

Annotate

The Nitrogen Fixers

Every plant and animal needs **nitrogen**. It is a building block in living things. It is found in all cells. Nitrogen is needed to make proteins and DNA. Life could not exist without nitrogen!

The air around us is mostly nitrogen and oxygen. We can't get nitrogen out of the air, though. It is in a form plants and animals can't use.

How do plants and animals get the nitrogen they need? The answer is: bacteria! **Bacteria** are single-celled living things. To see them, you need a microscope.

Many people think bacteria are bad. Some bacteria cause food to spoil. Others make you sick. But some bacteria are good! Your body contains many helpful bacteria. You need them inside you to help digest food.

Some bacteria are very important for all life on Earth. They live in soil. They use the nitrogen in the air. They change it into a new form. Plants can use it then. These bacteria are called **nitrogen fixers**.

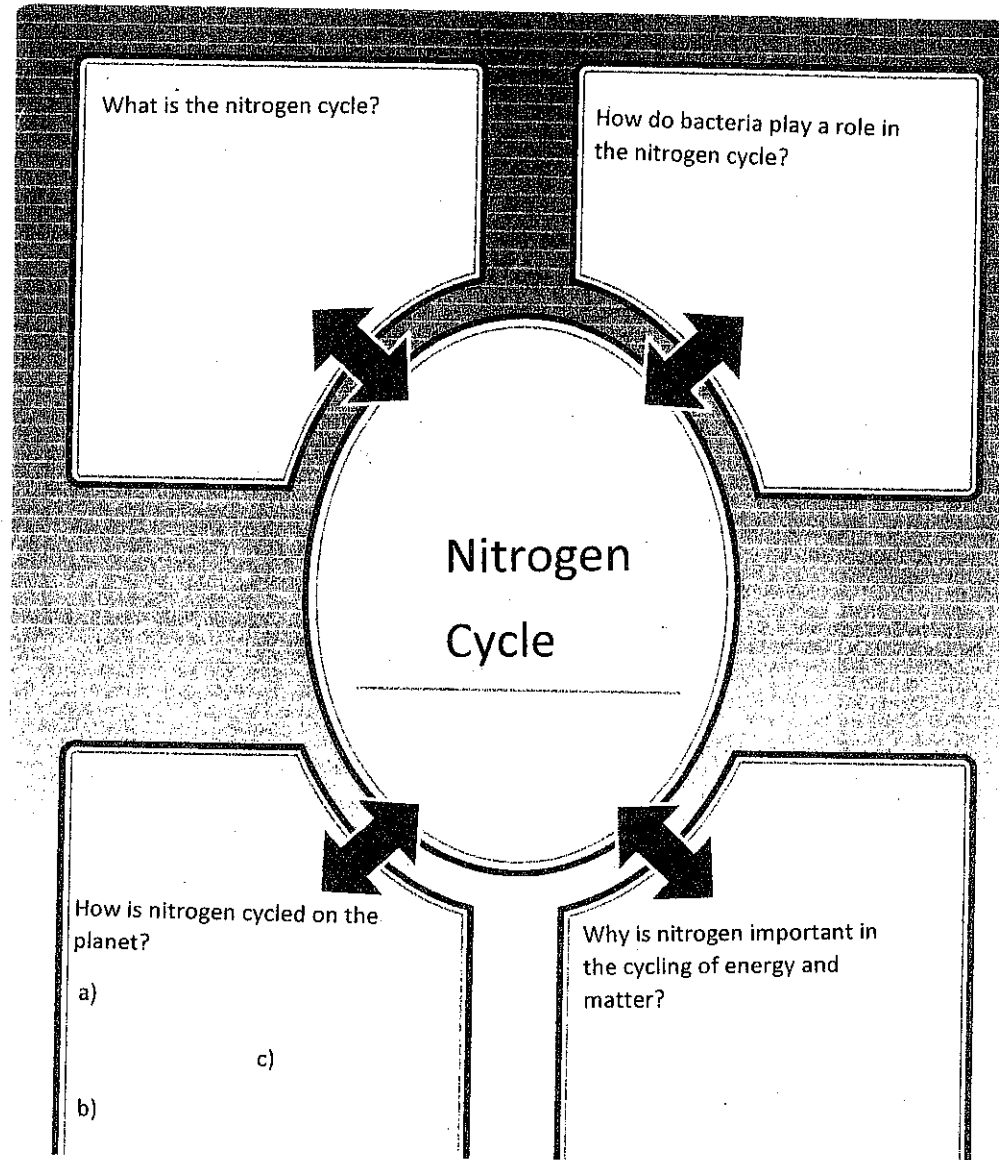
Nitrogen fixers help bring nitrogen to all other living things. Plants get nitrogen they need from the soil in this way. Now it's in the food chain. Some animals get nitrogen by eating plants. They are eaten by other animals. The nitrogen gets passed along.

Imagine--without these amazing bacteria, life as we know it wouldn't be possible!



Peanut plants have nitrogen-fixing bacteria in their roots. They help the plants get the nitrogen they need.

Date _____



Getting to Know: The Carbon Cycle

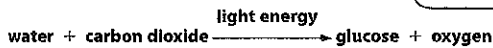
Many gardeners enjoy growing sunflowers. A sunflower seed will grow into a tall plant with beautiful flowers. It produces seeds that humans and wildlife use for food. The sunflower plant—like all plants—illustrates the carbon cycle. All the matter that makes up the roots, stems, leaves, flowers, and seeds of a plant is formed as a result of cell functioning that relies on the carbon cycle.

Where does the matter in a sunflower plant come from?

As much as 80% of the mass of a mature sunflower plant is water. If you could remove all the water from the plant's tissues, most of the remaining matter would consist of compounds that contain the element carbon. The sunflower plant, like all plants, takes in carbon dioxide from the air through its leaves.

Why do plants take in carbon dioxide?

Plants use carbon dioxide when they conduct photosynthesis. During photosynthesis, plants use light energy, carbon dioxide, and water to produce glucose and oxygen:



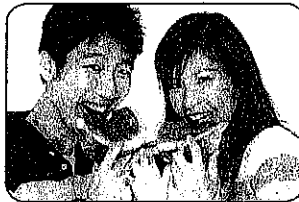
Carbon is an important element in the glucose molecule.

How does the carbon "cycle" in the environment?

All organisms need energy. Plants are considered producer organisms because they produce glucose, which the plant cells then use as energy. As the plants use energy, some of the carbon in the glucose is used to create new cells in growing stems, leaves, and roots. Forests are considered large reservoirs of stored carbon because of the multitude of carbon compounds that make up the tissues of the trees. Plants also release excess carbon dioxide back into the air, primarily through their leaves.

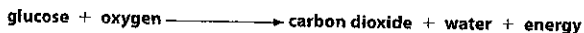
Are all organisms part of the carbon cycle?

Yes, all organisms are part of the carbon cycle because all organisms contain carbon compounds. Living organisms obtain carbon compounds from the environment and release carbon compounds back into the environment. In this lesson you will learn more about the importance of the carbon cycle to life on Earth.



The food we eat is part of the carbon cycle.

When an animal or other consumer organism eats plant matter, the carbon compounds from the plant are used again by the consumer's cells. During the process of *cellular respiration*, glucose and oxygen are combined in a chemical reaction that releases energy and produces carbon dioxide and water.



The carbon dioxide is then released by the organism as a waste product; in an animal, this occurs when the animal breathes.



Both a person and a sunflower plant are part of the carbon cycle. The person takes in oxygen and gives off carbon dioxide. The sunflower takes in carbon dioxide and gives off oxygen.

Misconception 2: I heard that the carbon is always found in nature as a compound. Is that true?
No, although carbon reacts with many other elements and can be found naturally in many compounds, it can also be found as a pure element. For example, graphite and diamond are both forms of pure carbon.

Misconception 1: Are carbon compounds only released into the atmosphere when humans burn fossil fuels such as coal, oil, and natural gas?
No, carbon compounds are released naturally back into the atmosphere as a waste product of cellular respiration. Carbon compounds are also released when organic matter decays or burns naturally. However, the human use of fossil fuels can release carbon compounds into the atmosphere faster than natural processes can store the carbon in living tissues or in fossil fuels. As a result, increased levels of carbon dioxide in the atmosphere can affect global climate conditions.

Date _____

