Pressure and Vacuums

Objective:

The purpose of this lesson is to understand how Pressure works, by using a Vacuum that will help us visualize the variables that affect Pressure. We will be able to understand how Volume and Temperature affect the value of Pressure.

Key Vocabulary:

- **Vacuum**: is a volume that encloses little or no matter at all, and the pressure inside is much smaller than the outside pressure (Atmospheric Pressure).
- **Pressure**: continuous physical force exerted on or against an object by something in contact with it through a medium.
  - Atmospheric Pressure: force exerted on a surface by the air above it as gravity pulls it to Earth.
- **Volume**: how much space an object or matter occupies.
- **Temperature**: the degree or intensity of heat in an object or matter, usually measured with a Thermometer.

Equations (commonly used):

\[ PV = nRT \]

(This Equation of Pressure used in Chemistry)
This Equation of Pressure used in Physics

\[ P = \frac{F}{A} \]

(Pressure is Proportional to Temperature)

(Pressure is Inversely Proportional to Volume)
Materials (Optional):

Here is a link to [Educational Innovations](#), where you can obtain the kit that we used to explain this lesson.
Again, it is an optional investment.
Background:

Pressure is hard to see with our eyes because it all happens very quickly. This instrumentation will allow us to see the patterns or indications that some sort of pressure phenomena is going on.

The syringe with the valve is a pump-like apparatus that will be extracting air molecules from the chamber as it is pulled out. This valve is special because it only allows the air molecules to travel one way. There is a check switch that does not permit any air to go back into the chamber as the syringe is pushed in. This allows the air molecules to come out of the other terminal side of the valve.

The base, with rubber gasket, and chamber will begin to feel very attracted (think of the attraction of two magnets). This happens because the pressure that is internal in the chamber has decreased very much to almost nothing at all, and the external pressure that is outside the chamber is pressing all around the chamber and base keeping them tightly together.