

## How can you tell air is "something?"

### Teaching and Learning Focus

In Investigation Question 1 students recognized that air affects other things, which is the result of the fact that it is matter. This simple procedure will help your students to understand that air is "something," that is, that like all matter it takes up space and can be contained. They will learn this by seeing that air takes up the space in a cup that is inverted in water such that objects in the cup do not get wet.

### Materials Needed

- Bag of fluffy cosmetic puffs or cotton balls
- Clear plastic drink cup
- Clear glass or plastic container - big enough to hold the completely submerged cup
- Water

### Safety

This investigation question is considered generally safe to do with students. However, please review it for your specific setting, materials, students, and conventional safety precautions.

### Setting the Scene

Remind students that in the last activity they found out that air affected things (e.g., by pushing or filling them.) Ask the students to consider other places where air can be found-other than around us in a room. Air can be in things, like a cup or a box that would normally be considered "empty". But if things with air in them are put in water, what happens to the air?

### Presenting the Investigation Question

Introduce your students to the investigation question: "*What happens to the air in a container when it is put in water?*"

Have your students discuss the question in pairs, then in groups, and then as a whole class. Record their answers on the flipchart.

Have your students brainstorm ideas about how this investigation question could be investigated.

1. Design an experiment that could be used to test the investigation question.
2. What materials would be needed?
3. What would you have to do?
4. What would be measured?
5. How long would the experiment take?

### Assessing What Your Students Already Know

Spend some time reviewing the results of Investigation 1 with your students. They should now have at least a general understanding about air and how it occupies the spaces between objects. Ask questions such as:

- What are some things that can hold air inside them?
- What are some things that air can escape from?
- Why can air escape from some things but not others?

### Exploring the Concept

1. Show your students the materials to be used in this investigation: cotton balls, clear plastic drink cups, and clear glass or plastic water container.
2. Ask your students to predict what they think will happen if they put the cotton balls in water and why? *(They would get soaked!)*
3. Now ask them what will happen if the cotton balls are pressed down into the bottom of the cup, and then the cup is put in water and why? Have your students write down or draw their predictions along with the reasons for them. *(Some might answer that they would still get soaked. Others might think that the cup would keep them dry. Some might suggest that it would depend how the cup was placed in the water.)* Note: You may need to put a piece of tape across the bottom of the cup to help hold the cotton balls in place, depending on the size of the cup and the puffs.
4. Ask for suggestions on how to lower the cup into the water so that the puffs stay dry. Allow the students to write and draw pictures to describe the various ways they could try to accomplish this.
5. Have students experiment to test their predictions. *(By experimenting they will find that pushing the inverted drinking cup into the water allows the cotton balls to stay dry. However, they may not be certain of why this is so.)*
6. Have your students look again at the predictions they made. Ask them to give explanations for what they have observed and whether this fits or does not fit with their predictions. *(Look for your students to make the connection that air is trapped in the cup, and that's why the cotton balls stay dry.)*
7. As a demonstration, use a sharp pencil to poke a hole in the bottom of one plastic cup. Make sure the students see that there is a hole. Ask them to predict what will happen if this cup is inverted in water, just like the ones that kept the cotton balls dry. Go ahead and invert this cup into a tank of water. The students will see that the water rises in the cup, and they will see bubbles emerging through the hole. Ask how this fit with their prediction. Discuss how the hole allowed the air to escape, which allowed the water to enter.

## Applying Students' Understanding

8. Ask your students to find another way to show that air is in the cup *(They will find that it can be released by upending the cup and the air can be seen as it bubbles to the surface. Your students can also experiment with transferring the air from one cup to another underwater.)*
9. Have your students draw pictures showing the different ways the cup was lowered into the water. They can circle the picture of the method that kept the cotton balls from getting wet. *(Alternatively, you could use the diagram below as a blackline master.)*



10. Have them consider the cup with the hole in it. What would happen if the whole had been in a different place in the inverted cup?

## Revisiting Investigation Question 2

Complete this investigation by asking your students to reflect on this question and how their answers may have changed as a result of this investigation. What do they know now that they did not know before? When a container full of air is put in water, the air takes up the space in the container. If there is a way for the air to escape upward, it will leave the container, allowing the water to enter.

## Weather Unit Sections

Introduction

Air

What is there between you and me?

**How can you tell air is "something?"**

What can air do when it presses on things?

Revisit the concept of Air  
Temperature  
Wind  
Clouds  
Weather

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