

## Air & Aerodynamics – Floating Balls and Flying Toilet Paper

Here's a great activity to demonstrate the Bernoulli Effect. You can do this one outside since someone in your household may be using a leaf blower to clean up the yard this weekend.

### Materials:

- Hair Dryer
- Roll of toilet paper
- Ping-Pong ball
- Balloon
- Stick or dowel
- Beach Ball
- Penny
- Leaf blower



**Procedure:** (Remember to have your parent's permission and have them watch and help you.)

- Set the hair dryer to cool, switch it on, and point it up.
- Carefully put the Ping-Pong ball in the stream of air. Hold the hair dryer very steady and watch as the Ping-Pong ball floats in the stream of air.
- Carefully move the hair dryer and watch the ball move as well.
- Try floating other lightweight objects in the air stream at the same time! With the hair dryer on, place an inflated balloon over your levitating Ping-Pong ball. Place a penny in the balloon before you blow it up to give it some added mass.
- How many objects can you float at once? Do they behave differently when there is more than one?
- Try using a leaf blower instead of the hair dryer. Now you can float larger objects like beach balls.

### What's Happening:

The floating ball, like airplanes that fly, are examples of *Bernoulli's Principle*. Airplanes fly because air on top of airplane wings exerts less pressure than air under the wings giving the plane lift. Bernoulli discovered that fast moving air flowing over a surface causes less air to push on the surface and the surface experiences lower air pressure.

The blowing air flows around the outside of the ball and, if you position the ball carefully, the air flows evenly around each side. Gravity pulls the ball downwards however the pressure from the moving air below the ball forces it upwards. When all the forces are balanced and the ball hovers in mid-air.

### Extension:

Hold a roll of toilet paper in the stream of air and watch the paper take off! Use a long stick or dowel so it can spin fast and unroll the paper. Place the empty toilet paper tube into the air stream, the air is funneled into a smaller area, making air move even faster. Balance a Ping-Pong ball in the air stream below the toilet paper tube. The result is amazing. The pressure in the tube becomes lower than that of the air surrounding the ball, and the ball is pushed up into the tube.

This activity is based on our Air & Aerodynamics kits. The source for this lab was: <http://www.stevespanglerscience.com/experiment/floating-balls-flying-toilet-paper>. Our teaching kits (described on our website) are loaned out FREE to provide classroom teachers and parents of home schooled children an opportunity to explore Science in interesting ways. Please consider volunteering as a classroom guest speaker or allow your business as a field trip location.

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