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Class: Physics II

Period: 2

Group #:

Lab # and Title: 2 – Hydrostatic Pressure

Laboratory Report

Purpose

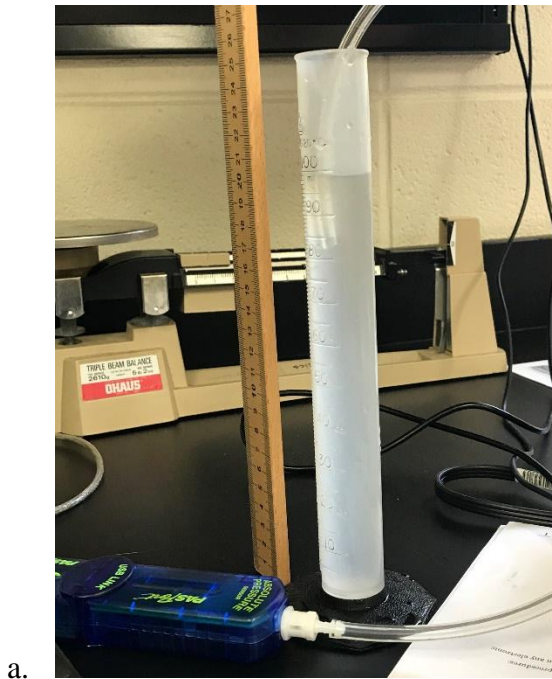
In this lab we are attempting to identify the relationship between pressure and depth in a liquid. We will measure the depth of the sensor and the pressure at each point.

Equipment Used

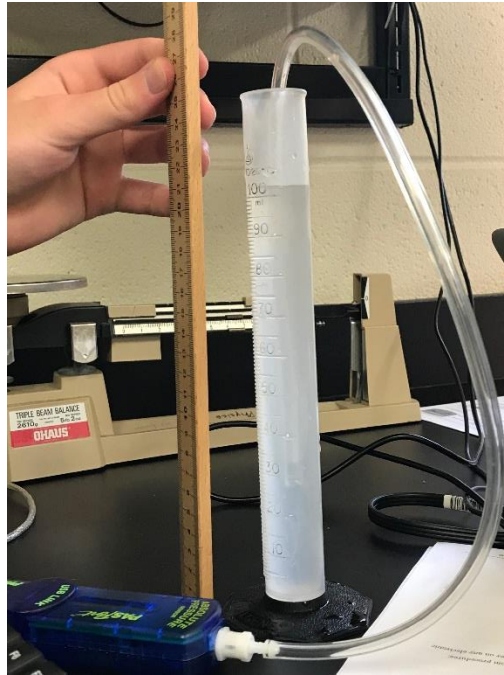
Depth sensor, water container, meter stick

Procedure

1. Fill a container with water to use for testing
2. Take an initial test of the pressure with the sensor out of the water, record this as depth 0
3. Take a test at a depth of 4 cm and record



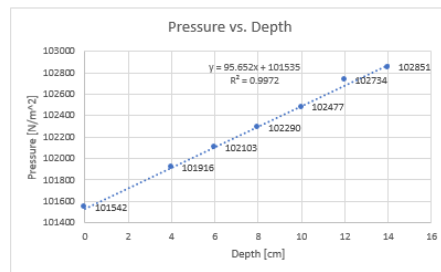
4. Repeat on even intervals until you have tested at depth of 14 cm



a.

5. Record your data and check for a trendline to find the correlation

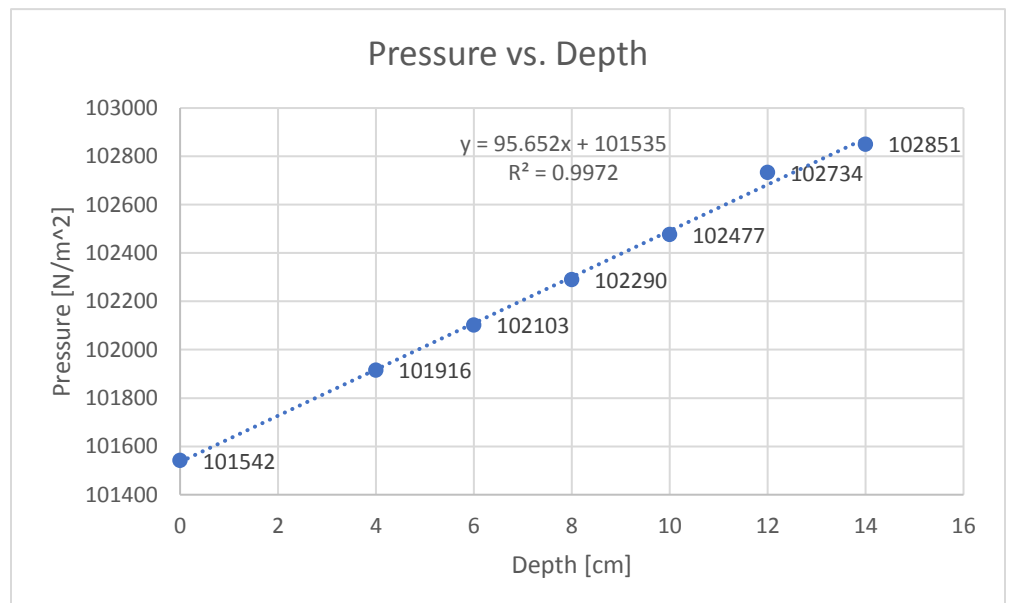
Depth [cm]	Pressure [N/m ²]
0	101542
4	101916
6	102103
8	102290
10	102477
12	102734
14	102851



a.

Data

Depth [cm]	Pressure [N/m ²]
0	101542
4	101916
6	102103
8	102290
10	102477
12	102734
14	102851



Analysis Questions

1. What type of relationship exists between pressure and depth?

The relationship between pressure and depth is strongly suggested to be directly correlated based on our lab. Our data gives a trendline with a R^2 value of 0.9972.

2. Static pressure is related to depth according to the equation,

$$P = P_0 + \rho gh$$

where P is pressure, P_0 is the initial pressure, ρ is density, g is acceleration due to gravity and h is depth.

From a linear graph relating pressure to depth, extrapolate a value for the density of the fluid in the reservoir (water).

$$102851 = 101542 + \rho(-9.8) * 0.14$$

$$\rho = 954.08 \text{ kg/m}^3$$

3. If the theoretical value of the density of water is $1,000 \text{ kg/m}^3$, calculate the percent error between your experimental value and the actual value. Show your work.

$$\% \text{ error} = \left| \frac{1000 - 954.08}{1000} \right| \times 100 = 4.59\%$$

4. If you performed this same experiment using liquid iodine (density $\approx 4,900 \text{ kg/m}^3$) instead of water, how would a graph of pressure versus depth be different?

The graph would have a much larger slope, because the denser liquid would exert a greater pressure