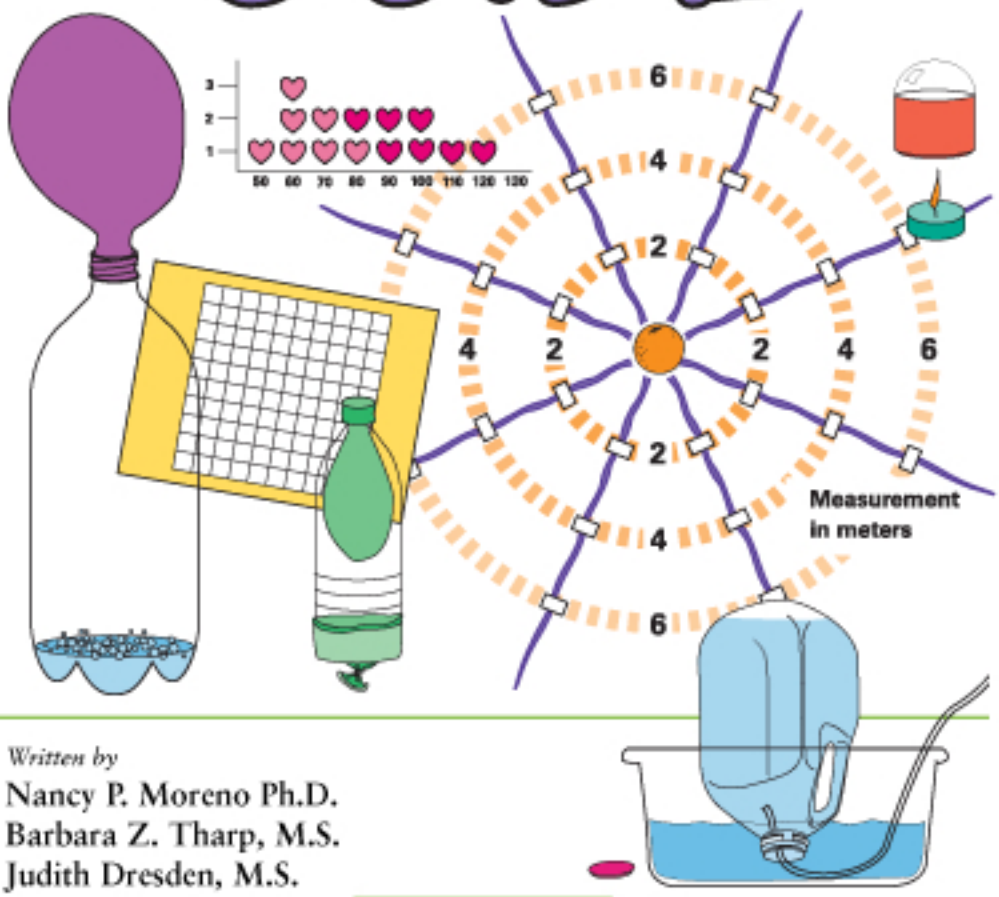
My World™ Air

TEACHER'S GUIDE



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The activities described in this book are intended for school-age children under direct supervision of adults. The authors, Baylor College of Medicine and the publisher cannot be responsible for any accidents or injuries that may result from conduct of the activities, from not specifically following directions, or from ignoring cautions contained in the text.

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About Air

3

Physical Science

About 78% of the volume of dry air is made up of nitrogen gas (N_2). Oxygen (O_2), the component of air that is required by our bodies, comprises less than one fourth of dry air. Argon, a non-reactive gas, makes up slightly less than 1% of dry air. Carbon dioxide (CO_2), a gas released from our bodies when we exhale, is present in even smaller quantities (less than one part per 1,000). Many other naturally occurring gases (such as neon, helium, methane and ammonia), as well as gases resulting from pollution, are present in air in very minute amounts. Water vapor, when present, can occupy up to 5% of the total volume of air. When we breathe, nitrogen, oxygen and all the other components of air enter and exit our lungs.

Unit Links

Mr. Slaptail's Secret
Story, pp. 6–15

Explorations
It's in the Air, p. 4

SETUP

You will need to tint three small batches of popcorn (or buy flavored popcorn) before you begin this activity. First, pop the corn. To tint it, measure 6 cups of popcorn into a sealable plastic bag. Add a tablespoon of yellow soft drink mix and 1–3 teaspoonfuls of water. Seal the bag and shake to distribute the color. Repeat the tinting process with the red, then the green mix—but use only 1 cup of white popcorn each time for these colors. You should have 6 cups of yellow popcorn in the first bag, 1 cup of red popcorn in the second bag and 1 cup of green popcorn in the third bag. Let the popcorn dry by spreading it on a paper towel or leaving the bags open.

When dry, put the popcorn in separate containers, separated by color. You also will need about 22 cups of white popped corn.

As an alternative, you may use purchased popcorn. Select different flavors to represent the color. You also can use different colored styrofoam packing peanuts or small balls of crumpled paper in different colors.

If you would like to create a larger model of air, multiply the materials by two or more.

PROCEDURE

1. Divide the students into six small groups. (If your students are very young, you may prefer to conduct the activity as a discovery lesson with the entire class.)
2. Have the Materials Manager from each group collect a measuring cup and a sealable plastic bag. Give three of the groups approximately 7 cups of white popcorn each. Give 1 bag of colored popcorn to each of the remaining three groups.

CONCEPTS

- Gases occupy space.
- Air is a mixture of different gases.
- Oxygen, the gas needed by the body, is not the principal component of air.

OVERVIEW

Students will use different colors of popcorn to model the composition of air.

SCIENCE, HEALTH & MATH SKILLS

- Measuring
- Observing

TIME

Preparation: 10 minutes
Class: 20 minutes

MATERIALS

- 30 cups of popped popcorn, (see Setup for alternatives)
- 3 clear resealable plastic bags, 1-gal size (12 x 15 in.)
- Clear plastic bag, 15-gal size (or a bag from the cleaners)
- Dry soft drink mix: 2 pkgs of yellow, 1 pkg each of green and red (see Setup)
- Transparency of Let's Measure student page

Each group will need:

- Clear resealable plastic bag, 1-gal size, (12 x 15 in.)
- Measuring cup, 8-oz size
- Copies of Let's Measure student sheet

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FIESTA POPCORN!

8 cups of popped popcorn

1/4 cup of sugar

6 tbs of butter

3 tbs of light corn syrup

1/4 tsp of baking soda

Food coloring

In a 2-quart saucepan, combine sugar, butter and corn syrup. Cook and stir over medium heat until mixture comes to a boil. Cook without stirring for 5 minutes. Remove from heat and stir in soda and food coloring. (If more than one color is desired, separate mixture into containers before adding food coloring.) Pour mixture over popcorn and stir gently to coat. Bake in a 300°F oven for 15 minutes. Stir and bake for 10 more minutes. Place popcorn in a large bowl to cool.

3. Project a transparency of the Let's Measure student sheet while you explain that the groups with white popcorn will measure 5 cups of popcorn into their bags; the group with yellow popcorn will measure 4 cups; the group with red popcorn will measure 1/4 cup; and the group with green popcorn will place only one kernel in its bag.
4. When the students have finished measuring, ask one student from each group to empty the popcorn from the group's sack into the large, clear plastic bag (which you will hold in a central location).
5. Shake the plastic bag. Ask, *What do you think I'm doing?* Lead the students to understand that the popcorn is being mixed. Ask, *Are the colors of popcorn arranged in a special way in the bag?* Students should note that the colors are mixed randomly.
6. Have the students identify which color of popcorn is represented by the most kernels in the bag, by the second-largest amount of kernels and so on, until you mention the single kernel of green popcorn. Follow by asking the students to name other kinds of mixtures (examples could include fruit salad, crayons of different colors in a large container, etc.).
7. Tell the students that air also is a mixture. In this case, the mixture is made up of different kinds of gases. Air contains many different kinds of gases. The different colors of popcorn in this bag are present in the same proportions as the different gases in air. (Some students already will know that oxygen and carbon dioxide are involved in breathing. If they are not familiar with this information, point out that the gas we take out of air when we breathe in is known as oxygen, and the gas we release when we breathe out is carbon dioxide.) Ask students to guess which color of popcorn represents oxygen molecules (yellow) and carbon dioxide molecules (green) in air.
8. Finally, point out that air is mostly nitrogen. The white popcorn corresponds to nitrogen molecules and the red popcorn corresponds to argon, gases that are present in air, but are not absorbed by the body during breathing.

VARIATIONS

- Make your own colored and flavored popcorn using the recipe on this page.

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Let's Measure

3

Color of Popcorn	Cups of Popcorn
White	
White	
White	
Yellow	
Red	$\frac{1}{4}$
Green	

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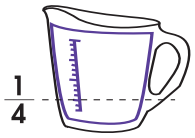
Vamos a Medir

Color de las Palomitas	Tazas de Palomitas
Blancas	
Blancas	
Blancas	
Amarillas	
Rojas	
Verde	

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