

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 $\pi r^2 = 0.60 \text{ in}^2$.

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

New pressure = $3 \text{ lb} / 0.60 \text{ in}^2 \text{ external} + 14.7 \text{ atmospheric} = 19.6 \text{ lb/in}^2$.

Push down on the scale with the plunger until $V = 10 \text{ cc}$ and measure weight (force), ~9 lb

New pressure = $9 \text{ lb} / 0.60 \text{ in}^2 \text{ external} + 14.7 \text{ atmospheric} = 29.4 \text{ lb/in}^2$.

For the three cases, $PV = \sim 294$, so $P_1 V_1 = k = P_2 V_2$

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

This page titled [9.4.1: Lecture Demonstrations](#) is shared under a [CC BY-NC-SA 4.0](#) license and was authored, remixed, and/or curated by [Ed Vitz](#), [John W. Moore](#), [Justin Shorb](#), [Xavier Prat-Resina](#), [Tim Wendorff](#), & [Adam Hahn](#).