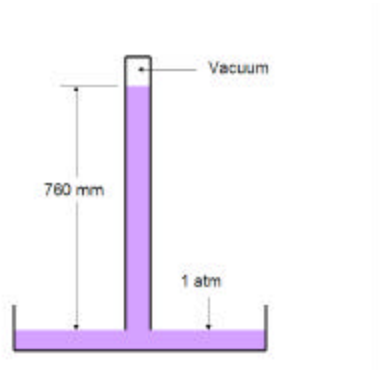


1. A mercury barometer is shown in the figure. One atmosphere of pressure corresponds to a supported column of Hg that is 760 mm high.
  - A. Calculate the density of mercury. Show your work.
  - B. Suppose the barometer is taken to the top of Mt. Mitchell, the highest point in North Carolina. Assume that Mt. Mitchell is 2000 m in elevation at the top. How high will the column of Hg be at that elevation.



2. What is the density of air inside a bicycle tire that has been inflated to 45 lbs./in.<sup>2</sup> of pressure?
3. A child releases a He balloon into the air. Assuming that the balloon is inelastic (has a constant shape) determine the elevation to which it will rise.
4. We calculated the root-mean-square speed of O<sub>2</sub> using the kinetic theory of gases.
  - A. What is the mean free path of O<sub>2</sub> at room temperature and at sea level.
  - B. Calculate the collision frequency of O<sub>2</sub> at room temperature and at sea level.