



Thursday, Sept 21, 2017

Pick up: none (unless you were absent)

Today you will:

- Make sure your Cornell Notes are complete

HOMEWORK:

Study & return to office hours this week to work on remediation (you must stay at least once)

The Earth as a System

Earth's Spheres



What is a System?

A system is an organized group of objects or components interacting as a whole.

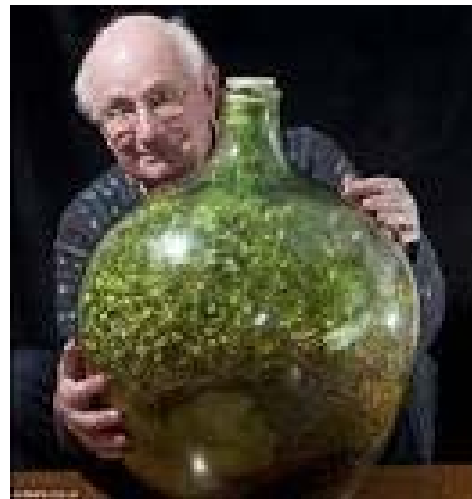
- What are systems you know?

The Earth System

- The Earth system is made up of many systems with matter and energy interacting.
- Matter – anything that has mass and takes up space
- Energy – light, heat, vibrations, or electromagnetic waves

What is the difference between an open and closed system?

- Open system – matter and energy are exchanged with the surroundings. Examples are an open jar, a lake, most systems on Earth
- Closed system – energy can be exchanged with surroundings, but matter cannot. Examples are a closed jar and MOSTLY the Earth System



Earth's Five Spheres

1. Atmosphere
2. Hydrosphere
3. Geosphere
4. Biosphere
5. Cryosphere



Atmosphere

Blanket of gases surrounding Earth's surface.
78% Nitrogen, 21% Oxygen, 1% other





Hydrosphere

All the water on Earth.

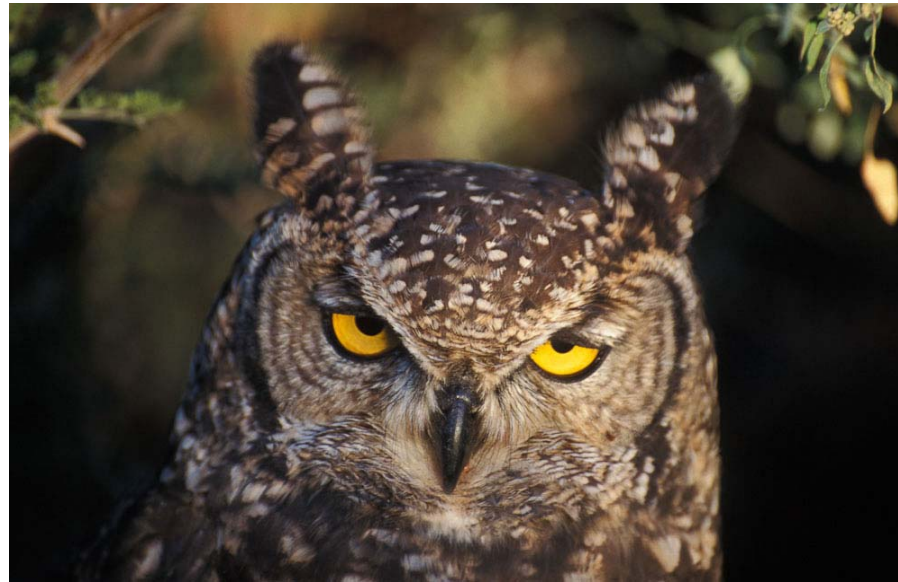
97% salt (global ocean) 3% fresh

A cross-sectional diagram of the Earth's geosphere. The diagram shows the outer layers of the Earth, including the crust and upper mantle. The crust is depicted with various tectonic plates, some of which are moving towards or away from each other. The upper mantle is shown with a distinct boundary, likely the asthenosphere. The diagram uses a color gradient from dark blue at the top to light green and yellow at the bottom, representing different geological layers. The text 'Geosphere' and 'Rocky part of Earth' is overlaid on the diagram in white.

Geosphere

Rocky part of Earth

Biosphere – life



Cryosphere

Ice sheets of Earth



Energy on Earth

First Law of Thermodynamics - Energy cannot be created or destroyed, but can be transferred from system to system.

Matter and energy are transferred between the five spheres (open systems).

Conservation
of
Energy

It's the Law

Earth's Energy Sources

Internal (inside Earth)

And

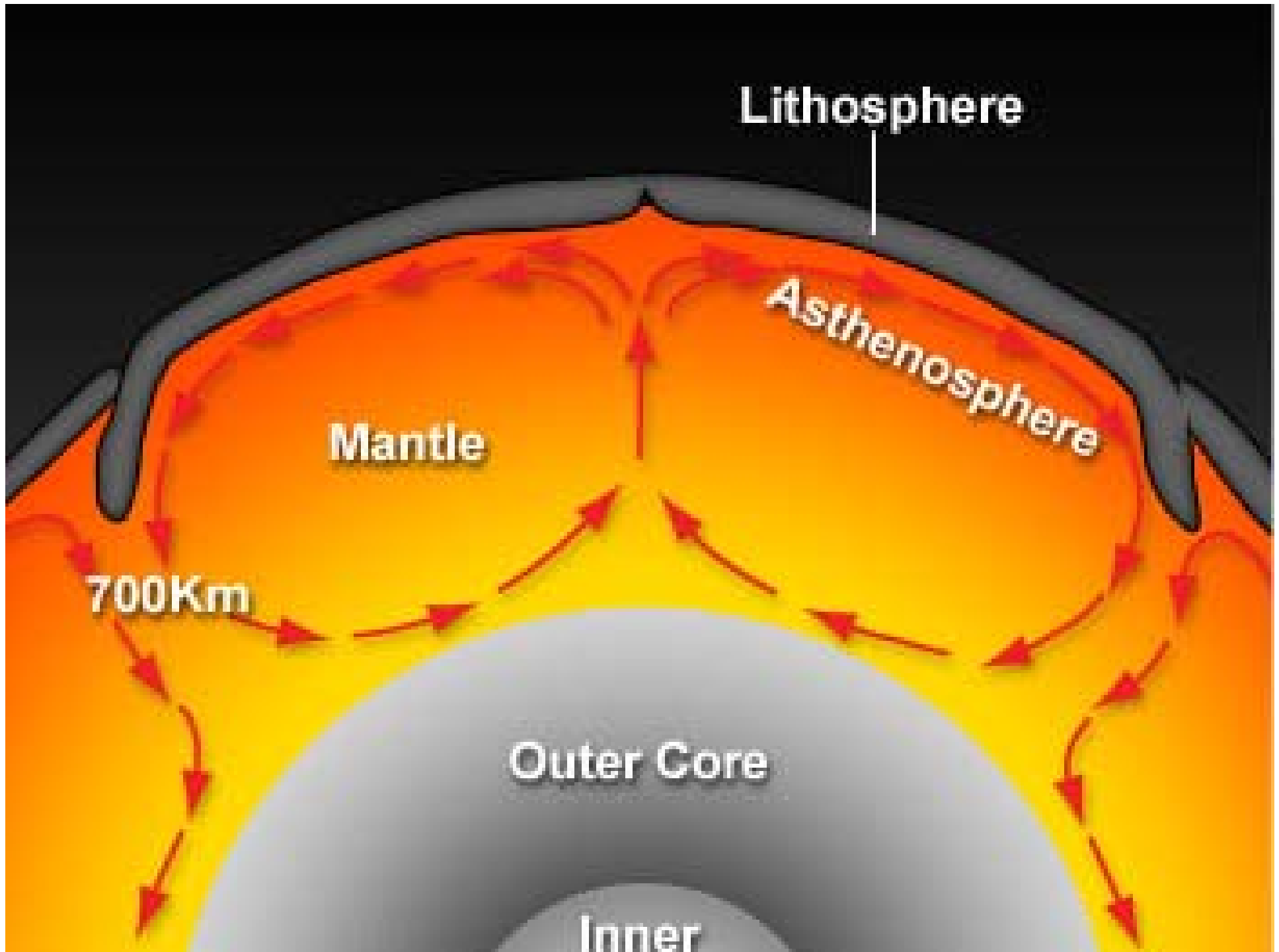
External (outside of Earth's spheres)



Earth's Internal Energy

- Geothermal energy
 - Convection currents move warm fluids to the surface and cool fluids sink.



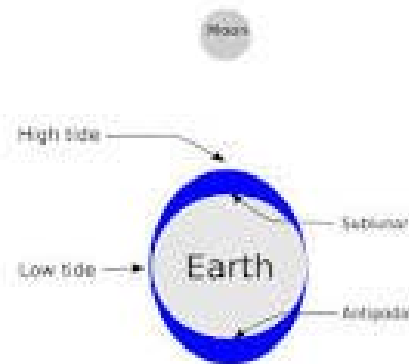


External Sources

1. The sun – causes movement of air masses, winds, ocean currents, and fuels photosynthesis.



2. Gravitational energy from the moon and sun – causes tides, mixing of ocean waters



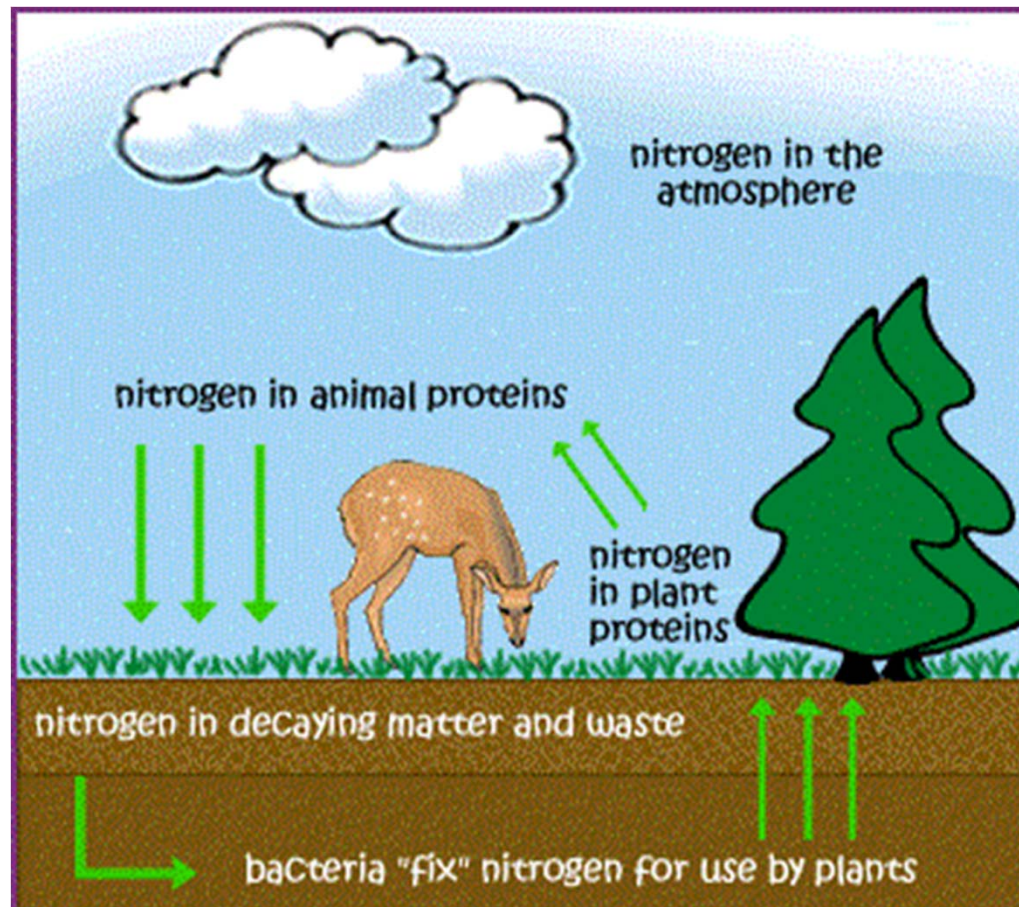
Earth's Biogeochemical Cycles

Biogeochemical cycles: the movement (or cycling) of matter through a system

1. Nitrogen cycle
2. Carbon cycle
3. Phosphorus cycle
4. Water cycle

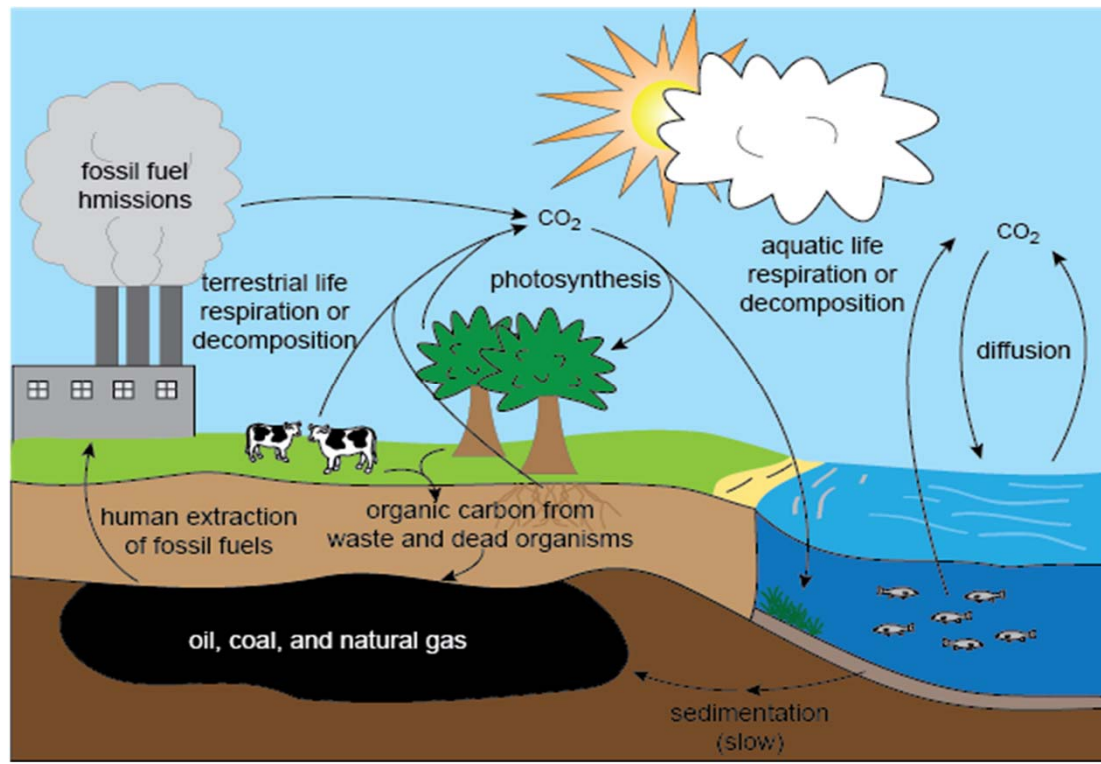
Nitrogen Cycle

Organisms need nitrogen, but can't use the nitrogen from the atmosphere as it is. It must be "fixed". Bacteria in the soil use the nitrogen and fix it so plants can use it. We eat the plants



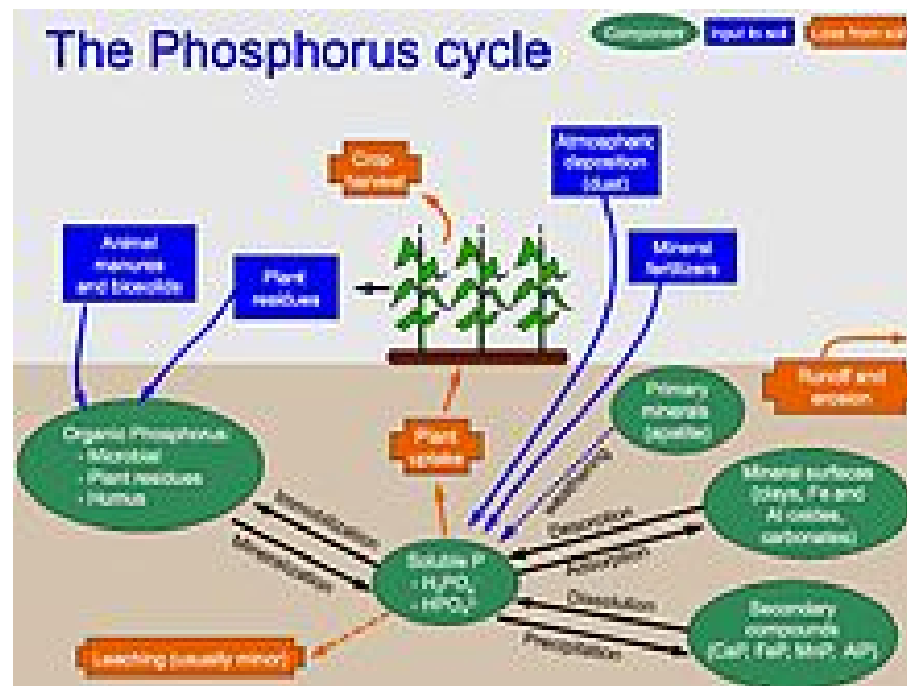
Carbon Cycle

Carbon is moved through photosynthesis, respiration, and combustion.



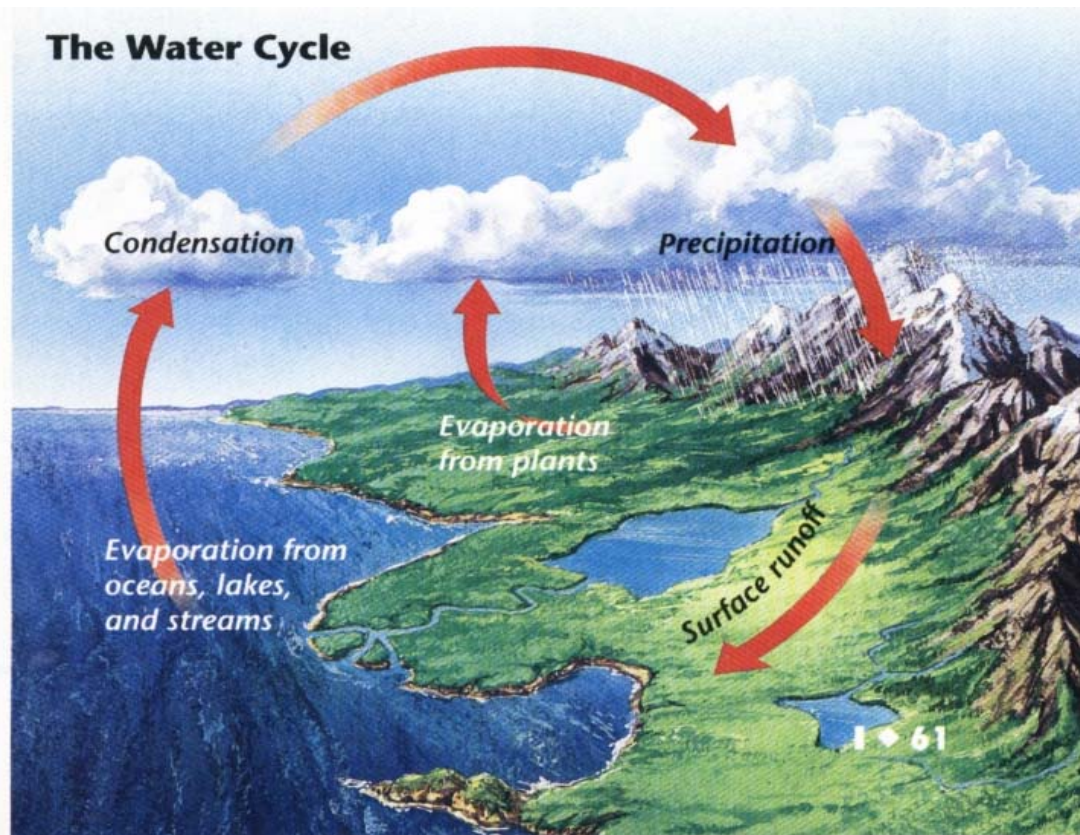
Phosphorus Cycle

Moves through all spheres except for the atmosphere (is not a gas).



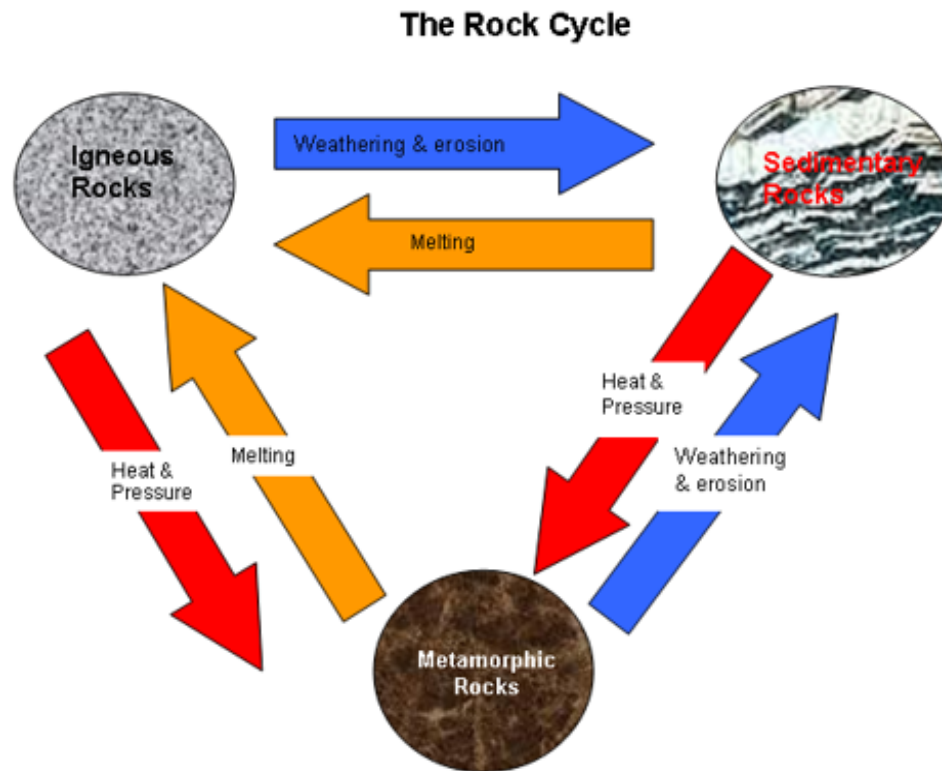
The Water Cycle

Water moves through the spheres via evaporation, condensation, and precipitation.



The Rock Cycle

- Sediment, remains, and minerals become rocks.



Ecology– The study of the relationships between biotic (living) and abiotic (not living) things.

Abiotic and Biotic factors that influence ecosystems

Abiotic

- Air (O₂, CO₂, N₂, etc)
- Water
- Light
- Wind
- Soil
- pH
- Temperature
- Salinity
- Humidity
- Inorganic nutrients (N, P)
- Etc.

Biotic

- Other organisms, so:
- Competition
- Predation
- Symbiosis
 - Mutualism
 - Parasitism
- Disease agents

Ecosystem – A community of living things and their environment

- Producers (autotrophs) – The transfer of energy through an ecosystem begins with plants capturing solar energy through photosynthesis.
- Consumers (heterotrophs) get energy by eating other organisms
- Decomposers – a type of consumer that breaks down dead organisms for energy.



Balancing forces in ecosystems.

- Carrying capacity – the largest population that an environment can support.
- Ecosystems react to restore balance when a change happens. It is easier for an ecosystem to react to a slow change than to a sudden change.

- Food web – diagram showing the feeding relationship among organisms in an ecosystem

