

Experiment M-2 How Low Can you Go?



Objectives

- To understand how air pressure changes with altitude.
- To simulate an environment below sea level.

Modules and Sensors

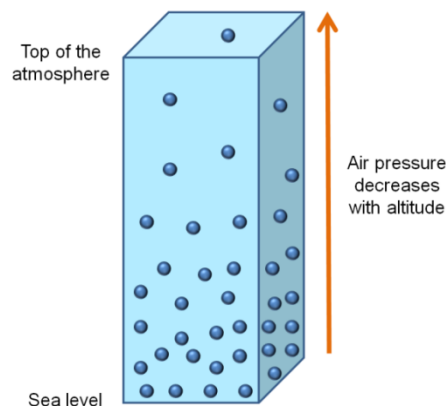
- PANDA-1 Panda Multi-sensor 

Materials

- | |
|---------------|
| ▪ Plastic bag |
| ▪ straw |

Introduction

Air pressure is defined as the amount of force per unit area exerted against a surface by the weight of the air above that surface. When the number of air molecules above a surface is high, more molecules exert force on that surface, thus air pressure is also high. Air pressure reaches a maximum of about 1 ATM at sea level and decreases as altitude increases. Air pressure has an exponential decay. The pressure is cut by half every additional 5 km above the earth.



At very low altitudes, pressure readings are generally high because the density of molecules above that area is high. The Dead Sea is the lowest point on earth. It is located more than 400 meters below sea level. The pressure of the atmosphere there is known to be very high.

In this activity, we will measure the pressure inside a plastic bag, while blowing air into it. We will also add the altitude data to the graph, in order to know the altitude that we are simulating, or the altitude that correlates with the measured pressure.







Procedure


Experiment setup

1. Check that you can take the straw and blow air into the plastic bag so that it will be full of air. While blowing into the bag, hold the bag around the straw with your hands so air won't leak out.




Settings

2. Press on the **Sound sensor** icon  on the top left of the screen.
3. Use the arrows   to select the barometer sensor.
4. Change the range to “kPa” using the range button on the top right of the screen.
5. Click on the **Record** icon .
6. Set the duration of 30 seconds using the arrows  .

7. Press on the **Add sensor** icon  on the top right of the screen.
8. Select the altitude sensor.

Testing and measurements

9. Click on the **Record** icon  to start the measurement.
10. Immediately insert the Panda to the bag with the straw, hold the bag tight around the straw and blow air inside.

It is very important not to get the panda wet!



11. Your graph should be similar to the following:



12. We can see that the barometric pressure increased while blowing the air inside the bag and on the other hand, the simulated altitude decreased.

Summary questions (Includes a challenge experiment)

1. Draw the expected graph of barometric pressure and altitude while walking up a mountain.



If you happen to go on a school trip, you may bring the panda and check if the expected graph looks like the measured one.

2. Look up the barometric pressure at the shores of the Dead Sea and on the top of Mount Everest.
3. What other parameters affect barometric pressure besides altitude?