

The Ecology Center

TIP:
Break kids up into groups and compare all recordings with one another at the end.

LESSON

CLIMATE & THE GREENHOUSE EFFECT

DESCRIPTION

Students make an experiment to mimic the “greenhouse effect.”

BACKGROUND INFORMATION

Each of the earth’s climate zones (tropical, temperate, polar) is home to very different plants and animals, which have become adapted to the region that they live in. Since the beginning of the human industrial period, people have recorded shifts in climate patterns across the globe. These human-made changes and irregularities in climate patterns are having huge impacts on our ability to grow food. The crops that we grow for food need specific conditions to thrive, and it is difficult for farmers to know what to grow if they cannot depend on their previous experience. Climate change may shift temperatures and rainfall patterns as well as causing stronger storms and more floods. These shifts in weather can, in turn, help some kinds of weeds and pests to spread to new areas.

Scientific research shows that the emissions of carbon dioxide from so many fuel-burning vehicles and machines has created a layer in our atmosphere that traps heat from the earth like a greenhouse. This is known as the “greenhouse effect.”

OBJECTIVES

- Students learn about climate zones and how earth’s climate is becoming warmer due to human activities causing more pollution and greenhouse gases.
- Students demonstrate the greenhouse effect.

STANDARDS

ESS2.D: Weather and Climate

Climate describes patterns of typical weather conditions over different scales and variations; Historical weather patterns can be analyzed to make predictions about future weather.

(NGSS) 5-LS2-1: Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

Science explanations describe the mechanisms for natural events.

MATERIALS

- Two shoeboxes
- Ruler
- Soil
- Two thermometers
- Colorless plastic food wrap
- Timer

TIME:

1 HOUR, 30 MINUTES

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PREP

- Ask students to bring in shoeboxes they may have at home in the weeks leading up to the lesson.
- Research general climate zones in California.
- OPTIONAL: Collect photos or images of different sustainable homes and buildings to inspire.

ACTIVITY

1. Discuss with students the background and potential effects of human fuel-burning vehicles on the earth's atmosphere to introduce the experiment.
2. Cover the bottom of each shoebox with about 2 inches (5 cm) of soil.
3. Lay a thermometer on the surface of the soil in each box.
4. Cover the opening of one box with a single layer of plastic wrap. Leave the other box uncovered.
5. Take readings from both thermometers.
6. Place both boxes, side by side, in a sunny place outdoors
7. Record readings from both thermometers every 15 minutes for 1 hour

DISCUSSION:

1. What climate zones exist in California? What are conditions like in each that might present design challenges to those living there?
2. Why is the temperature of Earth's climate increasing? Discuss the effects of a warming climate.
3. How are some ways we can minimize our impact on earth's atmosphere?

FURTHER LEARNING: DESIGNING YOUR SUSTAINABLE HOME

Break students up into teams. Tell them they work for an environmental company that builds homes for people that are completely good for the environment in all ways. Each team has the task of designing a dream home in one of California's climate zones. It must have at least four "sustainable" features. Have the teams sketch out a floor plan along with a short explanatory essay. The more creative, the better (a tree house with a floating garden bed, bicycle-powered kitchen appliances, etc.)! This will get kids thinking outside the box with sustainability in mind. After the design and drawing, each group can present their proposal. Evaluate each team and choose a winning team. A rubric like the one below can be helpful when evaluating each pitch.

SUSTAINABLE HOUSE RUBRIC

	1-WEAK	2	3-MODERATE	4	5-STRONG
CREATIVITY					
FUNCTIONALITY					
SUSTAINABILITY					
MATERIAL					
LOCATION					