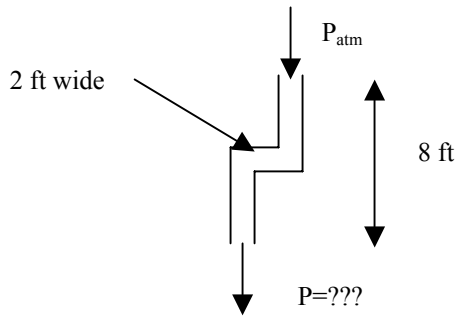
Solution for Pressure/Pipe Problem (A Units Nightmare the first time you try to do it):

We had a problem where we had gasoline (S.G. = 0.8) in a pipe that looked like:



The atmospheric pressure was 1 atm and we were asked to find the pressure at the bottom of the pipe (in atm). The solution is:

$$P = P_{atm} + \rho g h$$

Let's convert some units to get that h = 8 ft = 2.4384 m (the 2 feet horizontal distance does not come into play because horizontal changes do not change heights (pressures). Also, g = 9.8 m/s^2 and we know P_{atm} = 1 atm. Let's plug everything in to get:

$$P = 1\ atm + \frac{0.8 * 1g}{cm^3} * \frac{1kg}{1000g} * \frac{9.8m}{s^2} * 2.4384m * \frac{100^3 cm^3}{m^3}$$

$$P = 1\ atm + 19117.06 \frac{kg}{m * s^2}$$

Hmmm…We need to get the units to work out so we have atmospheres for both. I'm going to use the definition of a Newton to get rid of the kg:

$$19117.06 \frac{kg}{ms^2} * \frac{1Ns^2}{1kgm} = 19117.06 \frac{N}{m^2} = 0.1887 atm$$

Now add to get:

$$P = 1 + 0.1887 = 1.1887 atm$$