



Making Large and Small Leaf Model

Lesson Overview

Unit Title: Photosynthesis

Lesson Summary: This is a hands-on activity designed to investigate the structure of the leaf.

Subject Area(s) and Grade Levels: Click box(s) of the subject(s) and grade(s) that your Unit targets.

Life Science Physical Science Earth Science 5th 7th Biology

Arkansas Framework: http://arkansased.org/education/word/biology_9-12_06.doc

SLE – Student Learning Expectation Details



- CDL.7.B.17 Describe the structure and function of the major parts of a plant: roots, stems, leaves, flowers. (Only addressing leaves)



- Measurement, symmetry, shapes



- Journal writing: Write a summary of the relationship of the structure of plant tissue to its function as it relates to photosynthesis.

National Standards: <http://www.education-world.com/standards/national/index.shtml>

National Standards Details:

- Standard C: Develop an understanding of the cell.

Student Objectives and Procedures: (All 7-E's may not be present in a single lesson)

- Objective:**
- Students will know the structure and function of parts of the leaf.
 1. Create/Examine a leaf model.
 2. Know the basic structure of a leaf.
 3. Relate the structure to the function of a leaf as it relates to photosynthesis.
- Focus Question:**
- How do cells obtain and use energy?

Prerequisites / Background Information:

- Vocabulary
 1. Petiole: Stalk of a leaf that attaches the blade to the stem.
 2. Leaf blade: Broad, expanded part of a leaf that serves to capture light.
 3. Axillary buds: Buds located where a leaf joins a stem.

4. Vein: Vascular bundles which consist of xylem and phloem tissue give support to the leaf and also transport food and water.
 5. Upper Epidermis: Translucent tissue that allows light to pass through it to reach the mesophyll; also protects the internal tissues.
 6. Palisade Mesophyll: Contains the majority of the chloroplasts, therefore most photosynthesis occurs here.
 7. Spongy Mesophyll: Provides space for the exchange of gases during photosynthesis.
 8. Lower Epidermis: Contains most of the stomata (thousands per square centimeter).
 9. Guard Cells: Regulate the opening and closing of the stomata, therefore they control the exchange of gases between the leaf and the surrounding atmosphere.
- Provide students with an introduction and explanation of leaf structure and tissue before they begin. Same leaf parts and descriptions apply as with the large leaf model.

Timeline: 1-2 class periods to make models, answer questions and explore further.

Preparation: • 15 min to gather materials.

Elicit/Engage:

Explore: • 30 minutes

Explain: • 15-20 minutes

Cleanup: • 5 minutes

Teacher Preparation:

- Two variations of the leaf model are provided. A large leaf that could be done in groups or small leaf which each student can do and take home.
- Small Leaf Notes: Have various texts available for students to use as reference sources. The internet can also be used for reference. It is a good idea to have a sample small leaf model made in advance.
- Large Leaf: The class size model of the leaf helps the students to visualize where photosynthesis occurs in the leaf. This model is a very simple representation. It is important that the students know and understand the reactants and products of photosynthesis and what role each part of the leaf plays in the process.
- Small Leaf: In this assignment, students will construct a model of a leaf using textbooks or diagrams as a reference.

Materials:

- Large Leaf Model: per group
 1. 2 pieces green butcher paper or 1 green shower curtain.
 2. 2 sheets of clear plastic sheeting
 3. permanent green marker
 4. 5-6 brass fasteners
 5. scissors
 6. clear tape
 7. clear plastic tubing or cording
 8. colored construction paper
 9. permanent black marker
- Small Leaf Model: per student
 1. 2 green sheets (any type paper)
 2. 2 sheets clear
 3. 1 clear straw
- Shared Materials:
 1. permanent green markers
 2. stapler

- 3. scissors
- 4. clear tape



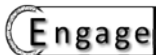
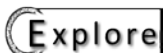
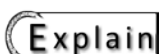
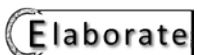


Technology – Hardware: (Click boxes of all equipment needed)

- | | | |
|--|--|---|
| <input type="checkbox"/> Camera | <input type="checkbox"/> Computer(s) | <input type="checkbox"/> Digital Camera |
| <input type="checkbox"/> Projection System | <input type="checkbox"/> Television | <input type="checkbox"/> VCR |
| <input type="checkbox"/> Video Camera | <input type="checkbox"/> Internet Connection | <input type="checkbox"/> Other: |

Technology – Software: (Click boxes of all software needed.)

- | | | |
|---|--|---------------------------------|
| <input type="checkbox"/> Database/Spreadsheet | <input type="checkbox"/> Multimedia | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Internet Web Browser | <input type="checkbox"/> Word Processing | |

Internet Resources:

Procedures:	Teacher's Notes:
 <ul style="list-style-type: none"> • Appropriate classroom behavior required. No specific safety equipment is required. 	<ul style="list-style-type: none"> • Students will be using scissors, caution is advised.
 <ul style="list-style-type: none"> • Have samples of real leaves on student's desks. Have students quickly draw the leaf and label the parts. 	
 <ul style="list-style-type: none"> • If you have made a large leaf model, unfold the large leaf model and flip through the layers. 	<ul style="list-style-type: none"> • Students will be excited to create their own smaller version.
 <ul style="list-style-type: none"> • The large leaf model would best be used as a teacher's aid. • The small leaf model lesson is designed for each student to be able to make and take their own leaf model with them. 	
	
  	



Formative Assessment

- Have the students manipulate the reactants and products and explain what is happening in the leaf using the large leaf model.
- Student questions may be found at the end of this lesson.

Summative Assessment



- An examination and classification of Arkansas trees by using their leaves.
- Compare and contrast of different leaves from trees native to Arkansas.



- Agri/Forestry with the leaves of Arkansas.
- Technology: Student could conduct internet or library research of the native trees of Arkansas and their leaf structure.

Notes:

- Resources:
 1. Large Leaf Model: Adapted from an article, Building Leaves and an Understanding of Photosynthesis, Patty Littlejohn, The Science Scope, p. 22-25, April/May, 2007.