Name_____ Date_____

Layers of the Atmosphere

The **atmosphere** is a layer of gases around Earth. It is held in place by Earth's gravity. We usually call it air. The atmosphere is made up of about 78% nitrogen and 21% oxygen. There is also some water vapor, a little carbon dioxide, and some other gases in very small amounts. Our atmosphere protects us by absorbing ultraviolet (UV) rays from the sun. The atmosphere also helps us by reducing temperature increases or decreases between day and night. Without the atmosphere, there could not be any life on Earth. People and animals need oxygen to breathe. Plants need carbon dioxide to do photosynthesis.

The gases in the atmosphere are thicker or denser closest to the ground. The higher up you go, the thinner the atmosphere becomes. There is no definite boundary between the atmosphere and outer space. The gases slowly become thinner and drift into space. As you move up through the atmosphere, it changes. It is made up of several layers.

The layer closest to the earth is called the troposphere. This is where most of the water vapor is. The higher up you go in this layer, the colder the air gets. The troposphere is higher over the equator and lower at the poles. The "top" of the troposphere is about 7 km at the poles and 17 km over the equator. Most weather takes place in this layer. The average temperature year-round at the surface of the Earth is a very comfortable 59ºF. About three-fourths of the gas molecules in the atmosphere are found in this layer.

The next layer is called the stratosphere. The higher up you go in the stratosphere, the higher the temperature gets. This is because ozone is found here. This is a layer of special oxygen molecules high above the earth. It absorbs harmful rays of light from the sun and changes them into heat. The

Layers of the Atmosphere (cont'd)

ozone layer acts like a shield to protect us from harmful UV radiation from the sun. The top of the stratosphere is about 50 km above the earth's surface. This is where most commercial jets fly. That's because there is no weather to disturb the flight but there is a steady wind.

Above the stratosphere is the mesosphere. This middle layer is the coldest layer of the atmosphere. The higher you go, the colder it gets. It can get as cold as -130ºF Fahrenheit!

Beyond the mesosphere is the thermosphere. The higher you go, the hotter it gets. The temperature in this hottest layer can be more than 2500ºF. The gases in this layer are very thin. The thermosphere includes a region called the ionosphere. It is special because it makes long distance radio communication possible by reflecting radio waves back to Earth. It is also where the aurora borealis are seen. The auroras are sometimes called the northern lights. These swirling, colorful lights are caused by particles from the sun entering Earth's atmosphere. The space shuttle orbits in the upper part of the thermosphere.

The last layer is the exosphere. Atoms of air are more and more spread out. Mostly hydrogen and helium are found here. Beyond this layer is outer space. There is no definite boundary between the two. The atmosphere just becomes thinner and fades away into space. When astronauts travel back to Earth from space, an altitude of 120 km or 75 miles marks the place where atmospheric effects become noticeable during reentry. We might say this height is the boundary between Earth's atmosphere and outer space.

Name_____ Date_____

Layers of the Atmosphere Questions

Multiple Choice Questions:

1. How many layers of the atmosphere are there?
    a. three
    b. four
    c. five
    d. six

2. What is the atmosphere?
    a. atoms
    b. a layer of gases around the Earth
    c. outer space
    d. oxygen

3. Which gas makes up most of the atmosphere?
    a. oxygen
    b. hydrogen
    c. nitrogen
    d. carbon dioxide

4. What is the layer of the atmosphere closest to the Earth?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

5. In which layer does weather happen?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

6. In which layer of the atmosphere is the ozone layer found?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

Name_____ Date_____

Layers of the Atmosphere Questions (cont'd)

7. In which layer are most of the gas molecules found?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

8. Which layer is the coldest?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

9. Which layer is the hottest?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

10. Oxygen, the gas we need to breathe, makes up what percent of the atmosphere?
    a. 78%
    b. 21%
    c. 17%
    d. 59%

11. What causes the northern lights or the aurora borealis?
    a. particles from the sun entering the Earth's atmosphere
    b. rainbows in the upper atmosphere
    c. fairy lights
    d. water vapor in the atmosphere

12. In what layer do the northern lights occur?
    a. troposphere
    b. stratosphere
    c. mesosphere
    d. thermosphere
    e. exosphere

Name_____ Date_____

Layers of the Atmosphere Questions (cont'd)

Ordering: Put these layers of the atmosphere in order from the Earth's surface outward:

_____thermosphere

_____troposphere

_____exosphere

_____stratosphere

_____mesosphere

Matching: Match the name of the layer to its description.

1. thermosphere	a. the middle, coldest layer
2. troposphere	b. the hottest layer
3. exosphere	c. the layer where weather happens
4. stratosphere	d. where the ozone layer is found
5. mesosphere	e. where astronauts "feel" the atmosphere begins

Draw and Learn:

Make a booklet of the five layers of Earth's atmosphere. For each page, label the layer of the atmosphere. Draw a picture of what you might find there. Show where it is in relation to the Earth below.

Name_____ Date_____

Layers of the Atmosphere Answers

Multiple Choice

1. c
2. b
3. c
4. a
5. a
6. b
7. a
8. c
9. d
10. b
11. a
12. d