

Blowing Up a Plastic Tube

Purpose: To estimate the amount of air contained in one breath. To show the amount of air that can be moved using Bernoulli's Principle.

Materials: Windbags TM which can be purchased from Educational Innovations at www.teachersource.com or from Science Explosion, Inc.. You can also make your own bags by using a large 30 gal. light weight plastic bag, glue that adheres to plastic, a "Seal-a-Meal" heater, or 2 inch packaging tape.

Procedure for making your own bag is as follows:

Cut the plastic bag down each side. Leave the bottom attached. When unfolded, the resulting plastic sheet will be twice as long as before (approximately 6 ft.). Trim the sheet to approximately 24 inches in width. Fold lengthwise, leaving about a 1 inch overlap. Seal the edges and seal the bottom of the tube closed. If you have a Seal-a-Meal, you may be able to heat seal instead of gluing. Prepare 2 such tubes.

If you use the Windbag you will need two of them. The Windbag's dimensions are 8ft. long and 10 inches in diameter.

Presenting the Activity:

1. Have a student hold the closed end of the tube. Squeeze the air out of the tube toward another student. Have the second student blow a breath of air into the tube. Squeeze the air from the breath of the second student toward the closed end of the tube. Estimate or measure the trapped volume of air and predict the number of breaths necessary to fill the tube.
2. Challenge the students to a race to fill a second tube with air. Have students hold the closed ends. On the count, blow your breath into the tube while holding the tube a few inches from your mouth. The tube should fill with air very quickly with just your one breath. The students will probably take 10-70 breaths to fill their bag the conventional way.

Principle Involved: The flow of breath into the tube will cause a region of reduced air pressure which will cause greater flow of outside air into the bag. This is an application of Bernoulli's Principle. When you purchase the Windbags they come with directions for about a dozen activities that you can do with the bags.