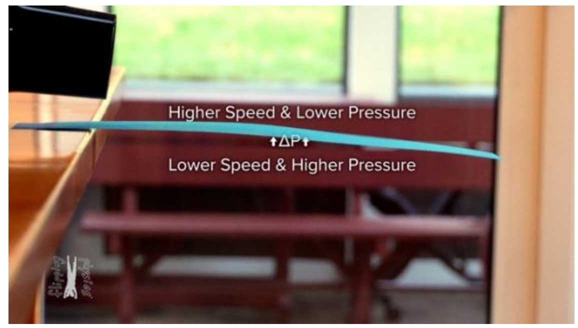
Flipping Physics Lecture Notes:
7 Fun Demos of Bernoulli’s Principle Explained
http://www.flippingphysics.com/bernoulli-demonstrations.html

Previously we derived Bernoulli’s Principle. Today we are going to demonstrate it in several different ways. To review Bernoulli’s Principle states that

$$P + \frac{1}{2}\rho v^2 + \rho g y = \text{constant}$$

The main relationship we are going to demonstrate today is that an increase in fluid speed means a decrease in pressure. In all of the following demonstrations we are going to assume the differences in heights are negligible compared to the differences in speeds and pressures.



Demonstration #1: The speed of the air above the paper is larger than the speed of the air under the paper, therefore, the pressure above the paper is less than the pressure below the paper. This creates an upward pressure difference on the strip of paper causing it to lift. This is the same concept which causes lift on an airplane wing.

Demonstration #2: The speed of the air between the two cans is larger than the speed of the air outside the cans, therefore, the pressure between the two cans is less than the pressure on the outside of the cans. This causes the two cans to initially move towards one another. This is the same concept which causes your car to be pulled towards a large truck while moving quickly on the highway.

Demonstration #3: When you blow through the funnel, the air flows from the bottom and around the sides of the ping pong ball. The air above the ping pong ball is essentially at rest. That means the pressure to the sides and below the ping pong ball is less than the pressure above the ping pong ball. Therefore, blowing the air through the funnel actually draws the ping pong ball toward the funnel. In fact …

Demonstration #4: This difference in pressure is large enough that, if you point the funnel downwards, the pressure difference is large enough to suspend the ping pong ball in the funnel, as long as you keep blowing air through the funnel.

Demonstration #5: If you blow through a straw upward on a ping pong ball, the ping pong ball will stay in the stream of air. This is because, when the ping pong ball moves to the side, the fast moving air on the side of the ball above the straw will have a lower pressure causing a pressure difference which pulls the ping pong ball inside the stream of fast moving air. In fact …

Demonstration #6: You can show this same effect with a leaf blower and a beach ball. And, you can even tip it to the side such that the beach ball is suspended in the air. The fast moving air over the top of the beach ball has a lower pressure and again causes lift.

Demonstration #7: And going back to our first demonstration of blowing over a sheet of paper, let's amp it up a bit and instead use a leaf blower and a roll of toilet paper. Again the air moving over the top of the toilet paper is moving faster than below the toilet paper, which causes the pressure above the toilet paper to be less than below the toilet paper. The difference in pressure causes lift on the toilet paper which holds it in the air, just like an airplane wing.