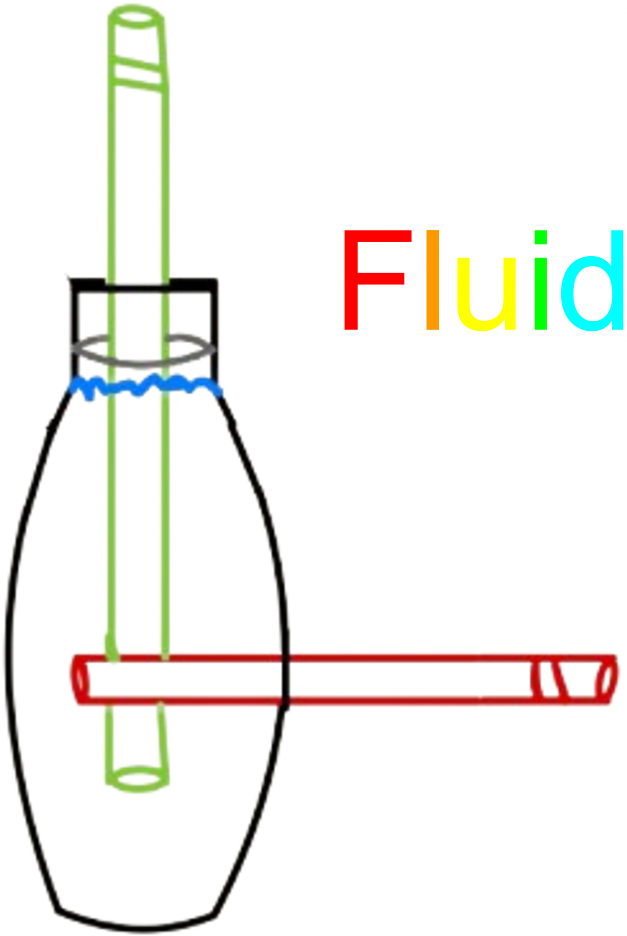
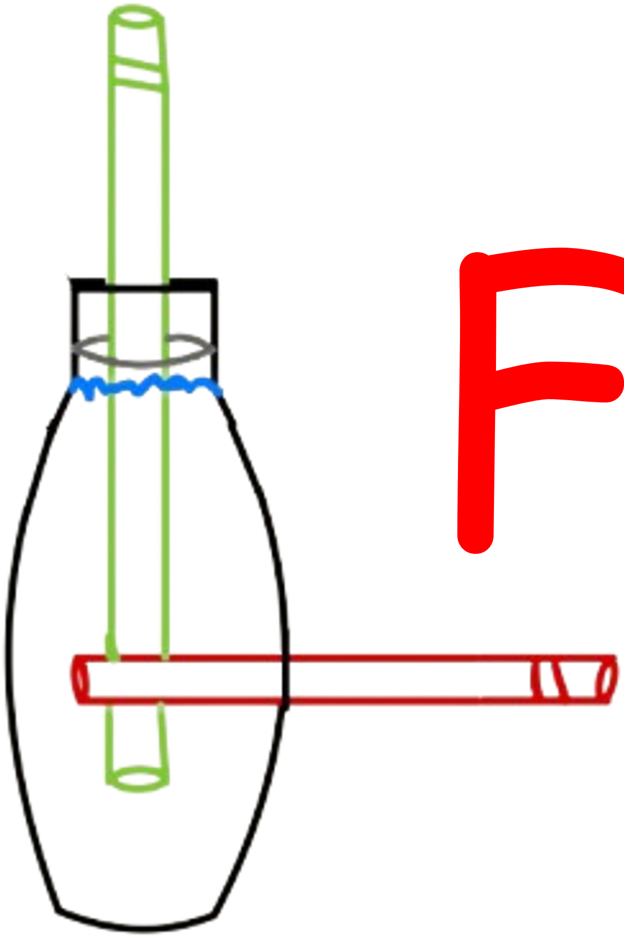
Fluid Dynamics

By Fan Long





Fluid

Dynamics

Hypotheses

The insides and outside pressures determines if the water can come in or out of the container.

Experimental Setting:

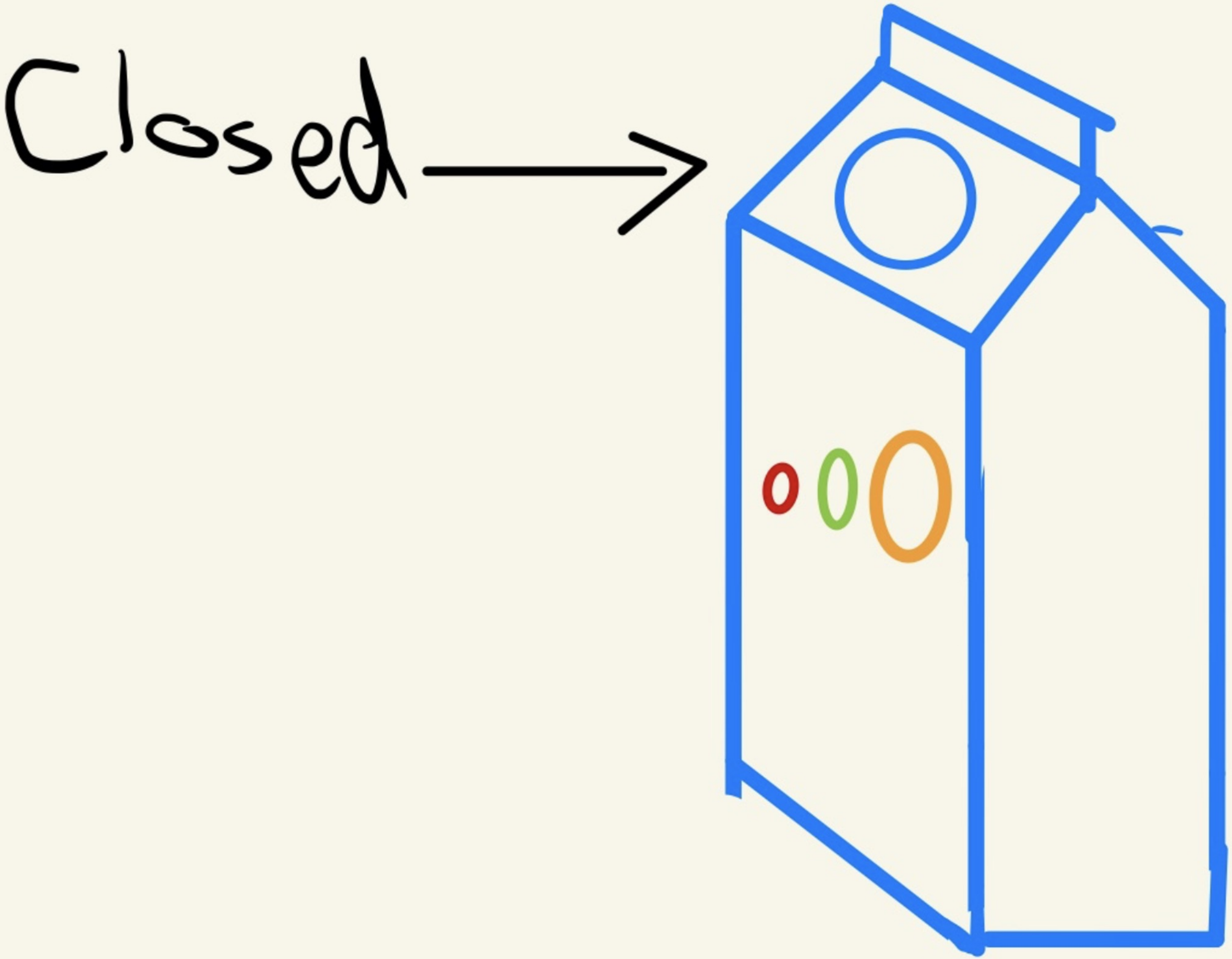
The cap is closed, there are three holes on the side of the milk container that you see, and the bottle is filled with water to the brim.

Observation:

The water is trapped and can't flow out through the three holes.

Explanation:

When air can't get into a bottle from a direction while water is trying to flow through the air basically stops it. Why? It is to do with the pressure inside and outside of the bottle of water. The water is pressured by gravity and wants to flow out while the air can only get in through that hole and can't because water is denser than air and air can only float above water, not get below water, unless not pressured from the top straw being above the bottom straw



Experimental Setting:

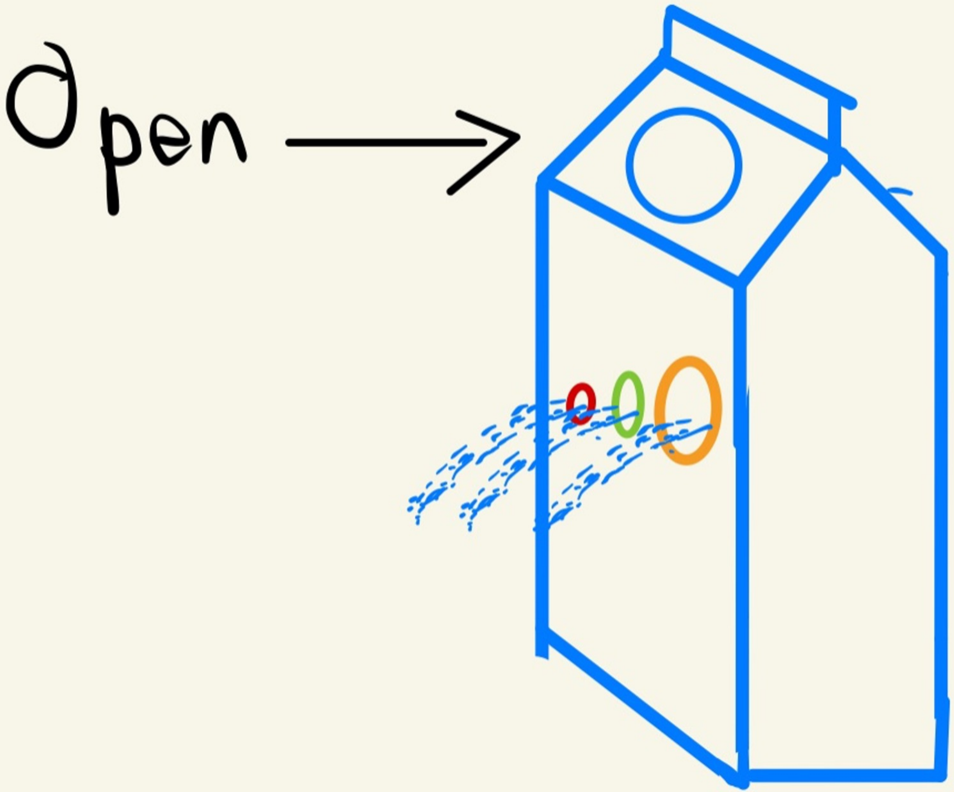
The cap is open, there are three holes on the side of the milk container that you see, and the bottle is filled with water to the brim.

Observation:

The water is not trapped and can flow out through all the three holes at once.

Explanation:

Air can come in to the container from above the three holes and the water can flow out freely because there is no pressure holding it back and the air inside the bottle is in touch with the rest of the air in the atmosphere around us and can freely come in.



Experimental Setting:

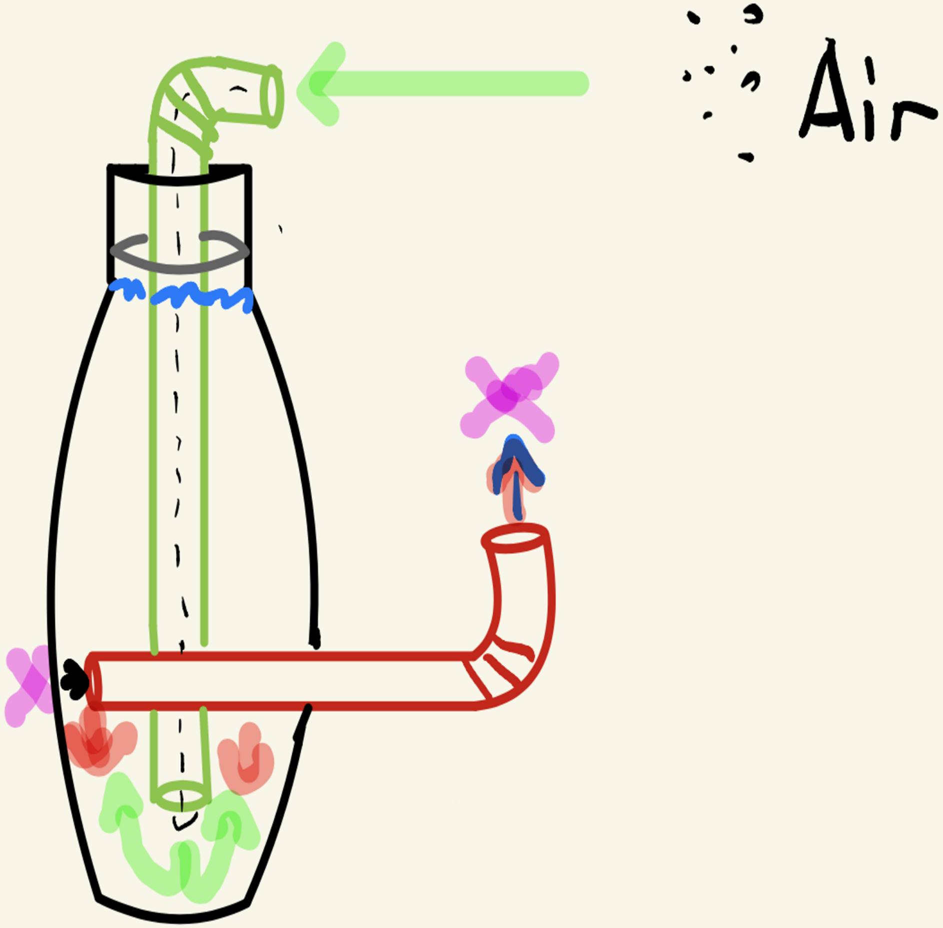
The green straw bottom is below the lowest point of the red straw and the water is filled to the brim.

Observation:

The water doesn't come out of the straw.

Explanation:

When the green straw bottom is below the red straw bottom the air gets pressured by the "falling" water and can't rise, thus making it impossible for the air to rise and the water to come out of the inclosed container where the air is stopping it from coming out by pressuring it like if there was only one straw, because the air can't rise up from its position underneath the straw.



Experimental Setting:

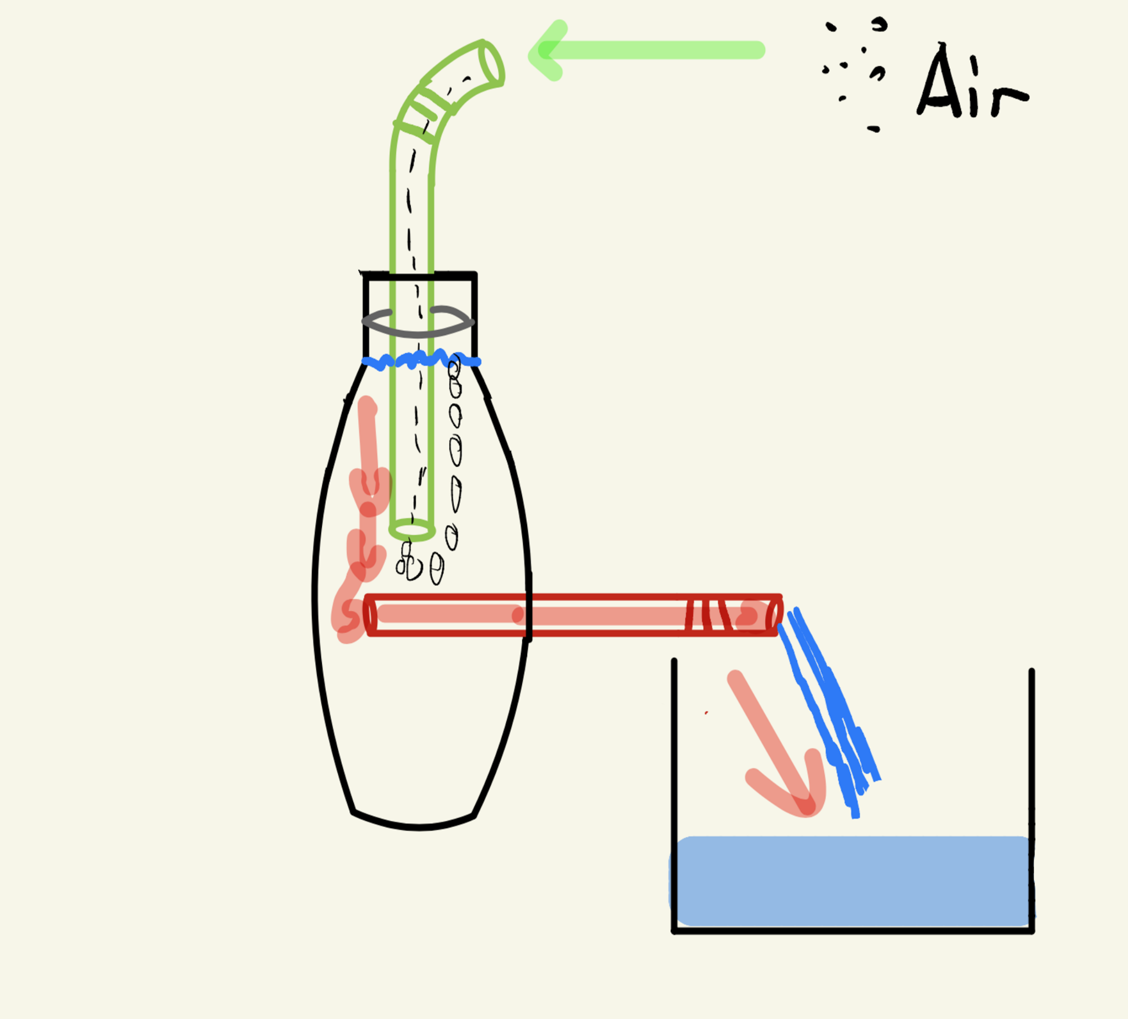
The green straw bottom is above the red straw's highest point.

Observation:

The water is flowing out rapidly and the air is bubbling upwards to the top.

Explanation:

Here, the air encounters less resistance, as the water can still flow through the red straw without encountering resistance from below its flow line. This allows the air to bubble up, enabling the water to flow out without much trouble. The air can rise without being too pressured because the water can still flow through, not exerting much pressure on the air while flowing out. This is because the red straw is positioned below the green straw's bottom, allowing the air to safely pass without being obstructed by the water trying to fall upon it. It prevents the air from being stopped from bubbling to the top by having a layer of water below the air that can still flow through the straw.



Experimental Setting:

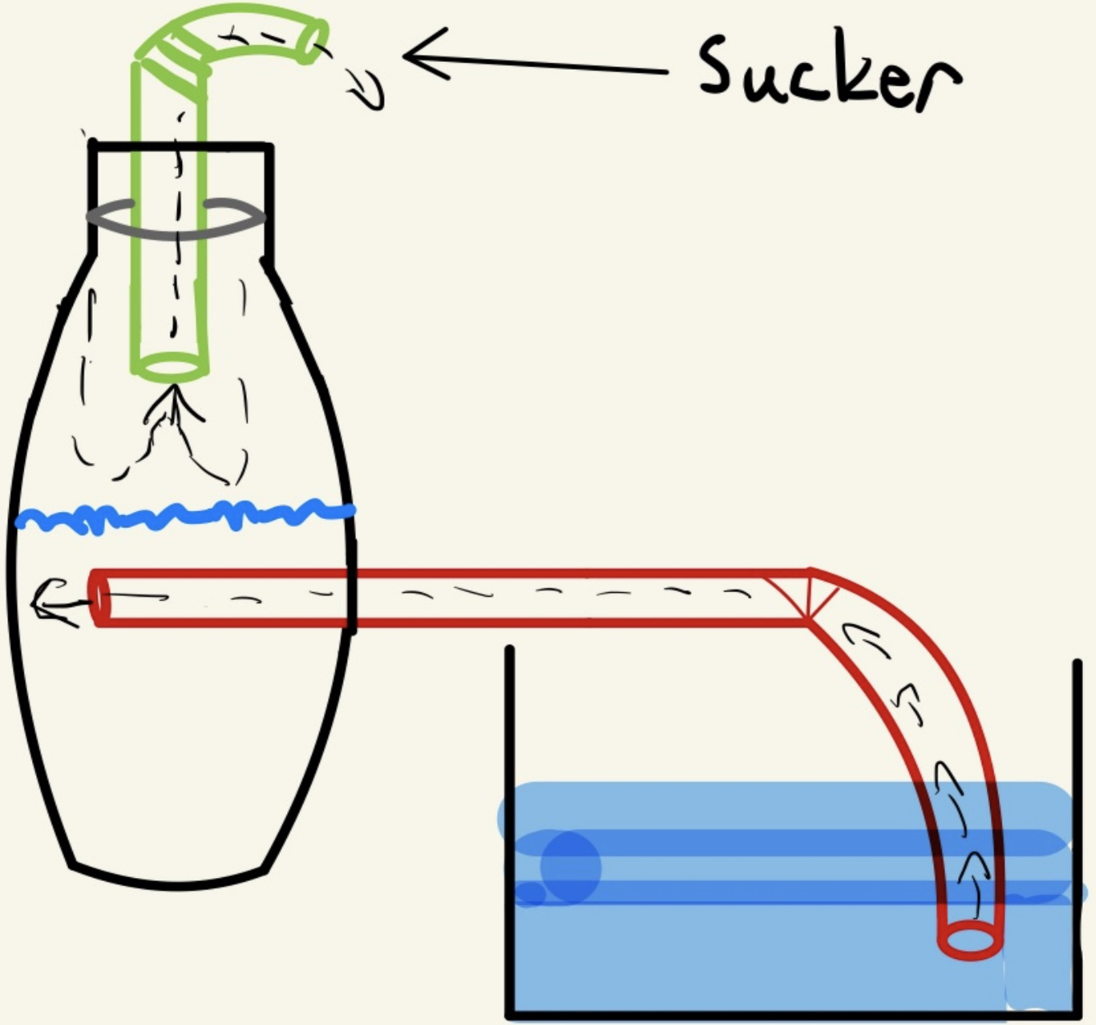
The green straw has a vacuum pump attached to it and it is sucking in the air.

Observation:

The water is coming out of the other container and is raising the water level of our bottle water level.

Explanation:

We use a vacuum pump to suck water out of the second container via the sucktion of air having no choice, but to pull in through the other straw, thus pulling in the water on the other end. This is due to the air being pulled out, causing a vacuum that must be filled by something else, whereas in this case it is the water at the other end because that is the only place more of a liquid can be sucked from to maintain the pressure inside of the bottle of water without imploding or decompressurising and getting a hole punched through by the vacuum trying so desperately to pull in something to fill the gap of nothing.



Experimental Setting:

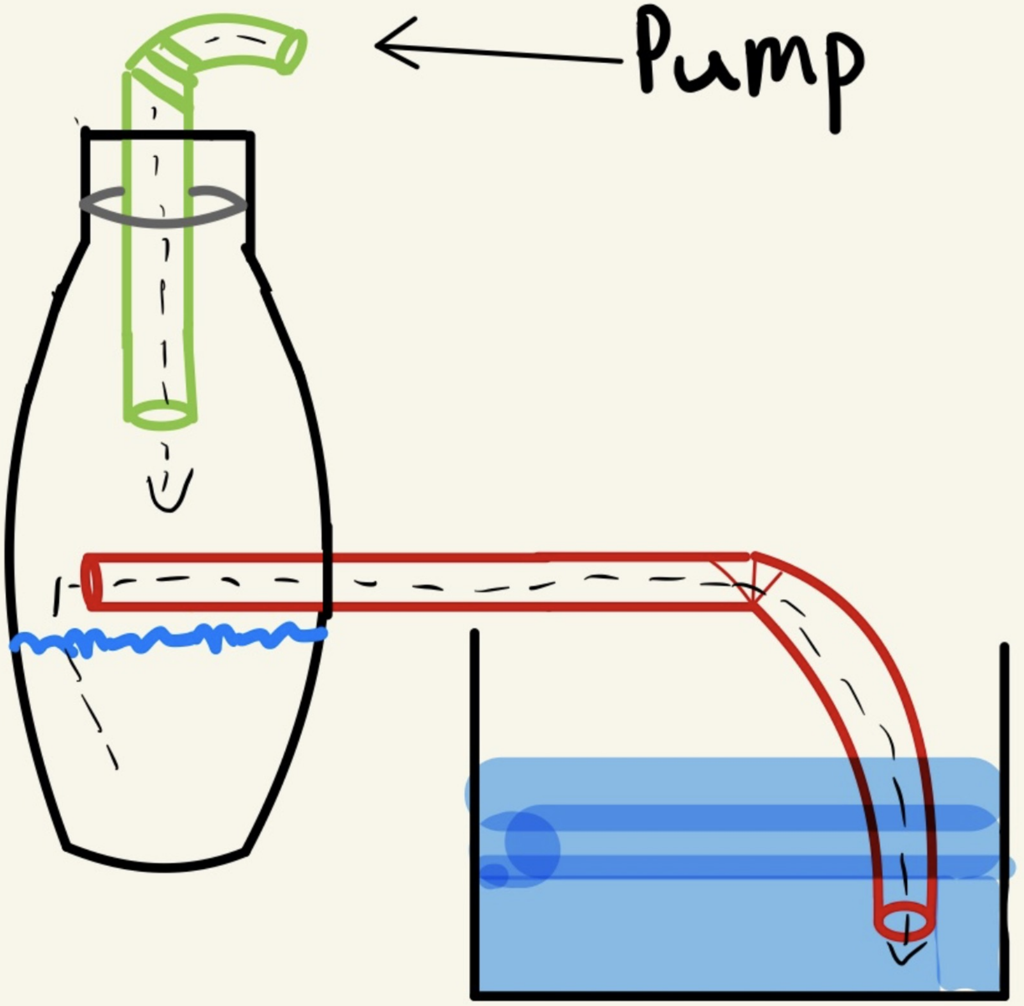
The water level is below the red straw's lowest point inside the bottle of water and air is getting pumped in.

Observation:

The water is flowing through the red straw from the pumping of air.

Explanation:

We can use a pump to start pumping in air and pushing the water through the red straw pushing it into our other container where we collect the water that was pushed out of the our bottle that we have here right now. The air goes in and the water goes out of the bottle due to the pressure inside growing and the need for the water to get out of the bottle to stabilize the pressure inside and maintain the pressure with the outside pressure to stop the bottle from exploding with the force of a miniature bomb.



Syphon Effect

Experimental Setting:

Cap is open and tube is filled with water.

Observation:

The water even came out when the water level was lower than the highest point of the tube.

Explanation:

The tube has no air and the tension of the water molecules bring the rest along with the ones that had already left the system.

$$PV = nRT$$

P = Pressure

V = Volume

n = number of moles

R = Ideal gas constant

T = Temperature