

Biogeochemical Cycles Webquest

In this webquest, you will use the given websites to find the answers to questions about the water, carbon/oxygen, nitrogen, and phosphorous cycles. Answer all questions in the spaces provided.

Water Cycle Introduction

Precipitation, evaporation, and condensation are all terms that you recognize, but what do they 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!

Website #1: http://www.epa.gov/ogwdw/kids/flash/flash_watercycle.html (choose auto, or start with Rain)

1. Another name for rain, snow, sleet, and hail is _____ . This occurs when there is so much _____ in the _____ that it cannot hold onto it anymore.
2. Name some locations where water is stored on earth _____
3. _____ is when water vapor comes from _____, and land.
4. Which temperature causes water vapor to turn back into clouds?

5. What is the name for the process that forms clouds?

Website #2:

http://oceanservice.noaa.gov/education/pd/oceans_weather_climate/media/watercycle.swf

6. How much of the Earth's water exists in each of the following locations?

Oceans	Atmosphere	Underground Aquifers	Rivers	Lakes	Soil	Glaciers/ Ice Caps

7. Click on "Person" and record two interesting facts about how individual people use water.
 - a. _____
 - b. _____
8. Click on "Agriculture" and record two interesting facts about agricultural uses of water.
 - a. _____
 - b. _____

Carbon 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 CO₂ into the air; autotrophs participate by removing atmospheric CO₂ 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 CO₂ traps heat. As more CO₂ accumulates, the Earth becomes warmer through a process known as the greenhouse effect.

Website: https://www.windows2universe.org/earth/climate/carbon_cycle.html

Introduction:

1. How long has carbon been underground? _____
2. Underground, carbon can be stored in _____, which humans _____.

Carbon in the Atmosphere:

3. When carbon is in the atmosphere, it's usually in the form of molecules of _____, which is a _____.
4. More _____ in our atmosphere makes our planet _____.

Go towards the plant:

5. Which process in plants removes carbon from the atmosphere?

6. If carbon were to leave the plant, which process would allow for that to happen?

Go towards the soil:

7. What happened to the plant the carbon was part of?

8. Carbon is now part of detritus; what is detritus?

9. Where does carbon go to from the soil?

Go towards the atmosphere, and then continue towards the surface ocean:

10. List the 3 ways carbon can enter the ocean.
 - a. _____
 - b. _____
 - c. _____
11. Which absorbs more carbon, the land or the ocean? _____

Move towards marine life.

12. _____ absorb carbon through the process of _____.

Nitrogen Cycle Introduction

The nitrogen cycle is 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: the ammonium ion (NH_4^+) and the nitrate ion (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.

Website: http://www.pbslearningmedia.org/asset/lps07_int_nitrogen/

Opening Screen

1. Nitrogen is essential to life. Where in all living things (including humans) is nitrogen found?

Begin the activity, and then hover over “Nitrogen in the Atmosphere.”

2. Nitrogen makes up about what percent of the atmosphere?

3. Nitrogen exists in what form in the atmosphere?

Read through “Nitrogen Fixation” and “Ammonification.”

4. What is the role of nitrogen-fixing bacteria in the nitrogen cycle?

Read over both “Nitrifications.”

5. Ammonia can form _____, which can then be converted into _____.

Both can be taken in by _____.

Read over “Denitrification.”

6. _____ bacteria can convert _____ back into _____, which goes into the _____.

Read “Ammonification.”

7. Ammonification is when decomposers do what?

Finally, read “Assimilation” and hover over the chipmunk.

8. What is the only way in which humans and other animals can obtain nitrogen?

Phosphorus Cycle Introduction: Phosphorus is an important chemical for plants and animals. It is part of DNA, certain fats in cell membranes, bones, teeth, and the shells of some 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 then 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.

Website #1: http://www.geography4kids.com/files/cycles_phosphorus.html

Cycling Phosphorus

1. Where does phosphate start (before life forms use it)?

Plants Need It

2. How do plants obtain phosphorus? _____
3. How do animals obtain phosphorus? _____

Losing the Element

4. The phosphorus cycle is not a true cycle due to a lot of the phosphorus being lost to the bottom of the ocean. Identify the different ways that phosphorus ends up at the bottom of the ocean.

Elemental Concern

5. Identify two ways in which phosphorus naturally enters the soil.

6. Identify a way in which phosphorus is *artificially* put into the soil.

Website #2: <http://enviroliteracy.org/article.php/480.html>

Paragraph 1:

7. How is phosphorus important to living things?

Paragraph 2:

8. The phosphorus cycle differs from the other cycles in that it does not have a _____.
9. The largest reservoir of phosphorus is _____.

Paragraph 3:

10. Describe the sequence of how phosphorus goes from the soil to a carnivore.

Paragraph 5:

11. Using evidence from the article, explain why phosphorus can be considered a pollutant.
