

Bernoulli's Principle



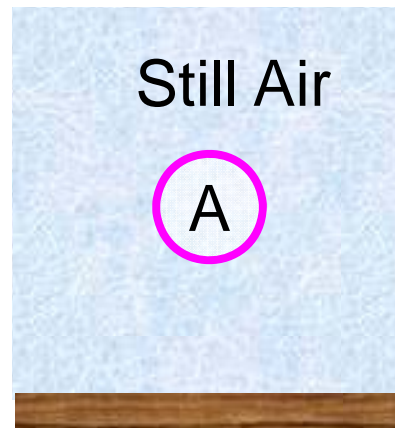
National Science Foundation
WHERE DISCOVERIES BEGIN

Bernoulli's Principle

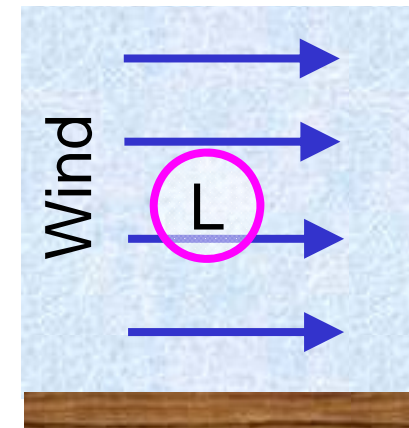
For a fluid, such as air or water, as the speed increases, the pressure decreases.

This effect is called *Bernoulli's Principle*.

Normal
Atmospheric
Pressure

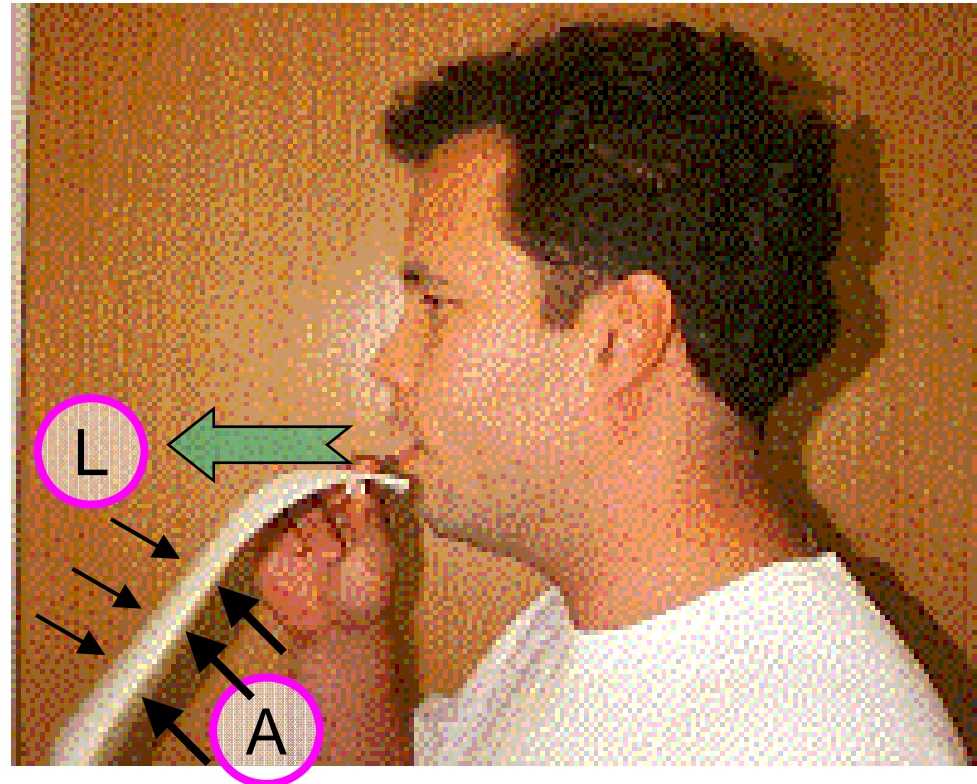


Low
Pressure



Bernoulli's Principle Demo

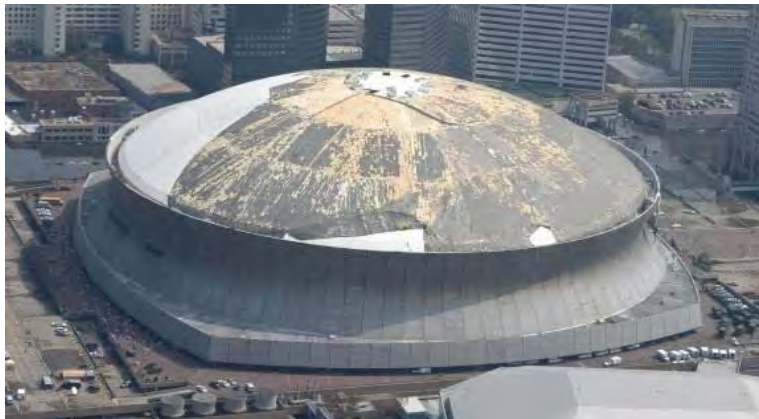
Hold a sheet of paper in front of your mouth and blow; the paper will rise.



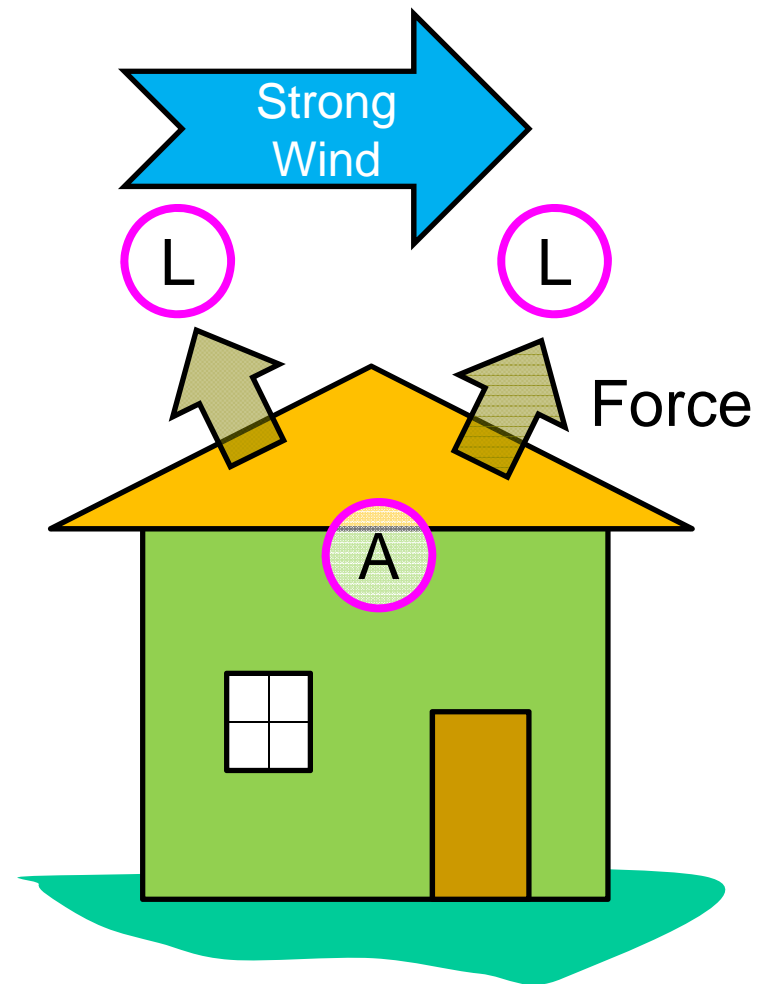
Low pressure on top;
Average pressure on bottom

Bernoulli's Principle and Wind

If wind is fast enough then the low pressure above the house can create a force that's large enough to lift the roof off.



New Orlean's Superdome after hurricane Katrina



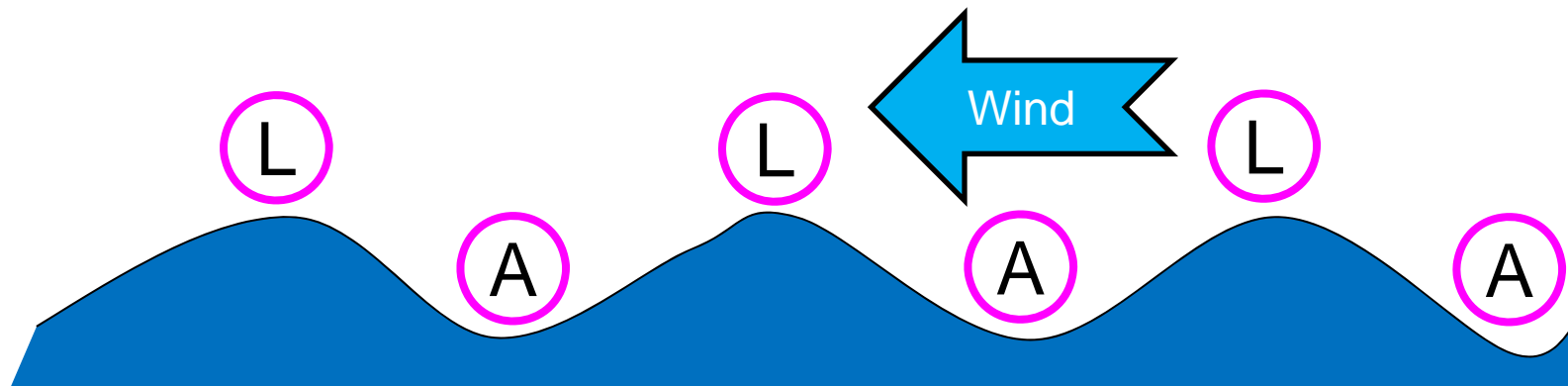
Bernoulli's Principle and Waves

Pressure varies when air is moving and we see this effect in the flapping waves of a flag and the ocean waves kicked up by a strong wind.



Bernoulli's Principle and Waves

Wind blowing over the ocean causes waves to build up due to Bernoulli's principle.



Air moves fastest at the tops of the waves so pressure is lowest there. The lower portion of the wave is blocked from the wind so air in the troughs of the waves is at atmospheric pressure.

Blowing into a Funnel

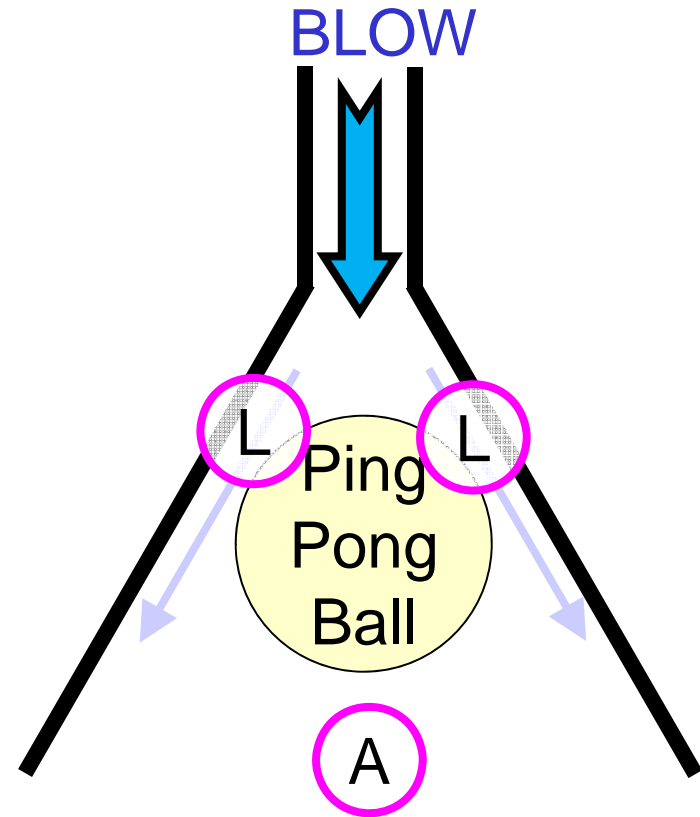
Blowing into a funnel with a ping pong ball inside.



Blowing into a Funnel

Blow hard through a funnel with a ping pong ball in the funnel's bowl.

Instead of being blown away, the ball is held tightly in the bowl due to pressure differences.

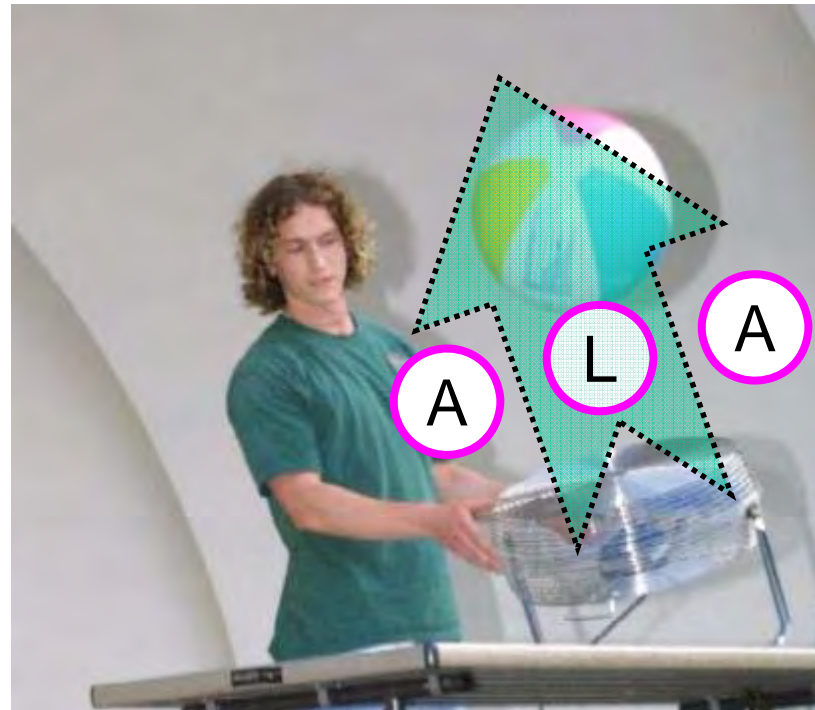
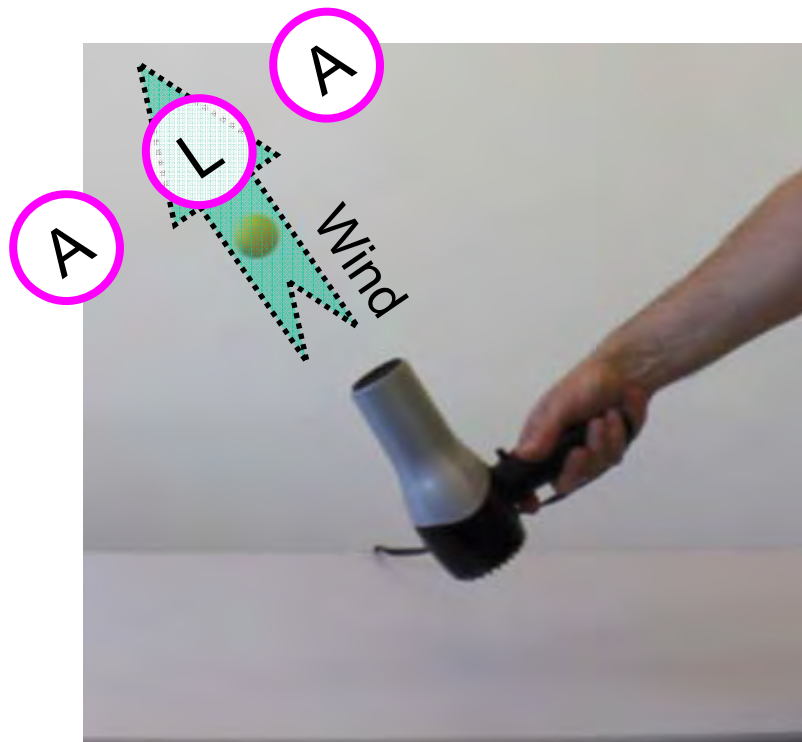


Bernoulli's Principle & Suction



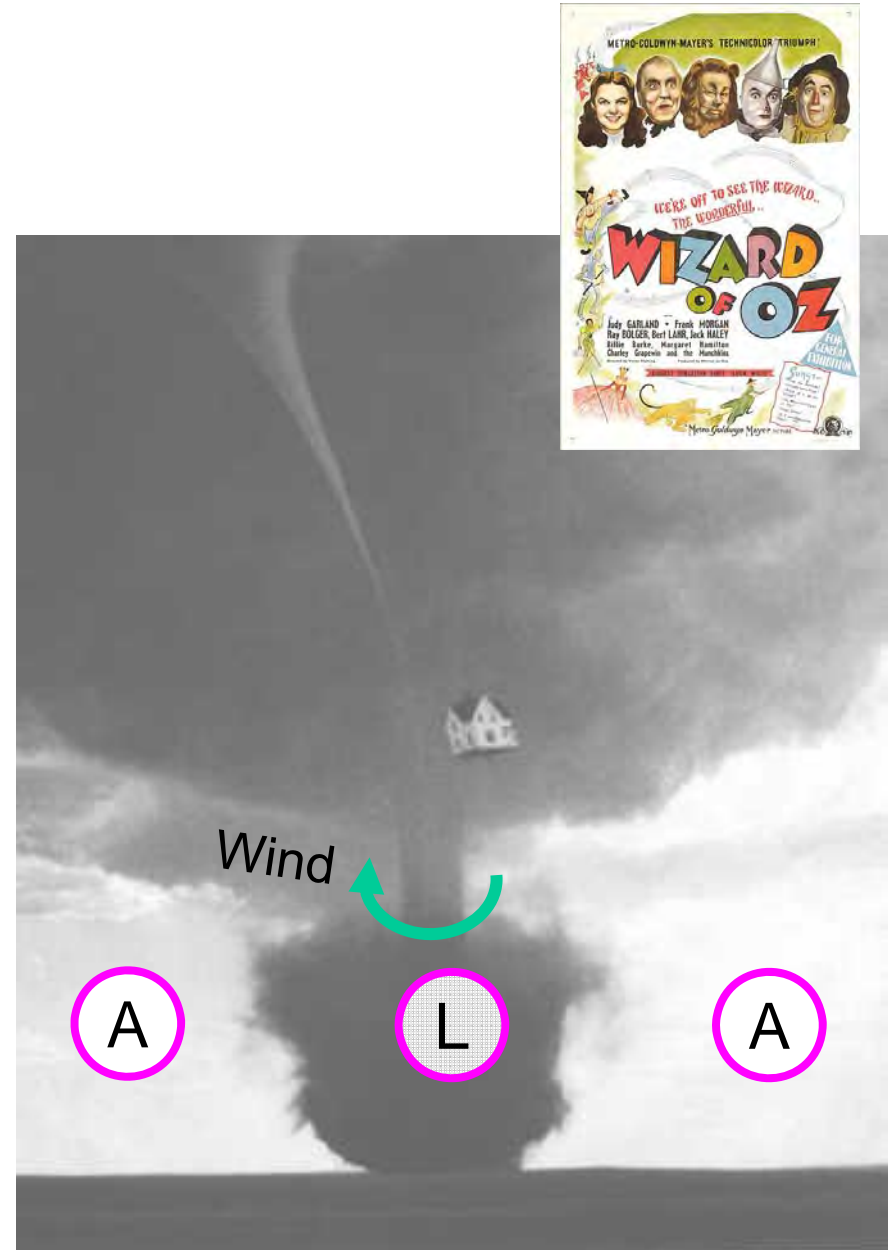
Bernoulli's Principle & Suction

Bernoulli's principle pulls the ball into the middle of the air stream.



Tornadoes

High speed winds of a tornado create pressure differences resulting in strong forces that pull objects into the center of the vortex.



The Wizard of Oz (1939)

Summary

- Bernoulli's Principle states that for a fluid, such as air or water, as the speed increases the pressure decreases.
- A force can occur due to pressure differences if the speed of a fluid varies.
- Examples of motion arising due to Bernoulli's Principle include the creation of waves by wind and the suction of a tornado.