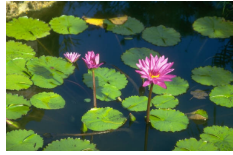


# SHED SOME LIGHT ON PHOTOSYNTHESIS



## BENCHMARKS AND TASKS

**SC.B.1.2.1** The student knows how to trace the flow of energy in a system (e.g., as in an ecosystem).

**SC.B.2.2.1** The student knows that some source of energy is needed for organisms to stay alive and grow.

**SC.G.1.2.3** The student knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

- The student recognizes that some source of energy is needed for all organisms to stay alive and grow.
- The student identifies the major source of energy of ecosystems as sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
- The student explains how green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

## KEY QUESTION

How do green plants manufacture their own food?

## BACKGROUND INFORMATION

Green plants have the capacity to convert some of the **energy** from **sun** into food energy. In the presence of sunlight, plants are able to combine water and carbon dioxide from the air to produce glucose. This process is known as **photosynthesis**. Plants take in water through their roots and the water rises to the leaves. Carbon dioxide enters the leaves through pores called stomata. In the presence of chlorophyll, a green pigment, and with energy provided by the sun, the plant manufactures sugars and starches from carbon dioxide and water. The leftover oxygen is released into the air, and much of the water is transpired out through the leaves. The process of photosynthesis is important not only to green plants but to all of life as a source of oxygen and water. Because of this ability to produce their own food, green plants are known as **producers**. All other living things on earth are directly or indirectly dependent upon the food that producers create.

## MATERIALS

### Per group

80 duckweed plants

1 sheet of black construction paper

water

4 100-mL beakers or other similar containers

masking tape

soil or pond mud

1 container for measuring 60 mL

1 paper clip

1 marker

**Per student**

observation sheet

**Teacher**

1 healthy green plant

**TEACHING TIPS**

1. Duckweed is a good plant for this activity because students can observe dramatic results in a short time. Duckweed plants can be found in freshwater ponds, swamps, and slow-moving streams or purchased at some aquarium supply stores (call first!). You can also search for duckweed online. Some possible online sources are: epondplants.com (\$3.00 per 50); Aquatic Plant Depot (#2.50 per ¼ lb.); [www.thewatergardenshop.com](http://www.thewatergardenshop.com) (\$2.99 per ½ C). Duckweed is a tiny, floating plant that can be found worldwide. It has light green ovate leaves that bear a single rootlet. It is a notorious reproducer and can overtake a water garden if not controlled. It provides good shade and an enjoyable snack for fish.
2. Ideally, each group should set up the lab, but if materials or duckweed plants are in short supply, have the class work together to set up one or two labs.

**ENGAGE**

Show students a healthy green plant. Ask: *Is this a healthy plant? What are some observable signs of healthy, growing plants?*

Ask: *Where do plants obtain food so that they can become healthy, growing plants?* (Note: Many children hold the misconception that plants obtain food from soil.)

**EXPLORE**

1. Students should use the marker and the masking tape to label the four 100-mL-beakers 1-4.
2. Have students pour 60 mL of water into each of the four beakers.
3. Students should place 20 duckweed plants in each beaker.
4. Instruct them to add 1-2 cm of soil or pond mud to Beakers 1 and 3.
5. Have students record the date and their observations of the plants in each beaker on the observation sheet.
6. Students should place Beakers 1 and 2 in a window or somewhere else so they will be exposed to light.
7. Students should place Beakers 3 and 4 in a cupboard or in some other place with no light.
8. After a few days have students again record their observations on the observation sheet.

**EXPLAIN**

*Which beaker contains the greatest number of duckweeds? . . . the least?*

*Which beaker contains the healthiest duckweeds?*

*What factors do you think are important for the healthy growth of duckweeds? Why?*

*What does soil contain that helps duckweeds stay healthy?*

*Are nutrients necessary for making plant food?*

*What do you conclude that plants use to make food?*

*Why are green plants known as producers?*

**EXTEND/APPLY**

Have students observe a plant's need for sunlight to carry out photosynthesis. Students should place pieces of black construction paper over one section or over entire the surface of a leaf and secure the construction paper with a paper clip. Students should set the plant in an area where it will

receive plenty of sunlight. After one to two weeks, students should remove the construction paper, observe the leaf, and note any changes. The covered part of the leaf should have died or turned a lighter shade of green or brown. Blocking the light alters the process of photosynthesis.

**ASSESSMENT**

Which of the following living things in a pond ecosystem uses the energy from the sun to make its own food?

- A) insect
- B) frog
- C) water lily
- D) small fish

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Variable Combinations	Date	Number of Duckweeds	Color of Duckweeds	Other Observations
<b><u>Beaker 1</u></b> (duckweed, sunlight, water, and soil)				
<b><u>Beaker 2</u></b> (duckweed, sunlight and water)				
<b><u>Beaker 3</u></b> (duckweed, darkness, water, and soil)				
<b><u>Beaker 4</u></b> (duckweed, darkness and water)				

