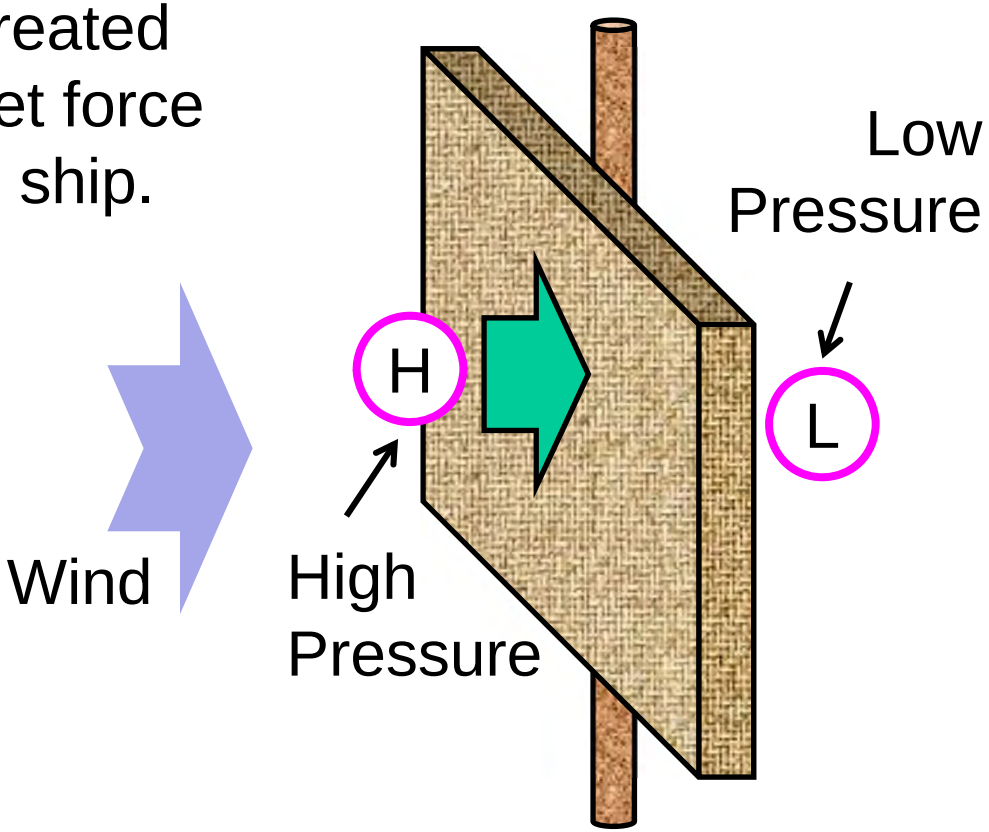
Pressure
Part 2

Pressure Difference & Force

Pressure differences produce a net force.

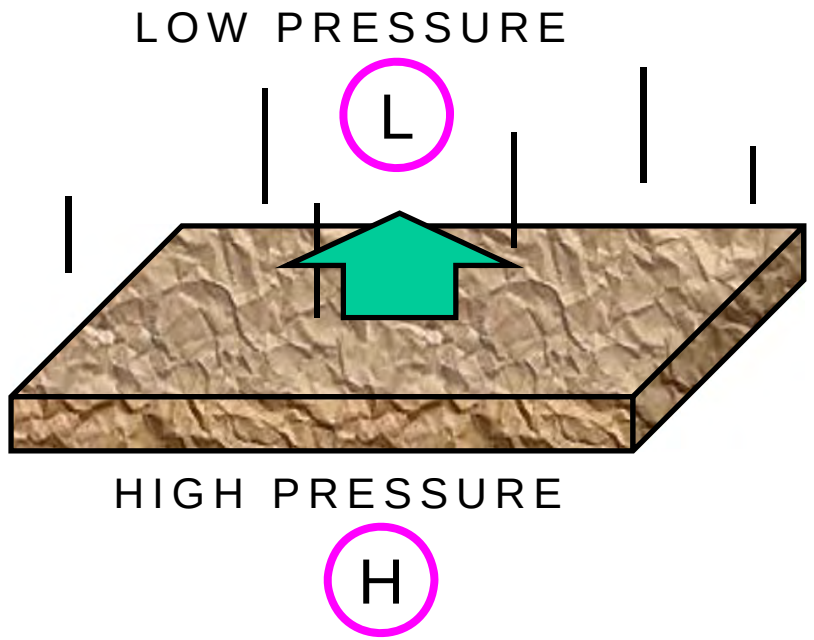
Pressure difference created by wind produces a net force on the sail of a sailing ship.



Pressure & Air Resistance

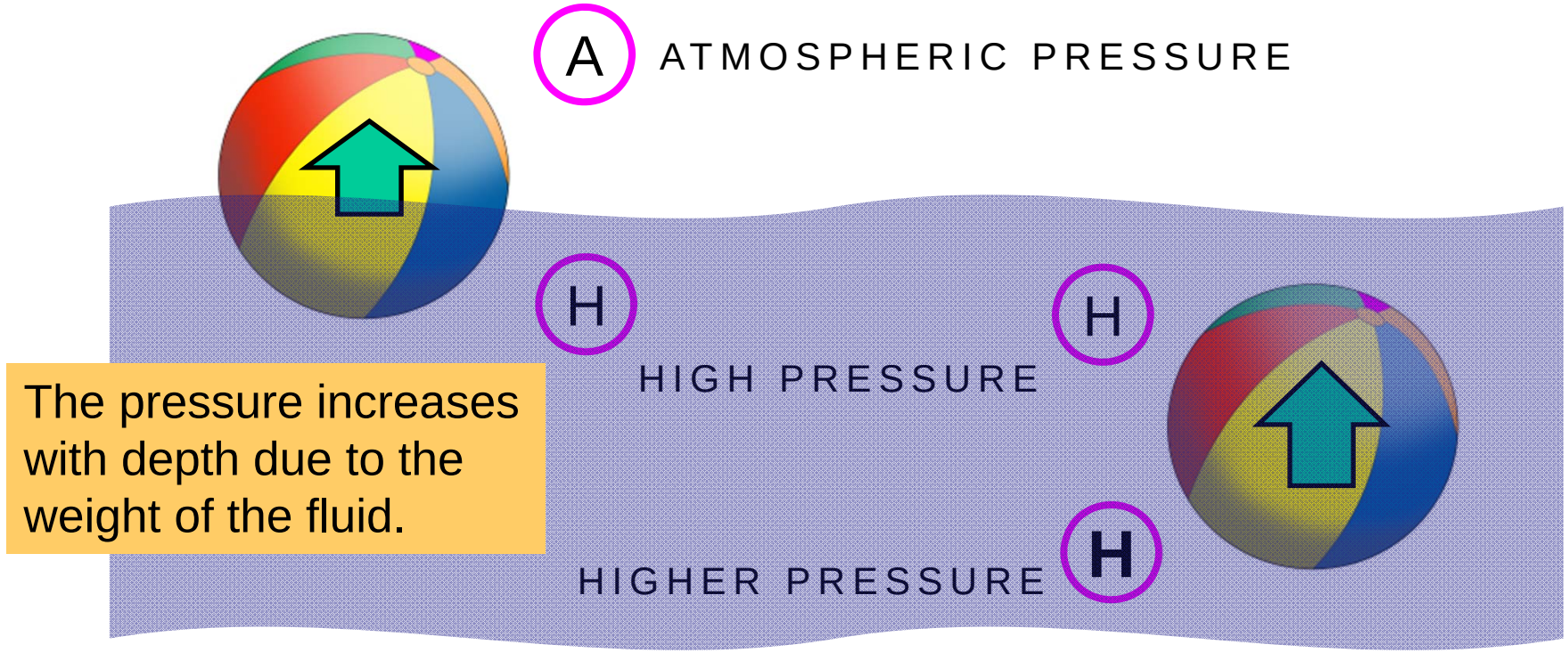
Force of air resistance is due to a difference in pressure.

High pressure builds by compression in under a falling object while low pressure is created in the wake.



Buoyancy

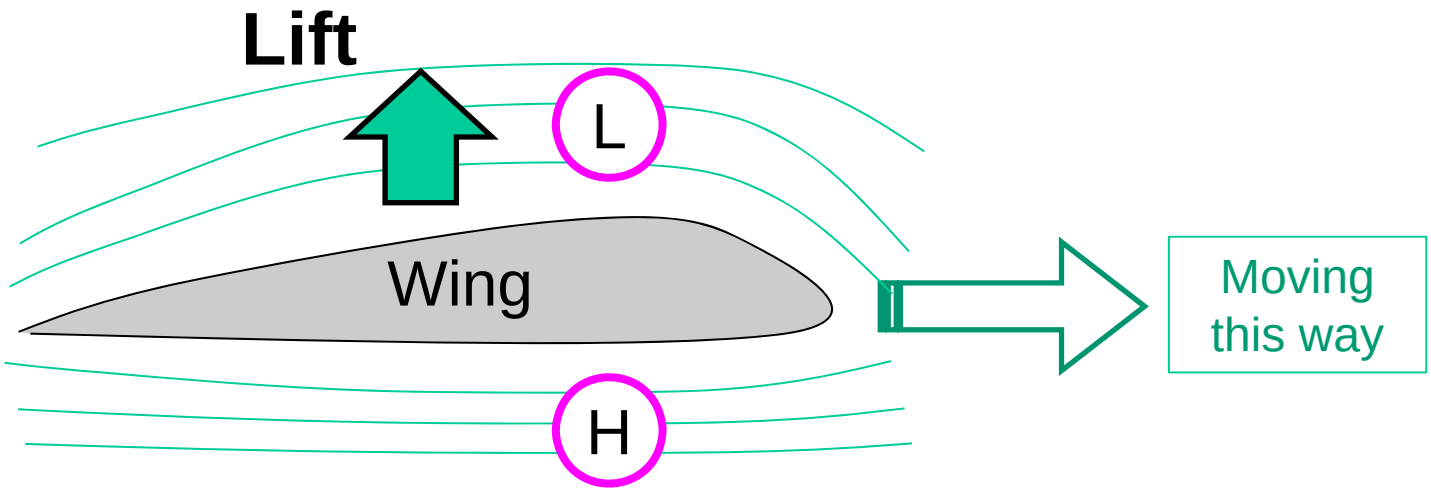
Buoyant force pushing submerged objects upward is also due to a pressure difference.



The pressure increases with depth due to the weight of the fluid.

Aerodynamic Lift

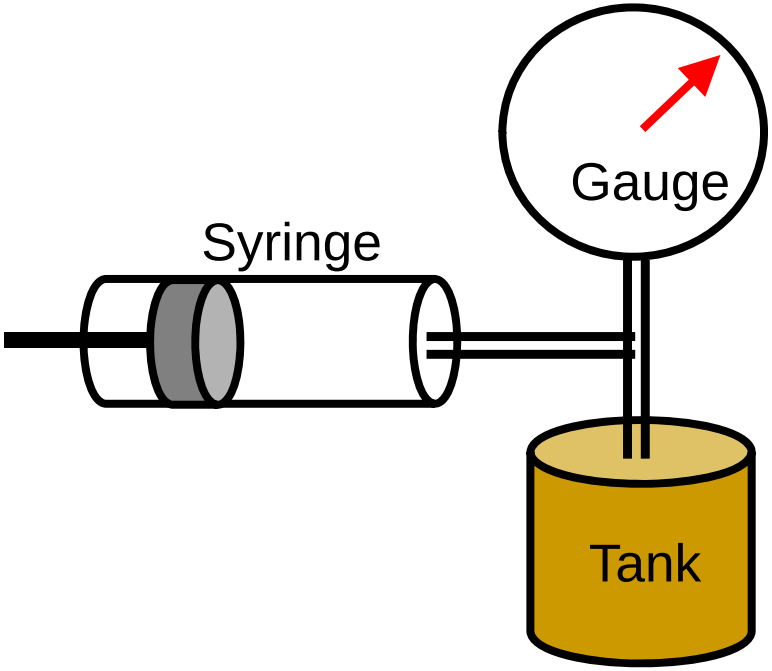
Aerodynamic lift is a force due to the pressure difference created by the airflow patterns over and under the wing.



Boyle's Law

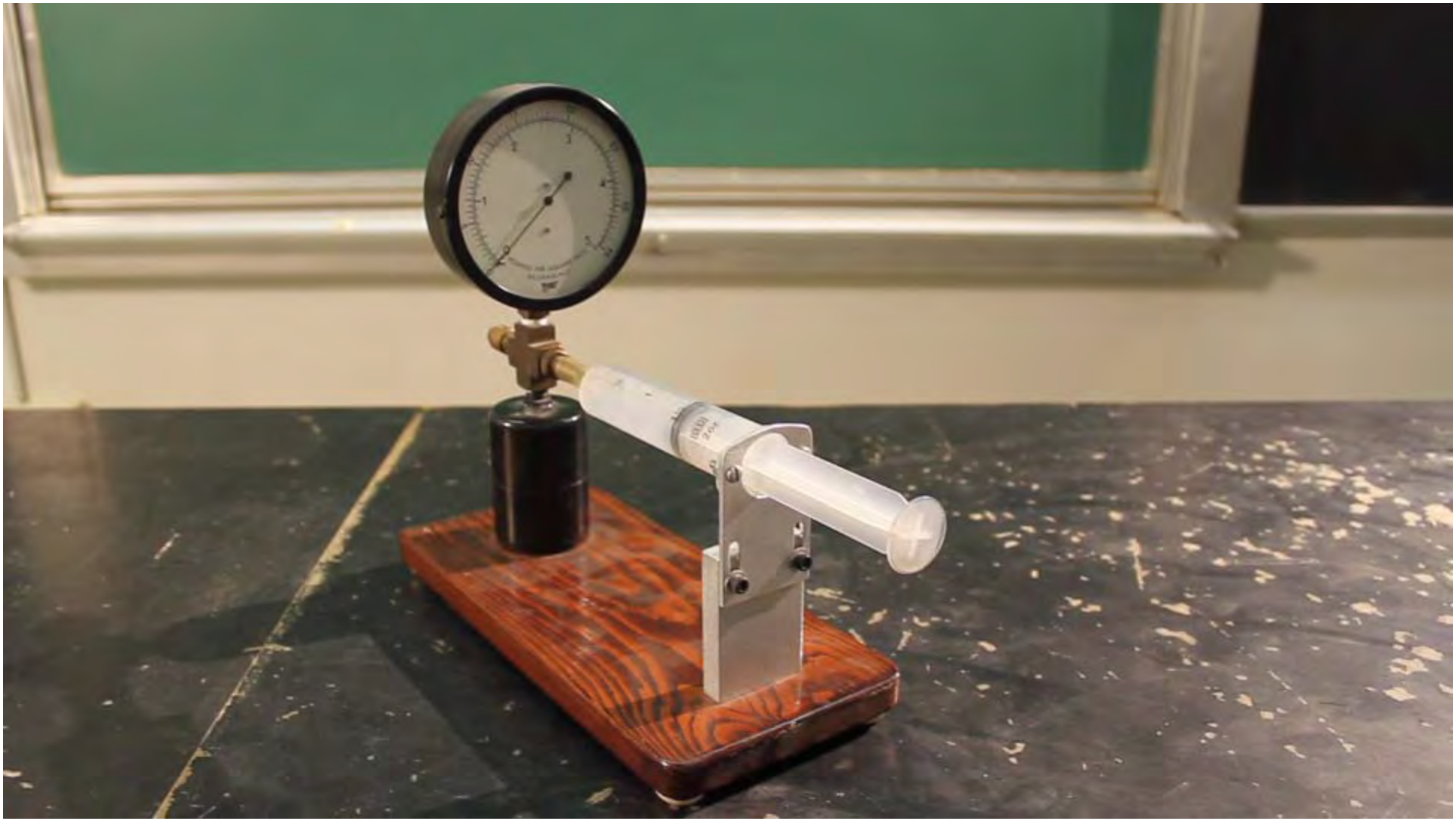
The pressure in a gas increases when the gas is compressed.

When a gas expands, the pressure decreases.



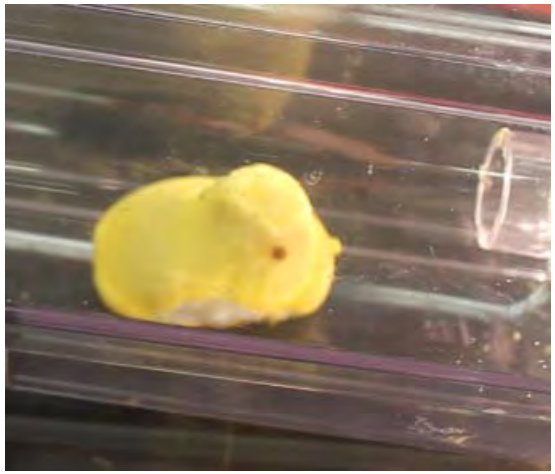
Compress the gas by pushing in the syringe. Dial gauge shows increase in pressure.

Boyle’s Law Demo



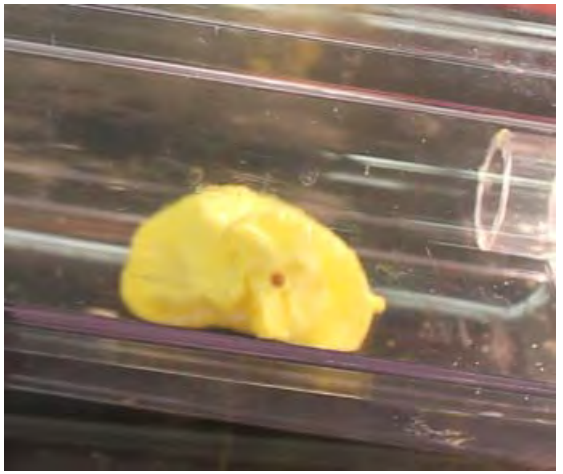
Peeps in a Vacuum

Peeps in a Vacuum



Before vacuum pump is turned on (normal atmospheric pressure)

After vacuum pump is turned on (very low air pressure in chamber)

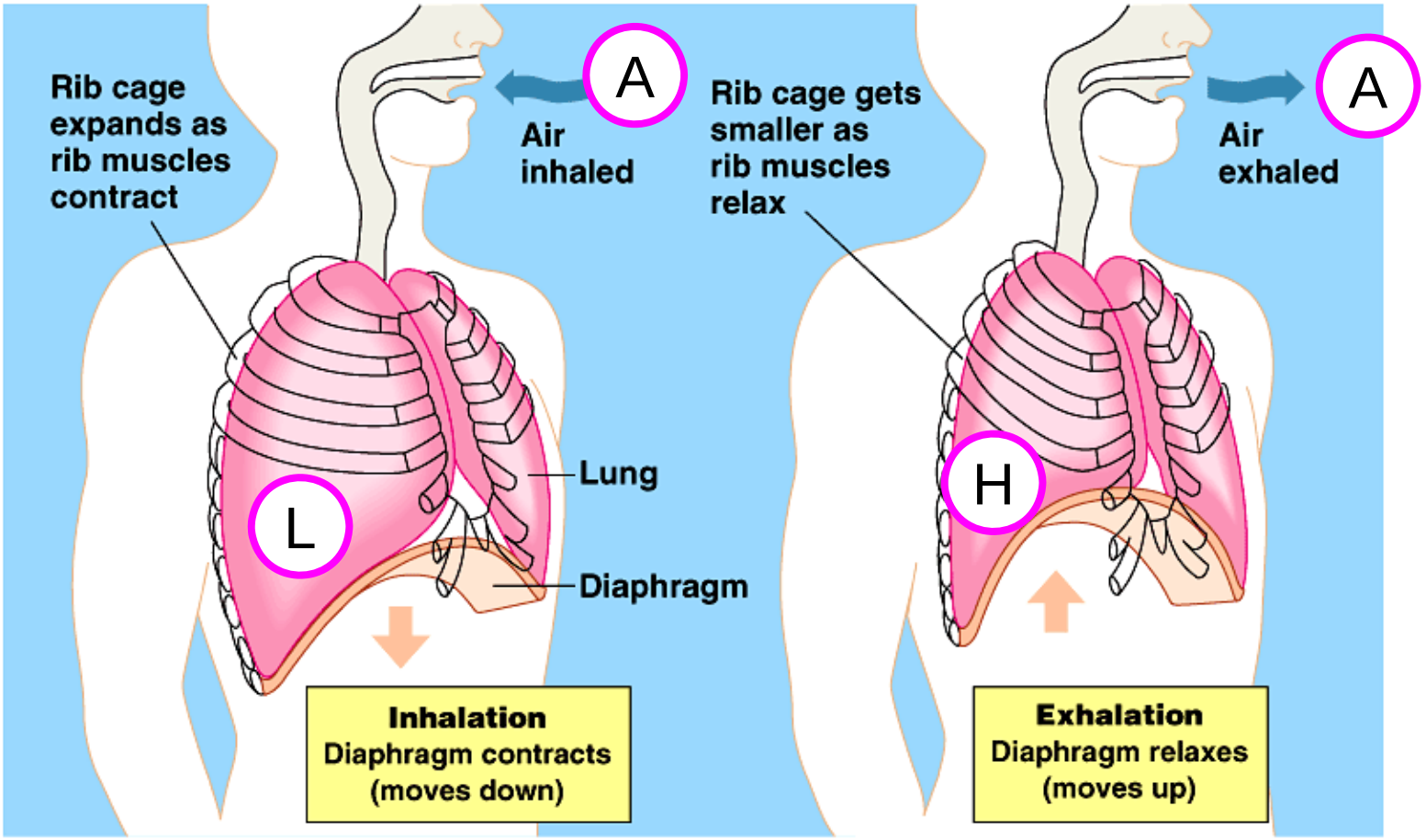


After vacuum pump is removed (back to normal atmospheric pressure)

Total Recall (1990)

Atmospheric pressure on Mars is less than 1% of Earth's pressure.

Breathing & Boyle's Law

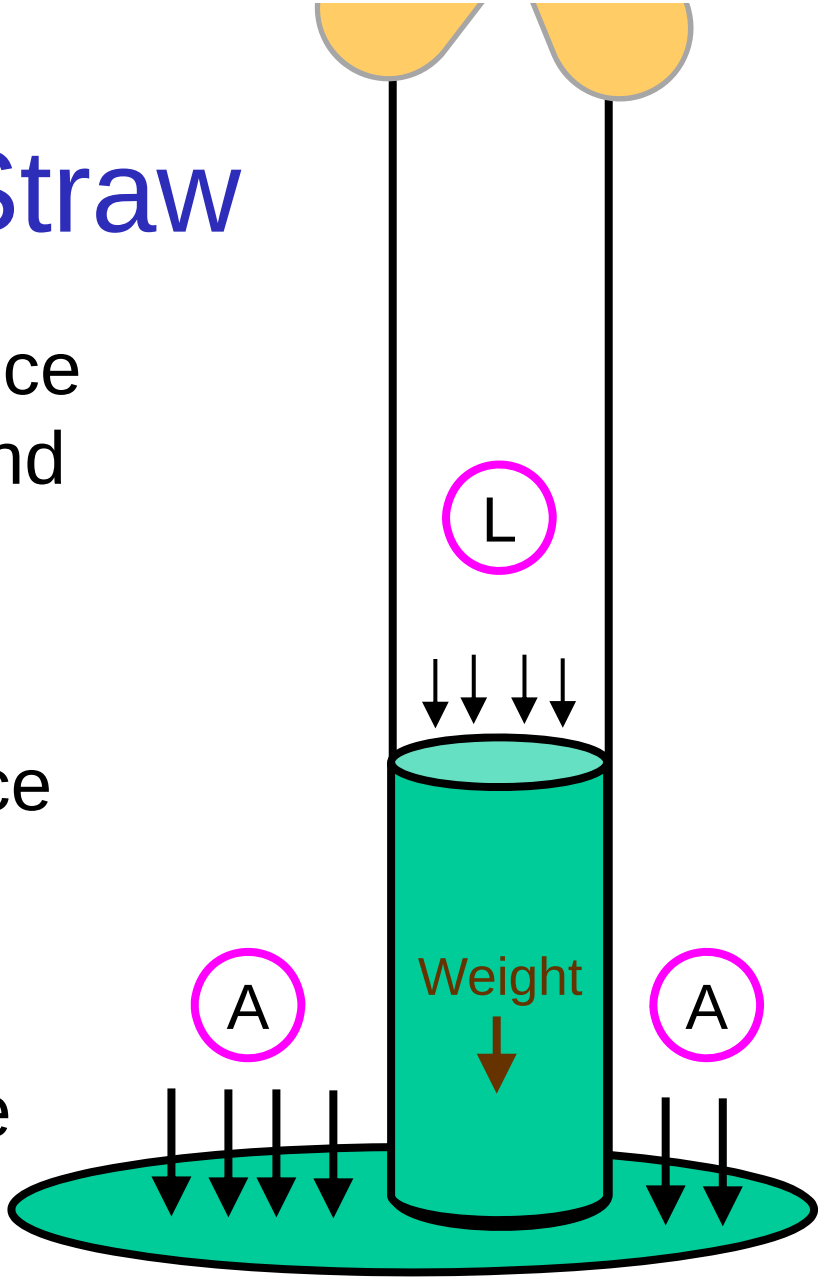


Drinking with a Straw

With your lungs, you reduce pressure in your mouth and in the straw.

Higher pressure outside gives a pressure difference that pushes liquid up the straw.

Force due to the pressure difference must match or exceed the weight.



NO “SUCKING” FORCE

The Curse of the Were-Rabbit (2005)

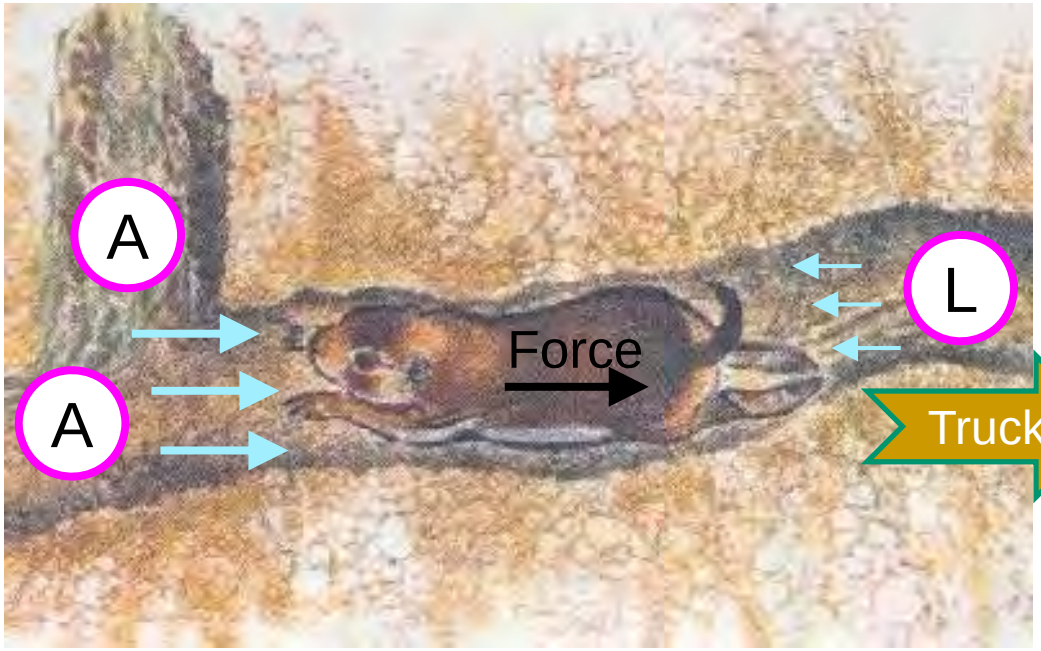
Prairie Dog Vacuum

Prairie dogs captured by giant vacuum truck with a padded bin.

The prarie dogs are sucked into a padded bin (CNN)

Vacuum Cleaner Force

As with any vacuum cleaner, it's the difference of pressure that creates the net force pushing objects towards the low pressure side.



Summary

- Pressure differences lead to a net force, such as air resistance, buoyancy, and lift.
- Boyle's law states that pressure in a gas increases as the volume is compressed.
- Pressure differences can be created by volume changes, as when we breath.
- The net force that draws air and objects into a vacuum is produced by the pressure difference between the vacuum and ambient atmospheric pressure (No "sucking" force).