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## LESSON: PLANTING A GREENHOUSE BAG

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**Grade Level:** 4<sup>th</sup> and 5<sup>th</sup> grade

**4-LS1-1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

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

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### INTRODUCTION

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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.

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### OBJECTIVE

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By completing this activity, the students will:

- See how plants grow and learn what plants need.
- Understand how a greenhouse works
- Understand Photosynthesis

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### SUMMARY

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This activity demonstrates the seed germination process and the effect of a greenhouse. Germination is between 8 to 10 days, depending on conditions.

[www.growgreatvegetables.com/plantinggrowing/germination/](http://www.growgreatvegetables.com/plantinggrowing/germination/)

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### MATERIALS

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- 2 quart or 1-gallon size food storage bags. One per group or student.
- Organic Vegetable Seeds (radish, lettuce)
- 1/2 cup of dirt per bag
- 1/4 cup of water per bag
- String
- Tag for students name on greenhouse

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## BACKGROUND

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**Photosynthesis:** We have a symbiotic relationship with plants growing in soil. Plants provide us with oxygen to breath and when we exhale we release carbon dioxide (CO<sub>2</sub>). In combination with water and sunlight, CO<sub>2</sub> is a core ingredient in the conversion of all components into glucose, a process is called photosynthesis.

**Greenhouses and the Earth's Atmosphere:** A greenhouse is a house made of glass, including glass walls and a glass roof, and allows for the growth of plants year-round, no matter what exterior conditions are because it maintains a warmer interior temperature. This elevated temperature is a result of light energy entering through glass, becoming trapped, and increasing presence of interior heat even after the sun sets.

The earth's atmosphere is very similar to a greenhouse. Thirty-one percent of the incoming radiation is reflected back into the atmosphere, while only 20% is absorbed by the atmosphere. The rest of the radiation is absorbed by the ocean, lakes, and land and is then converted into heat. At night, Earth's surface cools, releasing the heat back into the air; however, some of the heat becomes trapped, a phenomenon increasing as GreenHouse Gases (GHG) collect in the atmosphere.

**Changing Atmospheric Conditions:** Prior to large-scale release of GHG into the atmosphere, the retention of heat maintained a regular temperature that made the planet livable for humans. The increase of GHG is accelerating temperature increases, creating impacts of climate change that are disrupting habitats and dependent species on a global scale. Understanding the mechanism for atmospheric heating is critical to understanding the concept of climate change for all students.

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## SKILLS

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- Collaboration
- Critical thinking
- Interpreting

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## DIRECTIONS

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1. Split up the class into groups of 4 or 5 and have them complete the experiment as a group. Have students make a small tag to write the name of their group to hang on their greenhouse.
2. Slowly pour soil into one of the food storage bags.
3. Slowly pour the water into the bag to moisten the soil (*¼ cup of water to ½ cup of soil*).
4. Finally, drop a few seeds into the bag.
5. Blow into the bag (not too hard, the bag may pop) this is releasing carbon dioxide into the greenhouse and seal the bag when inflated.
6. Hang the greenhouse bag by one corner, with a piece of string, in a sunny spot or set inflated greenhouse flat on a window shelf. Make sure greenhouse cannot fall from the shelf or be disturbed.

Seeds in the greenhouse should germinate in about 7 to 10 days depending on conditions.



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## EXTENSION

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- Explain to students that the water cycle is working in their greenhouse. Let the students examine the condensation that is occurring in the bag.
- Before the start of the experiment, have students write down the procedures and list materials used.
- Have students research similarities between greenhouses and earth's atmosphere.  
<http://climatekids.nasa.gov/greenhouse-effect/>
- Have students come up with a hypothesis of the outcome of the experiment in order to explore the scientific method.

