HUFF AND PUFF CHALLENGE

Next:
Materials and Explanations

EXPERIMENT

1. Fill a ziplock bag with 2 cups of water and 1/2 Cup of Elmer’s Glue.  Add enough food coloring to turn the mixture a bright color.
2. Place the ziplock bag on the floor, and add a handful of rice to the bag.  Seal the bag and shake it vigorously.
3. Observe the bag for several minutes, and note any changes in the water and rice mixture.

HOW DOES IT WORK?

As the rice and water inside the ziplock bag are mixed together, the rice forms a gel-like substance. This substance acts as a barrier to the water, preventing it from spreading out. The glue helps to hold the rice in place and prevents the water from being absorbed. The food coloring helps to make the mixture visible, allowing you to observe the changes more easily.

Then:
Step-by-Step Photo Sequence
HUFF AND PUFF CHALLENGE

Puff and puff, but the piece of paper won't go in the bottle. What in the air pressure is happening? Putting an item into an empty soda bottle is a piece of cake. Just drop the object through the mouth of the bottle, right? Well, we have a challenge for you. Place a small item in the mouth of a bottle and attempt to blow the object into the bottle using a straw. Not so easy, now is it?

Materials
• Small paper ball
• 1-liter bottle
• Drinking straw
• Various small objects

EXPERIMENT
1. Make a small paper ball by bunching up a piece of paper. The ball needs to be able to loosely fit inside the mouth of the bottle.
2. Place the paper ball in the mouth of a 1-liter bottle that has been placed on its side.
3. Direct a straw towards the mouth of the bottle and attempt to blow the paper ball into the bottle.
4. The paper ball wiggles and jiggles around before flying out of the bottle!
5. Replace the paper ball in the mouth of the bottle and try again. The ball just will not go into the bottle.
6. Try doing the experiment with other objects! Try:
   - Small marshmallow
   - Miniature bow
   - Wedding mint
   - Piece of popcorn

7. Every item you try comes right back out of the bottle.
   What's going on here?

HOW DOES IT WORK?
As you might have guessed, the Huff and Puff Challenge has a lot to do with air pressure and air movement. With an item like the paper ball resting in the mouth of the bottle, it would make sense that the air from the straw would blow it into the bottle, but the exact opposite happens.

The secret is inside of the bottle. Although we refer to the bottle as being "empty," it's actually full to the brim. That's impossible… we can't see anything! Well, can you see the air that you breathe? The bottle is filled with air! Trying to blow more air into the bottle is impossible, just like if you were to put your lips directly on the mouth of the bottle and blow. It doesn't work!

While you can't blow air into the bottle, you are moving quite a bit of air along the sides of the bottle. When the air blows past the mouth of the bottle, it creates an area of low pressure behind it. This is called Bernoulli's Principle. This area of low pressure is exactly what the paper ball needs to hop out of the bottle's mouth!
HERE IS WHAT YOU NEED

SMALL PAPER BALL
1 LITER BOTTLE
STRAW
VARIOUS SMALL OBJECTS
PLACE THE BALL OF PAPER IN THE MOUTH OF THE 1 LITER BOTTLE
2. Use a straw and try to blow the object into the bottle.
WHY DOESN'T THE PAPER BLOW INSIDE OF THE BOTTLE?