# Determination of atmospheric pressure

**Purpose of work:** Determine atmospheric pressure.

**Devices and materials:**
039 - two glass tubes
000 - tripod
001 - tripod leg

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**Theoretical part:**
Atmospheric pressure is determined by the isothermal change in the volume of the air column. In a U-shaped tube open at both ends, the pressure in both elbows is the same and equal to atmospheric Pa. If, by moving the right knee, set the water level in the left knee at a distance $l_1$ from the upper end, then the air volume in the left knee will be $V_1 = Sl_1$, where S is the cross-sectional area of the tube.
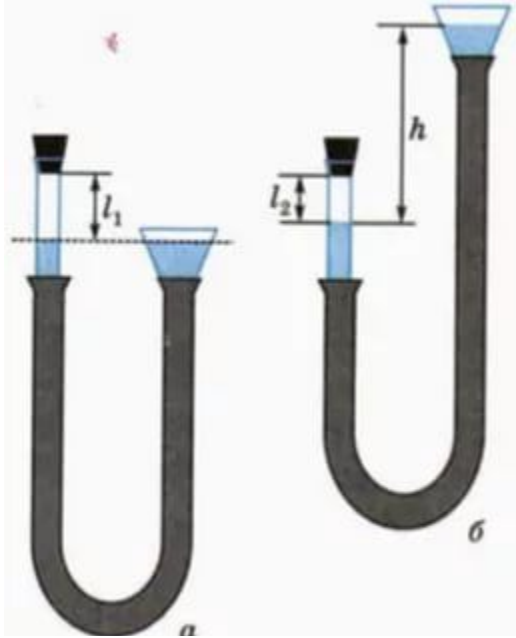
If now, having closed this knee with a plastic stopper, we begin to lower the right knee, then the length of the air column in the left knee will increase, and its pressure will accordingly decrease, since now atmospheric pressure is also balanced by the pressure of a column of water with a height of $\Delta h$. When the tube takes a vertical position, the height of the air column will be $l_2$, and its volume $V_2 = Sl_2$. The air expansion process can be considered isothermal.

The process equation will be written as follows:

$$p_aV_1 = (Pa - \Delta p) \cdot V_2,$$ where $\Delta p = pgh,$

from where it is easy to find atmospheric pressure:

$$P_a = \frac{pghl_2}{l_2 - l_1}$$

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**Work progress:**

1. Assemble the installation shown on the board.

2. Start the simulation

. 3. Hose the pipes and fill the system with water.

4. Close the left tube with a stopper, measure the height of the air column in it ($l_1$) and enter the data in the Table.

5. Lift the right handset.

6. Measure and enter in the Table the height of the air column in the left tube ($l_2$) and the height of the water column (h).

7. Collect the formula for calculating atmospheric pressure.

$$P_a = \frac{pghl_2}{l_1 - l_2}$$

8. Repeat the experiment several times.

9. Fill in the data in the Table.

| No. | p (kg / m³) | $l_1$ (m) | $l_2$ (m) | H (m) | Pa (Pa) | $P_{a\ av}$ (Pa) |
|-----|-----------|---------|---------|-------|---------|---------|
| January | 1000 | ... ... | | ... | | |
| 2 | | ... ... | | ... | | |
| 3 | | ... ... | | ... | | |

Conclusion:
A. We learned how to measure atmospheric pressure. Atmospheric pressure depends on altitude, humidity air and temperature. The higher the altitude, the lower the pressure. As the temperature rises, the pressure in the atmosphere increases.
**In**. Atmospheric pressure depends on altitude, air humidity and temperature. The higher the altitude, the higher the pressure.
**C.**Atmospheric pressure depends on altitude, air humidity and temperature. The higher the altitude, the higher the pressure. As the temperature rises, the pressure in the atmosphere decreases.