



## Floating Ping Pong Ball

**Target Grade:** K-8<sup>th</sup> Science

**Time Required:** 5 minutes

**Standards/Topics Covered:**

*Next Generation Science Standards:*

- K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.
- 3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

**Central Focus:**

In this activity, students will be able to interact with the magic (also known as science) of levitation! Students will use a ping pong ball, hair dryer, and Bernoulli's Principle to make a ping pong ball levitate. This activity can be used as an introduction to the interactions between forces.

Key terms: gravity, pull, push, balance, unbalanced, motion, pressure, air flow

**Background Information:**

Normally, when a ping pong ball is dropped, it will fall to the ground. This is due to gravity. Gravity is a force that pulls objects toward each other. However, when another force acts on the object, it can overcome the force of gravity. In this activity, the air stream will push the ping pong ball up into the air. The ball "floats" in the air at an even point when the force of gravity (which is forcing the ping pong ball down) is equal to the force of the air stream from the hair dryer (which is pushing the ping pong ball up). This is known as Bernoulli's Principle. Bernoulli found that faster air flows over the surface of something, the less the air pushes on that surface.

**Materials**

- Hair dryer
- Ping pong ball

**Instructions**

1. Turn on the hair dryer on the highest setting.
2. Point the hair dryer directly up so the air stream is toward the ceiling.



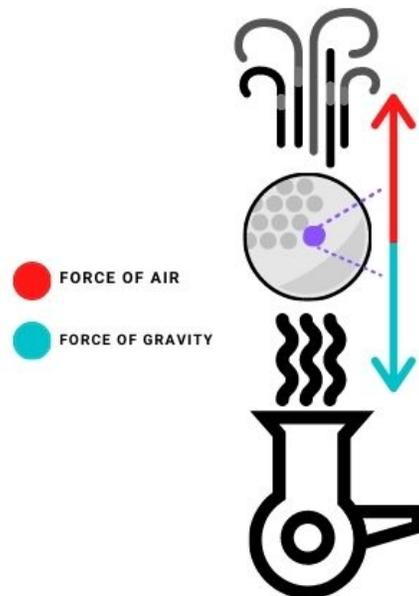
3. Place the ping pong ball above the hair dryer and balance it in the air stream.
4. Slowly start to tilt the hair dryer side to side and watch the ping pong ball float!
5. Change the speed of the blow dryer and see if it has an effect on the ball.

## Closure

1. What causes the ball to balance in the air?

The air from the hair dryer flows around the outside of the ball. If you position the ball carefully, the air flows evenly around each side. Gravity pulls the ball downward while the pressure below the ball from the moving air forces it upward. This allows for all the forces acting on the ball to balance out.

2. Draw a picture or diagram that shows all the forces acting on the object. Be sure to label each force.

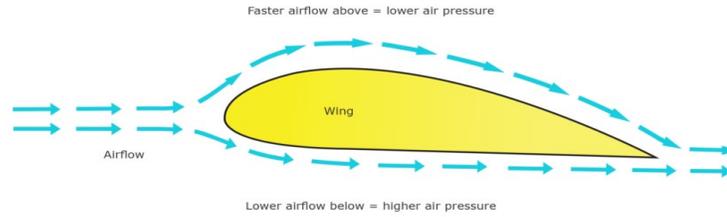


3. Why are you able to turn the hair dryer from side to side?

Bernoulli's principle says that the fast moving air around the sides of the ball is at a lower pressure than the surrounding stationary air. If the ball tries to leave the stream of air, the still, higher pressure air will push it back in.

4. What are some other real life examples of objects that can float in the air? How do you think that is possible?

Airplanes! Airplanes can fly because of Bernoulli's Principle. The greater air pressure beneath the wings causes an upward force that allows the airplane to fly.



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5. Why was there a change in floating height of the ping pong ball when you changed the speed of hair dryer?

The change in speed caused a change in the air pressure acting on the ball.

