Name: _____ **Date:** _____

Biogeochemical Cycles Webquest

In this webquest you will search for information that will answer questions about the water, carbon/oxygen, nitrogen and phosphorous cycles using the listed websites. Answer all questions in the spaces provided. The easiest way to answer the questions is to take your time! Don't rush through the websites, take your time finding the correct answer. The sites have lots of good information and are interesting, stay on task!

1. Water Cycle

Introduction

Precipitation, evaporation, and condensation are all terms that you recognize, but what do they really mean? They are all part of the water cycle, which is a complex process that not only gives us water to drink, and food to eat, but also helps our plants grow. Only about 3% of the Earth's water is fresh, and 1% of that water can be used for many human purposes. Why can't we use the other 2% of the fresh water found on the Earth? What about the other 97% of the water found in the world? To find these answers and to discover more, come along for an interactive journey through the water cycle!

Websites

http://www.mbgnet.net/fresh/cycle/index.htm.
http://www.mbgnet.net/fresh/cycle/concepts.htm.
http://www.mbgnet.net/fresh/cycle/cycle.htm.

Check out these websites for more information!
http://www.biology.arizona.edu/biochemistry/tutorials/chemistry/page3.html
http://www.wwnorton.com/college/chemistry/gilbert/tutorials/chapter_09/water_h_bond/index.html

Questions

- Evaporation is the process where a liquid changes from its _____ state to a _____ state.

- Why is evaporated water so clean?

  _____

- Condensation occurs when a _____ is changed into a _____.
- Condensation is the opposite of _____.
- When the _____ and _____ are right, the small droplets of water in clouds form larger droplets and precipitation occurs.
- Using the terms "evaporation", "condensation", and "precipitation", explain the water cycle in your own words.

  _____

  _____
- What factor is most important in determining whether water is a solid, liquid, or gas?

  _____

  _____
- Is the amount of water on Earth always changing or is it a constant amount?

  _____

  _____
- Explain surface runoff.

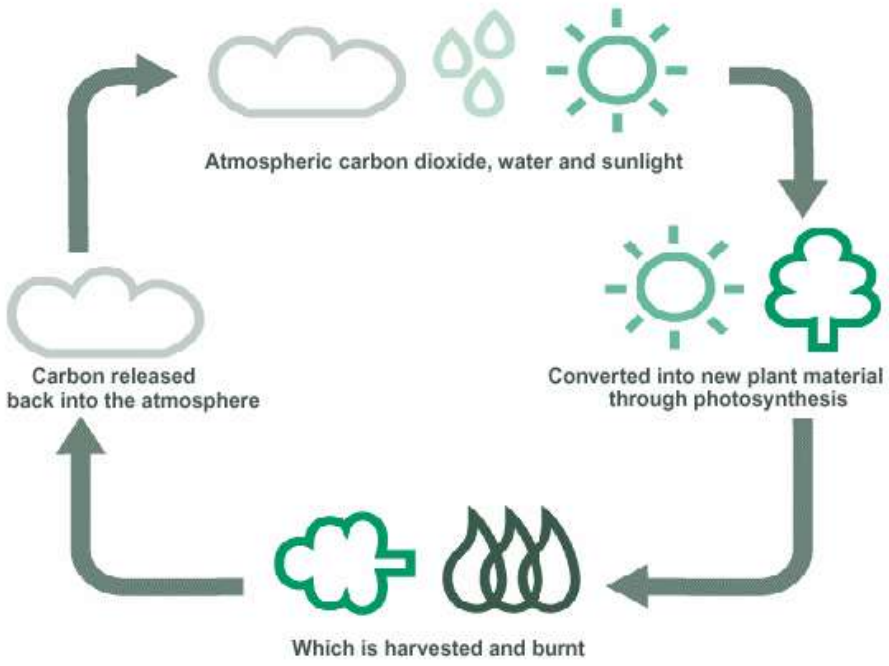
  _____

  _____

2. Carbon/Oxygen Cycle

Introduction

Carbon is an element that is found in all organisms, fossil fuels, soil, the ocean, and the atmosphere. We take part in the carbon cycle by breathing CO_2 into the air; autotrophs participate by removing atmospheric CO_2 for use in building leaves, stems and other organs



through the process of photosynthesis. As we burn more and more fossil fuels, such as oil and coal, we release large amounts of carbon dioxide into the atmosphere- more than can be removed by oceans and photosynthetic organisms. Within the atmosphere, this extra CO_2 traps heat. As more CO_2 accumulates, the Earth becomes warmer through a process known as the greenhouse effect.

Websites

http://nortonbooks.com/college/biology/animations/ch38a03.htm
http://www.wwnorton.com/college/chemistry/gilbert/tutorials/interface.swf?chapter=chapter_04&folder=carbon_cycle

Check this website out for more information!
http://www.open2.net/science/element/html/

Questions

- Why do plants and other photosynthetic organisms need CO_2 from the atmosphere?

  _____

- How can carbon move from "land" to bodies of water?

  _____

- Describe the way human impact has leads to increased levels of CO_2 in the atmosphere.

  _____
  _____
  _____

- What is the greenhouse effect?

  _____
  _____
  _____

- How much carbon is stored in the atmosphere as CO_2? _____

- What is detritus? _____

- How can human use of fossil fuels be detrimental to the environment?

  _____
  _____

- Describe one of the many paths a carbon molecule can take through the carbon cycle.

_____

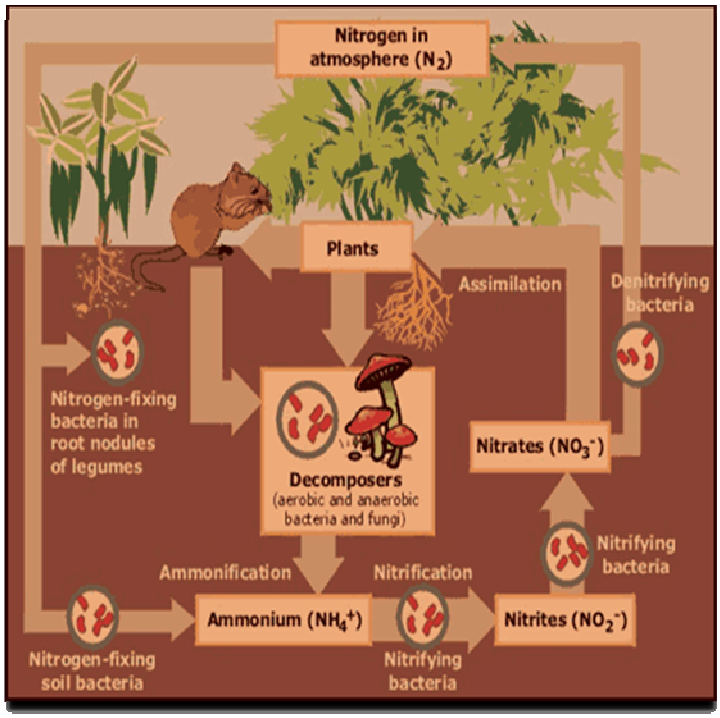
_____

_____

3. Nitrogen Cycle

Introduction

The nitrogen cycle represents one of the most important nutrient cycles found in terrestrial ecosystems. Nitrogen is used by living organisms to produce a number of complex organic molecules like amino acids, proteins, and nucleic acids. The majority of nitrogen is found in the atmosphere, where it exists as a gas (mainly N_2). Other major reserves of nitrogen include organic matter in soil and the oceans. Despite its large quantity in the atmosphere, nitrogen is often the most limiting nutrient for plant growth. This problem occurs because most plants can only take up nitrogen in two solid forms: ammonium ion (NH_4^+) and the ion nitrate (NO_3^-). Specialized bacteria "fix" nitrogen, converting it to a form that can be used by organisms. By fixing nitrogen, these bacteria are a critical link between atmospheric nitrogen and life on Earth.



Websites

http://nortonbooks.com/college/biology/animations/ch38a02.htm
http://www.physicalgeography.net/fundamentals/9s.html

Check out this website for more information!
http://www.neuse.ncsu.edu/nitrogen/

Questions

❖ How is nitrogen important in our lives?

_____

_____

_____

❖ Why are nitrogen-fixing bacteria contributions to the nitrogen cycle so important?

_____

_____

_____

❖ Nitrogen gas makes up _____ of the air we breathe.

- Nitrogen _____ converts _____ to _____ for organisms to use.

- Another useable form of nitrogen, NH_4^+ can be converted to _____ by _____ for organisms to use.

- Plants use both _____ and _____ to incorporate nitrogen into DNA, protein, and other molecules.

- Explain how animals get their needed amounts of nitrogen.
  _____
  _____

- Explain how nitrogen cycles through the land and ocean ecosystems.
  _____
  _____

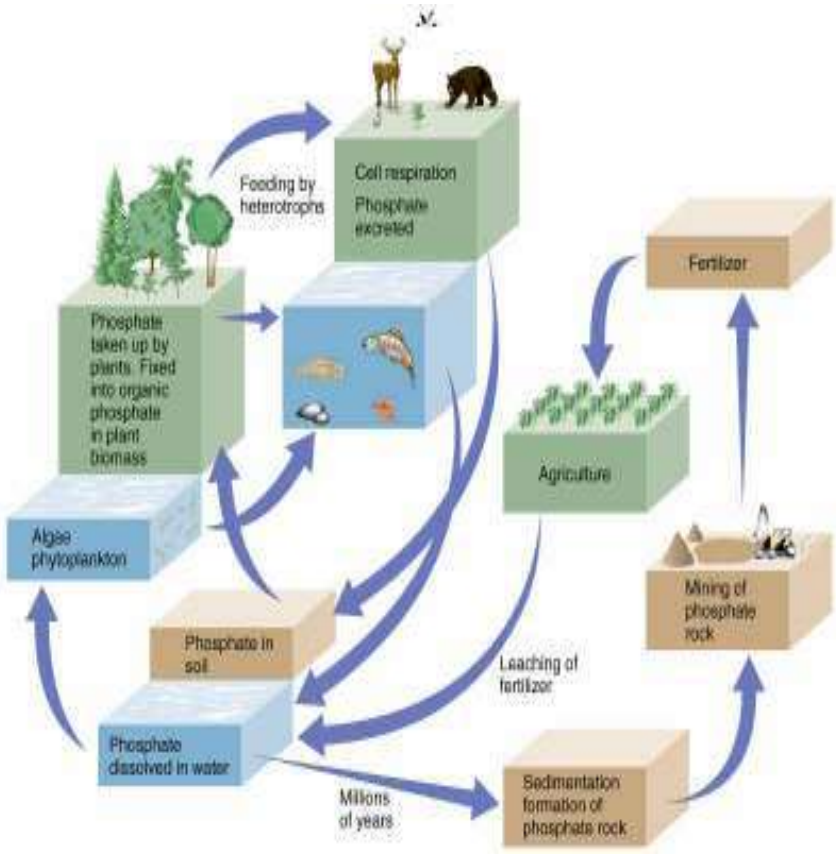
- How does the human impact of fertilizers impact the nitrogen cycle?
  _____
  _____
  _____

- Once in plants and animals, explain how does nitrogen return to the atmosphere?
  _____
  _____
  _____

4. Phosphorous Cycle

Introduction

Phosphorus is an important chemical for plants and animals. It is part of DNA, certain fats in cell membranes, bones, teeth and shell of animals. Phosphorus circulates through water, the Earth's crust, and living organisms. It is not in the atmosphere and is most likely to enter food chains following the slow weathering of rock deposits. Some of the released phosphates become dissolved in soil water which is taken up by plant roots. Phosphorus is therefore the main limiting factor for plant



growth in most soils and aquatic ecosystems.
Animals obtain phosphorus by eating plants and/or herbivores. Dead organisms and animal wastes return phosphorus to the soil, to streams, and eventually to ocean floors as rock deposits.

Websites

http://www.enviroliteracy.org/article.php/480.html
http://filebox.vt.edu/users/chagedor/biol_4684/Cycles/Pcycle.html
http://filebox.vt.edu/users/chagedor/biol_4684/Cycles/cycles.html

Check out these websites for more information!
http://cte.jhu.edu/techacademy/fellows/Kelly/webquest/savecrab.htm

Questions

- Explain why phosphates are a critical part of life.

  _____
  _____
  _____

- How is the phosphorus cycle different from other biogeochemical cycles? Explain.

  _____
  _____
  _____

- The largest reservoir of phosphorus is in _____ rock.

- Explain how phosphorus travels through the cycle from rock to omnivores.

  _____
  _____
  _____
  _____

- Why are excessive concentrations of phosphorus sometimes considered a pollutant?

  _____
  _____
  _____

- How do humans contribute to these excessive levels of phosphorus?

  _____
  _____
  _____

- Phosphorus is mainly stored in the _____ _____.

- How does the soil-based view of the phosphorus cycle compare/contrast with the global-view of the phosphorus cycle?

  _____

  _____

  _____

  _____