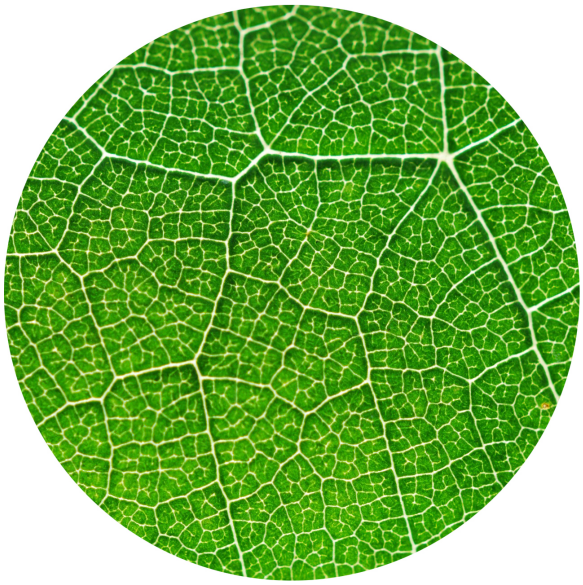
Photosynthesis Runs the World



This lesson incorporates content from Puzzled by Photosynthesis from KidsGardening's *GrowLab: Classroom Activities for Indoor Gardens and Grow Lights* by Eve Pranis and Joy Cohen.

Overview: Photosynthesis is a chemical process that takes place in plants that uses light energy to manufacture carbohydrates. It provides the 'fuel' all organisms need to live.

Grade Level/Range: 5 – 8th Grade

Objective:
Students will:

- learn about the basic ingredients needed for the process of photosynthesis
- discover the end products of photosynthesis
- understand the importance photosynthesis to all life on Earth

Time: 45-60 minutes

Materials:

- Puzzled by Photosynthesis Handout
- Index Cards
- Balls of string

Background Information

Plants make their own food during the process of photosynthesis. Using light energy, plants can convert water and carbon dioxide into the energy-rich simple sugar glucose. This sugar is the source of food used by most plants and ultimately, by all other consumers. This process also results in the release of oxygen into the air. Without photosynthesis, there would not be enough oxygen replaced in the environment to support life on Earth.

Dive deeper into photosynthesis by reading Photosynthesis 101.

Laying the Groundwork

Ask students to list some of the basic things that all organisms need to live and grow. Explain that all life needs some kind of energy to fuel their bodies and that animals get that energy through their food. Plants are also alive and need energy to live and grow. Where does their energy come from?

Use the Puzzled by Photosynthesis worksheet as a guide to explain photosynthesis. Use the background information to tailor the details of photosynthesis to fit the knowledge and ability levels of your students.

Spark inquiry by asking students to ponder, Why is photosynthesis so important to life on Earth?

Exploration

1. To explore the importance of photosynthesis, as a class, work to create a 3-D food web for your local ecosystem. Begin by reminding students that a food web is a combination of all the food chains in an ecosystem and that all food chains must include producers, organisms that make their own food and consumers, organisms that eat other organisms.

2. Pass out an index card to each student. Go around the room and ask each student to name a different organism that lives in your local environment and then have them write that name down on the front of their index card. On back of the card, ask them to write down a list of what that organism eats (they may or may not need to use resource materials to discover their answer). You can adapt this activity for younger students or if you have limited time, by having the names and information already written down for students. Since students are likely to list larger animals, try to encourage a few students to choose smaller animals (including insects) and plants in your area (producers), or you may need to add those yourself.

3. Have students sit in a circle with their cards in front of them with the name of the organism facing out and, using a ball of string, begin to connect your food web. Start by giving students with apex predators (a consumer that is not eaten by any other organism, such as wolves or grizzly bears or eagles) a ball of string, have them hold the end of it, and then ask them to look for another student that represents one of their foods sources and throw their ball of string to them. Continue on until everyone is connected and until each food 'chain' has landed on a plant/producer species.

4. Next, stand in the middle of the circle and have the students that ended up with the balls of string hand them to you. Ask students to guess what you represent. The answer is the sun. Pull on the strings and ask if anyone who feels the tug to then pull on their string. Continue on until every student can feel the tug. The message: we all depend on the sun's energy and plants' ability to convert the sun's energy into food to live.

Making Connections

Complete the activity by challenging students to come up with a way express this lesson creatively. Some suggested platforms include: a newspaper article, a piece of artwork, a poem, or maybe even through a song or a rap.

Branching Out

Complete the Let There Be Light lesson plan to further explore the importance of light for plant growth and development.

Link to Standards

5 - Matter and Energy in Organisms and Ecosystems

5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

MS - Matter and Energy in Organisms and Ecosystems

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.

MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

HS.Matter and Energy in Organisms and Ecosystems

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.