

## THE CARBON CYCLE 3132

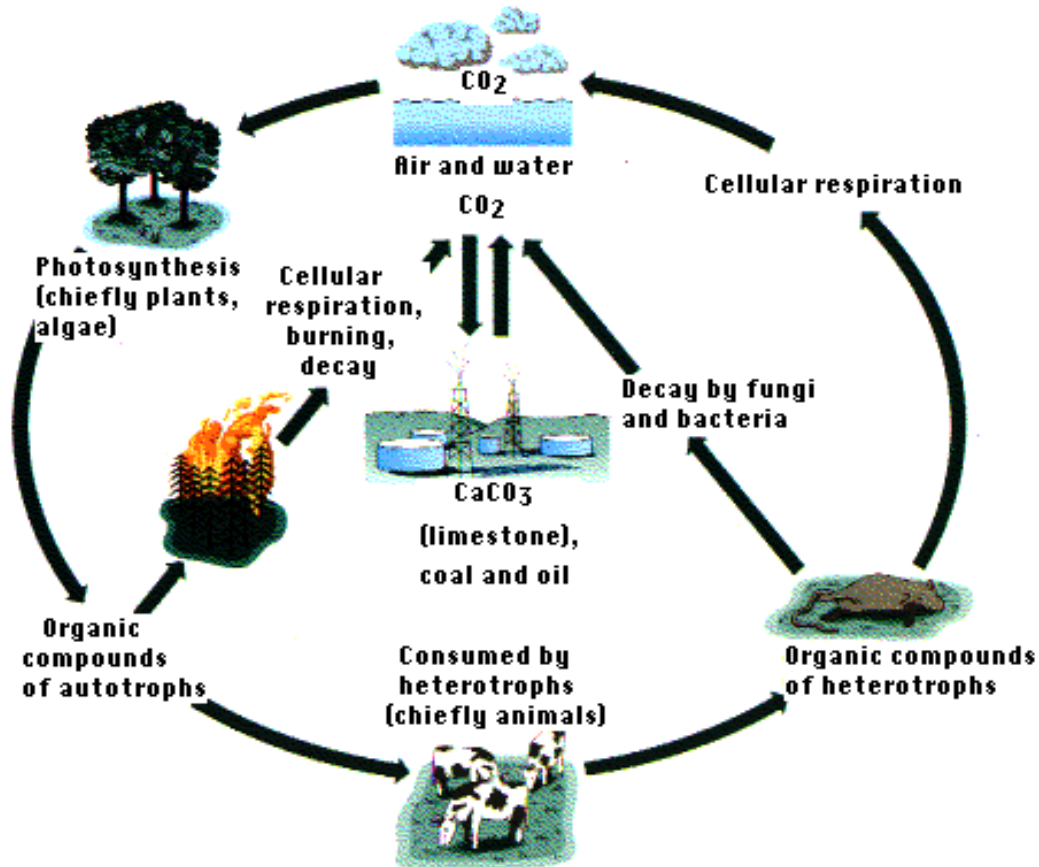
**Carbon and carbon dioxide are continuously recycled between living organisms and their environment.**

At the end of this unit, you should be able to do the following:

1. Draw and explain the carbon cycle.
2. List and explain the 3 ways carbon is released into the environment from living things.
3. Explain how carbon is moved from the environment into living things.
4. Explain the relationship between carbon and carbon dioxide.
5. Be able to use the following words correctly:

carbon cycle	respiration
carbon dioxide	combustion
carbon	fossil fuel
decomposition	photosynthesis

## The Carbon Cycle 3132



A lot of things in nature are **cycled or recycled**, that is to say, they are used over and over again. A familiar cycle is the **water cycle**. **Carbon is also a cycle**. Atoms of carbon are used over and over again. Sometimes they are part of a plant, sometimes they are part of an animal, sometimes they are found in the atmosphere as carbon dioxide. **The total amount of carbon on Earth does not change.**

The carbon cycle is quite simple. Carbon is provided in the environment for use by all living things. There are three processes which you will need to know, where the carbon is used by all living things and then given back to the environment for reuse. **The 3 processes are: 1) decomposition 2) respiration 3) combustion.**

Carbon is important to all living things because it is found in all organic molecules. Remember **organic molecules include: carbohydrates, proteins, lipids, nucleic acids, enzymes**. Carbon is also very abundant in the form of carbon dioxide, an invisible gas that you exhale every time you breathe. Generally when we think of the carbon cycle, we think of recycling both carbon and carbon dioxide.

The Carbon Cycle is the recycling of carbon from the environment into living things and back into the environment for reuse.

REMEMBER THIS !!!

*Carbon dioxide is included as part of the carbon cycle.*

REMEMBER THIS !!!

*All living things are composed of carbon. Carbon has to be recycled for use by newly birthed living organisms and those still growing or in need of repair.*

Interesting Scientific Fact: When some prehistoric plants died, they became buried over time by layers of Earth. During that time, they were changed into **fossil fuels** such as **coal, and oil**. The carbon contained in those once living organisms is burned as a fuel for cars. That same carbon is then released into the atmosphere. The carbon went from being a part of a plant to being released into the atmosphere as **carbon dioxide**.

The carbon cycle is quite simple. **Carbon is provided in the environment for use by all living things**. There are three processes which you will need to know, where the carbon is used by all living things and then given back to the environment for reuse by living organisms

**Question 1.** Why is the Carbon Cycle important?

**3 ways carbon is released to the environment from living things:**

1. **decomposition**
2. **respiration**
3. **combustion**

1. **Decomposition:** Carbon is found in all living things. When a plant (**producer**) or animal (**consumer**) dies, the carbon is released back into the environment by the decay or *decomposition* of the organism.

2. **Respiration:** Whenever you exhale, you breathe out carbon dioxide. The carbon in the carbon dioxide is then released into the environment for use by another living organism. Where does the carbon dioxide come from? In the process of *respiring*, living organisms break down glucose (carbohydrate) for energy. In this process both carbon dioxide and water are waste products and must be eliminated from the cell and/or body.

3. **Combustion:** When fossil fuels, such as coal, gas, oil are burned they release carbon into the atmosphere. The process whereby fossil fuels are burned to release carbon dioxide into the environment is call *combustion*.

**REMEMBER THIS !!!**

***The 3 ways carbon is released to the environment are the following:***

***1) decomposition, 2) respiration, 3) combustion.***

**Question 2.** List and explain the 3 ways that carbon is cycled from living organisms back into the environment.

**One way carbon moves from the environment into living things.**

## Photosynthesis

**Photosynthesis:** The process in which Producers, green plants, absorb carbon dioxide and water from the environment and convert them into a sugar (carbohydrate) for use by living things is called *photosynthesis*. Carbon in the form of carbon dioxide is taken from the atmosphere and used in the green part of producers to make sugar. The sugar can then be used by the producer or consumed and used by a consumer. In this way, the carbon moves from the atmosphere to a producer to a consumer.

**Photosynthesis** is the process that green plants use to take carbon in the form of carbon dioxide out of the air and create the organic molecule, sugar. The sugar is then available for use by the plant or consumed and used by animals.

REMEMBER THIS !!!

***Photosynthesis uses carbon dioxide and water to create sugar. In this process, carbon is removed from the environment and becomes a part of a living organism.***

**Question 3.** Explain how carbon is taken from the environment and can be used by a living organism. Be sure to explain how a carbon atom can end up in a:

- 1) producer
- 2) consumer.

**Question 4.** Draw and describe the carbon cycle on the back of this page.

**Interesting Scientific Fact:** The raw materials for photosynthesis are the waste materials of cellular respiration; the raw materials for cellular respiration are the waste products of photosynthesis. The two processes complement each other. They are a cycle by themselves. Because of this, if correctly balanced, plants and animals can live together in a closed community, like a sealed jar, with no need to ever add anything except sunlight. If correctly balanced, plants and animals can live together in a closed community, like the Earth, with no need to add anything except sunlight and assuming that man does not pollute the planet.

## Summary

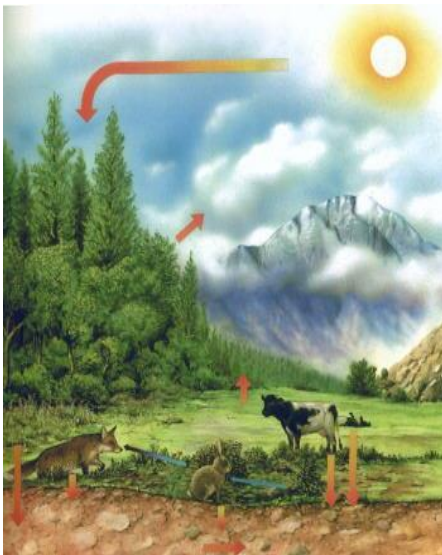
## The Carbon Cycle (3132)

The element **carbon** is very important to living things. It is found in almost all of the molecules that living things are made of, like proteins and carbohydrates. **Carbon** atoms have to be used and reused, over and over, so that new molecules can be made and used by living organisms.

In the atmosphere, carbon atoms are found in the gas called **carbon dioxide**. Plants are able to take carbon dioxide into their leaves. Then they use energy from the sun to make **glucose** from several carbon dioxide molecules and water. This process is called **photosynthesis**. Once glucose is made, plants can use it to make other molecules or for energy.

Animals eat plants to obtain the carbon in the plant's glucose and other molecules. The animals can then use these molecules as building blocks to help make their own molecules or for energy. When animals use the glucose for energy, it is broken apart in a process called cellular **respiration**. Carbon dioxide and water are released as waste products from cellular **respiration**. The carbon dioxide goes into the atmosphere where it can be used again for photosynthesis.

If an animal dies, its body decays. This is the work of decomposers like **bacteria**. The molecules in the body of the dead organism are full of carbon atoms. This is food for the decomposers. The decomposers use cellular respiration to break down these molecules in a process called **decomposition**. **Decomposition** releases carbon dioxide and water as waste products back into the atmosphere.



When we use gasoline to run our cars or oil to heat our houses we are burning fossil fuels. These fossil fuels are full of carbon. In the process of burning these fossil fuels, carbon is released to the atmosphere. This process is called **combustion**.

**Combustion**, cellular **respiration** and **decomposition** return carbon dioxide to the atmosphere. **Photosynthesis** takes carbon dioxide out of the atmosphere and puts it into molecules that living things need.

## Carbon Cycle Self Test

**Fill in the Blank** - *One word may be used twice.*

carbon

photosynthesis

leaves

sun

carbon dioxide

cellular respiration

decomposition

waste product

atmosphere

1. The processes called \_\_\_\_\_ and \_\_\_\_\_ are very important in the carbon cycle.
2. During photosynthesis, \_\_\_\_\_ from the \_\_\_\_\_ is made into glucose.
3. The carbon dioxide enters the plant through its \_\_\_\_\_.
4. The plant uses energy from the \_\_\_\_\_ to make carbon dioxide and water into glucose.
5. During \_\_\_\_\_, glucose is broken down for its energy and carbon dioxide is released as a \_\_\_\_\_.
6. \_\_\_\_\_ is the process that bacteria use to cause the decay of dead organisms
7. The element \_\_\_\_\_ is found in almost all of the molecules that living things are made of.

### True or False

- \_\_\_\_\_ 1. Carbon atoms are found in only a few molecules found in living things.
- \_\_\_\_\_ 2. Carbon atoms are found in almost all of the molecules in living things .
- \_\_\_\_\_ 3. Carbon atoms are found in the atmosphere in a gas called water vapor.
- \_\_\_\_\_ 4. Carbon atoms are found in the atmosphere in a gas called carbon dioxide.
- \_\_\_\_\_ 5. Carbon dioxide enters plants from the atmosphere.
- \_\_\_\_\_ 6. Photosynthesis is the process in which plants use the sun's energy to make carbon dioxide and water into glucose.
- \_\_\_\_\_ 7. Animals obtain their carbon by breathing in carbon dioxide.
- \_\_\_\_\_ 8. Animals obtain their carbon by eating.
- \_\_\_\_\_ 9. When animals eat, the molecules may be broken apart in the process called decomposition.
- \_\_\_\_\_ 10. When animals eat, the molecules may be broken apart in the process called cellular respiration.
- \_\_\_\_\_ 11. Glucose is a waste product of respiration.
- \_\_\_\_\_ 12. Carbon dioxide is a waste product of respiration.

- \_\_\_\_\_ 13. The carbon atoms within the molecules of an organism's body are trapped there forever.
- \_\_\_\_\_ 14. Decomposition releases the carbon in the molecules of an organism when it dies.
- \_\_\_\_\_ 15. Photosynthesis puts carbon dioxide into the atmosphere.
- \_\_\_\_\_ 16. Photosynthesis takes carbon dioxide out of the atmosphere.
- \_\_\_\_\_ 17. Cellular respiration puts carbon dioxide into the atmosphere.
- \_\_\_\_\_ 18. Cellular respiration takes carbon dioxide out of the atmosphere.
- \_\_\_\_\_ 19. Decomposition puts carbon dioxide into the atmosphere.
- \_\_\_\_\_ 20. Decomposition takes carbon dioxide out of the atmosphere.

### **Answer the Following**

1. In what molecule is carbon found in the atmosphere?
2. In what process do plants use carbon dioxide?
3. What molecule is made from this process?
4. What process allows animals to get energy from glucose?
5. What waste products are made from this process?
6. List and explain the 3 ways carbon is released from living things into the environment.
7. Explain how photosynthesis moves carbon from the environment into living things.
8. Explain the carbon cycle using everything that you have learned in this unit.



## Carbon Cycle Answer Sheet

**Question 1.** Why is the Carbon Cycle important?

**Question 2.** List and explain the 3 ways that carbon is cycled from living organisms back into the environment.

**Question 3.** Explain how carbon is taken from the environment and can be used by a living organism. Be sure to explain how a carbon atom can end up in a:

2) producer

3) consumer.

**Question 4.** Draw and describe the carbon cycle on the back of this page.