THE BOTTLE AND THE BAG

A. Question: *What is air pressure?*

B. Materials Needed:

1. One or two plastic sandwich bags.
2. One or two large wide-mouthed glass jars (for example, pickle jars).
3. Masking or transparent adhesive tape.

C. Procedure:

1. Place the materials on a table in front of the students. Ask the class: "What's inside the jar?

2. Invert a sandwich bag over the mouth of a jar and blow a little air into the bag so that it stays inflated over the jar.

3. Tape the bag air-tight against the jar.

4. Now ask one of the students to push the bag into the jar (without tearing it). It won't work!

5. Place another plastic bag inside another wide mouthed jar (if necessary you can reuse the previous bag and jar). Let the edge of the bag hang over the jar rim.

6. Tape it air-tight against the jar and let a student try and take the bag out of the jar (without tearing it). It won't work!

D. Anticipated Results:

With each part of the experiment, you and your students will see that it is not possible to either push down on the plastic bag or remove it from the jar.

E. Thought Questions for Class Discussion:

1. What is holding the bag out of the jar (when trying to push it in)?
2. What is holding the bag inside the jar (when trying to take it out)?
3. How could we get the bag inside the jar without making a hole in it?

F. Explanation:

It is the air occupying the space in the jar which kept the bag from going inside after it had been taped air-tight against the jar. In trying to push the bag in, the pressure increased (became the volume decreased) and this held the bag out.

When trying to take the bag out of the jar, the air pressure inside the jar decreased. This occurred because the volume increased and this is what kept the bag inside of the jar. We encounter the first situation when we try to fold up a plastic air mattress or an inflatable plastic toy (ex. beach ball).