

CARBON DIOXIDE AND OXYGEN CYCLE

reflect

Imagine that a student in your school fell down and is having difficulty breathing. Sirens wail as an ambulance pulls into the school parking lot. The emergency workers rush over to help the student. They begin rescue breathing. This is a procedure that allows them to push air into the student's lungs. In seconds, the student wakes up. She is going to be fine, thanks to the quick work of the emergency workers.



Why was the student's breathing trouble so dangerous? Humans need oxygen to survive. So do most **organisms** on Earth. Oxygen plays an important part in helping our bodies function. Where does the oxygen that we breathe in come from? What do we breathe out once we use the oxygen?

organisms: living things

How are plants and animals involved in the cycling of carbon dioxide and oxygen?

Carbon dioxide and *oxygen* are two gases that are very important to life on Earth. Carbon dioxide is found in the air. The **cells** of organisms, including humans and other animals, also produce it. Carbon dioxide is released from the body when organisms breathe out, or *exhale*. Plants need carbon dioxide to make their own food, and they release oxygen in the process.

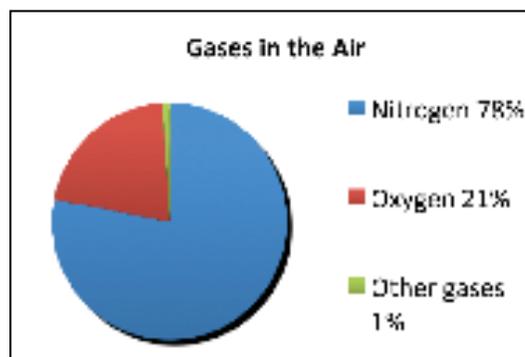
cells: the basic units of living things

Oxygen is also found in the air. Organisms like plants and green algae make their own food. During this process, the organisms release oxygen into the air. Many living things get oxygen from the air when they breathe in, or *inhale*. Oxygen helps the body's cells function normally.

The cycle of carbon dioxide and oxygen on Earth is dependent on plants and animals. Plants provide the oxygen that animals and other living things need to survive. Animals and other living things provide the carbon dioxide that plants need to make their own food.

look out!

The air we breathe is made up of more than just carbon dioxide and oxygen. About 78% of it is actually nitrogen! Oxygen is only about 21% of air. Carbon dioxide and other gases, such as argon, make up the rest.

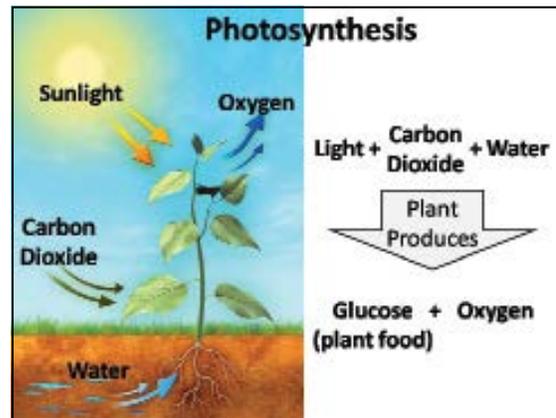


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What is the relationship between plants and animals? Where is oxygen produced? Where is carbon dioxide produced?

Plants and animals are linked to each other through the carbon dioxide and oxygen cycle. Plants produce oxygen, a gas that animals and other living things need. Animals and other living things produce carbon dioxide, a gas that plants need to make their own food. How are oxygen and carbon dioxide produced in plants and animals?

Plants make their own food from sunlight in a process called *photosynthesis*. In photosynthesis, sunlight, water, and carbon dioxide are combined in special cells inside the plant. Glucose is one product of photosynthesis. *Glucose* is a sugar that plants can use for energy. Another product of photosynthesis is oxygen. Plants release oxygen as a waste product. Plants and other **producers**, such as green algae, are the source of the oxygen in the air we breathe.



producers: a living thing that makes its own food

decomposers: a living thing that breaks down dead organisms and waste

Animals and other living things release carbon dioxide when they exhale. Where does the carbon dioxide come from? When organisms eat, their bodies break the food down into very small parts. The process of breaking down food produces carbon dioxide and other substances. Too much carbon dioxide in the body can be poisonous, so organisms release it back into the air. **Decomposers**, such as mushrooms and bacteria, also release carbon dioxide when they break down dead material.

look out!

Plants produce more than just oxygen. They also produce carbon dioxide, just like other organisms. Plants break down the glucose (or sugar) they make during photosynthesis to fuel their cells. The process of breaking down this sugar makes carbon dioxide, which the plants release into the air.

what do you think?

Take a look at the photographs below. Which photograph shows a way to support a healthy balance in the carbon dioxide and oxygen cycle? Explain your answer.



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What is the significance of the carbon dioxide and oxygen cycle to the survival of plants and animals?

The carbon dioxide and oxygen cycle is critical to life on Earth. Humans, and most other organisms, need oxygen to survive. When we inhale, oxygen moves from our lungs into our blood. Oxygen travels through the blood to all the cells in the body. The cells use oxygen to complete important jobs. For example, you are using oxygen right now as you read this sentence. The muscles that control your eyes use oxygen. Without oxygen, you could not use any of your muscles. In fact, our cells die quickly if they do not receive oxygen. That is why it is so important to help someone who cannot breathe by providing them with oxygen.

Plants and other organisms that perform photosynthesis rely on animals for carbon dioxide. Every time you exhale carbon dioxide, you are providing a plant with a building block it needs to make its own food.

Looking to the Future: Carbon Dioxide and Global Warming

As with any cycle, it is important that parts of the cycle stay balanced. Some scientists are worried that human activities are adding too much carbon dioxide to the air. Humans burn certain materials called *fuels* in order to generate electricity. Burning fuels can add a lot of carbon dioxide to the air. Activities like cutting trees and clearing forests can also be harmful. These activities reduce the number of plants that can take in carbon dioxide from the air and give off oxygen. Scientists think that too much carbon dioxide in the air might be increasing Earth's temperatures. This is a condition known as global warming and could cause problems by upsetting Earth's natural balance. So what can we do? The first step may be to use fuels that do not produce carbon dioxide. Wind and solar power are two ways to generate electricity without burning fuels.



Solar panels like the ones on this house can capture energy from the Sun and use it to generate electricity.



Wind turbines are devices that can capture the energy in wind and use it to produce electricity.

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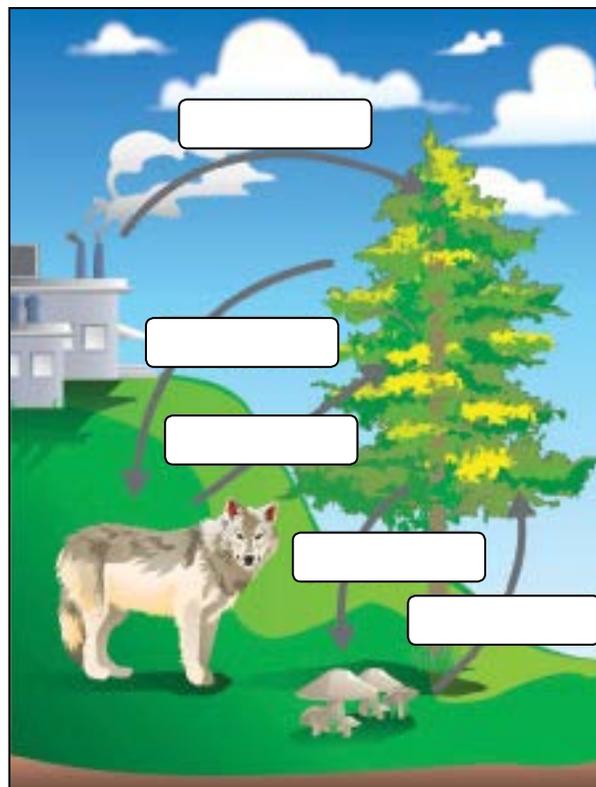
try now

In this activity, you will see evidence of the carbon dioxide you release when you exhale.

1. Safety first! Put on safety goggles, and make sure that your sleeves are rolled up. Pull back any loose hair.
2. Fill a small beaker with tap water.
3. Add a few drops of bromothymol blue to the beaker. Bromothymol blue is a chemical that changes color when carbon dioxide is present.
4. Using a straw, blow air very gently into the liquid. You should make small bubbles in the liquid. Only blow as much air as you can comfortably exhale. Be very careful! Do not suck the water up the straw or let the liquid get on your clothing.
5. Observe the liquid as you blow bubbles. What happens as you exhale more and more into the liquid? Write down any changes you see to the color of the liquid.
6. Why did the liquid in the beaker change color?

What do you know?

The carbon dioxide and oxygen cycle is important to life on Earth. Both gases are produced and used by living things. Study the diagram below. It shows the movement of gases between living and nonliving things. Use what you know to complete the diagram. Write “carbon dioxide” or “oxygen” in the empty boxes.



CARBON DIOXIDE AND OXYGEN CYCLE

connecting with your child

The Carbon Dioxide and Oxygen Cycle at Home

To explore the carbon dioxide and oxygen cycle, go on a photo safari of your neighborhood. Work with students to find examples of organisms in your neighborhood that produce oxygen. Take a photograph of as many examples as you can find. If a camera is not available, have students draw sketches and write brief descriptions. Look for organisms that undergo photosynthesis, such as trees, houseplants, vines, moss, and grasses. To find examples of carbon dioxide producers, look for organisms that consume and break down food, such as humans, dogs, birds, or mushrooms. Remember, plants also produce carbon dioxide.

Take photographs of as many carbon dioxide producers as you can. When you have finished finding examples, you may wish to print the photographs. This will allow you to spread them out and draw connections between them to demonstrate how carbon dioxide and oxygen cycle through your neighborhood ecosystem.

Here are some questions to discuss with students:

- Did you find more examples of oxygen-producing organisms or carbon-dioxide producing organisms?
- How are plants a unique member of the carbon dioxide and oxygen cycle?
- How could you add more oxygen to your neighborhood ecosystem?



Squirrels are common in many ecosystems. They are a good example of a carbon dioxide producer and oxygen.