Atmospheric Layers

Earth's **atmosphere** is held in place by gravity. The atmosphere protects life on the planet by absorbing ultraviolet radiation and by regulating temperature.

There is no exact place where Earth's atmosphere ends. Instead, it just gets gradually thinner and thinner (less dense) until it merges with outer space where it consists mostly of interplanetary gases such as hydrogen and helium.

The **troposphere** is the atmospheric layer closest to the earth. It is often referred to as the "lower atmosphere." This layer holds the most dense composition of gases and molecules. Almost all of our weather is created within the troposphere.

The **stratosphere** is just above the troposphere, starting at an average altitude of about 7 miles above sea level. The air here is more dry and less dense. Only the highest clouds can be found in this layer. Aircraft often fly in the lower stratosphere to escape the turbulence present in the troposphere. Near the top of the stratosphere lies the **ozone layer**.

The **mesosphere** lies just above the stratosphere, ranging from about 30 to 50 miles above sea level. This layer contains chemicals which absorb energy from the sun. Together, the stratosphere and the mesosphere are often called the "middle atmosphere."

The **thermosphere** lies above the mesosphere, starting at about 50 miles above sea level. This layer is often called the "upper atmosphere." Any person traveling at an altitude of more than 50 miles above sea level is considered an astronaut. Space shuttles and some satellites orbit the Earth within this layer. The thermosphere also is the layer in which auroras take place.

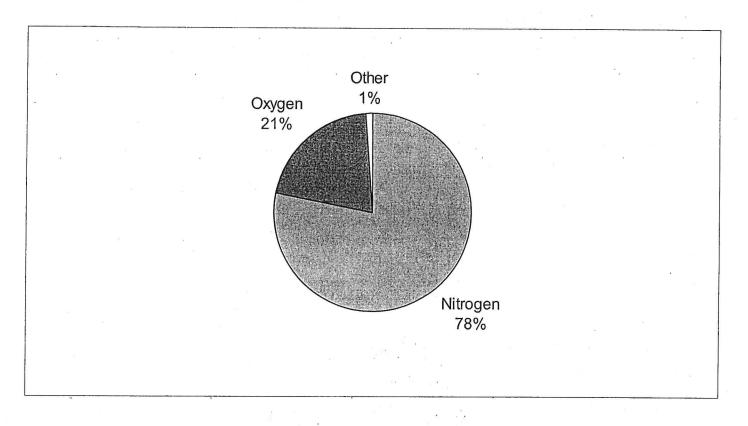
The **ionosphere** is a name often given to the combination of the mesosphere and the thermosphere. In both these layers, free ionic particles can be found. The ionosphere is important because it reflects radio waves, enabling much of our long-distance communication.

The **exosphere** is the outermost atmospheric layer. It has no definite outer limit, as it merges with space. Many satellites orbit the Earth within the exosphere, usually at altitudes of from 300 to 600 miles above sea level.



Air Composition

Ninety-nine percent of the air surrounding the Earth is found in the **troposphere** and the **stratosphere**. This air is made up of close to four-fifths nitrogen gas, and the rest is mostly oxygen gas. Small amounts of other gases and molecules are found in the air we breathe. Some of these are listed below.



Other major components of the air: (by descending percentage)

Argon

Carbon dioxide

Neon

Helium

Methane

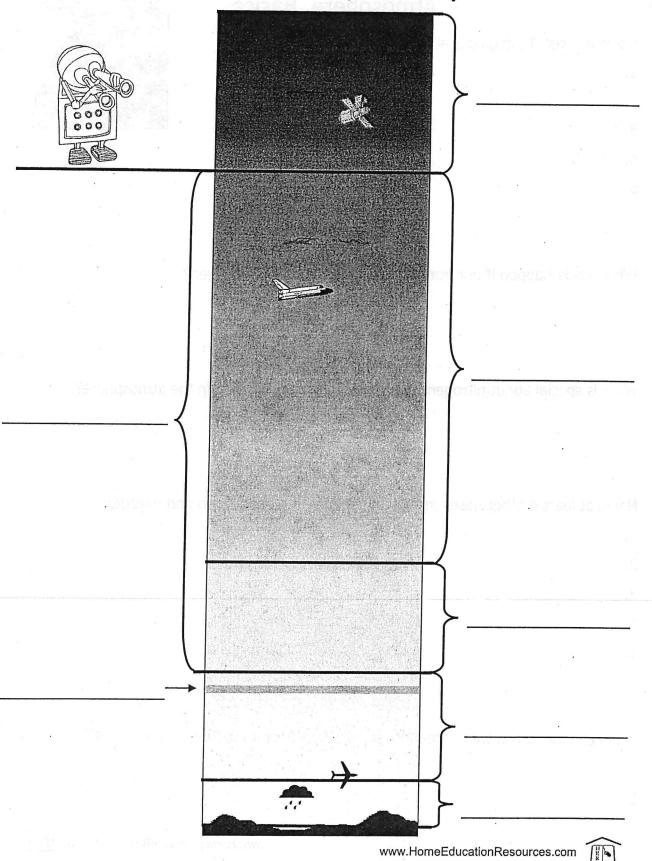
Krypton

Hydrogen

Water vapor (variable percentage)



Label the Atmospheric Layers



Atmosphere Basics Name at least 4 things our atmosphere does for us: 1. 2. 3. 4. 5. What would happen if our atmosphere consisted of pure oxygen? What is special about nitrogen, and what is its main function in the atmosphere? Name at least 4 other gases in the atmosphere besides oxygen and nitrogen: 1. 2. 3. 4. 5. If the atmosphere is like a greenhouse, what parts of it function as the "glass"? 1. 2.



Layers & Gases of the Atmosphere

Match each layer with its description.

A. closest to Earth, where almost all weather is created
B. mesosphere plus thermosphere; reflects radio waves
C. furthest from Earth; hosts the most satellites
D. too high for aircraft, but too low for satellites
E. hosts a few clouds and the ozone layer
F. hosts the space shuttle and some satellites

Find the atmospheric gases in the box to the right inside the puzzle. Then use the leftover letters, in order from left to right and top to bottom, to find the hidden message.

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METHANE
NEON
NITROGEN
OXYGEN
WATER
VAPOR

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ACROSS

- 5. This gas makes up close to one-fourth of the air surrounding Earth.
- 8. There is a high concentration of this and other metals in the mesosphere.
- 9. This is the third most abundant gas in the atmosphere.
- 11. The churning air in the troposphere helps determine the ____ of a place.
- 12. The atmosphere is composed of
- 13. The ____ layer is near the top of the stratosphere.



DOWN

- 1. This force holds Earth's atmosphere in its place.
- 2. This layer holds almost all of the water vapor in the atmosphere, as well as almost 3/4 of its mass.
- 3. The air in the stratosphere is less dense and more ____ than in the troposphere.
- 4. One way in which the atmosphere helps us is by absorbing solar ____
- 6. This is the most abundant gas in air.
- 7. These are seen in the thermosphere.
- 10. This type of wave is reflected by particles in the ionosphere.



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Layers of the Atmosphere