W 671

PHOTOSYNTHESIS

Can Plants Make Their Own Food?

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Can Plants Make Their Own Food?

Photosynthesis

Skill Level
Beginner – 4th Grade

Learner Outcomes
The learner will be able to:
- *Describe the process of photosynthesis*
- *Understand why photosynthesis is important*

Educational Standard(s) Supported
4.LS2

Success Indicator
Learners will be successful if they:
- Can put their play-doh pieces in the correct order to demonstrate how plants get materials they need for growth and reproduction
- Can correctly identify what goes in and out of the plant with their thumbs up or thumbs down

Time Needed 30-45 minutes

Materials List: Play-Doh, Tooth Pick, Notes handout

Introduction to Content

Photosynthesis is the process by which plants use carbon dioxide from the air, water and energy from the sun to produce sugar and oxygen. This process is important as it provides us with the fresh produce we love to eat.

Introduction to Methodology

This lesson provides a hands on learning approach to teaching photosynthesis. It can also serve as a method for teachers to assess their student understand of photosynthesis.

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Terms and Concepts Introduction

Photosynthesis, Oxygen, Chlorophyll, Carbon Dioxide, Chloroplasts, Stomata

Setting the Stage and Opening Questions

Break students into small groups. Ask each group to list as many fruits and vegetables as they can for each color. Give students only two to three minutes for this task.

Green: Celery, Cucumbers, Kiwi, Spinach, Kale, Cabbage, Brussel Sprouts, Broccoli, Peppers, Avocado, Asparagus, Beans, Zucchini, Lettuce, Okra, Peas
Red: Apples, Cherries, Strawberries, Tomatoes, Cranberries, Watermelon
Blue/Purple: Blueberries, Eggplants, Grapes, Plums, Beets
White/brown/tan: Garlic, Onions, Cauliflower, Potatoes, Mushrooms, Coconut
Orange/yellow: Bananas, Carrots, Corn, Oranges, Sweet potatoes, Squash, Pumpkins, Cantaloupe, Peaches, Pineapple

Lead a discussion about plants with students to help activate prior knowledge.

- How do we get our food?
- What gas do humans breathe out? What does plant release?
- What does a plant need in order for photosynthesis to occur?

Tips for Engagement

If short on time, have students make play-doh parts before going through the process and then have students put the parts in order as you speak.

Mention 4-H projects to your youth to get them more engaged outside of your lesson and a chance to learn more about the subject area.

- Horticulture
- Gardening
- Plant Science
- Entomology

Experience

Go through the process of photosynthesis. Use the notes handout to help your students follow along.

What does Photosynthesis mean? "Photo" which means light and "synthesis" means putting together. Photosynthesis is the process by which plants make their own food. Photosynthesis takes place in the leaves of plants and inside their cells in tiny structures called chloroplasts.

Chloroplasts contain a green pigment called chlorophyll that absorbs the sun's energy and allows this energy to be used to produce sugar from the carbon dioxide and water.

Carbon dioxide (CO_2) is a gas found in air that passes through small pores (holes) in the leaves. These pores are called stomata. Oxygen (O_2) is released by the plant and goes into the air.

Water (H_20) is absorbed by the roots.

Photosynthesis is important because it provides two main things: food and oxygen.

Now that you have explained the process of photosynthesis, have students demonstrate what they know by using play-doh pieces to model the 'ingredients' of photosynthesis and put their play-doh pieces in the correct order. Students will need to make four arrows, a water droplet, a leaf, a sun, and will need a tooth pick to carve 'O_2' and 'CO_2' in their arrows. If students are struggling, talk through the process of photosynthesis again. If a third time is necessary, have students follow along with you and move their pieces in the correct way as you explain. An example of what their model should look like can be found in the picture to the right.

Share

Lead a discussion with students about their models:

- What was your model different from that of your classmates?
- Describe your thinking as you created each of the pieces of your model.
- What mistakes did you make while putting all the play-doh pieces in the correct places?

Process

Ask students to turn to a partner and discuss the following:

- What do you think would happen if plants quit making oxygen?
- Why does it matter that we understand photosynthesis?
- How does photosynthesis impact the foods that you eat?

Allow pairs about three minutes to discuss the questions, then ask volunteers to share their responses with the class.

Generalize

Within their same pairs, pose the following questions for discussion:

- What are some key points you could give a beginner farmer about photosynthesis?
- How does photosynthesis help farmers?
- What if we had an extended solar eclipse that lasted for two days? Would we see any effect on our plants? How else would it affect photosynthesis?

Life Skill(s)

4th Grade:
Identify at least 4 project areas to consider as a project area for future 4-H work. (Head)

Actively listen to what others are saying; be able to restate or summarize what has been said. (Heart)

Resources used to organize this lesson:

- https://ssec.si.edu/stemvisions-blog/what-photosynthesis
- http://www.biology4kids.com/files/plants_photosynthesis.html

Apply

Ask students the question "Does it go into a plant or out of a plant?" for each of the elements below. Plants either consume or produce each of these. Students should give a thumbs up for in (consume) or a thumbs down for out (produce).

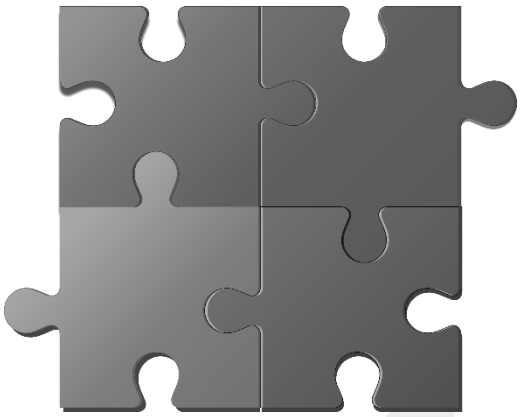
- Sunlight In
- Carbon Dioxide In
- Oxygen Out
- Water In

How can you apply what you've learned today to other real-life situations?

Name:_____

Photosynthesis Handout

What is photosynthesis?



Synthesis means

_____ _____

Leaves contain tiny structures called

_____

Chlorophyll absorbs the

_____

_____

Humans breathe in _____ made by plants.

Plants consume _____ released by humans.

Supplemental Information
Educational Standards Met

4.LS2: Ecosystems: Interactions, Energy, and Dynamics 1) Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.

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