

**Dedicated  
to Reducing  
Pesticides**

## Unit 3 Section 2 Lesson 2: Presto, Changeo

**Focus Areas:** Plant Lifestyles; Science, Math

**Focus Skills:** recognizing cause and effect, comparing and contrasting, simulating, recognizing patterns

### Objectives

- To understand the process of photosynthesis
- To recognize the importance of green plants

### Essential Questions

- How do green plants produce food?
- Why are all other living things dependent on green plants?

### Essential Understandings

Because green plants are the only living organisms capable of producing their own food, all other living organisms depend on them either directly or indirectly for survival.

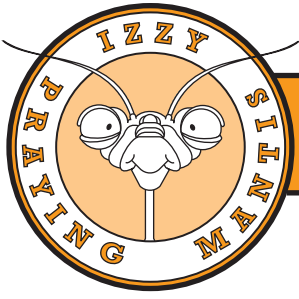
### Background

Green plants are the only living organisms that produce their own food. Light provides the energy to create a chemical reaction within specialized cells, called chloroplasts, in the leaves. Chlorophyll present in the chloroplasts captures light energy and uses it to produce simple sugars from carbon dioxide and water. This sugar is transported to other parts of the plant where it is either used as energy, formed into building blocks for growth, or stored. When animals (including us) eat green plants, we gain the benefits of these products within the plant.

In addition to the energy we gain from eating green plants or animals who have eaten them as part of their diet, we need plants to breathe! Oxygen is given off by green plants in the process of photosynthesis.



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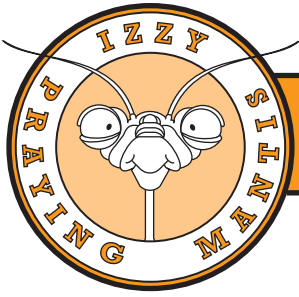
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Green plants are the lungs of the earth! All animals inhale oxygen and exhale carbon dioxide. Plants take in carbon dioxide and give off oxygen as they make food.



### Vocabulary

<b>atom</b>	the smallest particle of a single element
<b>carbon dioxide</b>	a gas exhaled by animals as a by-product of respiration (breathing) and used by plants to produce food
<b>chlorophyll</b>	a green substance in the leaves of most plants that absorbs energy from light and stores it as chemical energy
<b>chloroplast</b>	the part of the leaf that contains the chlorophyll, and the place where photosynthesis takes place
<b>element</b>	a material in which all atoms are the same
<b>exhale</b>	to breathe out
<b>hydrogen</b>	a gas found in nature and part of a water molecule
<b>inhale</b>	to breathe in
<b>molecule</b>	the combination of two or more atoms
<b>oxygen</b>	a gas inhaled by animals but given off by plants as a waste product during photosynthesis
<b>photosynthesis</b>	the process by which plants store energy to produce food



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**primary  
consumption**

eating green plants

**secondary  
consumption**

eating an animal or product from an animal that eats green plants

**stomata**

tiny openings in the leaf that allow air (containing carbon dioxide and oxygen) to enter and oxygen and water vapor to leave the plant

### Logistics



**Time:** two 20-minute sessions and time to check experiment during **Follow Up**

**Group Size:** 18 to 36

**Space:** comfortable seating; an open area to allow movement

### Materials



Handout 1 “Plants for Breakfast” with Answer Key \*

Handout 2 “Photosynthesis Recipe” \*

Handout 3 “Assessment” with Answer Key \*  
a house plant

blue, white, and red construction paper circles,  
3” diameter minimum

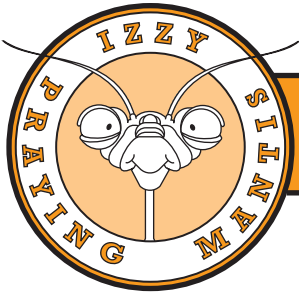
green construction paper squares, 3” x 3”

aluminum foil

scissors

paper clips

\* single copy provided



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### Preparation

1. Gather materials.
2. Make copies of Handout 1, “Plants for Breakfast.”
3. Prepare circles: 24 white circles marked with a large **H**, 24 blue circles marked with a large **O**, and 6 red circles marked with a large **C**.
4. Prepare green squares as needed to allow each participant to take an active part in the simulation.



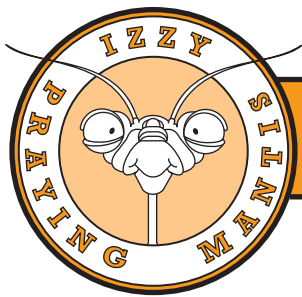
### Activity

**Challenge:** Become a part of the photosynthesis process.

*(Display for group viewing)*

### Introduction

1. Exhibit a green plant. Print the word **Chlorophyll** on the board.
2. Ask participants to explain what chlorophyll is. (makes plants green, also helps the plant make food to grow)
3. If necessary, explain that only green plants can make their own food, and chlorophyll is needed in this process.
4. Ask why all animals depend on green plants to live. [Animals eat plants (direct/primary) or other animals that have eaten green plants (indirect/secondary) as part of their diet.]
5. Distribute Handout 1, “Plants for Breakfast,” and discuss how each breakfast food is related to green plants.
6. Have the children indicate whether food comes from green plants directly (primary) or indirectly (secondary).
7. Ask a volunteer to explain why green plants are the first link in the food chain. [All living things depend on green plants for food either directly (primary) or indirectly (secondary).]

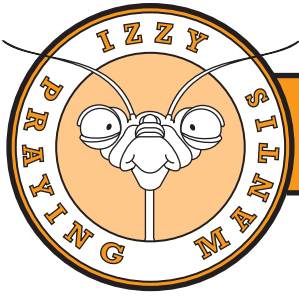


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### Involvement

1. Review why the ability of green plants to make their own food is very important to all other living things. (Either directly or indirectly, all living things depend on green plants for food.)
2. Invite the children to learn how green plants accomplish the amazing feat of food production by acting out the story of **PHOTOSYNTHESIS!**
  - a. Show the children the colored circles and explain that each colored circle is an **element**, all the same kind of **atom**. The white circles represent atoms of **hydrogen**, the blue are **oxygen** and the red represent **carbon**. All three kinds are needed in **photosynthesis**.
  - b. Tell the children:
    - i. They are about to become the ingredients of a magical recipe.
    - ii. They will pretend to be **molecules**.
    - iii. Molecules are tiny particles (pieces) of two or more elements. (Illustrate by holding up 2 white circles and 1 blue circle.) **Note:** As vocabulary is introduced, each word is printed on the board/chart paper.
3. Depending on the group size, select:
  - a. One or more children to read the Photosynthesis Recipe
  - b. One child to direct exchange of atoms
  - c. Children to play the part of molecules,  $H_2O$  (12) and  $CO_2$  (6)
4. Distribute  $H_2O$  and  $CO_2$  molecules among the group. (Each child receives 3 atoms.)
  - a. Each of 12 children receive 2 white circles and 1 blue circle.
  - b. Each of 6 children receive 1 red circle and 2 blue circles.**Note:** If there are additional group members, they can be given green squares and play the role of **chlorophyll**.
5. Distribute Handout 2, "Photosynthesis Recipe," and read as a group.





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6. Have the children selected as readers read the “Photosynthesis Recipe” and have other children act it out (see Handout 2).

### Follow Up

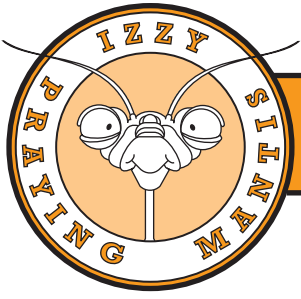
Practice the Photosynthesis simulation and present it to another group or grade level.

### Follow Through

1. Ask the question, “How does lack of light affect food production in green plants?”
  - a. Have the children cover 1/2 of a green plant’s leaves with foil. Secure the foil so light can’t enter.
  - b. Place the plant in a sunny spot and supply water as needed.
  - c. After one week, remove foil and observe results.
  - d. Compare the covered to the non-covered portions of leaves.
  - e. Discuss what effect lack of light had on the leaves.
  - f. Hypothesize what effect this lack of light has on food production.

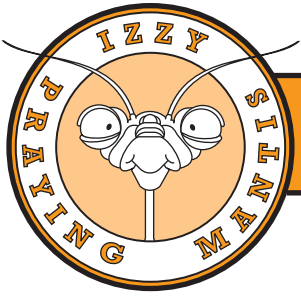
### Assessment

Complete Handout 3. Scoring: Vocabulary #1 – 10, 5 points each; Complete the Sentences, 5 points per blank; Examples of Primary and Secondary, 5 points each.



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### Notes



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