

JSD 3D Learning Activity Template

Grade: 6th

Title: Understanding the Greenhouse Effect

Utah Science with Engineering Education Standard (SEEd): 6.3.4 Construct an explanation supported by evidence for the role of the greenhouse effect on Earth’s surface.

Key crosscutting concept(s) (CCC): Energy and matter: flows , cycles, and conservation and Stability and change

Key science and engineering practice(s) (SEP): Planning and carrying out investigations, Engaging in argument from the evidence, and Obtaining, evaluating, and communicating information.

Materials: three thermometers, two clear glass jars that will fit over the thermometers, sun lamp or sunny window sill, paper towels, graph paper, clock, and pencil

Time: **Day 1:** 1 hour - for instruction and experiment set up. Experiment recording temperatures will last for several hours.

Day 2: 1 hour – for data analysis and

Teacher background, key content information and hints: Teachers should know the difference between weather and climate. They should also have a general knowledge of the greenhouse effect and how human activities are increasing greenhouse gasses and global temperatures.

Prior knowledge that students need: Students need to know the difference between heat and temperature and climate.

Learning Activity Plan

These three aspects of a lesson should be identified in your learning activity.

Gathering: Students will carry out an experiment and use models to obtain data about the greenhouse effect.

Reasoning: Students will use the collected data to analyze and evaluate the greenhouse effect. They will develop an argument from the evidence.

Communicating: Students will record their results in their science journal and write an explanation based on the evidence. They will communicate this to the class.

Phenomenon: Changes to Earth's global climate have had and will have major consequences for life on Earth.

Learning Activity: Students will conduct an experiment and make a model of the greenhouse effect. Through the experiment and model they will begin to understand the amount of greenhouse gasses in the atmosphere. In this experiment, the water vapor will act like a greenhouse gas and increase the temperature in the jar with the wet paper towel even more than the temperature in the dry jar.

Materials for Each Group: three thermometers, two clear glass jars that will fit over the thermometers, sun lamp or sunny window sill, paper towels, graph paper, clock, and pencil

Procedure: Divide the class into small groups and distribute materials to each group. Each group will place three thermometers within a few inches of each other on a sunny windowsill or under a sun lamp. All three thermometers should receive the same amount of light for the entire day. Have students periodically check the thermometers until they are at exactly the same temperature and record this beginning temperature and the time.

Cover two thermometers with glass jars, leaving one thermometer uncovered. Place a wet paper towel inside one of the two jars. Use water at room temperature to wet the paper towel. Periodically check all three thermometers and record the temperature and time. Students take temperature readings of the thermometers inside the jars and compare them to the temperature of the thermometer outside the jars.

Students take their final temperature measurements and analyze the data that they have collected. They will graph the data to show how the temperature of the thermometers under the "dry" glass jar and the "moist" glass jar changed throughout the day, and how these temperatures compared with the temperature of the thermometer outside the jars. Students will write a summary of their findings and how these results compare to the greenhouse effect of our atmosphere. They will communicate their findings with the class.

Questions to consider: Do all three thermometers record the same temperature? If no which one is higher? Can you explain why the three temperatures are not the same?

Assessment of student learning

Teacher will observe the students during the experiment and watch the groups work on their data analysis and summary. The students will be graded on their data collection, summary, and presentation.

Student information:

<http://www.ck12.org/user%3Ac2fyywgud3lubkb3agv1bgvylmsxmi5nys51cw../book/CK-12-Earth-Science-6th-Grade/section/9.13/>

<https://www.nps.gov/ever/learn/education/upload/Greenhouse-Effect-for-kids-2.pdf>

BrainPop video:

<https://www.brainpop.com/science/ourfragileenvironment/greenhouseeffect/>

Greenhouse effect interactive:

<http://www.ck12.org/assessment/tools/geometry-tool/plix.html?eld=SCI.ESC.625&questionId=55c247325aa41320a9c05f88&artifactID=2192377&backUrl=http%3A//www.ck12.org/earth-science/Greenhouse-Effect/%3Fdifficulty%3Dall%26by%3Dall%23interactive>

This is a short summary you can use to explain to your students the basics of the Greenhouse effect.

What is the Greenhouse Effect?

Certain gases in the atmosphere such as carbon dioxide, methane, and water vapor trap energy from the sun. The natural greenhouse gases act like a big blanket around the earth, keeping it warm.

Humans can create extra greenhouse gases but this means that more heat gets trapped. This causes the temperature of the earth to rise, which results in Global Warming.

Global Warming is the recorded increase in the average temperatures of the earth's atmosphere and oceans. Global Warming affects the weather patterns on Earth and causes Climate Change. Climate change results in higher sea levels, more rainfall and severe droughts and floods.

What effect does climate change have on humans and animals?

A greenhouse is a small house made of glass that is used to grow plants. A greenhouse traps the sun's rays and keeps the heat from escaping. It is warm inside. In the same way that the glass traps heat in a greenhouse, the atmosphere traps heat next to the earth.

Names: _____

Temperature Recording Sheet

time	temperature of thermometer 1 outside jar	temperature of thermometer 2 under dry glass jar	temperature of thermometer 3 under moist glass jar
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Change in temperature			

Do all three thermometers record the same temperature? _____

If no, which one is higher?

Can you explain why the three temperatures are not the same?

Evaluation of the experiment:

