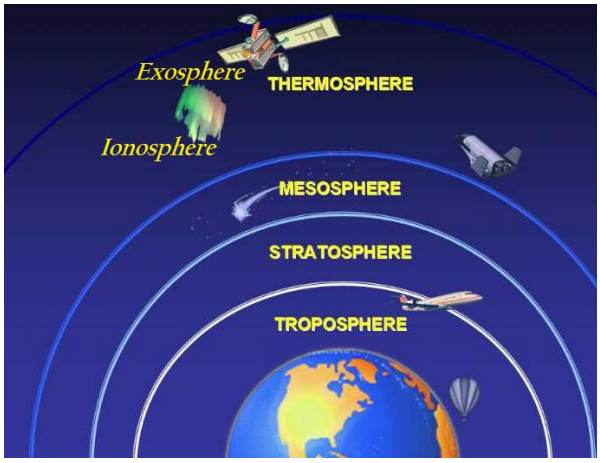
NAME _____ BLOCK _____

6-4.1 WEATHER STUDENT PACKET

- WEATHER WARM UPS
- WEATHER VOCABULARY
- ATMOSPHERE
- GASES
- CAREERS



6-4.5 Investigating Daily Weather

Table 1: Daily Weather Data

Weather Data	Unit of Measurement	Day 1	Day 2	Day 3	Day 4	Day 5
Date						
Temperature						
Precipitation						
Air Pressure						
Cloud Cover						
Wind Direction (direction that the wind is coming from)						
Wind Speed						

Matching: Weather Careers

1. _____ Meteorologist
2. _____ Atmospheric Scientists
3. _____ Climatologist
4. _____ Hydrologist

A. Scientist who studies earth's water.
B. Scientist who studies earth's weather over time.
C. Scientist who studies earth's atmosphere.
D. Scientist who studies earth's weather.

WARM UPS- Week of_____

Tuesday Warm Up-MATCHING THE LAYERS OF THE ATMOSPHERE

1.___ mesosphere

2. ____thermosphere

3. ____ionosphere

4. ____troposphere

5. ____stratosphere

6.___exosphere

A. Layer that has the "Aurora Borealis" (The Northern Lights) or ions.
B. Layer that is where all weather happens.
C. Middle layer where meteors burn up.
D. Layer where the Ozone is.
E. The hottest layer.
F. The layer that exits into space.

Wednesday Warm Up-FILL-IN-THE-BLANK THE GASES OF THE ATMOSPHERE

1. Air pressure _____ as molecules of gases get _____ apart.
2. The stratosphere has a layer of this special gas _____.
3. This gas makes up 78% of the atmosphere: _____.
4. This gas makes up 21% of the atmosphere: _____.
5. These gases make up the leftover 1% of gases in the atmosphere: _____.

Thursday Warm Up-Weather Careers

1.  Nick Bond is a _____ because he studies Washington State's climate over a period of 12 months or more.

2. Someone who studies water on the earth and atmosphere is a _____.

3. Someone who studies the atmosphere is an _____.

4.  Ed Piotrowski of WPDE is a _____ because he studies daily weather.

Friday Warm Up-Quiz Matching Review

A. Troposphere
B. Stratosphere
C. Mesosphere
D. Thermosphere
E. Ionosphere
F. Exosphere

1._____Layer where meteors burn up.

2. ____Layer where weather balloons are.

3. ____Layer with Ozone.

4.____Layer where you would find a satellite.

5. ____Layer where you find the Aurora Borealis.

6.____ The farthest layer out to space.

Weather Vocabulary Standard 6-4.1

Compare the composition and structure of Earth's atmospheric layers (including the gases and differences in temperature and pressure within the layers).

1. atmosphere	The layer of gases that surrounds the planet and makes conditions on Earth suitable for living things.
2. troposphere	The layer of the atmosphere nearest Earth's surface where all weather occurs, temperature is warmest near the ground and decreases as you go higher, (as altitude increases, temperature decreases).
3. stratosphere	The layer above the troposphere, where the ozone layer is contained, the stratosphere is cold except in its upper region where ozone is located (the temperature rises as you move upward)
4. mesosphere	The layer above the stratosphere, where meteors burn up, the temperature decreases as you rise (the mesosphere is the coldest layer)
5. thermosphere	The layer above the mesosphere, temperature increases as you rise
6. ionosphere	Part of the thermosphere, auroras(displays of light in the night sky) are found in this layer, contains electrically charged gas particles
7. exosphere	The outermost layer of the atmosphere, where satellites and space shuttles orbit, (the cold regions of outer space extend from the exosphere)
8. air pressure	The force exerted by the gases pushing on an object, is greatest near the surface of Earth, in the troposphere. (Air pressure decreases through the layers farther from the surface as Earth's pull of gravity decreases.)
9. atmospheric scientist	A scientist who studies the atmosphere, from the surface of the earth to several hundred km above (They collect and analyze data about current and past conditions.)

Release of Air Pollutants in Sunbeam City

Air pollutant	1990 Release	2000 Release
Carbon monoxide	793,225	943,680
Nitrogen oxides	132,563	143,212
Sulfur dioxide	65,816	63,466
Particulate matter	123,458	234,650

10. meteorologist	A scientist who studies weather (they measure and record data such as wind speed, air pressure, and precipitation.)

Mean Monthly Temperature (°C) in Sunbeam City

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1961–1971	7	11	10	17	23	29	33	30	26	16	8.5	8
1994–2004	8	11	13	18	23	29	33	31	27	20	13	8

11. climatologist	A scientist who study the earth's climates. (They use temperature and precipitation to describe different climates.)

Mean Monthly Temperature and Precipitation for Sunbeam City (1971–2000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature (°C)	7	11	13	18	23	29	33	31	27	20	13	8
Precipitation (cm)	1.5	1.8	1.5	0.4	0.6	0.2	1.1	1.1	0.8	0.6	0.8	1.0

12. hydrologist	A scientist who study the distribution and movement of earth's water.

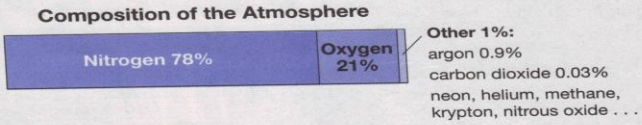
Groundwater Use Since 1940

Year	Groundwater used (billions of liters per year)
1940	26
1950	43
1960	59
1970	110
1980	92
1990	76
2000	92

Getting the Idea

Earth is surrounded by a blanket of a gas mixture that we call the **atmosphere**. The air around you is part of this atmosphere. The most common gas in the air is nitrogen. Nitrogen makes up 78% of atmospheric gas. The most familiar component of our air, oxygen, makes up about 21%, while the remaining 1% is composed of argon, water vapor, carbon dioxide, and other gases. Many of these gases are vital to living things. They protect, support, and do not harm living things. Also in the atmosphere are small particles such as sea salt, smoke, dust, and volcanic ash.

Composition of the Atmosphere



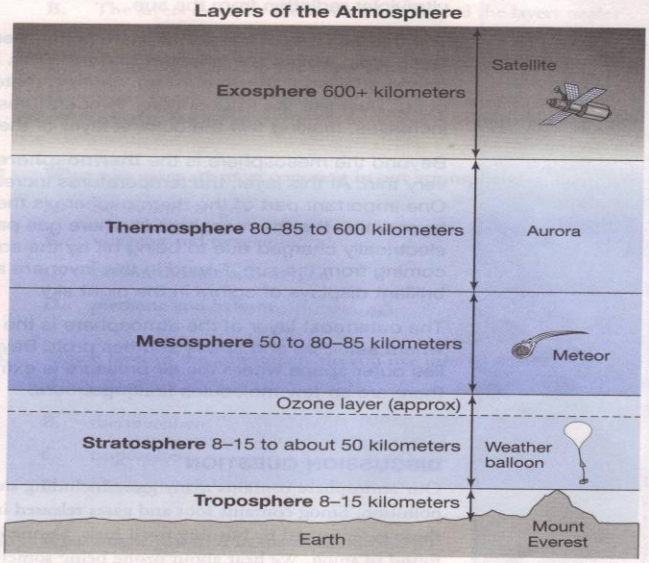
Air Pressure in the Atmosphere

Air pressure is greater nearer Earth's surface. At sea level, there are more molecules pushing down from above. In contrast, air pressure decreases as you move upward away from sea level. The air outside an airplane flying high in the sky has fewer molecules in it. So the air pressure in this part of the atmosphere is less than the atmosphere down on the airport runway. Some people find it harder to breathe on high mountains. There are fewer molecules in the atmosphere at high elevations, so there is less oxygen in the air and the air pressure is less.

Layers of the Atmosphere

Earth's atmosphere is divided into layers based on differences of temperature. These differences are a result of the way the sun's energy is absorbed as it travels through the atmosphere. Some layers contain gases that easily absorb the sun's energy, whereas other layers do not. The layers that absorb the sun's energy are warmer than the other layers. This is the reason that the various layers have different temperatures. Earth's five atmospheric layers are the troposphere, stratosphere, mesosphere, thermosphere, and exosphere.

Layers of the Atmosphere



The layer closest to the ground is known as the **troposphere**. It contains almost all of Earth's carbon dioxide, water vapor, air pollution, weather, clouds, and life forms. Temperatures are warmest at the surface of the earth and decrease as you go higher in the troposphere.

Above the troposphere is the **stratosphere** where the air is very thin, containing little moisture. It is extremely cold in the lower part of the stratosphere. At the top of the stratosphere, there is a layer of ozone. This ozone layer, if we take steps to reduce global warming, will continue to help protect the earth from the sun's ultraviolet radiation. The ozone absorbs the UV radiation, keeping it from getting down to the surface of the Earth where it can harm living organisms. In the stratosphere, temperature increases as altitude increases due to the ozone molecules absorbing ultraviolet radiation from the sun.

The middle layer of the atmosphere is the **mesosphere**. In this layer, radio waves are reflected to Earth. This is the layer where meteors falling to Earth burn up, causing meteor showers to occur. Just like the troposphere, temperatures drop as altitude increases, making this the coldest layer of the atmosphere.

Beyond the mesosphere is the **thermosphere** where the air is very thin. At this layer, the temperatures increase with altitude. One important part of the thermosphere is the **ionosphere**. This layer within the thermosphere is where gas particles are electrically charged due to being hit by the solar energy that is coming from the sun. Found in this layer are auroras which are brilliant displays of colors in the night sky.

The outermost layer of the atmosphere is the **exosphere**. This is where satellites and space shuttles orbit. Beyond the exosphere lies outer space where the air pressure is extremely low because there are so few molecules floating around.

DISCUSSION QUESTION

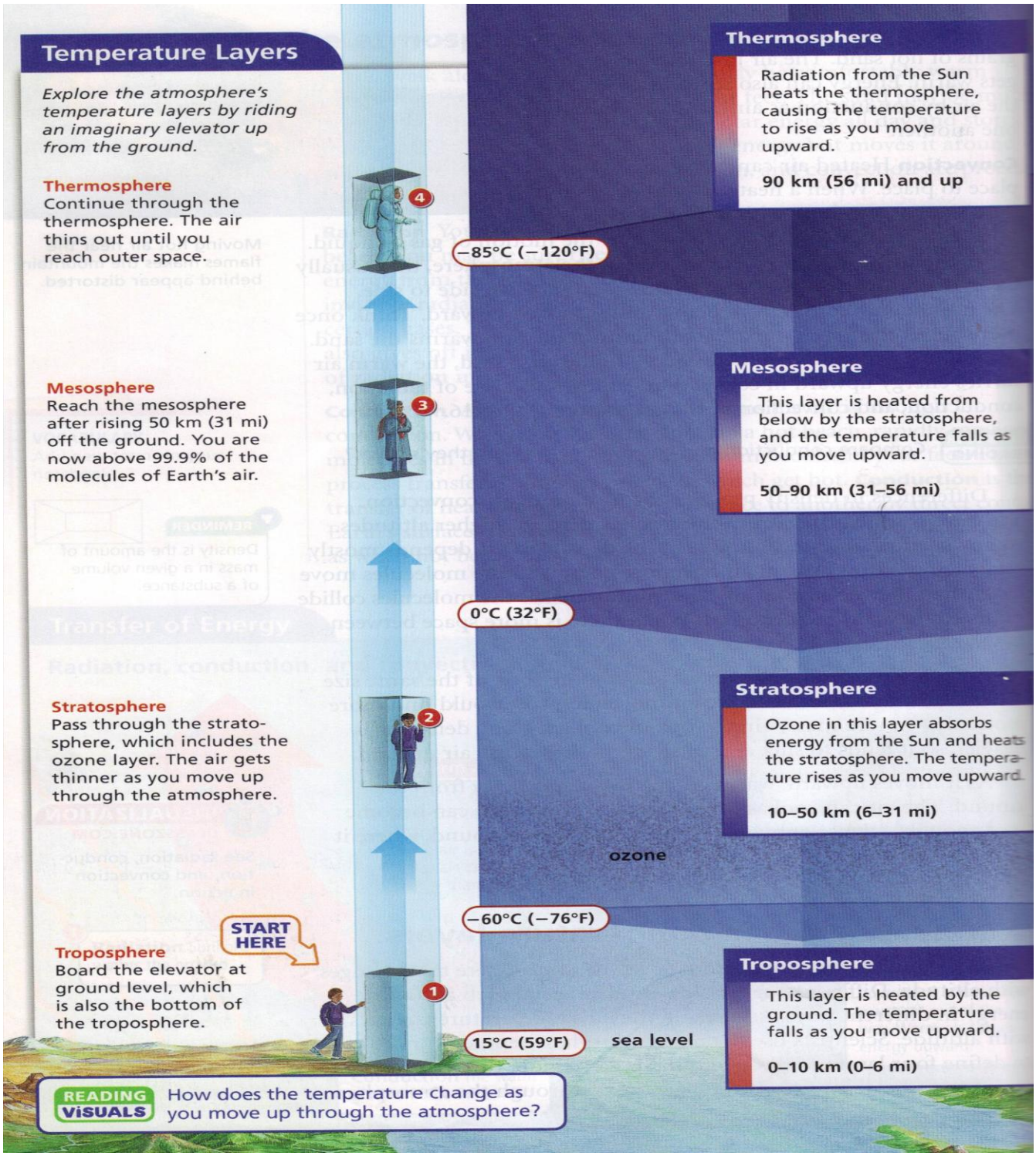
Our atmosphere contains many gases including smog—a type of pollution. Smog contains soot and gases released in car exhaust, as well as those gases caused by burning fossil fuels. Ozone is another chemical found in smog. We hear about ozone being something good. How would you explain to a friend that ozone can be bad?

1. Why do different layers of the atmosphere have different temperatures?
   - **A.** The higher you go up, the colder it gets.
   - **B.** The layers closer to the sun are hotter, and the layers nearer the Earth are colder.
   - **C.** There is no wind in the upper atmosphere.
   - **D.** Some layers contain gases that absorb the sun's energy, while other layers do not.

2. What two gases are most common in our atmosphere?
   - **A.** argon and oxygen
   - **B.** nitrogen and oxygen
   - **C.** carbon dioxide and oxygen
   - **D.** methane and helium

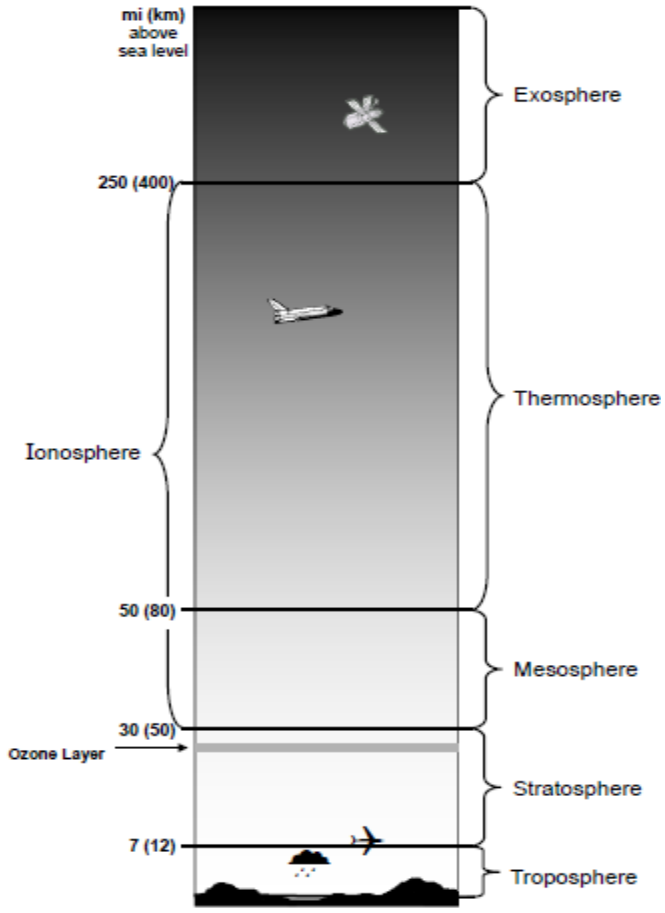
3. Which layer of the atmosphere do you live in?
   - **A.** exosphere
   - **B.** thermosphere
   - **C.** troposphere
   - **D.** mesosphere

4. What might you find in the exosphere?
   - **A.** space shuttle
   - **B.** jet plane
   - **C.** radio waves
   - **D.** hot air balloon

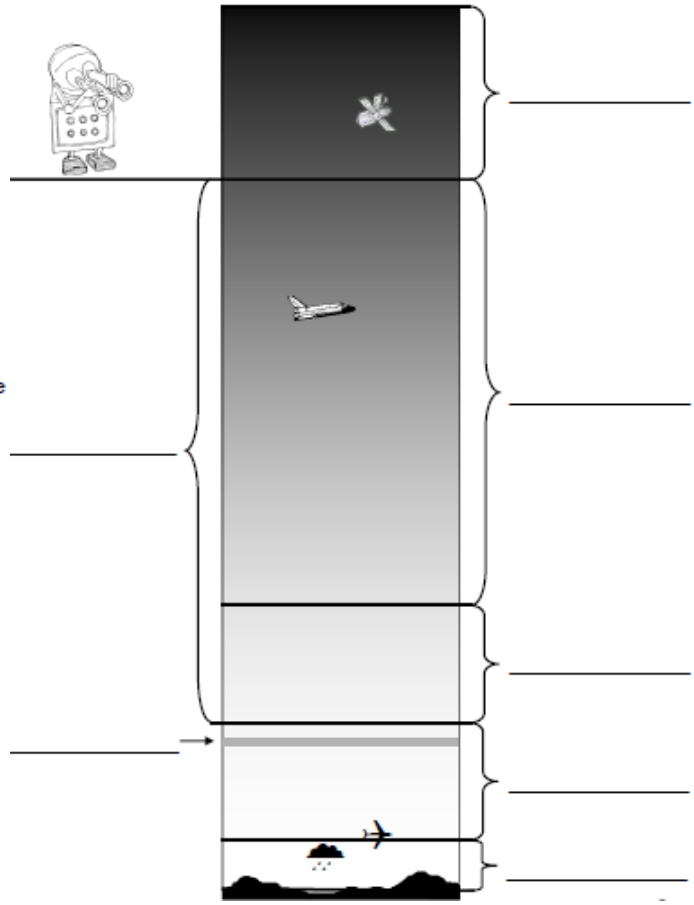


Atmospheric Layers Foldable Project	
Labeled layers of the atmosphere, including the ozone, ionosphere, and exosphere.	20 points _____
Illustrated what happens in each layer.	20 points _____
Diagramed types of gases found in each layer.	20 points _____
Listed at least 3 facts about each layer using information from graphic organizer on atmospheric layers.	30 points _____
Neat and colorful	10 points _____
Total score	

Atmospheric Layers



Label the 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

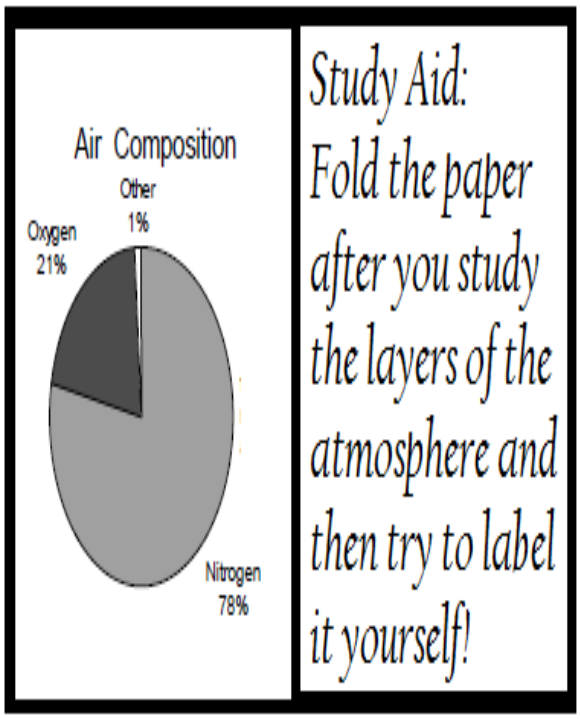
The **stratosphere** is just above the troposphere, starting at an average altitu of about 7 miles above sea level. The air here is more dry and less dense. Only th highest clouds can be found in this layer. Aircraft often fly in the lower stratosphere escape the turbulence present in the troposphere. 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 "middl 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 trav eling at an altitude of more than 50 miles above sea level is considered an astronau 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.



Study Aid: Fold the paper after you study the layers of the atmosphere and then try to label it yourself!

Name: _____ Date: _____ Block: _____

Atmosphere Study Guide

List three (3) important functions of the atmosphere:

1. _____

2. _____

3. _____

4._____

5._____

Name the layers of the atmosphere in order from Earth to space and one thing you remember about it:

1. _____

2. _____

3. _____

4. _____

Part of 4

5. _____

6. _____

What are the two most abundant gases in the atmosphere and what are their percentages?

1. _____% _____
2. _____% _____

What does the ozone layer absorb? _____

The layers of the atmosphere are classified according to _____

In which layer are the important gases that are necessary for weather conditions found? _____

How does the temperature change as you move upward through each layer of the atmosphere?

1. **Layer:** _____ **change:** _____
2. **Layer:** _____ **change:** _____
3. **Layer:** _____ **change:** _____
4. **Layer:** _____ **change:** _____
5. **Layer:** _____ **change:** _____

When does the temperature change from one extreme to the other in the stratosphere? Why?

The ozone layer is found in the _____.

What is an atmospheric scientist? _____.

What is a hydrologist? _____.

What is a meteorologist? _____.

What is a climatologist? _____.

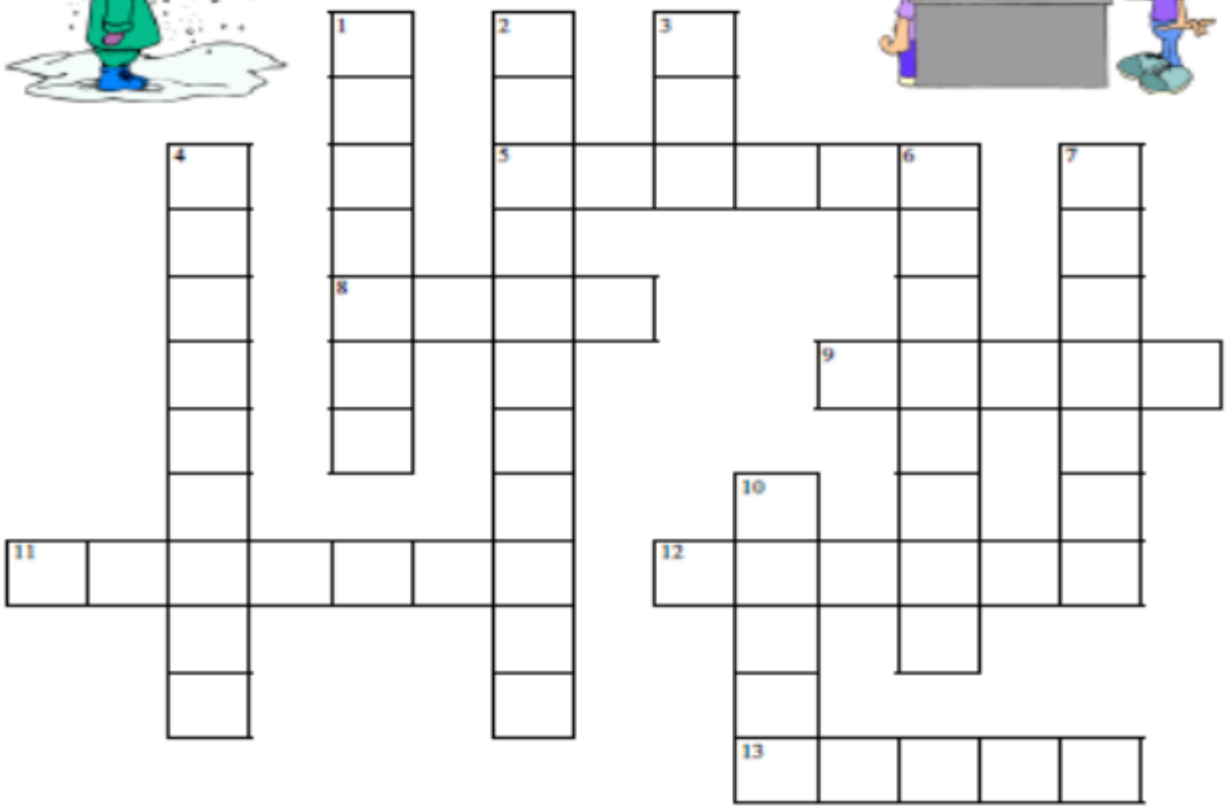
Layers & Gases of the Atmosphere

Match each layer with its description.

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

The Puzzling Atmosphere

How well do you know your atmosphere?
Use the clues below to help fill in the puzzle.



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 five _____ .
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.