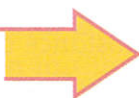


64 Earth's Atmosphere



You know the space around you as “air,” and you may sometimes think of it as being empty. In fact, the air around you is a mixture of gases, including water vapor. Meteorologists call the air that surrounds the earth the **atmosphere**. To better predict weather and climate, scientists need to understand the atmosphere. You can find out what is in the earth’s atmosphere by using a computer to simulate collecting air samples from different parts of it.

CHALLENGE



How does the earth’s atmosphere vary?

This NASA aircraft can fly up to 20 km above the earth’s surface. Atmospheric scientists have attached instruments to the bottom of the aircraft that can collect data on air temperature, water vapor, and air pollution.



MATERIALS



For each pair of students

- 1 computer with Internet access
- 1 calculator



For each student

- 1 Student Sheet 64.1, “Data from Air Samples”



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PROCEDURE

1. Imagine releasing a balloon that can collect data about which gases are in the air, the air temperature, and the air pressure. Do you predict that the atmosphere would be the same at every altitude? Explain your ideas in your science notebook.



A researcher in Antarctica launches a weather balloon that carries a package of instruments to an altitude of around 25 kilometers.

2. On a computer, go to the *Issues and Earth Sciences* student page of the SEPUP website, and select the link under Activity 64, “Earth’s Atmosphere.”

- On the left side of the screen, you should see a list of atmospheric layers and the distance of each layer from the earth’s surface.
- You will gather data from three different altitudes within each atmospheric layer.

3. Select an atmospheric layer to investigate by clicking on the name of that layer on the left side of your screen.

4. Read Student Sheet 64.1, “Data from Air Samples,” carefully. Be sure you understand where to record the data for the atmospheric layer you selected. Then write the name of that layer on the top of the data table that shows the correct altitude.

5. Repeat Steps 3–4 until you have sampled the air at all of the altitudes above the earth’s surface.

6. Observe any patterns in the atmospheric data that you have collected. As you look over the data on different layers of the atmosphere, consider what stays the same and what changes.

Hint: Student Sheet 64.1 is set up so that the upper layers of the atmosphere are on the top and the lower layers are on the bottom.

7. Work with your partner to calculate the mean of each data set on Student Sheet 64.1.
8. In your science notebook, create a table to compare the mean data for the four layers of the atmosphere that you sampled. Be sure to create columns for each of the four gases that you sampled, the air temperature, and the air pressure. Label this table "Mean Atmospheric Values."
9. Discuss with your partner which data are the same for the different atmospheric layers and which data are different. Compare your data to the prediction that you made in Step 1, and revise your initial ideas as needed.

ANALYSIS

1. Which layer of the atmosphere has:
 - a. the most water vapor?
 - b. the lowest pressure?
2. What remains the same in different layers of the atmosphere?
3. Scientists have divided the earth's atmosphere into different layers. What property of the atmosphere do you think these divisions are based on?
4. You collected data on four layers of the atmosphere. The atmosphere merges into outer space in an extremely thin upper layer known as the **exosphere**. Which of the five layers of the atmosphere do people live in?

