Name: _____ Period: _____

Layers of the Atmosphere Packet

Component → 8.2.1

Guiding Questions (questions you should be able to answer by the end of this packet before taking the test!)

1. What are the atmosphere layers in order from the ground to the sky?
2. What are 2-3 items that can be found in each layer of the atmosphere?
3. How does the density and temperature change as you move from one layer to the next?

Agenda (fill in the squares and circles as you complete everything on the agenda)

Layers of the Atmosphere Song and #hashtags → *10 Minutes* → Page 2

- Listen to the layers science song on the science department webpage.

Layers Reading & Diagram → 40 Minutes → Page 3-5

- Highlight key characteristics of every layer as you read. Complete the worksheet.
- *Show your science teacher your packet!*

Layers Density Column Lab → *30 Minutes* → Page 6

- Follow the instructions at a lab station to complete the Layers Density Column
- When you are done, make sure you answer the analysis questions.

Layers Note Video → *12 Minutes* → Page 7

- Watch the Layers Note Video while following along on the notes page
- Watch the World Record Stratosphere Space Jump video after notes

Layers Drawing → 10 Minutes → Page 8

- Complete the Layers Drawing. Make sure you are following the directions and include all of the steps

Guiding Questions → 5 Minutes → Page 9

- *Show your science teacher your packet!*

Study for the Layers of the Atmosphere QUIZ tomorrow!

Quiz → 10 Minutes → fill in date to take the quiz _____

- Review your notes
- Give your science teacher your packet and ask for a quiz

70% or Above	69% or Under
• KEEP this packet safe! You need it for the unit test! • See your teacher to get the Ozone Packet.	• Highlight your notes • Study your packet • Ask any questions you might have • Retake the Layers quiz tomorrow

Unit Test will cover 4 packets: Layers of the Atmosphere, Ozone, Greenhouse, and Global Warming

Name: _____ Period: _____

LAYERS OF THE ATMOSPHERE SONG

- **Click on the Layers of the Atmosphere song link on the 8th grade Science Department webpage.**
- **Create a hashtag for every layer as you listen to the atmosphere song. Your hashtag should include a special characteristic for each layer such as a feature or temperature.**
- **Have fun with creating your original atmosphere hashtags!**

_____

_____

_____

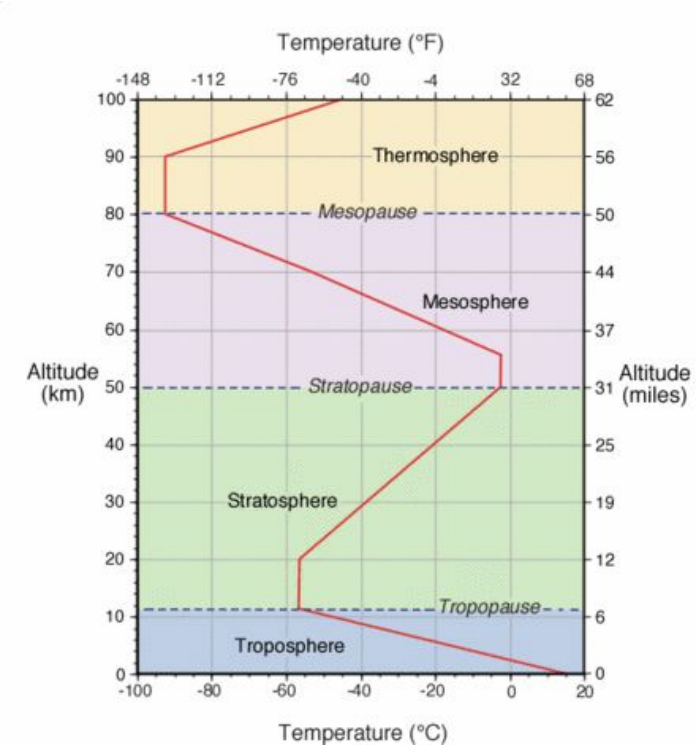
_____

Name: _____ Period: _____

Layers of the Atmosphere Reading

Read and highlight important characteristics for each layer. Pay special attention to features and temperature.

Background:
Based on temperature changes, the Earth's atmosphere is divided into layers. The layers include the troposphere, stratosphere, mesosphere, thermosphere, and exosphere.



Troposphere:
You live in the inner, or lowest, layer of Earth's atmosphere, the troposphere (TROH puh sfeer). Tropo- means "turning" or "changing." Conditions in the troposphere are more variable than in the other layers. The troposphere is the layer of the atmosphere in which Earth's weather occurs. The depth of the troposphere varies from 16 kilometers above the equator to less than 9 kilometers above the North and South poles. Although it is the shallowest layer, the troposphere contains almost all of the mass of the atmosphere. As altitude increases in the troposphere, the temperature decreases. On average, for every I-kilometer increase in altitude, the air gets about 6.5 Celsius degrees cooler. At the top of the troposphere, the temperature stops decreasing and stays at about -60°C. Water here forms thin, feathery clouds of ice.

The Stratosphere:
The stratosphere extends from the top of the troposphere to about 50 kilometers above Earth's surface. Strato- means "layer" or "spread out." The stratosphere is the second layer of the atmosphere and contains the ozone layer. The lower stratosphere is cold, about -60°C. Surprisingly, the upper stratosphere is warmer than the lower stratosphere. Why is this? The middle portion of the stratosphere contains a layer of air where there is much more ozone than in the rest of the atmosphere. When the ozone absorbs energy from the sun, the energy is converted into heat, warming the air. The ozone layer is also important because it protects Earth's living things from dangerous ultraviolet radiation from the sun. We can also find weather balloons and Jets in the Stratosphere.

The Mesosphere:
Above the stratosphere, a drop in temperature marks the beginning of the next layer, the mesosphere. Meso- means "middle:' so the mesosphere is the middle layer of the atmosphere. The mesosphere begins 50 kilometers above Earth's surface and ends at an altitude of 80 kilometers. In the outer mesosphere, temperatures approach -90°C. The mesosphere is the layer of the atmosphere that protects Earth's surface from being hit by most meteoroids. Meteoroids are chunks of stone and metal from space. What you see as a shooting star, or meteor, is the trail of hot, glowing gases the meteoroid leaves behind in the mesosphere.

-Continue to read and highlight on the next page-

Name: _____ Period: _____

The Thermosphere:

Near the top of the atmosphere, the air is very thin. At 80 kilometers above Earth's surface, the air is only about 0.001 percent as dense as the air at sea level. It's as though you took a cubic meter of air at sea level and expanded it into 100,000 cubic meters at the top of the mesosphere. The outermost layer of Earth's atmosphere is the thermosphere. The thermosphere extends from 80 kilometers above Earth's surface outward into space. It has no definite outer limit, but blends gradually with outer space. The thermo- in thermosphere means "heat." Even though the air in the thermosphere is thin, it is very hot, up to 1,800°C. This is because sunlight strikes the thermosphere first. Nitrogen and oxygen molecules convert this energy into heat. Despite the high temperature, you would not feel warm in the thermosphere. An ordinary thermometer would show a temperature well below zero. Why is that? Temperature is the average amount of energy of motion of each molecule of a substance. The gas molecules in the thermosphere move very rapidly, so the temperature is very high. However, the molecules are spaced far apart in the thin air. There are not enough of them to collide with a thermometer and warm it very much. Brilliant light displays, such as those shown in, also occur in the ionosphere. In the Northern Hemisphere, these displays are called the Northern Lights, or the aurora borealis. Auroras are caused by particles from the sun that enter the thermosphere near the poles. These particles strike atoms, causing them to glow.

Exosphere:

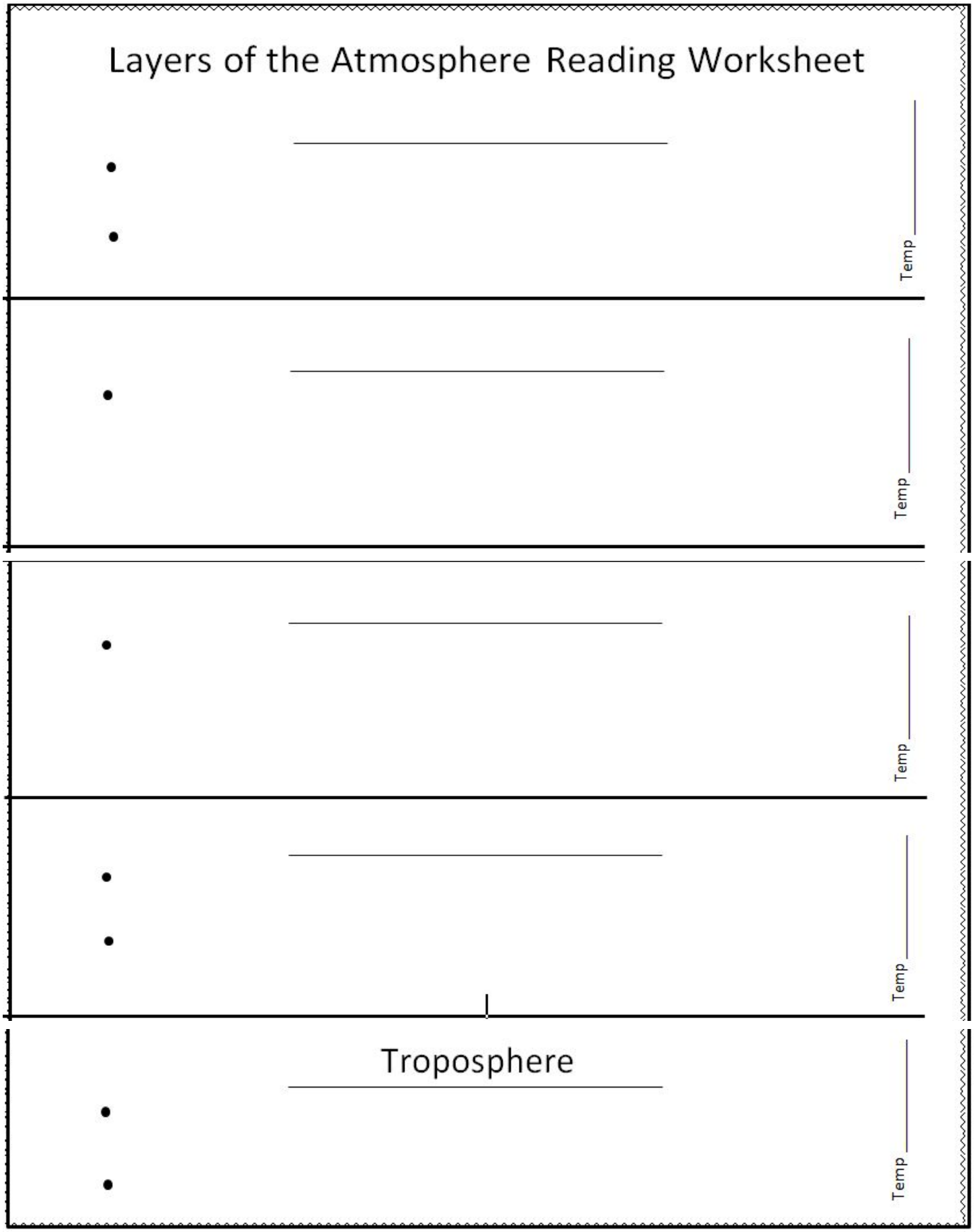
Exo- means "outer," so the exosphere is the outer portion of the thermosphere. The exosphere extends from about 400 kilometers outward for thousands of kilometers. Our space shuttles and satellites can be found in the exosphere. Since the exosphere is the outer portion of the thermosphere, it also increases in temperature.

Procedure:

1. Complete ALL of the following steps and check them off as you finish each one.
2. On the diagram on the next page, fill in the NAME of each of the following atmosphere layers in order:
   - ❑ Troposphere (look it is already written on your paper!)
   - ❑ Stratosphere
   - ❑ Mesosphere
   - ❑ Thermosphere
   - ❑ Exosphere
3. Fill in the temperature information on the right side of the graph.
   - ❑ TEMP: Does it INCREASE or DECREASE in every layer.
4. On the chart below label the following features next to the bullet points:
   - ❑ Aurora Borealis - Northern Lights
   - ❑ Clouds
   - ❑ Planes
   - ❑ Meteors
   - ❑ Ozone Layer
   - ❑ Satellites
   - ❑ Birds
   - ❑ Space Shuttles
   - ❑ Weather

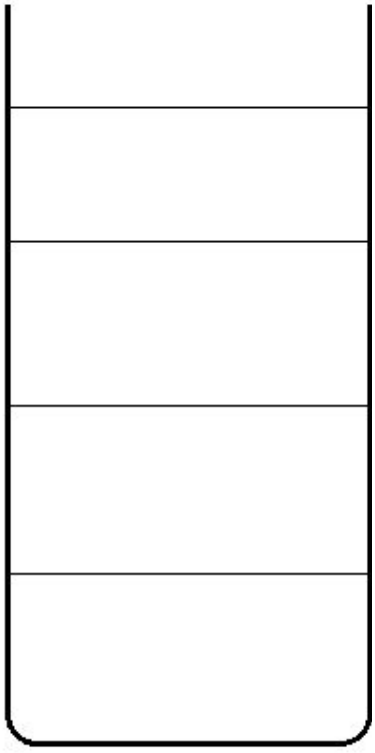
Name: _____ Period: _____

Layers of the Atmosphere Reading Worksheet



Name: _____ Period: _____

Layers of the Atmosphere Density Lab



Complete the following:

1. In the diagram ABOVE, color in the layers as represented in your test tube. Use colored pencils or markers.
2. Label your colored layers with the different layers of the atmosphere.
    - HINT: THE TROPOSPHERE SHOULD BE AT THE BOTTOM
3. On the outside of your drawing place the real life "features" of every layer in the correct location as per your diagram.

4. Answer: How does the density of the air change as you increase in altitude?

_____

_____

_____

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Layers of the Atmosphere Notes

Atmosphere
- The whole layer of air that surrounds Earth
- A mixture of gases
- Keeps Earth warm
- Protects life

Why is the atmosphere important?
- Protects life
- Keeps Earth warm
- Allows talking/sound
- Provides weather
- Allows flight
- Absorbs harmful radiation

CODE WORD: _____
***You MUST watch and listen to the entire video to get the code word*

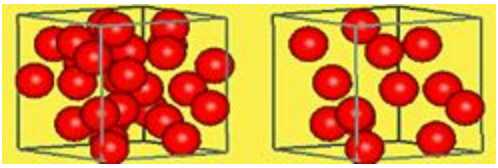
Gas	Percent
Nitrogen (N_2)	78.08
Oxygen (O_2)	20.94
Argon (Ar)	0.98
Carbon Dioxide (CO_2)	0.04
Other Elements	0.01
Water Vapor (H_2O)	0-1

Composition
- Mostly Nitrogen
- Can change due to natural causes (volcanoes erupting) or the season

Layers of the Atmosphere
- Troposphere
- Stratosphere
- Mesosphere
- Thermosphere
- Exosphere

Altitude
- Height above sea level

Density
- The amount of mass in a given volume
- The density of the atmosphere **DECREASES** with altitude
- Most of the mass



Layer	Layer # (Lowest is 1)	Temperature increases or decreases	Features included
Troposphere	1	Decreases	• Weather • Birds • Clouds • Humans • Mountains
Stratosphere	2	Increases	• Ozone • Weather Balloon • Planes
Mesosphere	3	Decreases	• Meteors
Thermosphere	4	Increases	• Aurora Borealis
Exosphere	5	Increases	• Satellites • Space Shuttles

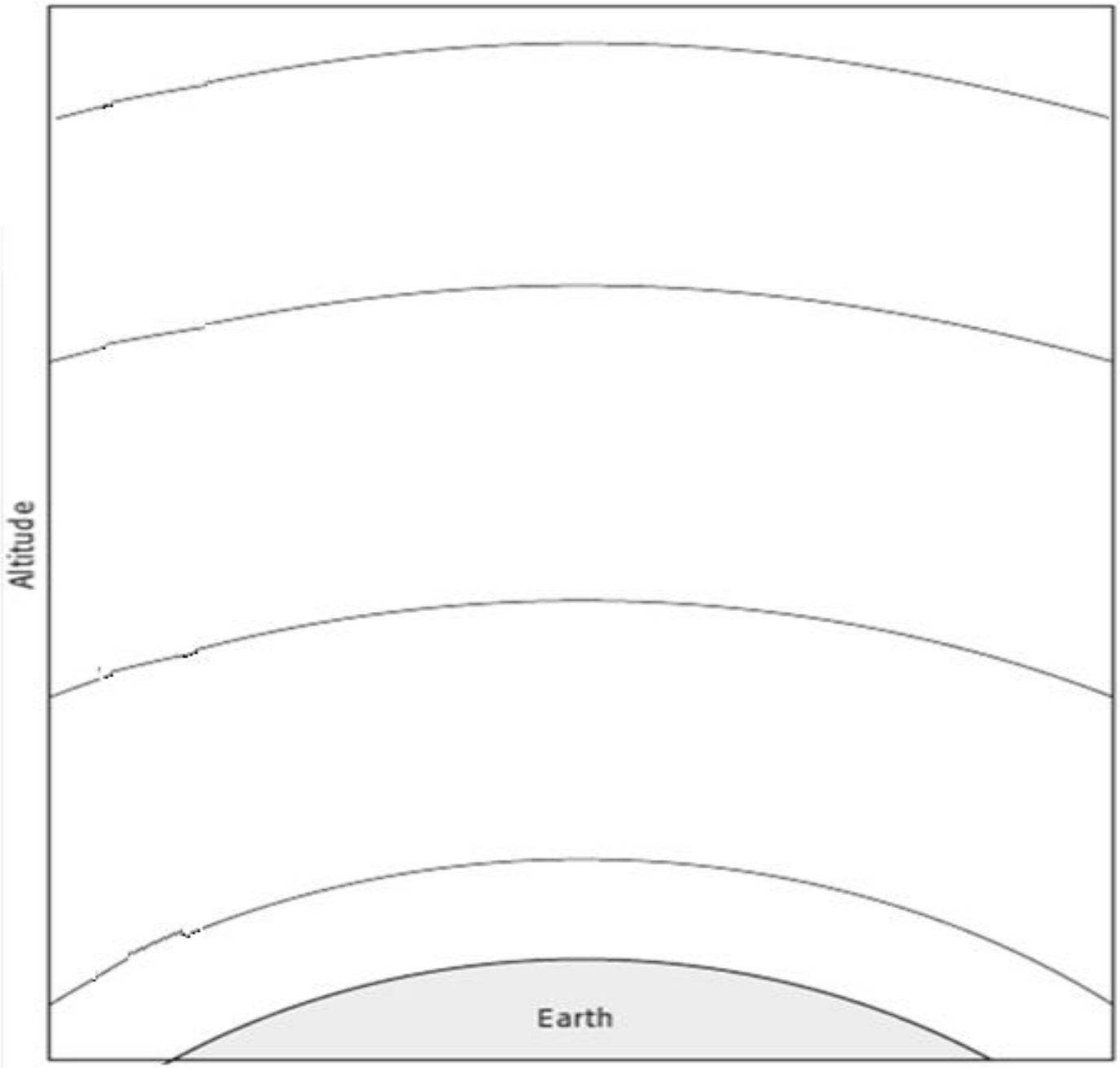
Memory Mnemonic Device: **T**hey **S**ay **M**cDonald's **T**astes **E**xcellent

Name: _____ Period: _____

Layers of the Atmosphere Drawing

In the drawing below, complete the following **(MAKE SURE TO CHECK OFF EACH ITEM AS YOU COMPLETE IT)**

- ❏ Name the five layers of the atmosphere.
- ❏ Use and arrow to indicate if the temperature is increasing or decreasing in every layer.
- ❏ Make dots to show the density of the air particles in each layer***. HINT:*** ***<u>More dots = more dense</u>***
- ❏ Draw the examples given below in the diagram to show where each of them would be located:
  - ❏ Mount Everest
  - ❏ Meteors
  - ❏ Weather balloon
  - ❏ A flock of geese
  - ❏ Aurora Borealis
  - ❏ Spacecraft orbiting
  - ❏ Jet airplane
  - ❏ Ozone Layer
  - ❏ Clouds
  - ❏ Space Shuttle



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Guiding Questions

Answer the following questions like you would if these were test questions.

1. What are the atmosphere layers in order from the **ground to the sky**?

_____

_____

_____

_____

GROUND: _____

2. What are 2-3 items that can be found in each layer of the atmosphere? (Need to name the layer in your answer!)

_____

_____

_____

_____

_____

3. How does the density and temperature change as you move from one layer to the next?

_____

_____

_____