy-rich compound ATP (Adenosine Triphosphate) and the phosphates used by plants as _____.
- Phosphorus cycles in a complex way which is **different** from the elements of carbon, oxygen and nitrogen. Phosphorus in the form of phosphates is deposited as faeces and guano on land masses such as the island of Nauru. Rain then erodes the phosphorus-rich guano into the ocean. The guano then is eroded further in the ocean. There is little deposition back onto the _____.