



PLANT  
PRESERVE  
INSPIRE

Conservation Education  
Pre & Post Content– Trees,  
Please!  
[redlands.edu/trees](http://redlands.edu/trees)



esri®

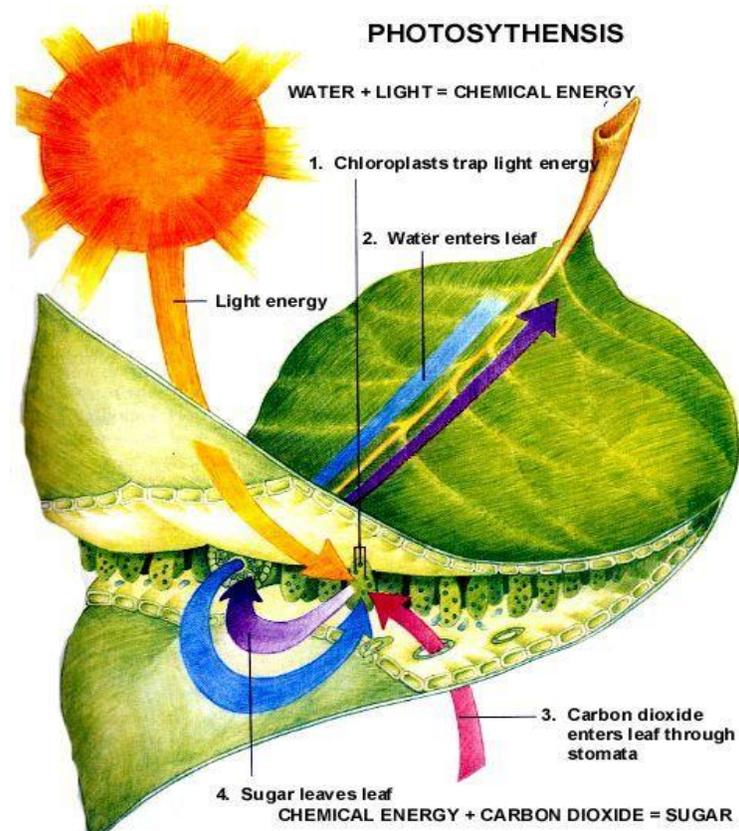


UNIVERSITY OF  
Redlands



INLAND EMPIRE  
RESOURCE  
CONSERVATION DISTRICT

## LESSON: DO LEAVES BREATHE?



**HS-LS1-** Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. [Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.] [Assessment Boundary: Assessment does not include specific biochemical steps.]

**LS1.C:** Organization for Matter and Energy Flow in Organisms: The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.

### INTRODUCTION

The Redlands Plant-A-Thon is celebrating the 50<sup>th</sup> anniversary of Earth Day through tree planting and supplemental classroom content. This activity is being provided to increase student awareness of the area around us, teach a sense of responsibility for the environment and encourages development of this knowledge in a free-form, group exercise. The suite of concepts and vocabulary covered will depend on the length of activity facilitated by the participating teacher, but at any length should increase student

preparation for program participation. It would also be suitable for post-program facilitation, to reinforce concepts and vocabulary covered during the program for maximum content retention.

---

## OBJECTIVE AND SUMMARY

---

This activity will help students understand the how photosynthesis transforms light energy into stored chemical energy by converting carbon dioxide plus water into sugar plus released oxygen. Complete understanding of photosynthesis is essential to student comprehension that while intensity and volume vary, that all trees regardless of species and age play a role in absorption of CO<sub>2</sub> and release of O<sub>2</sub> back into the atmosphere. This absorption results in long-term sequestration of atmospheric carbon as semi-permanent storage in tree biomass. The initial absorption and long-term sequestration of CO<sub>2</sub> by trees is one of the methods to address climate change being implemented in a variety of scales in regions all over the world.

Participation in the activity should result in student comprehension of this process and implications on a large scale, resulting from first-hand facilitation of experiments steps including set-up, development of hypothesis, and observation of results.

---

## MATERIALS

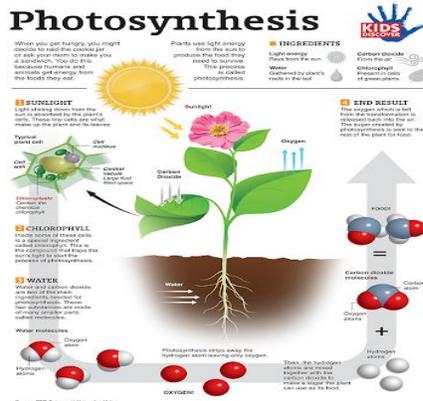
---

- Leaves
- Water
- Bowl
- Poster Paper
- Pencils, Pens, Markers, and color pencils

---

## BACKGROUND

---



Photosynthesis is a process during which energy from light is harvested and used to drive synthesis of organic carbohydrates from carbon dioxide and water, generating oxygen.

---

## SKILLS

---

- Observing
- Identifying
- Collaboration
- Critical thinking
- Interpreting

---

## DIRECTIONS

---

### **Pre-Activity Preparation: Class 1**

- Have students discuss the process of photosynthesis including exchange of inputs and outputs. Explain the materials and plan to submerge the leaf in liquid, and ask students to create individual hypotheses regarding expectations once the process begins.

### **Activity: Class 2**

- Prior to the next class, pick a green leaf (active) from a tree and submerge it in a glass (or a large glass beaker) bowl with lukewarm water and let it sit for a few hours in a sunny spot, held underwater by a small rock. Within that time frame, you should see bubbles begin to form on the surface of the leaf.
- During class:
  - Ask the students to observe the bowl and leaf. What interaction are they seeing at the surface of the leaf?
  - Lead students in a discussion regarding leaf use of sunlight as part of the photosynthetic process, specifically that as the leaf creates energy, it needs to expel components including oxygen and water (**vocabulary:** the release of water from a plant is called transpiration). The process of photosynthesis is what allows us to see the bubbles -- as the leaf releases oxygen while submerged, the oxygen can be seen as bubbles in the water eventually rising to the surface and releasing.
  - Following the observation and discussion, place students in groups and have them research and create unique models showing the process of photosynthesis, using creative materials if you wish.
  - Ask for volunteers to share models with the class and display on classroom walls