Cincinnati Public Schools

Remote Learning Plan

Grade 7

SCPA - 7 Science Moraga

Week 4- Atmosphere

Student Name_____ Bell _____

Weekly Outcomes:

- **Learning Outcome -Week 4: Atmosphere - Describe the properties of the atmosphere**
- **Directions** - Do your Reading and Questions for the week. Then select and complete activities from the menu for that week. **OR** or go one Schoology
- **Task** - Complete Reading Comprehension and the Read and Respond Non Fiction for the week and 100 points worth of work from the menu **for the week.**
- **How do I know if my work is good?**
    - Information is accurate.
    - All parts of the question are answered completely.
    - Work is detailed and completes the required task.
    - If applicable, work is colorful and visually appealing.
- **What if I need help?**
    - Visit www.discoveryeducation.com and read the Engage and Explore tabs for the following lessons (Do this through Schoology on the left hand side bar)
        - 3.3 (Earth's Spheres)
    - Visit http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/earths-atmosphere.htm and explore the slide shows/videos listed below. Once finished, complete the "Test Yourself" activity.
        - Earth's Atmosphere

Week 4: Atmosphere - Describe the properties of the atmosphere

Atmosphere

This text is from the U.S. National Oceanic and Atmospheric Administration: National Weather Service.

The atmosphere is a cloud of gas and suspended solids extending from the Earth's surface out many thousands of miles, becoming increasingly thinner with distance but always held by the Earth's gravitational pull.

The atmosphere surrounds the Earth and holds the air we breathe; it protects us from outer space; and holds moisture (clouds), gases, and tiny particles. In short, the atmosphere is the protective bubble in which we live.

This protective bubble consists of several gases (listed in the table to the right) with the top four making up 99.998% of all gases. Of the dry composition of the atmosphere nitrogen, by far, is the most common.

Chemical makeup of the atmosphere excluding water vapor

Gas	Symbol	Content	
Nitrogen	N_2	78.084%	99.998%
Oxygen	O_2	20.947%	
Argon	Ar	0.934%	
Carbon dioxide	CO_2	0.033%	
Neon	Ne	18.20 parts per million	
Helium	He	5.20 parts per million	
Krypton	Kr	1.10 parts per million	
Sulfur dioxide	SO_2	1.00 parts per million	
Methane	CH_4	2.00 parts per million	
Hydrogen	H_2	0.50 parts per million	
Nitrous oxide	N_2O	0.50 parts per million	
Xenon	Xe	0.09 parts per million	
Ozone	O_3	0.07 parts per million	
Nitrogen dioxide	NO_2	0.02 parts per million	
Iodine	I_2	0.01 parts per million	
Carbon monoxide	CO	trace	
Ammonia	NH_3	trace	

Nitrogen dilutes oxygen and prevents rapid burning at the Earth's surface. Living things need it to make proteins. Oxygen is used by all living things and is essential for respiration. It is also necessary for combustion or burning.

Argon is used in light bulbs, in double-pane windows, and used to preserve the original Declaration of Independence and the Constitution. Plants use carbon dioxide to make oxygen. Carbon dioxide also acts as a blanket that prevents the escape of heat into outer space.

Chemical makeup of the atmosphere including water vapor

Water Vapor	Nitrogen	Oxygen	Argon
0%	78.084%	20.947%	0.934%
1%	77.30%	20.70%	0.92%
2%	76.52%	20.53%	0.91%
3%	75.74%	20.32%	0.90%
4%	74.96%	20.11%	0.89%

These percentages of atmospheric gases are for a completely dry atmosphere. The atmosphere is rarely, if ever, dry. Water vapor (water in a 'gas' state) is nearly always present up to about 4% of the total volume.

In the Earth's desert regions (30°N/S) when dry winds are blowing, the water vapor contribution to the composition of the atmosphere will be near zero.

Water vapor contribution climbs to near 3% on extremely hot/humid days. The upper limit, approaching 4%, is found in tropical climates. The table (left) shows the changes in atmospheric composition with the inclusion of different amounts of water vapor. Earth's atmosphere is a cloud of gas and suspended solids that surrounds the planet. The envelope of gas surrounding the earth changes from the ground up. Five distinct layers have been identified using. . .

- thermal characteristics (temperature changes),
- chemical composition,
- movement, and
- density.

Each of the layers are bounded by "pauses" where the greatest changes in thermal characteristics, chemical composition, movement, and density occur.

Exosphere

This is the outermost layer of the atmosphere. It extends from the top of the thermosphere to 6,200 miles (10,000 km) above the earth. In this layer, atoms and molecules escape into space and satellites orbit the earth. At the bottom of the exosphere is the thermopause located around 375 miles (600 km) above the earth.

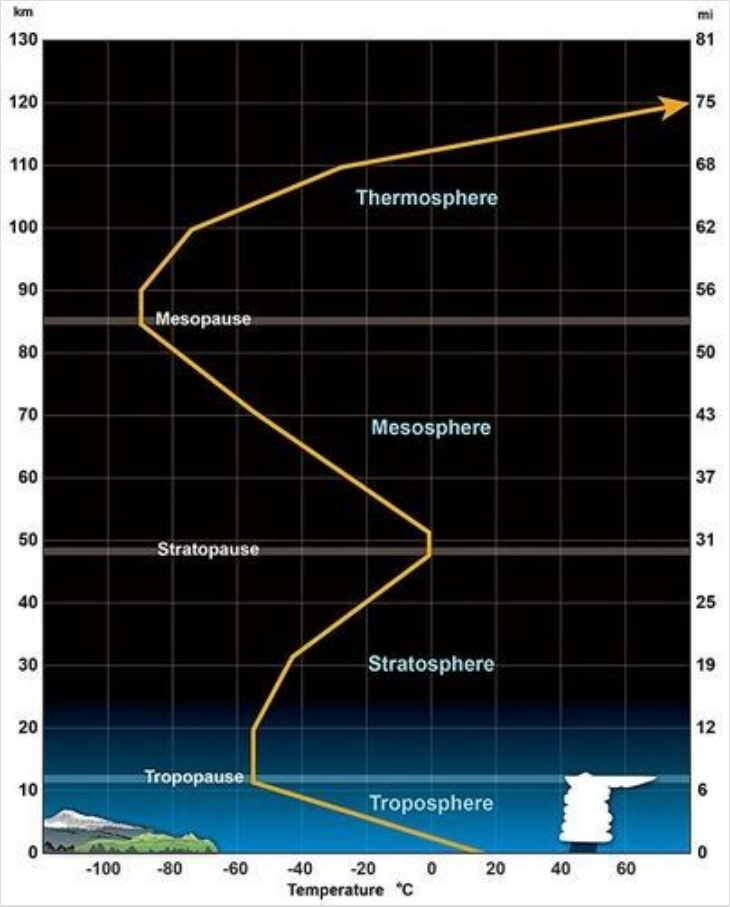
Thermosphere

Between about 53 miles (85 km) and 375 miles (600 km) lies the thermosphere. This layer is known as the upper atmosphere. While still extremely thin, the gases of the thermosphere become increasingly more dense as one descends toward the earth.

As such, incoming high energy ultraviolet and x-ray radiation from the sun begins to be absorbed by the molecules in this layer and causes a large temperature increase.

Because of this absorption, the temperature increases with height. From as low as -184°F (-120°C) at the bottom of this layer, temperatures can reach as high as 3,600°F (2,000°C) near the top.

However, despite the high temperature, this layer of the atmosphere would still feel very cold to our skin due to the very thin atmosphere. The high temperature indicates the amount of the energy absorbed by the molecules but with so few in this layer, the total number of molecules is not enough to heat our skin.



Mesosphere

This layer extends from around 31 miles (50 km) above the earth's surface to 53 miles (85 km). The gases, including the oxygen molecules, continue to become more dense as one descends. As such, temperatures increase as one descends rising to about 5°F (-15°C) near the bottom of this layer.

The gases in the mesosphere are now thick enough to slow down meteors hurtling into the atmosphere, where they burn up, leaving fiery trails in the night sky. Both the stratosphere (next layer down) and the mesosphere are considered the middle atmosphere. The transition boundary, which separates the mesosphere from the stratosphere, is called the stratopause.

Stratosphere

The Stratosphere extends around 31 miles (50 km) down to anywhere from 4 to 12 miles (6 to 20 km) above the earth’s surface. This layer holds 19 percent of the atmosphere's gases but very little water vapor. In this region the temperature increases with height. Heat is produced in the process of the formation of Ozone and this heat is responsible for temperature increases from an average -60°F (-51°C) at tropopause to a maximum of about 5°F (-15°C) at the top of the stratosphere.

This increase in temperature with height means warmer air is located above cooler air. This prevents "convection" as there is no upward vertical movement of the gases. As such the location of the bottom of this layer is readily seen by the 'anvil-shaped' tops of cumulonimbus clouds.

Troposphere

Known as the lower atmosphere almost all weather occurs in this region. The troposphere begins at the earth's surface and extends from 4 to 12 miles (6 to 20 km) high. The height of the troposphere varies from the equator to the poles. At the equator it is around 11-12 miles (18-20 km) high, at 50°N and 50°S, 5½ miles and at the poles just under four miles high.

As the density of the gases in this layer decrease with height, the air becomes thinner. Therefore, the temperature in the troposphere also decreases with height in response. As one climbs higher, the temperature drops from an average around 62°F (17°C) to -60°F (-51°C) at the tropopause.

Read and Respond
NONFICTION

Article/Author: _____

Main Idea:

_____
_____
_____
_____

Supporting Detail 1:

Supporting Detail 2:

Supporting Detail 3:

Three Important Facts or Statistics:

1. _____
2. _____
3. _____

One Opinion From the Article:

_____
_____
_____

My Opinion About the Article:

_____
_____
_____
_____
_____

Author's Purpose

☐ Persuade ☐ Inform ☐ Entertain
☐ Explain ☐ Describe

_____
_____
_____
_____
_____

Text Structure

☐ Description ☐ Problem & Solution
☐ Order & Sequence ☐ Cause & Effect
☐ Compare & Contrast

_____
_____
_____
_____
_____

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GRAPHING DIRECTIONS:

Table 1 contains the average temperature readings at various altitudes in the Earth's atmosphere.

1. **Plot this data on the graph on the worksheet**, and **connect adjacent points with a smooth curve**.

Be careful to plot the negative temperature numbers correctly.

This profile provides a general picture of temperature at any given time and place; however, the actual temperature may deviate from the average values, particularly in the lower atmosphere.

TABLE 1
Average Temperature Readings at Various Altitudes

Altitude (km)	Temp (^{o}C)	Altitude (km)	Temp (^{o}C)
0	15	52	-2
5	-18	55	-7
10	-49	60	-17
12	-56	65	-33
20	-56	70	-54
25	-51	75	-65
30	-46	80	-79
35	-37	84	-86
40	-22	92	-86
45	-8	95	-81
48	-2	100	-72

2. **Label the different layers of the atmosphere** and the separating boundaries between each layer.

3. Mark the general **location of the ozone layer**.

4. You should place eight words on your graph in the correct locations:

troposphere	**stratosphere**	**mesosphere**	**thermosphere**
tropopause	**stratopause**	**mesopause**	**ozone layer**

QUESTIONS:

1. What is the basis for dividing the atmosphere into four layers?

2. Does the temperature increase or decrease with altitude in the troposphere? stratosphere? mesosphere? thermosphere?

3. Copy the table below onto your paper and fill in the boxes.

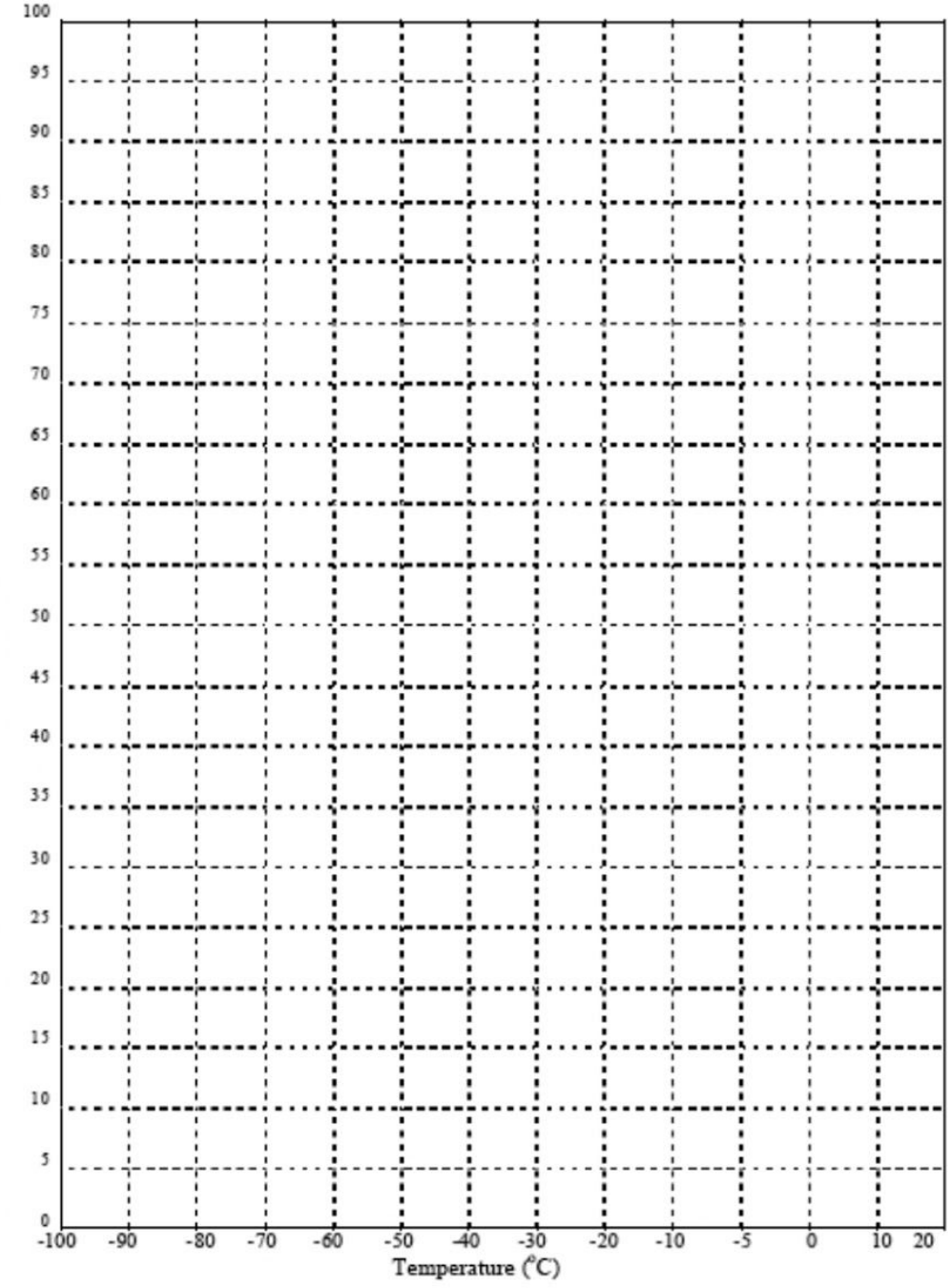
	Height (km)	Temp (C)
tropopause:		
stratopause:		
mesopause:		

4. Explain what causes the temperature to increase with height through the stratosphere, and decrease with height through the mesosphere.

5. Explain what causes the temperature to decrease with height in the troposphere.

Graph of Temperature at Various Altitudes

ALTITUDE (km above sea level – Y-axis)



Atmosphere Menu

Directions: Choose activities from the menu below after finishing your Reading Comprehension and worksheets for the week. You should have a total of 100 points.

25 POINTS

Week 4: Atmosphere - Describe the properties of the atmosphere

- ❏ Create a model of the atmosphere. Include all of its layers. Be creative!
- ❏ Design a flipbook for the layers of the atmosphere and their composition..

50 POINTS

Week 4: Atmosphere - Describe the properties of the atmosphere

- ❏ Venus is considered Earth's sister planet. Create a Venn diagram to compare and contrast the atmospheres of the two planets.
- ❏ Many people are "going green" and becoming concerned about the environment. Considering the layers of the atmosphere, their composition, and their impact on our lives, create a public service announcement that discusses how people can help the atmosphere.

75 POINTS

Week 4: Atmosphere - Describe the properties of the atmosphere

- ❏ Each layer of the atmosphere serves an important role in our life on Earth's surface. After deciding which layer is the most important, create a news report proclaiming the disappearance of this layer and the effect this will have on our daily lives.
- ❏ You are the new image consultant for the superhero "Mr. Troposphere." He has this name because his super powers greatly resemble the characteristics of the troposphere. Write a story or create a video about his latest adventure.

Atmosphere Menu Work -Create a one pager. For each box not used color it in