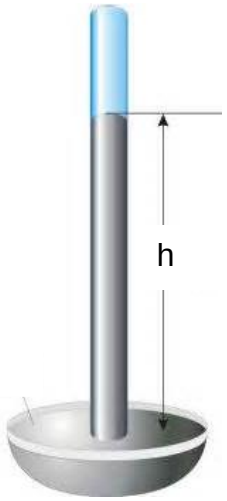
Practice – Hydrostatics and the Barometer

This is repetitive practice to help you learn how to use the hydrostatic equation: $P_{bottom} = P_{top} + \rho gh$.

Each of the problems below is a separate problem. But each uses the same figure to the right.



1. If you take your water filled barometer to the top of a mountain where the atmospheric pressure is 80000pa, what is the height of the column of water?

2. You took your trusty ketchup filled barometer to a distant planet ($\rho_{ketchup} = 1480 kg/m^3$). If the height of the ketchup column is .25 m, what is the atmospheric pressure at your location on the planet? Assume the planet your on has a $g=20m/s^2$.

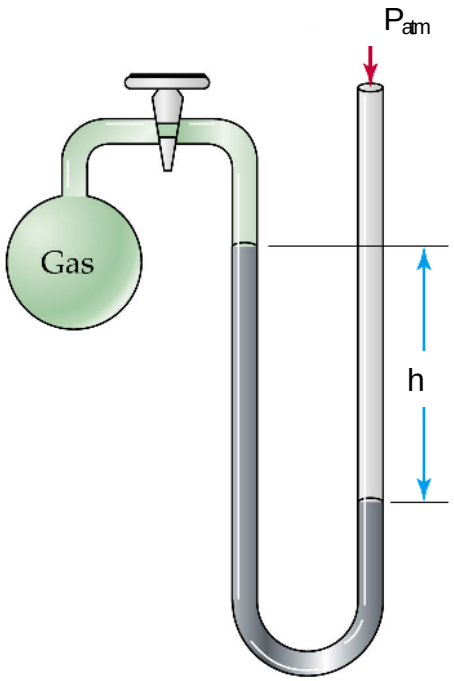
3. The center of the sun is estimated to have a pressure of about $1x10^{16}$ pa. If we could put a mercury barometer at the center of the sun, what is the height of the mercury column? Gravity on the surface of the sun is about $280m/s^2$. So assume that number in your equation. (and yes this question is completely senseless...but good practice with large numbers :)

4. How much higher is a column of water than a column of mustard (($\rho_{mustard} = 1052 kg/m^3$) given that the barometer sits at sea level on the Earth?

Practice – Hydrostatics and the Monometer

This is repetitive practice to help you learn how to use the hydrostatic equation: $P_{bottom} = P_{top} + \rho gh$.

Each of the problems below is a separate problem. But each uses the same figure to the right.



1. If the mercury filled monometer is at sea level on Earth and h=.25m, what is the absolute gas pressure?

2. What is the difference in pressure between P_{atm} and P_{gas} given that h = .4m and the fluid is mercury?

3. If the difference in pressure is 200pa, what is the height difference, h, given the fluid is mercury?

4. If the water filled monometer is at sea level on Earth and h=.25m, what is the absolute gas pressure?

5. If the water filled monometer is at sea level on Earth and P_{gas} is 50000pa, what is h?

Practice – Fluid Dynamics and Continuity with Bernoulli

This is repetitive practice to help you learn how to use the continuity equation: $Q = A_1 v_1 = A_2 v_2$

Bernoulli equation: $P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$

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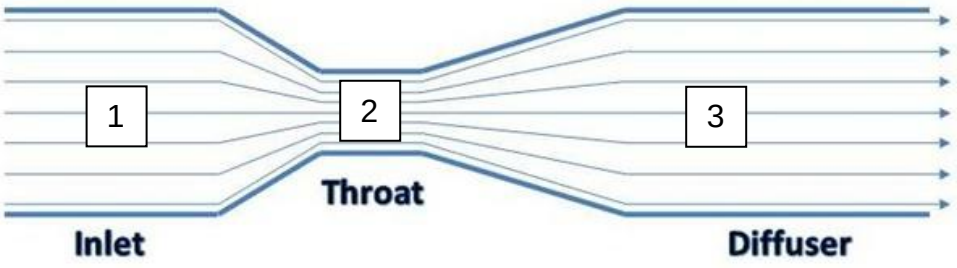

1. If $A_1 = .4m^2$, $A_2 = .2m^2$, $v_1 = 20m/s$, assume air is flowing
   a) Calculate v_2

   b) Calculate the pressure difference P_1-P_2

2. If $P_1 - P_2 = 200Pa$, $v_2 = 80m/s$, assume air.
   a) Calculate v_1

   b) Calculate A_1 if $R_2 = .05m$

3. If P_3 = atmospheric pressure, $v_3 = 4m/s$, and $A_3/A_2 = 3$ Assume water
   a) Calculate v_2

   b) Calculate P_2