

## Lab – Hydrostatic Pressure vs. Fluid Column Height

### Learning objective -

To determine the relationship between water column height, tubing diameter, and pressure.

### Materials -

5 gallon jugs (modified)  
PocketLab pressure sensors  
Bicycle pumps

Vinyl tubing  
Metersticks  
Ziplock bags and paper towels

### Modifications to 5 gallon jugs:



¼ inch tubing connector mounted in side of 5 gallon jug. This step is not easy.



Tire stem valve mounted on jug cap.

### Procedure -

1. Fill a modified 5 gallon jug so that there is about 6-8 inches of water in it. Adding some food coloring will make the fluid height easier to determine.
2. Turn on a PocketLab sensor and pair with an iPad. Set the PocketLab app to display pressure.
3. Seal the PocketLab and a paper towel in a plastic bag and drop into the jug.
4. Connect vinyl tubing to the nozzle on the jug. Raise the free end of the tubing at least 5 meters above the jug.
5. Record the tubing inner diameter.
6. Connect a bicycle pump to the jug.
7. Record the initial pressure as displayed by the PocketLab app.
8. Increase pressure in the jug by pumping the bicycle pump. Record pressure (as displayed by the PocketLab app) and fluid column height, making at least one measurement every meter of height.
9. Repeat for a different tubing diameter.



### Analysis -

Create a single graph that shows pressure vs. water column height for at the two different tubing diameters.

### Conclusion -

Write a conclusion, in claim/evidence/reasoning format, that answers the question  
**What is the relationship between water column height, tubing diameter, and pressure?**

Example data –

