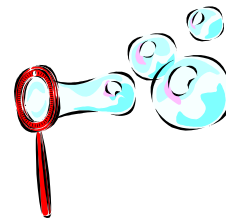


IS AIR REALLY THERE?



BENCHMARK and TASK

SC.A.1.1.1 The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).

- The student manipulates and observes three different states of matter: solid, liquid, and gas.

KEY QUESTION

How do we know that air is present?

BACKGROUND INFORMATION

All materials and objects are considered to be matter. Matter is anything that takes up space and has mass. If something isn't matter, it's energy. Matter is made up of tiny particles called atoms.

Everything alive, dead or never having lived is made up of atoms.

Matter exists in three forms on earth: solid, liquid, and gas. The particular state of a type of matter depends both on the matter itself and the temperature. A change in temperature can result in a change in the state of matter.

A solid is something that maintains its shape. The atoms of a solid vibrate in a fixed place. A liquid maintains its volume (the amount of space it takes up), but takes the shape of its container. The atoms of a liquid vibrate and move around slowly. A gas has no fixed volume, but takes up the volume of its container. The atoms of a gas move around quickly and are spaced far apart.

A fourth state of matter is called plasma. Like a gas, plasma does not have a definite shape or volume. Plasmas only exist at very high temperatures. Stars, including the sun, are made of matter in a plasma state.

MATERIALS

Teacher

1 feather
1 empty, plastic 2-L soda bottle
bubble solution ingredients:
 2-4 Tbsp. Dawn or Joy liquid detergent
 4 cups water
 ½ cup glycerin (optional)

Per group

newspaper
1 shallow container of bubble solution
paper towels

Per student

1 styrofoam cup
1 sharpened pencil
1 straw

TEACHING TIPS

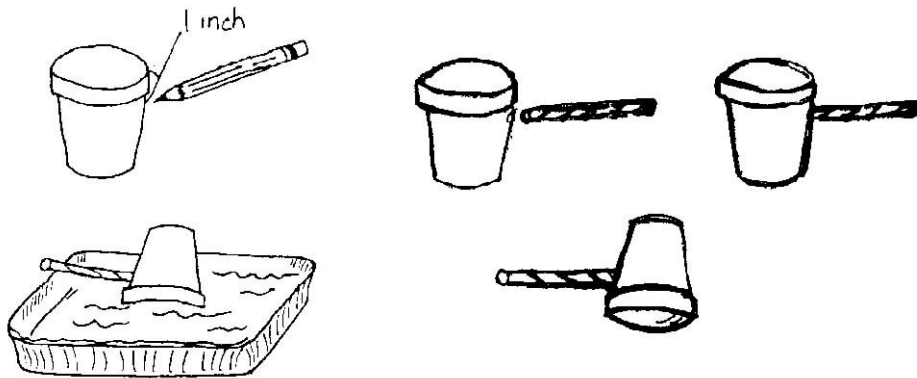
1. Mix the bubble solution ahead of time so it can settle. The ingredients may need to be doubled, depending on the number of groups in your class.
2. Plan to take the class outside, if possible.

ENGAGE

1. Show the students an empty 2-liter soda bottle.
Ask:
Is there anything inside this bottle?
2. Place a feather on top of the opening of the soda bottle and squeeze the bottle while students observe.
3. Ask:
What happened?
Why do you think the feather moved?
When I squeezed the empty bottle, did anything come out?

EXPLORE

1. Arrange the students in groups. Have students cover their tables with newspaper. Pour the bubble solution that you have prepared ahead of time into shallow containers (1 per group).
2. Distribute 1 styrofoam cup and 1 straw to each student.
3. Demonstrate how to make a hole in the styrofoam cup by using a pencil point. The hole should be made on one side about one inch from the top. Students should then place a straw through the hole in the cup.



4. Students should place the open end of the cup in the bubble solution, then remove it and observe the soap film across the cup opening.
5. Show students how to hold the cup upside down and blow slowly through the straw to form large bubbles. Give the students ample time to explore.

EXPLAIN

After students have had time to explore, challenge them with the following questions:

What do you think is inside the bubbles? Why do you think so?

How could air get inside the bubbles?

Can you think of a way to make smaller or larger bubbles?

(Students may discover that they can control the size of the bubbles by the amount of air they blow into the cups.)

EXTEND/APPLY

Brainstorm a list of other things that have air in them.