

## Sample Lesson #2

### Photosynthesis

All living things must have energy, which they get from food. Organisms that make their own food are autotrophs. This group includes plants, algae (al jē), and cyanobacteria (sī ə nō bak tīr ē ə). Organisms that get energy by consuming other organisms are heterotrophs. This group includes all animals, fungi, and some bacteria and protists.

Most autotrophs make food through **photosynthesis**. This process converts energy from the sun into a form that all living things can use.

Photosynthesis occurs in a cell's chloroplasts. These organelles contain the pigment chlorophyll. Pigments are molecules that absorb some wavelengths of light and reflect others. For example, chlorophyll absorbs blue light and red light. It reflects green light, which is why many plants appear green.

Photosynthesis is a two-stage process. During the first stage, an autotroph takes in energy from the sun. Some of this energy is used to break apart water molecules into hydrogen and oxygen.

The second stage involves a complex series of chemical reactions. These reactions convert hydrogen and carbon dioxide to glucose.

The equation below summarizes the changes that occur during photosynthesis:



During all chemical processes—including photosynthesis—matter is conserved. No atoms are created or destroyed. They are only rearranged. Energy is also conserved. The sun's energy is converted and stored in the bonds of the glucose molecule.

Autotrophs play an important role in all ecosystems. They convert light energy into chemical energy. They also convert inorganic molecules (CO<sub>2</sub> and H<sub>2</sub>O) into glucose and oxygen. Glucose is stored in the plant. Oxygen is released to the atmosphere through the plant's stomata. Both glucose and oxygen are used by all living things.



**Photosynthesis converts the sun's energy into chemical energy. It also converts inorganic molecules into organic molecules that all living things need.**

1. Choose the correct word for each statement.

Photosynthesis occurs in (chloroplasts / mitochondria).

In photosynthesis, carbon dioxide and water are (reactants / products).

In photosynthesis, glucose and oxygen are (reactants / products).

2. In photosynthesis, matter is conserved. Which statement is true?

- A) Atoms in oxygen and carbon dioxide are destroyed, and new atoms are created.
- B) Atoms in glucose and oxygen rearrange to form carbon dioxide and water.
- C) Atoms in carbon dioxide and water rearrange to form glucose and oxygen.
- D) none of these

3. Which of these performs photosynthesis?

autotrophs

heterotrophs

all living things

4. In what way do autotrophs play an important role in the ecosystem?

- A) Autotrophs convert light energy into a form all living things can use.
- B) Autotrophs produce glucose and store it.
- C) Autotrophs release oxygen as they carry out photosynthesis.
- D) all of these

5. Photosynthesis is an endothermic reaction. Energy is (taken from / released to) the environment.

6. The green color of most plants is caused by chlorophyll. True or False?

\_\_\_\_\_ Chlorophyll reflects blue and red light, and it absorbs green light.

7. Match each term with how a light wave is changed.

\_\_\_\_\_ absorption

A) wave spreads out; light appears dimmer as distance increases

\_\_\_\_\_ reflection

B) wave changes direction

\_\_\_\_\_ transmission

C) some energy becomes thermal energy; amplitude decreases; light is less bright

8. A wave's \_\_\_\_\_ is a measure of the number of vibrations per second.

9. The materials used to make synthetic materials come from \_\_\_\_\_ resources.