Problem No. 23

MAGDEBURG
HEMISPHERES

Team
Belarus
Reporter
Alexey Boris
Problem statement

Prove the existence of atmospheric pressure using various beakers, a piece of paper, and other equipment of your choice. Is it possible to estimate the value of the atmospheric pressure?
Pressure is the force applied perpendicular to the surface of an object per unit area over which that force is distributed. The atmospheric pressure is caused by the gas molecules colliding with the surface.

In our presentation we also used Boyle’s law to prove our calculations.
Set up №1
Set up №2

Water can’t drain if the glass is full.
Set up №3

You can hear sound when releasing the finger.
Set up №4

\[ F_p + mg = F_o \Rightarrow \]
\[ F_p = F_o - mg \]

\[ p_0 V_o = pV \Rightarrow \]

\[ \frac{F_o}{V_o} = \frac{F_p}{V} \Rightarrow \]

\[ F_o V_o = (F_o - mg)V \Rightarrow \]

\[ F_o V_o = F_o V - mgV \Rightarrow F_o (V - V_o) = mgV \Rightarrow \]

\[ F_o = \frac{mgV}{V - V_o} = \frac{1 \times 10^{-3} \times 7.18 \times 10^6}{(7 - 5) \times 10^{-6}} = \frac{7 \times 2}{2} = 35 \text{ N} \]
\[ P_0 = \frac{F_0}{S} = \frac{35}{\pi r^2} = \frac{35}{3.14 \times 0.01} = \]

\[ = 1114.64 \]

\[ \text{correlates} \]

\[ P_0 \text{ (true)} = 101325 \]

\[ \epsilon = 10\% \]
Conclusions

1) We can prove existence of the atmosphere with several methods (we used four set ups)

2) We can measure the air pressure.
Thank you for your attention