

Upward Through Air

Track how atmospheric properties shift as altitude rises.

6.7.c “properties of the atmosphere change with altitude;”

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each statement that tells how a property changes with altitude. Circle the name of the property in each statement you underlined.

A Changing Column of Air

- ① Earth’s atmosphere is a stack of gases held by gravity. Near sea level, the air is packed more tightly because the weight of all the air above presses down. This lower air has higher density and higher air pressure. As a hiker climbs a mountain, there are fewer gas particles above and around the hiker. The air becomes less dense, and air pressure drops. Breathing may feel harder because each breath contains fewer oxygen molecules, even though oxygen remains about 21 percent of dry air.
- ② Temperature does not change in one direction throughout the atmosphere. In the troposphere, the lowest layer where weather occurs, temperature usually decreases with altitude. Mountain peaks are often colder than nearby lowlands for this reason. Above it lies the stratosphere. There, temperature increases with altitude because ozone absorbs energy from the Sun. Still higher layers have their own temperature patterns. Therefore, knowing only that a place is higher is not enough to predict temperature unless you know which atmospheric layer it is in.
- ③ Air also changes in moisture and in how it moves as altitude increases. Most water vapor is close to Earth’s surface, so clouds and storms form mainly in the troposphere. Commercial airplanes often cruise near the top of that layer or in the lower stratosphere, where the air is thinner than at the ground. Pilots and engineers must account for lower pressure and density at high altitude. Weather balloons measure these changing conditions as they rise, helping scientists describe the atmosphere layer by layer.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Why do air pressure and density decrease as a hiker climbs higher?

2 How does temperature change with altitude in the troposphere? How does it change in the stratosphere?

3 Why can breathing feel harder at high altitude even though oxygen remains about 21 percent of dry air?

4 Why is knowing that a place is higher not enough to predict its temperature?

3 YOUR TURN _____ Your own words

Imagine a weather balloon rises from the ground to near the top of the troposphere. Write exactly three sentences describing how the air changes. Include air pressure, density, and temperature.

PART 1 • READ AND MARK

Underline each statement that tells how a property changes with altitude. Circle the name of the property in each statement you underlined. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Why do air pressure and density decrease as a hiker climbs higher?	There are fewer gas particles above and around the hiker, so there is less weight of air pressing down.
2	How does temperature change with altitude in the troposphere? How does it change in the stratosphere?	Temperature usually decreases with altitude in the troposphere. It increases with altitude in the stratosphere.
3	Why can breathing feel harder at high altitude even though oxygen remains about 21 percent of dry air?	Each breath contains fewer oxygen molecules because the air is less dense.
4	Why is knowing that a place is higher not enough to predict its temperature?	Temperature changes differently in different atmospheric layers, so you must know the layer.

PART 3 • YOUR TURN (SAMPLE ANSWER)

As the balloon rises through the troposphere, air pressure decreases because less air is above it. The air becomes less dense, so fewer gas particles surround the balloon. Temperature usually decreases with altitude in this layer, and most water vapor stays closer to Earth's surface.

Accept equivalent descriptions of lower pressure and density at higher altitude. For the open response, require all three named properties and the correct troposphere temperature pattern.