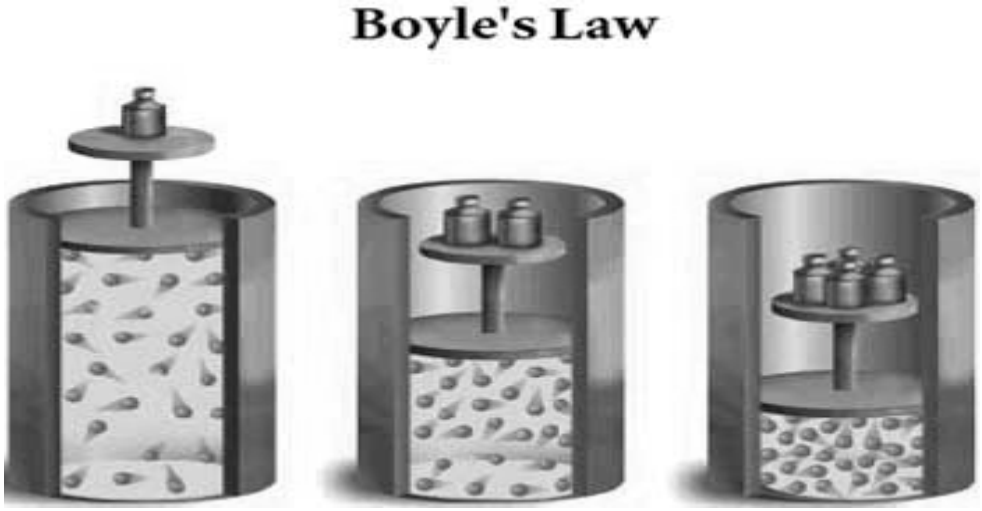
Boyle's Law

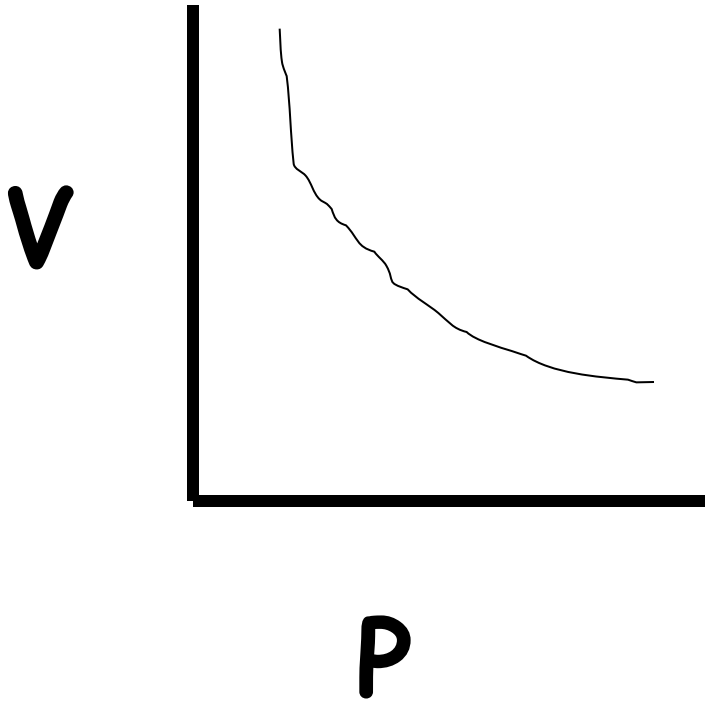
The relationship between the pressure and volume of a gas in a closed container

The Law, published in 1662, states:

For a fixed amount of gas kept at a fixed temperature, pressure and volume are inversely proportional. (while one increases, the other decreases)



As a graph, this inverse proportion would look like this:



In your experiment today, as the volume inside the syringe went down, the pressure increased. Particles became closer together and collided more often with each other.

Let's look at some different demonstrations of Boyle's Law!

Charles' Law

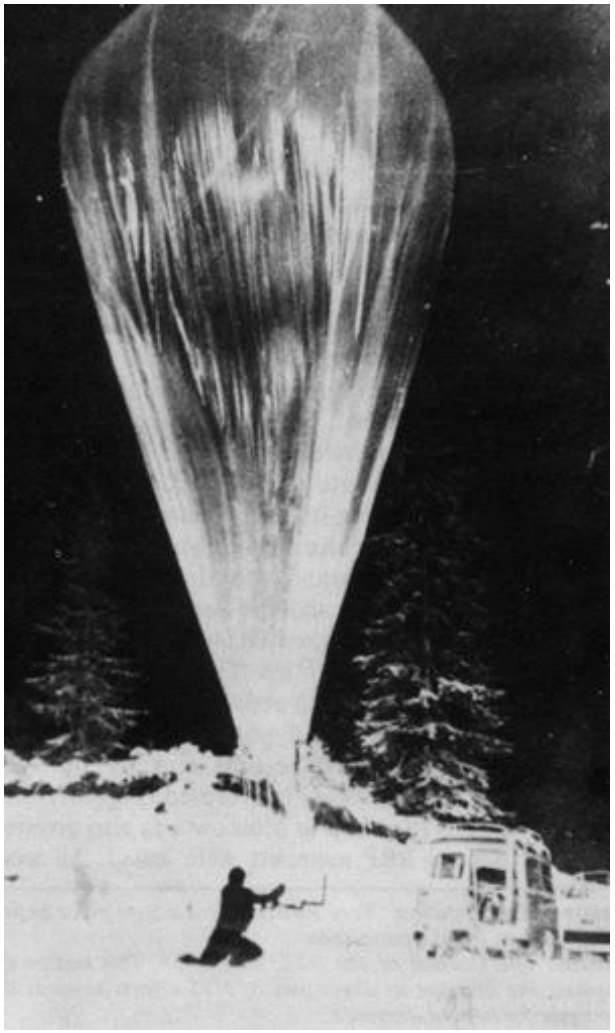
The relationship between the volume and temperature of a gas in a closed container.

The Law, published in the late 1700's, states:

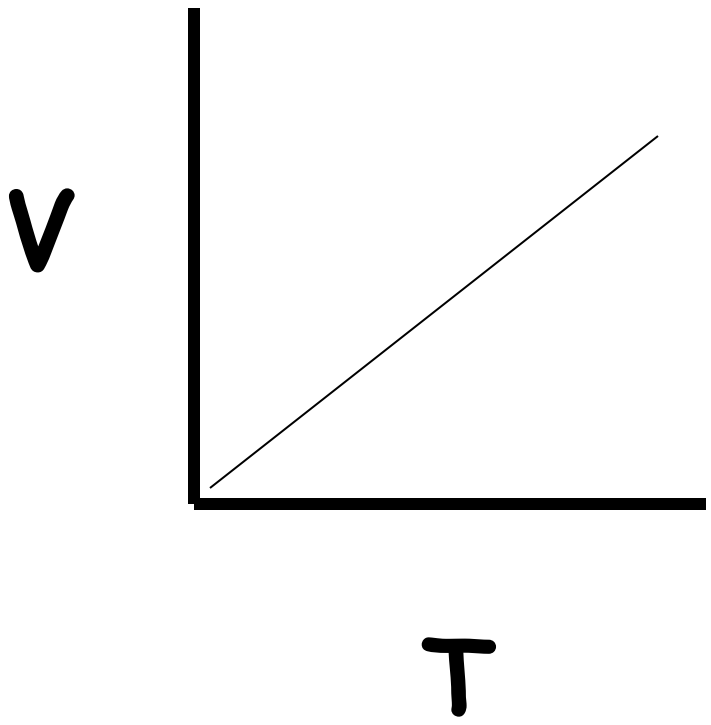
when the temperature of a gas (at constant pressure) increases, its volume increases.

At higher temperatures, particles move faster. As a result, they collide more often with the walls around them. As long as the volume of the container can change, the total push of the collisions results in the gas taking up more space. The volume of the gas increases.

Similarly, if the temperature of a gas decreases, then its volume decreases.



As a graph, this direct proportion would look like this:



As the temperature in the soda can decreased, the volume decreased and the can was crushed.

Bernoulli's Principal

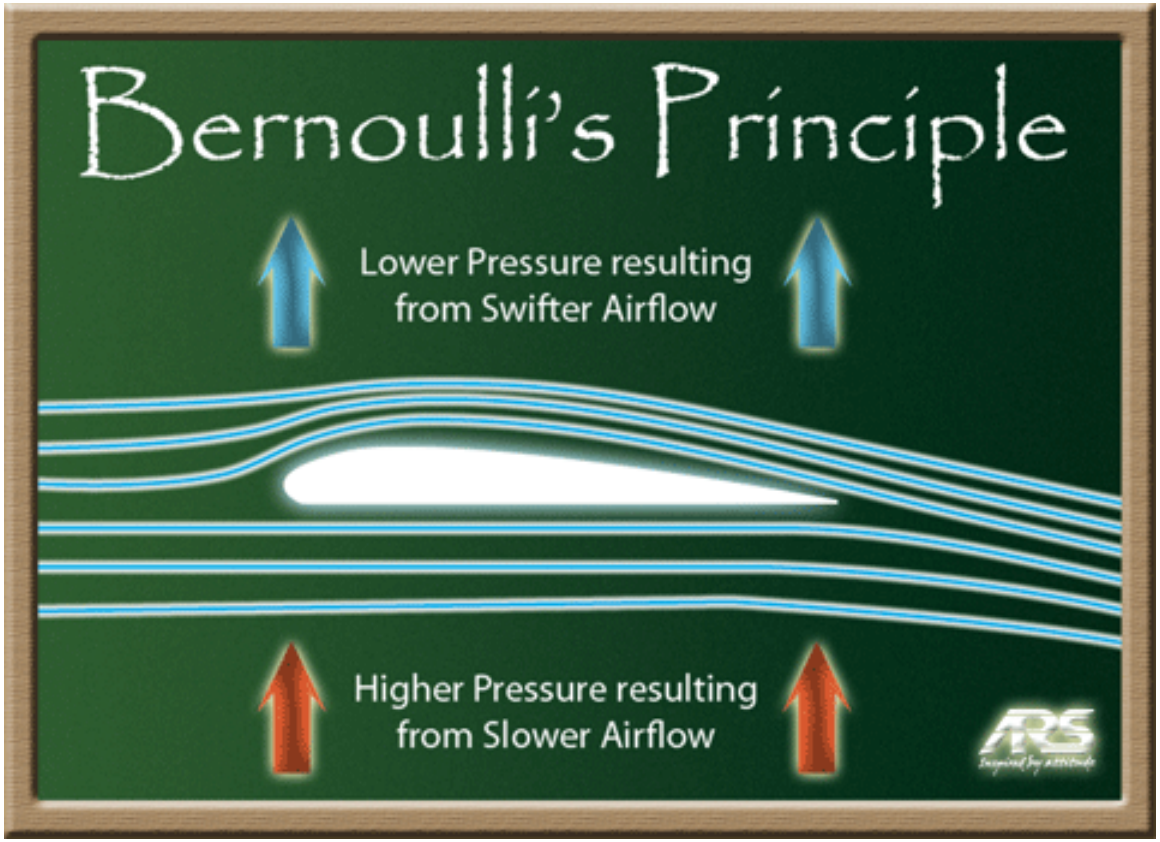
The relationship between air pressure and "lift"

The Law, published in the 1700's, states:

As the speed of a fluid increases, the pressure of the fluid decreases.

We know that air behaves similar to a fluid, so if we increase the speed of air, the pressure in the air must decrease.

If we can increase the speed of air on top of a surface, that would create an area of low pressure, and cause that surface to "lift" up.



How does the fertilizer solution get drawn up and mix with the water?