



# The Greenhouse Effect



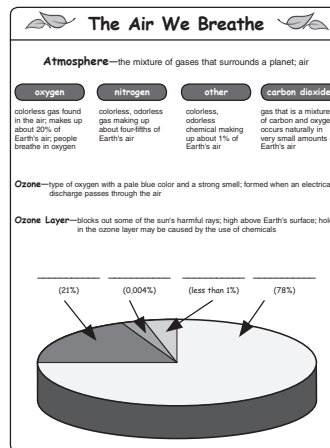
**Objective:** Given an explanation, definitions, and resource materials, the students will draw a diagram to explain the greenhouse effect on our atmosphere and demonstrate this effect through experimentation.

## Vocabulary

- greenhouse effect
- greenhouse gas
- ozone
- ozone layer
- global warming

## Materials

- The Air We Breathe on page 88
- lamp (for each group)
- shoebox (for each group)
- small thermometer (for each group)
- overhead projector, chart paper or interactive whiteboard, and appropriate markers
- student dictionaries, encyclopedias, or other reference materials
- clear or light-colored plastic (eco-friendlier option: discarded plastic wrap)
- darker piece of plastic (eco-friendlier option: discarded pieces of garbage or leaf bags)
- Technology Resources on page 92.



## Preparation

1. Gather reference books and other resources for student use.
2. If you have access to the Internet, compile links for appropriate sites (as suggested on the Technology Resources page) into a document for student access.
3. Copy the The Air We Breathe onto a transparency or scan it into an interactive whiteboard. White out or hide the definitions for each vocabulary term.

## Opening

1. Ask the students if they have ever seen a greenhouse. Ask if they know how a greenhouse works. (The glass panels on the greenhouse let light and heat in from the sun. The glass keeps the heat from escaping. The inside heats up, like the inside of a car heats up when it is parked in the sun.)
2. Review with the students the definition of *atmosphere* (a mixture of gases that make up the air that surrounds our planet). Explain that tiny particles, such as dust, water, and pollen, also float around in the atmosphere.

## Part 1

1. Display the vocabulary terms from The Air We Breathe on the overhead or whiteboard. Encourage the students to use dictionaries and other reference books to define these terms.
2. Have the students form groups to research further the concept of Earth's atmosphere and its elements.
3. Instruct the student groups to use their information to create simple pie graphs to show the composition of the atmosphere (or use the chart on page 88), similar to the one shown on page 87.

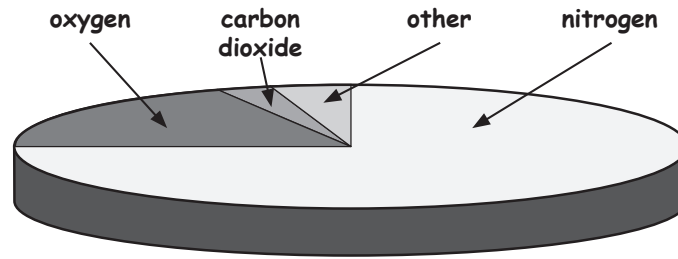


# The Greenhouse Effect (cont.)



## Part 1 (cont.)

### Atmosphere



## Part 2

1. Have the students use approved reference materials to research and learn about how *greenhouse gases* work to create the *greenhouse effect* and *global warming*.
2. Ask the students to draw diagrams showing how greenhouse gases affect the atmosphere. (If necessary, assist students with this task.)
3. Call on two or three student volunteers to explain their diagrams to the class.

## Part 3

1. Have each group of students (from Part 1) use a light-colored piece of plastic, a darker piece of plastic, a box, and a lamp to create a model of the greenhouse effect.
  - The box represents Earth.
  - The light piece of plastic represents the natural atmosphere.
  - The lamp serves as the sun.
2. Have the students set up group demonstrations to show how our atmosphere holds in some heat.
3. Place the thermometer in the box, cover it with the light-colored plastic, and record the temperature.
4. Next have the students add the layer of darker plastic over the box. Tell the class this represents carbon dioxide emissions and other greenhouse gases.
5. Have each group record the change in temperature.

## Closing

Discuss with the students how greenhouse gases affect Earth's temperature and the implications that has for people, animals, and plants.

## Extension

Write the vocabulary words on the board. Divide the students into two or more teams. Have each team work together to write sentences using the vocabulary words correctly—one sentence for each word. The first team to use all the vocabulary words wins.

### ELL Tip

Work with a small group to complete the graphic organizer, *The Air We Breathe*. Look up the terms in a reference book, and assist the students in rewording the definitions in simple terms they can understand.



# The Air We Breathe



**Atmosphere**—the mixture of gases that surrounds a planet; air

**oxygen**

colorless gas found in the air; makes up about 20% of Earth's air; people breathe in oxygen

**nitrogen**

colorless, odorless gas making up about four-fifths of Earth's air

**other**

colorless, odorless chemicals making up about 1% of Earth's air

**carbon dioxide**

gas that is a mixture of carbon and oxygen; occurs naturally in very small amounts of Earth's air; plants absorb carbon dioxide

**Ozone**—type of oxygen with a pale blue color and a strong smell; formed when an electrical discharge passes through the air

**Ozone Layer**—blocks out some of the sun's harmful rays; high above Earth's surface; hole in the ozone layer may be caused by the use of chemicals

