9.4.1: Lecture Demonstrations

Measuring Pressure with a Syringe and Baby Scale

Syringe on Baby Scale

A free-moving 30 cc glass syringe is plugged with a luer lok stopper with a trapped volume of 20 cc at atmospheric pressure.

The plunger is 7/8" in diameter (0.88") so the area is $\pi r^2 = 0.60$ in^2.

Push down on the scale with the plunger until V = 15 cc and measure weight (force), ~3 lb

New pressure = 3 lb/0.60 in^2 external + 14.7 atmospheric = 19.6 lb/in^2.

Push down on the scale witht the plunger until V = 10 cc and measure weight (force), ~9 lb

New pressure = 9 lb/0.60 in^2 external + 14.7 atmospheric = 29.4 lb/in^2.

For the three cases, PV = ~294, so $P_1V_1 = k = P_2V_2$

Measuring Atmospheric pressure with a Manometer and Vacuum Pump

Connect a vacuum pump to the top of a 100 cm tube dipped in mercury in a vial in a sidearm flask, turn on pump, measure height of Hg corresponding to 5 mi of air in atmosphere.

Syringe (etc.) in A Bell Jar

Put a syringe, marshmallow, small bag of chips or pretzels, etc. in a bell jar and turn on vacuum.

Syringe in Bell Jar