# **Atmosphere and Weather Comprehension Check**

1. What is the atmosphere? Describe its role on Earth.
2. Describe the four layers of the atmosphere: the troposphere, stratosphere, mesosphere, and thermosphere.
3. Explain how weather and climate are different from one another.
4. How do radiation, conduction, and convection work to affect the air temperature, and therefore the weather?
5. What role does gravity play in creating air pressure? How does air pressure affect the weather?

1. What is humidity? Describe what happens to the weather as humidity changes.
2. What are prevailing winds? Why do they occur?
3. What are air masses? How do they change and move?
4. Compare warm and cold fronts, including how they form and how they affect the weather.
5. Why is it important for people to look after the atmosphere? How can people help take care of it?

# **Atmosphere and Weather Comprehension Check Answer Key**

1. What is the atmosphere? Describe its role on Earth.
   1. The atmosphere is the layer of air that protects and surrounds Earth. It is 78% nitrogen, 21% oxygen, and 1% argon, carbon dioxide, and trace other gasses. The atmosphere allows plants and animals to breathe, and its pressure allows for water to be in a liquid state. In addition, it absorbs the sun’s harmful radiation while trapping the right amount of heat to keep Earth warm, but not too hot.
2. Describe the four layers of the atmosphere: the troposphere, stratosphere, mesosphere, and thermosphere.
   1. The troposphere is the lowest layer of Earth’s atmosphere. Almost all of Earth’s weather happens in the troposphere. Gasses in the troposphere trap some of the sun’s heat, helping to keep it warm.
   2. The stratosphere is the second lowest layer of the atmosphere, and it contains about 80-90% of the ozone. Ozone is a gas that blocks harmful rays from the sun from reaching Earth.
   3. The mesosphere is the third layer of the atmosphere, and it is also the coldest. The air in the mesosphere is too thin for airplanes to fly safely.
   4. The uppermost layer is called the thermosphere, and it extends all the way to space. The air in the thermosphere is extremely thin. Air in the thermosphere is mainly hydrogen and helium.
3. Explain how weather and climate are different from one another.
   1. Weather and climate are related but are two different concepts. Weather is the state of the atmosphere at a particular place and time. Climate, on the other hand, is the average weather of a place or region over a period of time.
4. How do radiation, conduction, and convection work to affect the air temperature, and therefore the weather?
   1. Air temperature plays a role in changing the weather. Radiation from the sun warms the air on Earth and becomes trapped by gasses in the atmosphere. This greenhouse effect keeps our Earth warm. The sun’s radiation changes in strength depending on whether it’s day or night, the season, and altitude.
   2. Conduction happens when molecules bump into one another, causing heat energy to be transmitted through a substance. In the air, molecules are farther apart than in solids or liquids. This causes conduction in the air to happen more slowly. During the day, the sun heats the ground through radiation and the ground in turn heats the air above it via conduction. At night, the air cools the ground through conduction.
   3. Convection is the movement of molecules through a substance. Convection happens more easily in the air because molecules move around more freely there than in solids or liquids. Convection works by transferring heat from hot areas to the air. As air warms, it becomes lighter and rises.
5. What role does gravity play in creating air pressure? How does air pressure affect the weather?
   1. Gravity plays a large role in creating air pressure. Gravity pulls things, including air, toward the ground. This creates air pressure, the weight of air pressing down on the ground. Air pressure changes depending on your elevation as well as the air temperature. Because cold air is more dense than warm air, it exerts high air pressure. Areas with high air pressure tend to have clear skies, whereas areas with low pressure can expect clouds and storms.

1. What is humidity? Describe what happens to the weather as humidity changes.
   1. Humidity is a measure of the amount of water vapor in the air. If the relative humidity measures 100 percent, the air is fully saturated and water droplets begin to condense. When this happens on the ground, it creates fog. When this happens in the air, it creates clouds. Humidity also accounts for the creation of dew in the mornings or frost when temperatures fall below freezing.
2. What are prevailing winds? Why do they occur?
   1. Prevailing winds are giant belts of wind that continuously circle Earth due to the patterns of warm air with low pressure around the equator and cool air with high pressure at the poles. The cold, high-pressure air from the poles moves towards the equator, pushing the warm air up so it can flow back to the poles. This creates a continuous cycle of wind over the entire planet.
3. What are air masses? How do they change and move?
   1. An air mass is a huge volume of air that has roughly the same temperature and humidity throughout. Air masses are thousands of miles wide and form whenever land or sea has contact with air for a long period of time. Air masses can move, taking their weather with them. As they move, though, their temperature and humidity can change, causing related changes in the weather. For example, a warm, humid air mass moving up a mountain experiences a temperature drop and a rise in humidity, causing it to rain.
4. Compare warm and cold fronts, including how they form and how they affect the weather.
   1. A front occurs where air masses meet. A warm front occurs when an advancing warm air mass meets a retreating cold air mass and the warm air rises. A cold front occurs when an advancing cold air mass meets a retreating warm air mass. The denser cold air pushes the warm air up. Both cold and warm fronts cause the temperature to drop, humidity to rise, and often clouds and rain.
5. Why is it important for people to look after the atmosphere? How can people help take care of it?
   1. It is important for people to look after and protect the atmosphere because it plays such a vital role in our lives and survival. Air pollution, burning coal, contributing to global warming, clearing forests, and more all have negative effects on our atmosphere. We must work to protect the ozone layer as it is our number one defense against the sun’s powerful rays.
   2. One way people can protect the atmosphere is by passing laws and other regulations that reduce harms to the ozone layer. In addition, we can use fewer fossil fuels and plant more trees and plants to absorb CO2 and help clean the air!