

# How To Make Water Move Uphill

## Equipment Required

1. Harbor Freight Brake Bleed Kit
2. Clean empty bottle
3. Water
4. Food Color



Figure 1



Figure 2

## Procedure

1. Fill empty bottle with colored water.
2. Assemble materials (Figure 1)
3. Test the vacuum pump by placing finger over the end of the plastic tube and squeeze the pump handle. You should see vacuum reading on the gauge. (Figure 2)
4. Place end of plastic tube in colored water bottle.
5. Squeeze the pump handle several times and watch the colored water move up the tube towards the catch jar reservoir. (Figures 3,4,5,& 6 )
6. Review The Science Involved section.

Figure 3



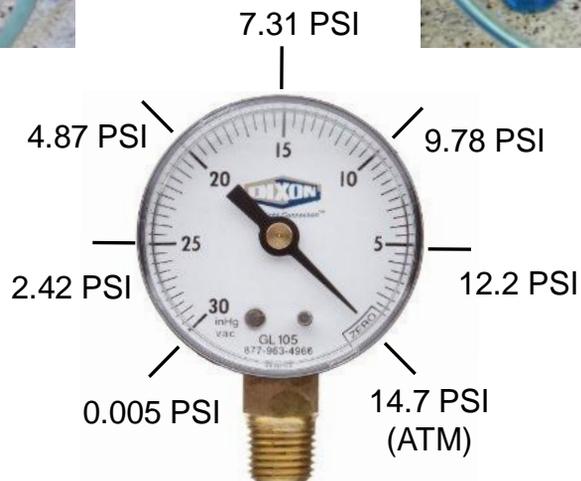
Figure 4



Figure 5



Figure 6



Conversion  
Inches of H<sub>G</sub> to PSI

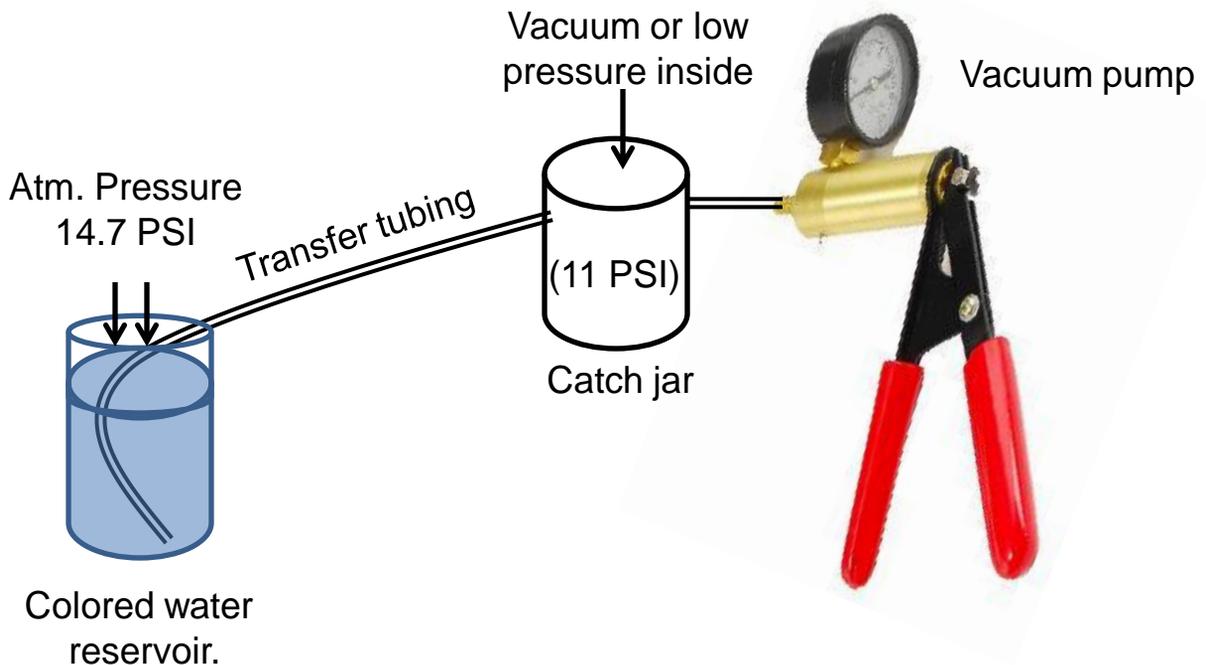
Figure 7

## The Science Involved

Mother Nature strives to keep atmospheric pressure equal. Therefore, areas of high pressure always flow to areas of low pressure. Ultimately the pressures equalize. The hand vacuum pump has the ability to remove air from a volume. With less air in the volume, the pressure in that volume is reduced. The remaining pressure is measured with a vacuum gauge. The vacuum unit of measurement is inches of H<sub>g</sub> (Mercury). \*

The gauge has been rescaled to show readings in PSI as well. See figure 7. The vacuum pump reduces the pressure in the catch jar and the transfer tubing. We now have atmospheric pressure (high pressure) forcing the colored water to flow uphill to the low pressure catch jar.

**Atmospheric pressure is at work.**



Additional notes:

Atmospheric pressure is equal to 14.7 PSI (Pounds per Square Inch)

Things to ponder – If we had a strong enough vacuum pump, how high do you think the water column would reach?

Answer: 33 feet

\*\* For more information on the origins of inches of Hg, research Torricelli's Liquid Barometer.