

# Introduction to Climate Change

## Summary

This is designed to be an introductory lesson to climate change. It covers the importance of the atmosphere, the basics of the "Greenhouse Effect" and an introduction to the human contribution to increased greenhouse gases.

## Main Core Tie

Science - Earth Science

[Standard 3 Objective 3](#)

## Time Frame

3 class periods of 60 minutes each

## Group Size

Individual

## Materials

Classroom projector Worksheet (1 per student)

## Background for Teachers

About 30 percent of the sunlight that beams toward Earth is deflected by the outer atmosphere and scattered back into space. The rest reaches the planet's surface and is reflected upward again as a type of slow-moving energy called infrared radiation.

The heat caused by infrared radiation is absorbed by "greenhouse gases" such as water vapor, carbon dioxide, ozone and methane, which slows heat escape from the atmosphere. Although greenhouse gases make up only about 1 percent of the Earth's atmosphere, they regulate our climate by trapping and holding heat in a kind of warm-air blanket that surrounds the planet.

This phenomenon is what scientists call the "greenhouse effect." Without it, scientists estimate that the average temperature on Earth would be colder by approximately 30 degrees Celsius (54 degrees Fahrenheit), far too cold to sustain our current ecosystem.

With too much heat placed into our atmosphere by greenhouse gases such as carbon dioxide and methane, the greenhouse effect is amplified beyond normal ranges. The effect to our climate is global warming rates which are higher than previous warming rates in the past 500,000 years of Earth's history.

## Student Prior Knowledge

Students should understand that an atmosphere composed of gasses surrounds Earth and that the source of light and heat on our planet is the sun.

## Intended Learning Outcomes

1. Use Science Process and Thinking Skills
  - a. Observe simple objects, patterns, and events, and report their observations.
  - h. Predict results of investigations based on prior data.
  - i. Use data to construct a reasonable conclusion.
3. Understand Science Concepts and Principles
  - a. Know and explain science information specified for the grade level.

4. Communicate Effectively Using Science Language and Reasoning
  - b. Describe or explain observations carefully and report with pictures, sentences, and models.
5. Demonstrate Awareness of Social and Historical Aspects of Science
  - a. Cite examples of how science affects life.
6. Understand the Nature of Science
  - c. Science findings are based upon evidence.

### Instructional Procedures

Begin with a discussion about the atmosphere. What are the components of our atmosphere? How does our atmosphere change through the layers of our atmosphere? The atmosphere protects life on Earth by absorbing ultraviolet solar radiation, warming the surface through heat retention (greenhouse effect), and reducing temperature extremes between day and night. What is its composition? Nitrogen, oxygen, and argon, which together constitute the major gases of the atmosphere. The remaining gases are often referred to as trace gases, among which are the greenhouse gases such as water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Ask about the greenhouse effect. What do you know about the greenhouse effect? Do you think that the greenhouse effect can affect our climate? Distribute the first page of the worksheet and explain to the students that they will be asked to diagram the greenhouse effect after watching a short video (<http://www.uen.org/climate/videos.shtml>) (Episode 4: Too Much Carbon Dioxide).

After the video finishes allow the students a few minutes to fill out the worksheets individually. Then give them the opportunity to work in small groups to evaluate each other's diagrams and alter their own. Finally, review the worksheet as a class.

After the diagrams are complete, begin a discussion about the greenhouse effect and how it relates to climate change. How do greenhouse gasses affect the Earth's climate? How are humans contributing to the amounts of carbon dioxide in the atmosphere? Ask students how scientists know about the levels of carbon dioxide in the atmosphere over time. (Recent data has been collected using carbon dioxide monitors around the globe and air trapped in glacial ice in provides samples that are hundreds of thousands of years old.) Ask them to speculate about what a graph showing carbon dioxide levels over time might look like.

Distribute page two of the worksheet and ask students to evaluate the graphs (first as individuals, then small groups, then as a class). The second graph provides an opportunity to discuss the trends of human population growth and what that means for Earth's climate and the timeframe

### Strategies for Diverse Learners

Explain the process of global warming to diverse learners. Have them draw a picture of the greenhouse effect with arrows showing radiation bouncing off the atmosphere and radiating down to earth.

### Assessment Plan

Choose 6 questions from the lesson and give students a quiz based on the quiz.

### Bibliography

- [Climate Change Videos](#)
- [What is the Greenhouse Effect?](#)
- [Global Climate Change: Understanding the Greenhouse Effect](#)

### Authors

[Holly Godsey](#)

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