







Photosynthesis: How Do Plants Make Their Own Food?

Overview:

Students will learn about the process of photosynthesis, or how plants make sugar and oxygen. Using examples of plants in the garden students will be able to explain why light and water are essential for plant growth.

Objectives:



At the end of the lesson students will be able to:

-  **Explain** the general purpose of photosynthesis in plants.
-  **Identify** the two products of photosynthesis (sugar and oxygen).
-  **Explain** the ways that humans are dependent on photosynthesis.
-  **Hypothesize** why plants produce varying amounts of oxygen over time.


Materials:

-  Photosynthesis poster

On the Board:

-  Vocabulary
-  Student Reflection Questions

Suggested Snack:



-  Green vegetables from the garden




Preparation:

-  Prior to the lesson, project the overhead of the Photosynthesis poster.

Vocabulary:

 photosynthesis
 glucose

 cellular respiration
 oxygen

 carbon dioxide
 chlorophyll
 chloroplasts

Learning Activities:

I. Warm-Up Activity (5 min.)

- A. Ask students: Why do humans need to eat food to survive?
- B. Begin a discussion about how humans need food for energy so that our bodies can function and perform everyday tasks.
- C. Transition the discussion to plants. While plants do need nutrients in the soil to survive, they can also **make their own food through a process called photosynthesis**. They can then break this food down to use as energy through a process called *cellular respiration*.

- D. Photosynthesis is a process that occurs in plants in which light energy is turned into chemical energy (in the form of sugar).

2. Presentation (15 min.)

- A. Use the poster with this lesson to illustrate how plants turn light energy into sugar.
- B. Explain the role of chloroplasts and chlorophyll. Plant cells have organelles called chloroplasts. Chloroplasts capture light energy from the sun. Chloroplasts have chlorophyll, which is a green pigment that absorbs light energy. (Many plants look green because chlorophyll reflects the green wavelengths of light.)
- C. Explain that plants use water, carbon dioxide, and light energy to help form glucose (a kind of sugar) and release oxygen into the air.
- Explain that glucose is a carbohydrate and draw the chemical formula for Photosynthesis on the board.
$$6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$

carbon dioxide + water + light \longrightarrow sugar + oxygen
 - Ask students: Why is it important that plants release oxygen into the air? (Humans and other animals need oxygen!)

3. Garden Activity (10 min.)

- A. Observe the plants in one area of the garden in small groups of three-four. Discuss the differences in the leaf sizes and the consequent varying exposures to sunlight for different plants.
- B. Answer the following questions in groups:
1. Will a small or large leaf release more oxygen? Why or why not? (The large leaf will release more oxygen because it has more surface area to capture light.)
 2. What factors will increase or decrease the amount of oxygen released through photosynthesis? (sunlight availability, water, surface area of leaf)
- C. Bring students back into the classroom and go over the answers as a class.

4. Snack: Serve green leafy vegetables from the garden. (5 min.)

5. Have students answer the Reflection Questions in their garden journals. (5 min.)

Student Reflection Questions:

1. Suppose you wanted to test the effect of different colors of light on plant growth. What would your hypothesis be? How would you go about testing this hypothesis?
 - **Green light is least effective for plant growth because they are already green due to the pigment chlorophyll in their leaves.**
2. Why are humans dependent on photosynthesis to live?

Assessment Questions:

1. What do plants need in order to undergo photosynthesis?
 - **carbon dioxide, water, sunlight**
2. What are the two products of photosynthesis?
 - **sugar/glucose, oxygen**
3. What would happen to a large leaf in the garden if we put paper over part of the leaf?
 - **It would turn brown and that part of the leaf would die.**

Standards:

Next Generation Science Standards

- HS-LS1-5.

Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

- MS-LS1-6.

Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.



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