



Shrink Wrap with a Vacuum

Grades: all

Science Standards: Content Standard B: Physical Science; Content Standard E: Science and Technology

Background: This demonstration is used to show the effect and presence of atmospheric air pressure on a surface. You will need a large plastic (polyethylene) trash bag (55 gallon) and a Shop-Vac. **Caution:** Never cover the head of the person with the bag. Very young children may not like this feeling of being unable to move.

Procedure:

1. Seat a student in a large plastic bag on the floor with the knees bent and the feet close together and near the body. Note that the air pressure inside the bag is the same as outside the bag.
2. Let the student hold the bag from the inside, snugly around the neck of his/her body for a good seal. The suction nozzle of the Shop-Vac should be inserted inside the bag opening, but should not come into contact with the plastic bag. An assistant can hold the seal around the nozzle. The student should shield the end of the nozzle with his/her hand lightly over the end so that no plastic bag will be pushed into the nozzle.
3. Turn on the Shop-Vac and remove the air from inside the bag. If there is a leak, it will not shrink tightly. With the Shop-Vac on the "suction" position, the plastic bag will mold itself around the student's body.
4. Ask the student to move his/her knees apart, raise an elbow from the side, or extend a foot slightly. Students quickly feel the effect of air pressure pushing on all surfaces in all directions when the pressure inside the bag is less than the air pressure outside the bag.

Discussion:

The misconception that air is "sucked" out of the bag is common. Newton never used the word "suction" but rather words like push and pull to describe forces. Have students describe this demonstration using push and pull. Ask students where this is applied to everyday examples? Meats are sealed in cryovac and vacuum sealed peanuts and coffee are examples. Polyethylene in trash bags is low density polyethylene (LDPE) and the flexible polymer chains permit the bag to be molded to the "student package".