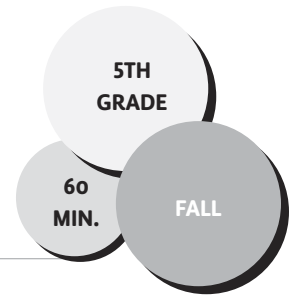


# What Do Plants Eat?

**THEME:** EXPLORING THE ECOLOGY OF FOOD



## ESSENTIAL QUESTION

*How does the process of photosynthesis affect us as humans?*

## LEARNING OBJECTIVES

- ✓ Students will be able to explain the process of photosynthesis.
- ✓ Students will be able to explain how the process of photosynthesis benefits all animals, including people.

## CONCEPTS

carbon dioxide (CO<sub>2</sub>)    oxygen (O<sub>2</sub>)  
photosynthesis    sugar as energy

### *Engaging the Classroom Teacher*

- Prior to the lesson, ask the teacher about students' level of familiarity with atmospheric gasses such as carbon dioxide and the process of photosynthesis. If this lesson will be students' introduction to photosynthesis, consider having groups practice and perform the prewritten script because they will not have enough knowledge to create their own.
- Ask the teacher whether there are established groups that will collaborate well together. If not, ask for guidance in creating groups.

- During Action Step 2, suggest that the teacher circulate through the room, checking in with different groups who might need support solving the puzzle.
- During Action Step 4, suggest that the teacher support groups while they create their own skits, or rehearse the pre-written script.
- During Action Step 5, suggest that the teacher help ensure students are being a respectful audience to their peers who are performing.

## LESSON DESCRIPTION

In this lesson, students work in groups to put together a puzzle of the photosynthesis process. Then, after checking for understanding as a class, the groups make the process come alive by creating and performing photosynthesis skits.

## MATERIALS

- A simple, plant-based food for students to taste, such as slices of fruit or cubes of whole wheat bread
- Photosynthesis Poster (p. 526)
- Bin of props and costumes for skits (optional)

For each group of 4–6 students:

- Photosynthesis Puzzle Kit, which includes images of a plant, the sun, a CO<sub>2</sub> molecule, water, and IN and OUT arrows (p. 525)
- Brown paper bag

## PREPARATION

- › Prepare food for students to taste.
- › Photocopy and cut out components of Photosynthesis Puzzle Kit for each group, and put components in brown paper bag to conceal them.
- › Photocopy and cut out Photosynthesis Role Cards for each group of 4–6 students.

## ACTION STEPS

**1. Food as Matter and Energy:** Gather students in a circle and share a tasting. Give each student a slice of fruit or a cube of whole wheat bread. Ask, *Why do we need to eat?* As students share, explain that food is what gives us matter, or substance, to grow and energy to do things. Then ask, *If we get matter and energy from eating food, how do plants get their matter and energy to grow?* Accept any answers. *Did you know plants get their matter from air and water, and their energy from the sun?* Tell students that the name of this process is photosynthesis. Have them say the word aloud. Ask them to imagine if they could photosynthesize. Say, *Any time you were tired or hungry, you could just go out and stand in the sun to feel energized and full. That's what the plants do!* **(5 min.)**

**2. Solving Photosynthesis Puzzle:** Explain to students that you have a photosynthesis puzzle for them to solve in groups to determine how plants make their own food. Say, *You'll be racing against other teams to see who can solve it first. When your group thinks you've solved it, have everyone raise their hands, and I'll come*

*over and check.* Pass out a kit to each group of students, and ask them not to open the bags until you give the signal. Then have students race. Circulate through the room, keeping an eye out for group members who raise their hands. Have groups keep going until the last group has solved it correctly. **(10 min.)**

**3. Photosynthesis Model:** Display the Photosynthesis Poster, and go over the process as a class. Say, *The plant takes in the sun's energy through its leaves. It takes in carbon dioxide from the atmosphere through the leaves. Water travels through a plant's roots and up through the stem to the leaves. Inside the cells of the plant's leaf, the energy from the sunlight allows the plant to turn water and CO<sub>2</sub> into sugar. The plant then lets out oxygen.* Give students time to rearrange any objects or arrows on their puzzles to make them accurate. **(5 min.)**

**4. Creating Skits:** Say, *Now imagine if these different parts of the process could speak! We're going to create skits to help explain how a plant makes its own food.* Explain that in groups they will develop dialogue to help demonstrate how these ingredients work together. (If it's helpful, you can reference the Sample Photosynthesis Skit at the end of this lesson for ideas about what this might look like.) Pass out a set of Photosynthesis Role Cards to each group. If they have additional people in their group, encourage them to create extra roles that tie in to the process. Have students work on writing the script for the first ten minutes, and assign groups to different areas to stand up and rehearse it. Circulate through the room, encouraging students to incorporate as much physical movement as they can. **(20 min.)**

**5. Performing:** Have a couple groups volunteer to perform their skits for the class. Remind students to project their voices and include as much physical movement as they can. Remind the rest of the class to be a respectful audience by remaining quiet and attentive during the performance. Ask students, *While watching the skit, what did you learn about photosynthesis that you didn't realize before?* **(15 min.)**

## REFLECTION

Have students discuss the following questions in small groups, then share with the class: **(5 min.)**

### Social and emotional learning

- *What went well working in your group?*
- *What did not go well in your group? How did you solve these problems?*

### Check for understanding

- *How is a plant's process of getting energy different from that of animals?*
- *There are many people, including adults, who may not remember exactly how photosynthesis works. How would you explain the process of photosynthesis to someone else?*
- *What do you think might happen if a plant doesn't get enough water or sunlight?*
- *What environmental issues affect photosynthesis?*

## ADAPTATIONS

**Noncompetitive Race Option:** For the photosynthesis puzzles, if you think racing against other teams might present a management challenge, you can instead have the teams race against the clock, saying something like, *I'm giving teams puzzles to put together. My challenge to you is to see if every team finishes their puzzles in less than five minutes!*

**Performing a Pre-written Skit:** Depending on the specific academic needs and abilities of the students in your class, you might have students perform the Sample Photosynthesis Skit provided at the end of this lesson in their groups rather than writing their own skit.

**Climate Change Extension:** Ask students, Do plants increase or decrease CO<sub>2</sub> in the atmosphere? Do plants increase or decrease O<sub>2</sub> in the atmosphere? Then discuss carbon dioxide's role in climate change and how plants have the power to help in consuming all this CO<sub>2</sub> that accumulates in the atmosphere.

## ACADEMIC CONNECTIONS

Next Generation Science Standards

Life Science Disciplinary Core Idea


**NGSS.LS1.C.**

Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. Plants acquire their material for growth chiefly from air and water.

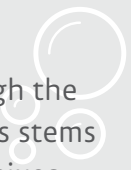
# Photosynthesis Role Cards



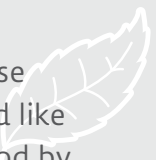
**You're the sun.** The energy you emit through your rays of sunshine help the plant make its own food.




**You're carbon dioxide,** also known as CO<sub>2</sub>. The plant breathes you in through its leaves.



**You're water.** You travel through the plant's roots and up through its stems to the leaves where the plant mixes your molecules (H<sub>2</sub>O) with Carbon Dioxide (CO<sub>2</sub>) to make sugar.



**You're a plant.** You can choose whichever type of plant you'd like to be! You make your own food by capturing energy from sunlight and using water (H<sub>2</sub>O) and (CO<sub>2</sub>) to make sugar in your leaves.



**You're an animal.** You breathe in oxygen that plants release through the process of photosynthesis. To get your energy, you also eat plants and animals that eat plants.

# Sample Photosynthesis Skit

**CHARACTERS:** Plant, Sun, Atmosphere, Water | **NONSPEAKING CHARACTERS:** Sugar, Carbon Dioxide

**Plant:** [waking up and stretching] I am hungry! Lucky for me, Sun is out today. Good morning, Sun!

**Sun:** Good morning!

**Plant:** Would you mind shining some of your light on my leaves here?

**Sun:** Going to cook some food for yourself? I'm happy to help.

[Sun hands over rays of light to Plant]

**Plant:** Thanks. Now I need to find CO<sub>2</sub> in the air.

**Plant:** [shouts toward sky] Yoo-hoo, Atmosphere. I can't see you, but I know you're out there.

**Atmosphere:** Morning, Plant. I'm here. Same as usual? You need some CO<sub>2</sub> molecules?

**Plant:** Yes, please!

[Atmosphere gives Plant a handful of CO<sub>2</sub> molecules.]

**Plant:** Thank you, Atmosphere. Remember, I'll have some leftovers to give you soon.

**Plant:** [looks down at ground] One more ingredient for my breakfast. Hi, Water. Are you down there? I think I saw you raining from the sky yesterday.

**Water:** Hi Plant. Yup, I'm just resting here in the cool ground. Feel free to drink me up through your roots.

**Plant:** Thanks so much. Gulp. Gulp. Gulp. I'm going to send this water through my stems into my leaves where the cooking magic happens!

**Plant:** OK, time to mix these ingredients together. [Plant mixes ingredients and produces sugar.]

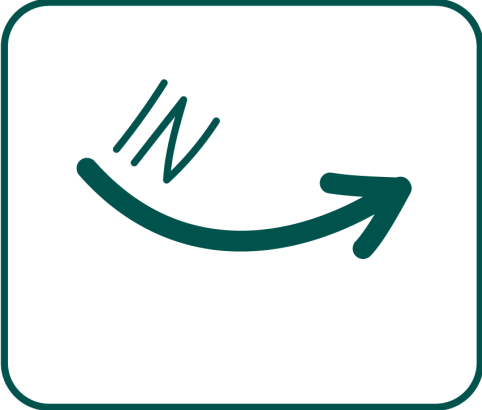
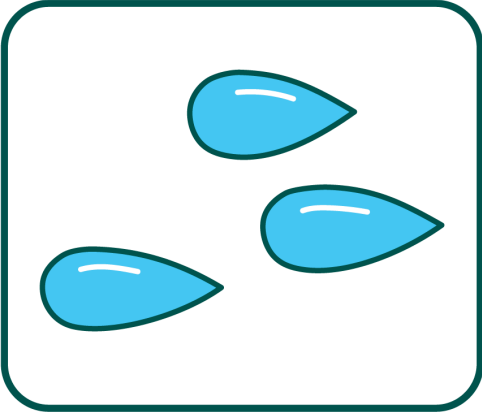
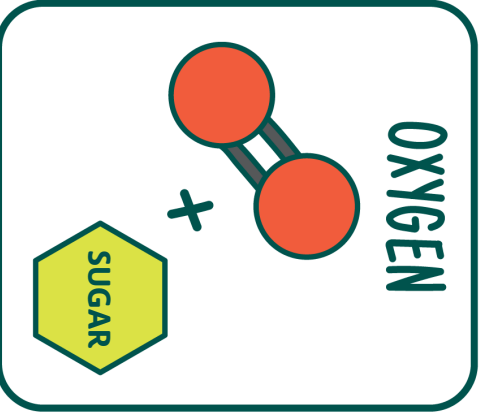
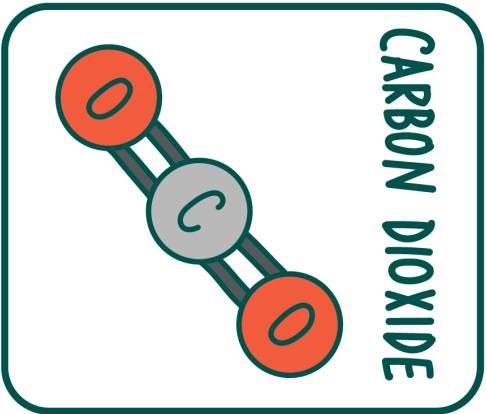
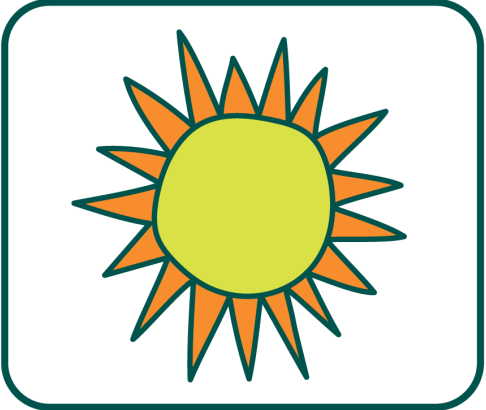
**Plant:** [to Atmosphere] Thanks for the carbon, Atmosphere, but I don't need this oxygen. Please share it with all the animals who live around here.

**Atmosphere:** My pleasure! Enjoy your breakfast.

[Plant eats the sugar it produced and grows one inch taller.]

**Plant:** Ahhh! Feeding myself takes some work, but I'm pretty lucky all the ingredients I need come from the sun, air, and water!

# Photosynthesis Puzzle Kit



# Photosynthesis

