

LAB: Discovering the Atmosphere

Glencoe Interactive Online Lab

History & Purpose: If you lived in Aristotle's day you may have had strange beliefs about the atmosphere. People back then knew it existed, but they didn't really know what it was. It wasn't until centuries later that scientists living in different eras slowly pieced together the mystery and discovered what the atmosphere really is and what it contains. By the time the 17th century arrived, scientists had begun to use new methods of inquiry to learn about the sky. Yet, they still had only vague ideas about what made up the air they breathed. Issac Beeckman was one of the first people to realize that air had real substance. He speculated that air had weight, pressed down on objects on Earth and was expandable.



Materials: Laptop/Chromebook

Objective: In this lab you will be simulating going up in the atmosphere and measuring temperatures at different altitudes. The objective of this Lab is to observe how temperatures change as you ascend into the atmosphere. After collecting the data, you will determine, compare, and contrast your observations with what could possibly be happening in atmosphere. The question to be answered in this lab is "What relationship(s) do you think exists with Altitude and Temperature, Altitude and Density, as well as Altitude and Pressure.

Hypothesis: What do you think happens to the temperature of air as you go higher in the sky?? Why???" ? Write an "If... then... because..." below. Explain your thinking.

Procedure:

- 1) Google search "Glencoe Virtual Lab Atmosphere" then click on the first link (also shown below) http://www.glencoe.com/sites/common_assets/science/virtual_labs/ES14/ES14.html
- 2) Drag the red slider arrow along the altitude measurement bar and select various altitudes beginning with sea level (altitude= 0km).
- 3) Click the Launch button to launch the balloon or rocket.
- 4) Observe the balloon or rocket being launched in the atmosphere, and returning to Earth by parachute. Record the data in the **Data Table** shown right.
- 5) If the "Show Phenomenon" button is enabled, click it to learn about the meteorological/astronomical phenomenon occur in the selected layer. Take notes in the **Data & Observations** section.
- 6) Repeat the lab at different altitudes until you have completed the 11 altitudes. As you collect data, watch for trends in atmospheric pressure, density, and temperatures within the layers of the atmosphere.
- 7) Graph the temperature data on the printed grids. Draw a smooth best fit line for each set of data. When you are done, complete the questions at the end of the lab.

Data Table: Record your data here.

Altitude (km)	Density (% above sea level)	Pressure (Pa)	Temperature (°C)
0			
5			
10			
25			
50			
60			
75			
100			
150			
200			
400			

Data & Observations: Record your notes on the various phenomenon below:

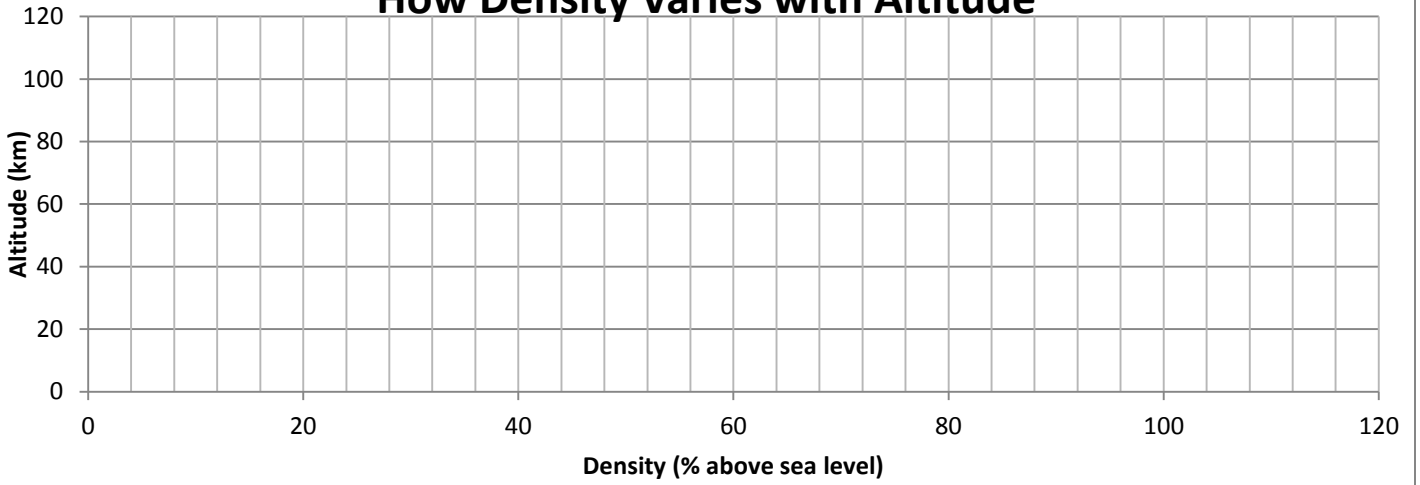
- 1) What are the names of the atmospheric layers shown in the lab? List them in order from lowest to highest altitude and indicate their approximate ranges of altitude.

*Example: The **Troposphere** is the lowest layer of the atmosphere, spanning **0km – 10km altitude**.*

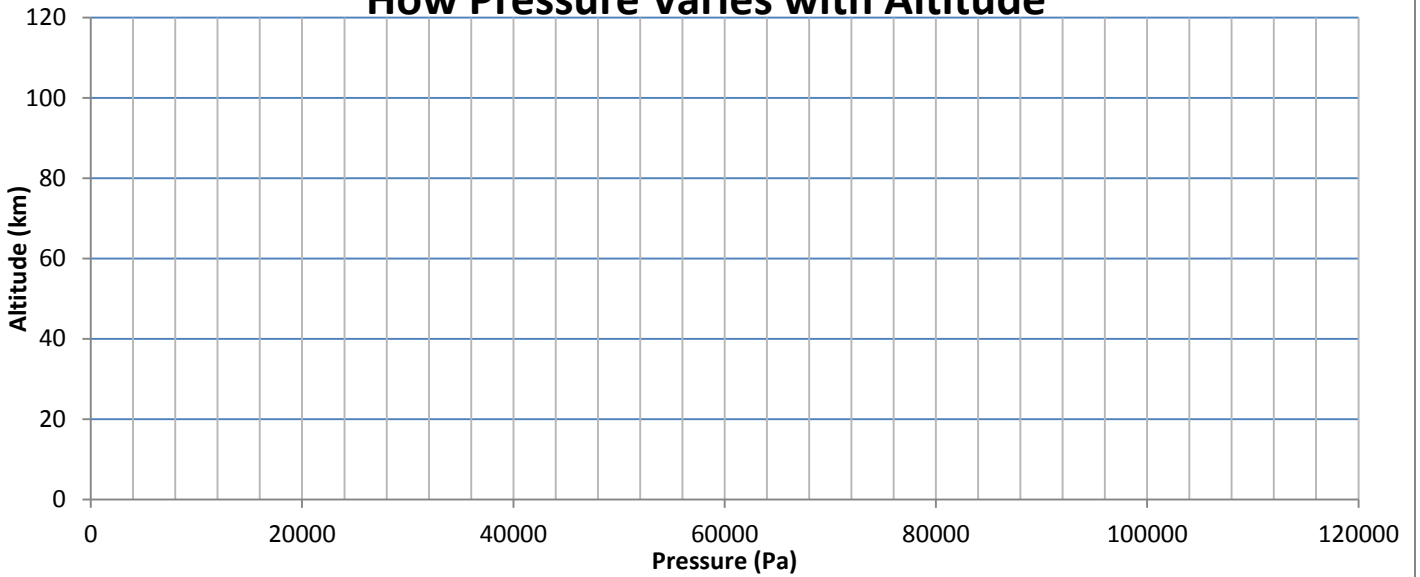
- 2) After clicking on the “SHOW PHENOMENON” button, record your notes below (step 5 of procedure):

Name of Phenomenon	Altitude (km)	Drawing of Phenomenon	Observations/Notes
Weather			
Jet Stream			
Ozone Layer			
Noctilucent Clouds			
Meteor Trails			
Radio Waves reflected by Ionosphere			
Auroras			

How Density Varies with Altitude



How Pressure Varies with Altitude



How Temperature Varies with Altitude

