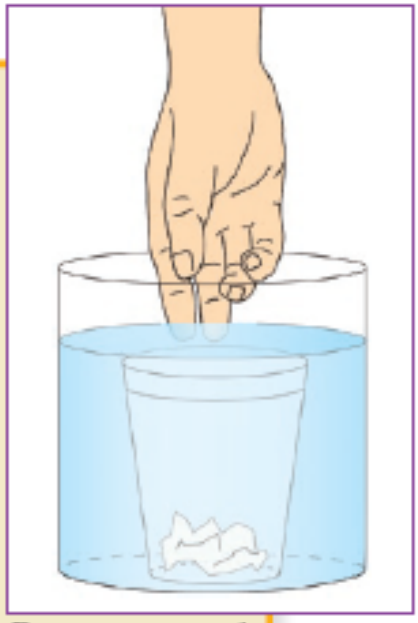
cannot sit in that same chair at the same time. You are already taking up the space in the chair. You have volume. Does air have volume, too?

The three demonstrations you observed provide evidence that air takes up space, and therefore, has volume.

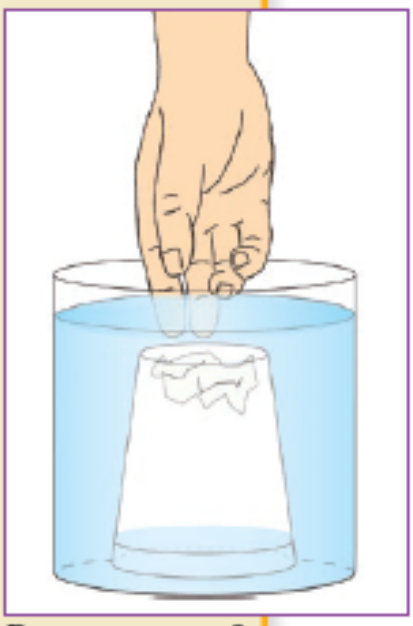
- When a cup containing air and a paper towel is pushed upright into a bowl of water, the water rushes into the cup and pushes out the air. Only one object can be in one place at a time. The water rushing into the cup takes the place of the air that was in the cup. As a result, the paper towel in the cup gets wet. The level of the water in the bowl rises a very small amount because the cup and paper towel take the place of some of the water.

- When a cup is pushed into the water upside down, the paper towel stays dry. In the upside-down cup, air takes up space in the cup and stays in the cup as it is lowered into the water. The water cannot push the air out. There is no way for the air to escape from the cup. The paper towel does not get wet because the water cannot reach it. In *Demonstration 2*, air takes up the space inside the cup. Because two things cannot occupy the same space, water cannot fill the space inside the cup if air is already there. The level of water in the bowl rises higher than in *Demonstration 1* because now the cup, the paper towel, *and* the air are taking the place of some of the water.

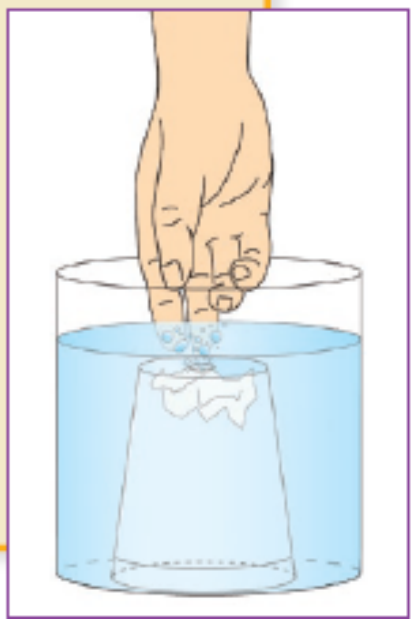
- The hole in the cup in *Demonstration 3* allowed the air in the upside-down cup a way to escape. The air in the space in the cup is pushed out of the hole by the water. The cup fills with water, and the paper towel gets wet. The level of the water in the bowl will rise the same distance as in *Demonstration 1*. The bubbles you saw are an indication of air escaping from the cup.



*Demonstration 1*



*Demonstration 2*



**volume:** a measure of how much space something takes up.

## Volume

In the demonstrations, you were looking for evidence that air takes up space. You may have made some conclusions about this based on the demonstrations. Scientists call the amount of space a substance takes up **volume**. The cup and the water in the demonstrations took up space. The paper towel also took up space. It makes sense that all these parts of the system have volume. The question is whether air takes up space as well.

When an object takes up space, only that object can be in that space at any one time. For example, if you sit in a chair, another person