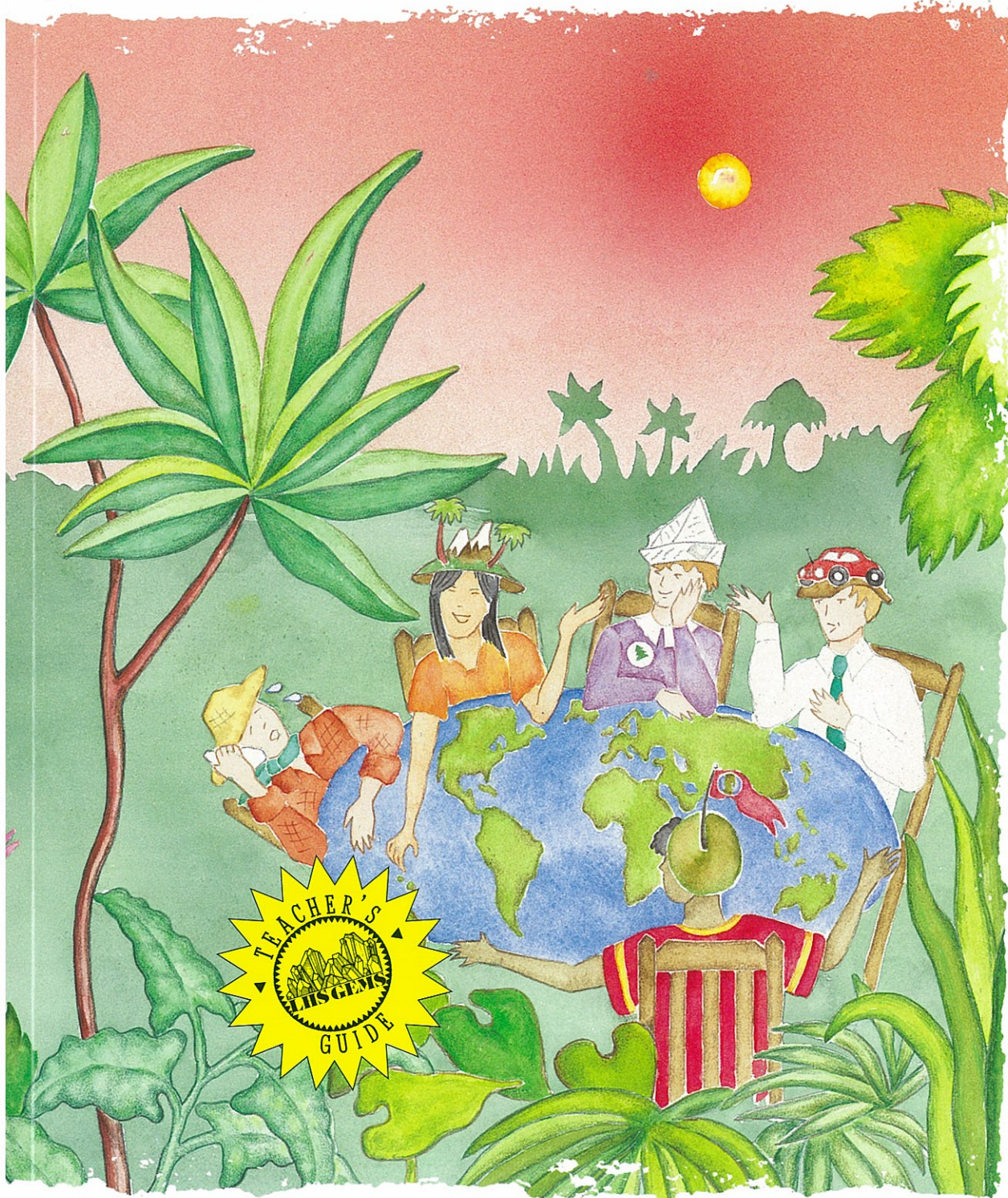


Global Warming



&
THE

Greenhouse Effect

Lawrence Hall of Science • University of California at Berkeley

Session 1

What You Need

For the class

- 3 large sheets of butcher paper
(each 2–3 feet wide and about 6 feet long)
- 1 marking pen
- 1 roll of masking tape
- 1 pair of scissors

For each group of 4 students

- 1 sheet of blank paper
- 5 or more sentence strips
(Sentence strips are commercially available from school supplies companies—see Resources on page 146—or, you can make your own by cutting sheets of butcher paper into strips about 3" wide and from 18" to 36" long—the exact size is unimportant.)
- 1 marking pen

For each student

- 1 sheet of blank paper
- 1 handout: "Average Global Temperatures . . ."
(see page 15)
- 1 homework sheet: "Everyone Likes to Talk About the Weather" (see page 14)

Session 2

What You Need

For the class

- 1 piece of string, 4¹/₂ feet long
- white chalk and chalkboard, or marking pen,
and butcher paper
- 1 pair of scissors

For each group of 4 students

- 2 two-liter clear plastic soda bottles
- 2 thermometers
- 3 strips of thin cardboard, 1/2" x 1"
- 3 cups of potting soil
- 2 fine or medium-tipped marker pens
(one red, one green)
- 1 roll masking tape
- 1 piece plastic wrap, approximately 6" x 6"
- 1 rubber band
- 1 100-watt light bulb
- 1 clip-on lamp
- 1 extension cord (if needed to connect lamp to outlet)
- 1 large book or piece of wood for securing the lamp
- 1 plastic 8-oz. cup
- 2 graphing data sheets:
"The Greenhouse Effect" (see page 28)

Session 3

What You Need

For the class

- 3 large sheets of butcher paper
- 1 felt-tip pen
- 4 sheets of colored paper (yellow, red, blue, and brown)
- 1 lamp and wood block stand from Session 2, for demonstration
- 1 package (about 1 lb.) of large, dry, white lima beans
- 1 package (about 1 lb.) of large, dry, red kidney beans (any large beans or other red and white objects can be substituted)
- 1 roll of transparent tape
- 1 pair of scissors

optional

- 1 calculator

For each group of 4 students

- 1 copy of the "Global Warming" game board and cards (see pages 46–54)
- 3 copies of the score sheet (see page 48)
- 1 penny or other coin

For each student

- 1 handout: "Global Temperatures and Carbon Dioxide" (see pages 56–57)

Session 4

What You Need

For the class

- 1 box of baking soda
- 1 gallon of diluted Bromothymol Blue Solution (BTB), see page 61 for how to prepare
- 1 air pump, either bicycle pump or balloon inflator
- 1 32 oz. bottle of white vinegar
- 1 graduated cylinder or measuring cup
- 1 short candle (about 2" tall)
- 1 open clear glass or plastic container with sides taller than the candle
- 1 chalkboard or butcher paper and marker
- 1 gallon of white vinegar (32 oz. for each class session)

For each group of 4 students

An additional number of the items marked with an asterisk will be required in Session 5 (see pages 78–79).

- 1 empty glass wine bottle, 750 ml
- 1 dropper or squirt bottle, about 6 oz. size
- 1 sheet of white paper
- 1 teaspoon
- * 3 plastic cups, 8 oz. size
- * 4 small clear plastic cups (such as graduated medicine cups or 3½ oz. clear Solo® cups)

- * 3 balloons, 8–10" in diameter, in three different colors
- * 3 plastic straws
- * 6 twist ties
- 1 handout: "Air and Carbon Dioxide Observation Sheet"
(see page 74)
- 1 roll of masking tape or other object with a hole about
3½" diameter; same size for all groups
- 1 tray
- optional*
- 1 graduated cylinder

For each student

- 1 handout: "Air and Carbon Dioxide Data Sheet"
(see page 75)
- 1 homework sheet: "Surprise Increase in Atmosphere's
CO₂" (see pages 72–73)

Session 5

What You Need

For this session, you will need all of the materials prepared for Session 4 plus the items listed below. Items from Session 4 are marked with an asterisk.

For the class

- * 1 box of baking soda
- * 1 gallon of dilute BTB
- * 1 air pump
- * 1 gallon bottle white vinegar
- * 1 graduated cylinder or measuring cup
- 1 car
- 1 manila folder
- 1 roll of masking tape or duct tape
- 1 chalkboard or butcher paper and marker

For each group of 4 students

- * 1 empty glass wine bottle, 750 ml
- * 1 dropper or squirt bottle containing BTB
- * 1 teaspoon
- * 3 plastic cups, 8 oz. size
- * 5 small 3½ oz. clear plastic cups
- * 4 balloons, 8–10" in diameter, three different colors
- * 1 roll of masking tape or other object with a hole about
3½" in diameter; same size for all groups
- * 1 tray
- 1 sheet of white paper
- 4 plastic straws
- 8 twist-ties
- 1 handout: "Four Gas Samples: Observation Sheet"
(see page 88)

For each student

- 1 handout: "Four Gas Samples: Data Sheet" (see page 89)
- 1 two-sheet homework assignment: "Carbon Dioxide In
the Atmosphere: Who Contributes and How Much?"
(see pages 90–91)

Session 6

What You Need

For each student interest group

- One copy (for each student in the group) of a specific interest group's description and list of questions. Include one additional copy for the group (see pages 101–105)

For each student

- Homework article on global climate change (select the article most appropriate for your students—see pages 106–107)

Session 7

What You Need

For the class

- 1 sheet of butcher paper
- 1 marking pen

For each group of 3 or 4 students

- 4 copies of the "Effects Wheel" sheet (see page 114)
- 1 pad of Post-Its™ (3" x 1½")
- 2 marking pens, of different colors (preferably green and red)
- 1 handout: "Flash! Messages" (see pages 115–117)

Session 8

What You Need

For the class

- 4 sheets of butcher paper
- 1 roll of masking tape

For each group of four students

- 5 sentence strips
- 1 or more marking pens