Atmospheric Layers

By: Brittany Long, David Diaz, Karen Kuers, Kristin Bartee & Rene Lewis

Focus on Inquiry

The students will model the layers of the atmosphere through an interactive lab that looks at characteristics of the atmosphere by analyzing the atmospheric temperature profile and the special features that can be found in each layer.

Lesson Content Overview

Students will look at the different layers of the atmosphere to determine how the atmosphere helps sustain life on Earth.

Duration	Setting	Grouping	PTI Inquiry Subskills
110 minutes	Classroom	Whole classroom and groups of 3-4 students.	1.3, 3.3, 3.4, 3.5, 3.7, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.9

Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
Engage	8-10	1.3, 3.7	YouTube video	1	Red Bull jump from stratosphere video https://www.youtube.com/watch?v=FHtvDA0W34I
Explore	60 minutes	3.5, 3.7, 4.2, 4.3, 4.4	N/a	3	Students will look at the layer tube and then use it to label their lab sheet. Students will then observe and graph data.
Explain	20-25	3.3, 3.4, 4.3, 5.1, 5.2, 5.3, 5.9	n/a	3	Students will sort the words and pictures into their appropriate place within Earth's layers.. Students will write the info on their lab sheet.
Expand	8-10	3.5, 5.2, 5.3	Digital image	2	Students will view the full jump video, respond to questions, and discuss. https://www.youtube.com/watch?v=vvbN-cWe0A0
Evaluate	5	5.1	n/a	1	Exit slip- will check for student understanding.

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

Next Generation Science Standards – Inquiry

NGSS Practice 2: Developing and Using Models
NGSS Practice 4: Analyzing and Interpreting Data
NGSS Practice 6: Constructing explanations
NGSS Practice 8: Obtaining, Evaluating and Communicating Information

Next Generation Science Standards – Earth Science

MS-ESS2-1. Develop a model to describe the layers of the atmosphere.

Florida Science Standards – Nature of Science

SC.6.N.3.4: Identify the role of models in the context of the sixth grade science benchmarks.

Florida Science Standards – Earth Science

SC.6.E.7.9: Describe how the composition and structure of the atmosphere protects life and insulates the planet.

Materials and Advance Preparation

Materials List

Class set: All materials **PER** water bottle**Recommend 10 bottles**

- 16 oz vegetable oil (Thermosphere)
- 12 oz water (Mesosphere)
- 8 oz Dish soap (Stratosphere)
- 4 oz corn syrup (Troposphere)
- A water bottle (so that if a student shakes it, it will go back to normal)

Student materials:

- Paper/Notebook
- Bottle with different materials
- Ruler
- Colored Pencils/Markers

Blackline Masters

1. Blackline Master #1: Atmospheric Profile Lab
2. Blackline Master #2: Atmospheric Profile Graph
3. Blackline Master #3: Atmospheric Layers Description Cards
4. Blackline Master #4: Layers of the Atmosphere Check for Understanding and answer key
5. Blackline Master #5: Clip art pictures

Advance Preparation

1. Teacher will create the lab tubes (liquid with various densities) ahead of time. *It is recommended that you pour each liquid slowly and preferable down the side of the container to prevent them from mixing.*
   - At the bottom of the container pour 4 oz of corn syrup
   - On top of the corn syrup pour 8 oz of dish soap
   - On top of the dish soap pour 12 oz of water
   - On top of the water pour 16 oz of vegetable oil
2. Print and copy Blackline masters 1 & 2 for students (1 per student)
3. Print one set of cards (Blackline Master #3) for each student group.
4. Cut out description cards from Blackline Master #3
5. Print out clip art pictures (one per student)
6. Have engage video ready

Lesson Information

Learning Objectives

1. The student will be able to use the data collected in this lesson to correctly differentiate the layers of the atmosphere and explain how the characteristics of these layers protect life and the planet
2. The student will be able to explain how modeling the layers of the atmosphere helps them draw conclusions about Earth as a system.

Prior Knowledge Needed by the Students

- Methods of heat transfer
- What the atmosphere is in general
- How to read a graph
- How to create a graph
- The difference between observe, infer, and predict (nature of science)

Background Information

The Earth is divided into 5 "spheres:" Geosphere, Biosphere, Hydrosphere, Atmosphere, and Cryosphere. Each sphere interacts with another allowing the Earth to work as a system. The atmosphere is an important layer that provides protection for life to survive on Earth. The atmosphere is divided into 4 layers beginning at the surface with the Troposphere. The Troposphere extends to about 11 kilometers and contains all of Earth's weather, with temperatures decreasing with an increase in altitude. At about 11 kilometers the Stratosphere begins which contains the Ozone layer that protects Earth from the suns UV rays. Temperature in this layer increases with increasing altitude and extends to about 50 kilometers. From 50 kilometers to about 87 kilometers, the Mesosphere helps burn up meteors that enter the Earth's atmosphere and temperature decreases with increasing altitude. The final layer from 87 kilometers to space is the Thermosphere where temperature increases with an increase in altitude. This layer is where the aurora (northern and southern lights) occur.

Lesson Procedure

Engage

1. Students will watch video on Felix Baumgartner jumping from the Stratosphere. ***Teacher will say, "Watch this video of Felix Baumgartner jumping to Earth from the stratosphere and make observations about Felix, what he's wearing, what his vehicle is like, and what conditions he might encounter during his jump."*** Video (1:30): https://www.youtube.com/watch?v=FHtvDA0W34I

NOTE: *If there is an advertisement at the beginning of the video, please fast forward or "Skip" through the ad if available. Make sure to display the video full screen (arrows to the right of video time bar at the bottom of the screen) so that the web page advertisements and other suggested videos are not seen. Watch for and close any pop-up ads that may occur during the video.*

2. At the conclusion of the video, students will answer 4 questions about what they observed.
3. Students will silently answer 4 questions for about 5 minutes. ***Teacher will monitor***
   - When Baumgartner gets to his jumping spot, he is 24.2 miles above the Earth's surface. Where between Earth and space do you think he was located (ex: closer to Earth, closer to space, in space, barely off the Earth, etc)? Explain your thinking. ***Possible student answers could be: space, upper atmosphere, above the Earth. Explanations will vary.***
   - Why do you think he needed to jump from a capsule and not an airplane? ***Possible student answers could be: Airplanes can't fly that high, Capsules are easier to take that high up, You can't jump out of an airplane that high, the capsule is similar to a space shuttle, an airplane is going too fast.***
   - Why do you think Baumgartner was dressed like an astronaut? ***Possible student answers could be: It would give him oxygen and protect him from the harsh elements of space, you can't breathe that high up, and it's really cold.***
   - Hypothesize why you think the people in the control center are concerned about him passing out? ***Possible student answers could be: If he passes out he won't be able to pull his parachute open, it wouldn't be safe for him to be passed out.***
4. Students will share their answers with a shoulder partner. ***Teacher will monitor***
5. Say to the students, "Let's model the layers of the atmosphere so we can look at the characteristics of the different layers. This will help us determine how those characteristics might affect a person descending from space to the Earth."

Explore

Part 2: Layer Tube and Observations

1. Students will look at a tube filled with different liquids of different densities and see a 4 layered look.
2. Students will then make 3 qualitative observations about the tube and record them in a chart. ***Possible student answers may be: The layers stack on top of each other, some layers are bigger than others, they don't seem to mix, and they don't affect each other. Answers may also vary.***

3. Students will answer the question, "Why might it be helpful to model the layers of the atmosphere?"
   Possible student answers may include: We can't experience all the layers of the atmosphere, it's easier to see all the layers at once.

Part 3: Graphing Temperature Data

1. Students will use temperatures at different altitudes data to create a graph on the chart provided.
2. After graphing the temperatures, students will be able to see how the temperature changes at each level in the atmosphere.
   Student graphs should follow this pattern: Temperature in layer D will decrease, Temperature will increase in Layer C, Temperature will decrease in Layer B, and Temperature will increase in Layer A.

Part 4: Graph Analysis Questions

1. After students complete the graph they will answer the following questions.

- Describe the temperature patterns that you see on the graph. ***Possible student answers may be: the temperatures are changing, some of the temperatures increase and some of them decrease, the temperatures in layer D decrease, layer C increase, layer B decrease ,and layer A increase, temperatures are getting colder in layer D, warmer in layer B, Colder in layer C, warmer in Layer B.***

- How is temperature related to altitude? ***Possible student answers may be: Temperatures are changing with altitude, temperatures are getting colder and warmer with altitude, as you go up in the atmosphere the temperatures change.***

- Hypothesize why the temperature stays the same as altitude (height) increases at each black line? ***Possible student answers may be: temperatures are slowing transitioning into the next layer, when the layer changes in temperature, it takes a certain amount of altitude to make those changes and reverse the temperature***

- Compare layers A and C. Hypothesize why you think the temperatures are increasing. ***Possible student answers may be: It's getting closer to the sun, answers may vary because it's their prediction on why they think temperature changes.***

- Compare layers B and D. Hypothesize why you think the temperatures are decreasing**.** ***Possible student answers may be: further you get away from the ground the colder it gets, answers may vary because it's their prediction on why they think temperature changes.***

Explain

Part 5: Layer Identification

1. Students will use the cards that have descriptions on them to explain basic characteristics of the layers like temperature and features found in each layer.
2. The students will look at the description on each card and figure out which layer it belongs to fill in the chart.
3. Once students have filled in the descriptions they will identify the name of each layer.
4. After that is complete students will either draw or teacher can print out pictures of what features are found in each layer. For example an airplane in the Troposphere.
5. After that is complete students will answer the following analysis questions:

- In order state the layers of the atmosphere from the Earth's surface increasing in altitude. ***Possible student answers may be: troposphere, stratosphere, mesosphere, and thermosphere. If the student gets the layering wrong they could be in any order.***
- List what objects or special characteristics can be found in each layer. ***Possible student answers may be: Troposphere - air plane, Stratosphere - ozone layer, Mesosphere - meteors, Thermosphere - Aurora.***
- What can you infer about why commercial airplanes fly in layer D? ***Possible student answers may be: It's as high as they can go, it's too hot in the stratosphere, what airplanes are made of will not hold up in higher layers. Answers may vary because it's based off students reasoning.***
- Hypothesize how you think the atmosphere helps living things survive on Earth. ***Possible student answers may be: answers may vary because it's based off students predictions. Atmosphere gives us oxygen. Atmosphere gives us weather, Atmosphere protects us from meteors and UV rays.***
- Predict what would happen on Earth without the Stratosphere or if it had holes ***Possible student answers may be UV Rays would increase. ***MISCONCEPTION is that it causes global warming******
- Summarize what happens in the Troposphere- ***Student answers will vary, but should be similar to the description cards.***
- Summarize what happens in the Stratosphere- ***Student answers will vary, but should be similar to the description cards.***
- Summarize what happens in the Mesosphere- ***Student answers will vary, but should be similar to the description cards.***
- Summarize what happens in the Thermosphere- ***Student answers will vary, but should be similar to the description cards.***

6. The class will get back together whole group and the teacher will pose the questions:
   - How do the characteristics of the atmosphere you observed affect living things? ***Student responses will vary but should include that the atmosphere protects living things from harmful radiation, objects from space entering the Earth, and acting as an insulator keeping the Earth warm.***
   - How do the characteristics affect conditions on Earth? ***Student responses will vary but should include that the different layers of the atmosphere allow living things to be protected, provide oxygen, and provide warmth so that they can survive.***

Expand

1. Students will watch the full video of Felix Baumgartner's Jump and answer the following questions: Video (20:00): https://www.youtube.com/watch?v=vvbN-cWe0A0
   NOTE: *If there is an advertisement at the beginning of the video, please fast forward or "Skip" through the ad if available. Make sure to display the video full screen (arrows to the right of video time bar at the bottom of the screen) so that the web page advertisements and other suggested videos are not seen. Watch for and close any pop-up ads that may occur during the video.*
2. Students will answer the following follow-up questions regarding the jump video:
   - Describe why Baumgartner slows down when he reaches the lower levels of the stratosphere. ***Possible student answers may be because he pulled his parachute, friction began slowing him down, air resistance slowed him down.***
   - Analyze the benefits of using a weather balloon for the jump instead of a plane. ***Possible student answers may be cheaper to make, can go higher in the atmosphere, easily repeated, airplanes fly too quickly.***
   - Pretend you are trying to break Baumgartner's record. What are some concerns you would need to address before the day of the jump? ***Possible student answers may be parachute working, cold feet, good weather conditions, balloon working, capsule fully operational. Answers may vary.***

- Predict why no one has previously jumped from the height that Baumgartner jumped from. ***Possible student answers may be people were scared, no technology was able to get that high in the atmosphere***.
- Predict why Baumgartner did not jump from a higher height? ***Possible student answers may vary but could be along the lines of human body can't handle anything higher, technology is limited to that height.***
- How does modeling the layers of the atmosphere help you predict what would happen to a living thing at different heights above the Earth? ***Possible student answers may be that it shows how hot or cold the layers are or how high above the Earth they actually are which makes predictions easier to make.***
- Why are models important to learning about the layers of the atmosphere and learning about science in general? ***Possible student answers may be that it is difficult to experience all the layers of the atmosphere so modeling helps to actually see and learn about all of them. In general, models allow people to see concepts that are too abstract, and objects that are too big, too small, or too dangerous to experience firsthand.***

3. Students will discuss their responses to the questions with their shoulder partner.

Evaluate

FORMAL EVALUTION

- Layers of the Atmosphere Check for Understanding

INFORMAL or OPTIONAL EVALUATIONS

1. Summarize in a few sentences the atmosphere and how it works.
2. What stood out the most about each layer?

WRAP UP.

Bring the lesson to a conclusion by students sharing with each other what they have learned from the activity and teacher addressing any misconceptions. Possible discussion questions could include:

- *How do we differentiate the layers of the atmosphere? Possible responses could include that we differentiate the layers by elevation, temperature, and density.*
- *Explain how the characteristics of these layers protect life and the planet. Possible responses could include that the layers help to burn up space objects before they reach the Earth, they provide shelter from harmful radiation, and they provide insulation to keep the Earth warm.*
- *Explain how modeling the layers of the atmosphere helps us learn about Earth as a system. Possible student answers may be that it is difficult to experience all the layers of the atmosphere so modeling helps to actually see and learn about all of them.*

Supplementary Resources

Teachers

Red Bull. (2016). *Diagram of Stratos Mission Flight.* Retrieved from http://www.extremetech.com/wp-content/uploads/2012/10/Diagram-of-Stratos-mission-flight-path.jpg
Image depicting what happened and when during the Baumgartner's jump.

NASA. (2013). Earth's Atmospheric Layers.
https://www.nasa.gov/mission_pages/sunearth/science/atmosphere-layers2.html
Website that shows an image and gives explanations of each layer.

Students

NASA. (2013). Earth's Atmospheric Layers.
https://www.nasa.gov/mission_pages/sunearth/science/atmosphere-layers2.html
Website that shows an image and gives explanations of each layer.

KidsGeo. (1998). The Layers of Our Atmosphere. http://www.kidsgeo.com/geography-for-kids/0046-layers-of-the-atmosphere.php
Website that has an abundance of information about all aspects of the atmosphere.

Geography4Kids. (2017). A Cozy Blanket Around the Earth. http://www.geography4kids.com/files/atm_composition.html
Website that has an abundance of information about all aspects of the atmosphere.

CITATION OF SOURCES.

(N.A.). (2017). Weather Balloon Image. Retrieved from https://allaboutweather.wikispaces.com/Weather+Forecasting with permission from Creative Commons Attribution-ShareAlike 3.0 Unported.

Cardinal, D. 2012). *The tech behind Felix Baumgartner's stratospheric skydive | ExtremeTech.* Retrieved from http://www.extremetech.com/extreme/137521-the-tech-behind-felix-baumgartners-stratospheric-skydive

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Mormegil. (2011). Shuttle Image. Retrieved from https://commons.wikimedia.org/wiki/File:Shuttle.svg

NASA. (2006). International Space Station Image. Retrieved from https://commons.wikimedia.org/wiki/File:ISS_after_STS-119_(computer_rendering_of_August_2006).jpg

P.wormer~commonswiki. (2010). Atmosphere Profile Image. Retrieved from https://commons.wikimedia.org/wiki/File:Atmprofile.jpg

Redbull. (2012). Felix Baumgartner's supersonic freefall from 128k' - Mission Highlights. Retrieved from https://www.youtube.com/watch?v=FHtvDA0W34I

__✓__ Yes, I cited all materials and resources used in this lesson.

Kristin Bartee, Brittany Long, David Diaz, Karen Kuers, and Rene Lewis

Lesson authors' signatures

Blackline Masters 1: Atmospheric Profile Lab

Layers of Atmosphere

Part 1: Red Bull Jump Video Clip

1. When Baumgartner gets to his jumping spot, he is 24.2 miles above the Earth's surface. Where between Earth and space do you think he was located (ex: closer to Earth, closer to space, in space, barely off the Earth, etc)? Explain your thinking. _____
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_____
_____
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2. Why do you think he needed to jump from a capsule and not an airplane? _____
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3. Why do you think Baumgartner was dressed like an astronaut? _____
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4. Hypothesize why you think the people in the control center are concerned about him passing out? _____
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_____

Part 2: Layer Tube

Look at the tube with the 4 different layers and make 3 qualitative observations about what you see.

Qualitative Observations:
1.
2.
3.

1. Why might it be helpful to model the layers of the atmosphere?

Part 3: Graph

Use the data below and graph the temperatures on the atmospheric temperature profile.

Altitude (Km)	Temperature (C)
0	20
3	-15
8	-30
10	-40
12	-40
20	-35
30	-30
40	-15
52	-5
54	-5
60	-20
70	-60
80	-80
87	-95
89	-95
100	-60
125	-20
135	40
140	70

Part 4: Graph Analysis

1. Describe the temperature patterns that you see on the graph. _____
_____
_____

2. How is temperature related to altitude? _____
_____

3. Hypothesize why the temperature stays the same as altitude (height) increases at each black line? _____
_____
_____

4. Compare layers A and C. Hypothesize why you think the temperatures are increasing._____
_____
_____
_____

5. Compare layers B and D. Hypothesize why you think the temperatures are decreasing. _____
_____
_____
_____

Part 5: Layer Identification

Look at the cards, compare the descriptions to your graph, and identify which layer is represented by the description.

	Description of each layer
Layer A **Name:**	
Layer B **Name:**	
Layer C **Name:**	
Layer D **Name:**	

1. In order, state the layers of the atmosphere from the Earth's surface increasing in altitude. _____
_____
_____

2. List what objects or special characteristics can be found in each layer. _____
_____
_____

3. What can you infer about why commercial airplanes fly in layer D? _____
_____
_____
_____

4. How you think the atmosphere helps living things survive on Earth? _____
_____
_____
_____

5. Predict what would happen to Earth without the Stratosphere or if there were holes in this layer. _____
_____
_____
_____

6. Summarize the characteristics of the Troposphere. _____
_____
_____

7. Summarize the characteristics of the Stratosphere. _____
_____
_____

8. Summarize the characteristics of the Mesosphere. _____
_____
_____

9. Summarize the characteristics of the Thermosphere. _____
_____
_____

Part 6: Full Stratosphere Jump

1. Describe why Baumgartner slows down when he reaches the lower levels of the stratosphere. _____
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_____
_____
_____

2. Analyze the benefits of using a weather balloon for the jump instead of a plane.
_____
_____
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3. Pretend you are trying to break Baumgartner's record. What are some concerns you would need to address before the day of the jump? _____
_____
_____
_____

4. Speculate as to why no one has previously jumped from the height that Baumgartner has jumped from. _____
_____
_____
_____

5. Brainstorm possible reasons why Baumgartner did not jump from a higher height?
_____
_____
_____
_____

6. How does modeling the layers of the atmosphere help you predict what would happen to a living thing at different heights above the Earth? _____
_____
_____
_____
_____

7. Why are models important to learning about the layers of the atmosphere and learning about science in general? _____
_____
_____
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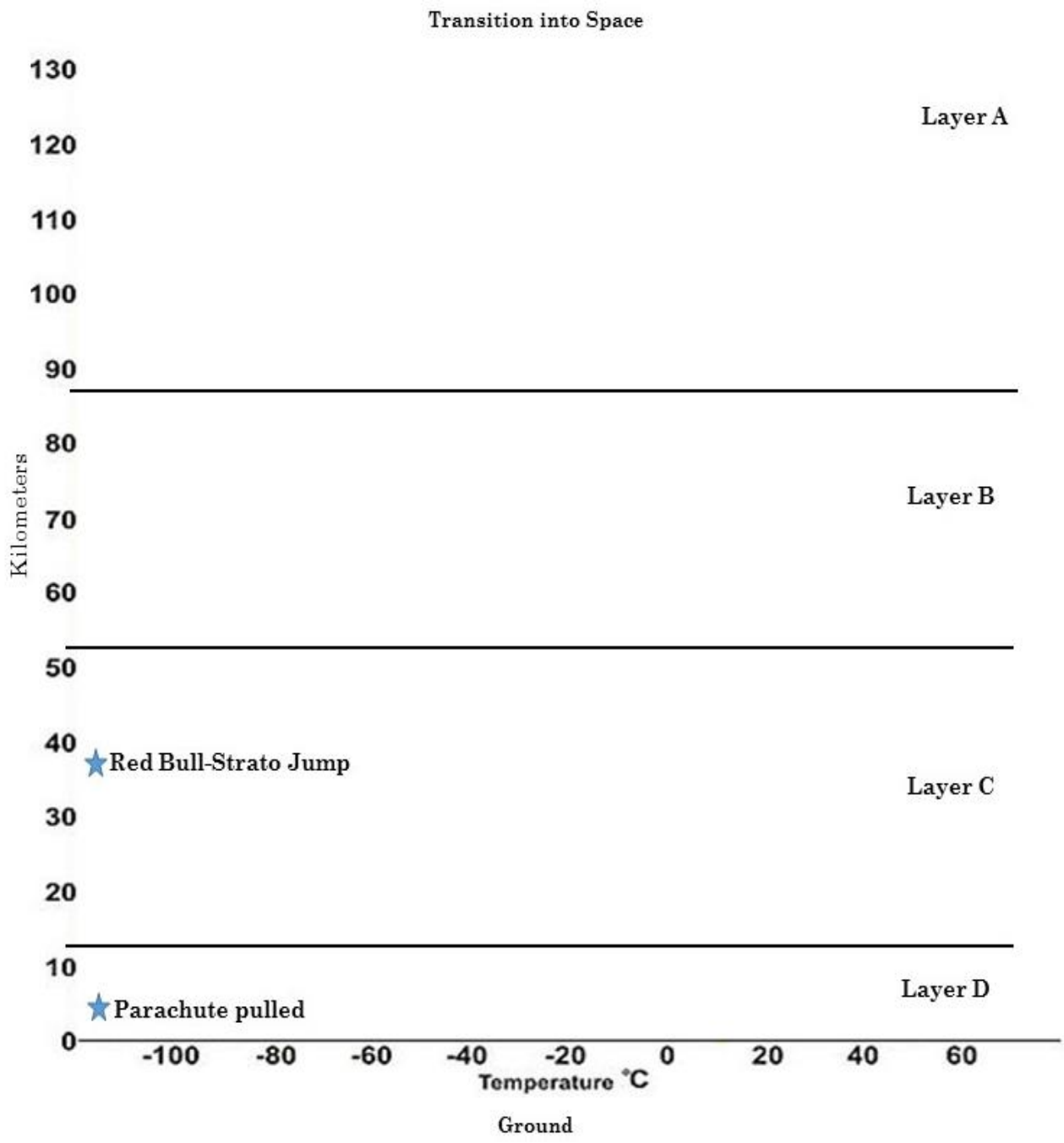
_____

Blackline Masters 2: Atmospheric Profile Graph

Atmospheric Temperature Profile



Blackline Masters 3: Description Cards

Thermosphere
The air is very thin and the temperature increases with height. Both the space shuttle and the International Space Station orbit in the middle-to-upper part of this layer. Also, the auroras (northern & southern lights) occurs in this layer. Thickest layer, and our boundary into space.

Mesosphere
This is the coldest layer. Although the air is thin, it's still thick enough to burn up meteors due to friction which protects life from the impacts of the meteors as well as prevents the dust from shading out the sun and causing major adjustments to the weather and climate of Earth. Second thickest layer and temperature decreases with height.

Stratosphere
Contains the ozone layer which protects life on Earth by absorbing harmful ultraviolet (UV) radiation. The stratosphere also acts like a blanket keeping the Earth warm and habitable. Some weather balloons can reach the lower part of this layer. Temperature increases with height.

Troposphere
This is the layer closest to Earth, where all living things are found. This is where the water cycle occurs bringing water to all life on Earth, as well as where the gases we breathe reside. It is also the layer where all weather occurs and jets fly. As you increase in height the air pressure and temperature decreases.

Blackline Masters 4: Atmospheric Layers Check for Understanding and Answer Key

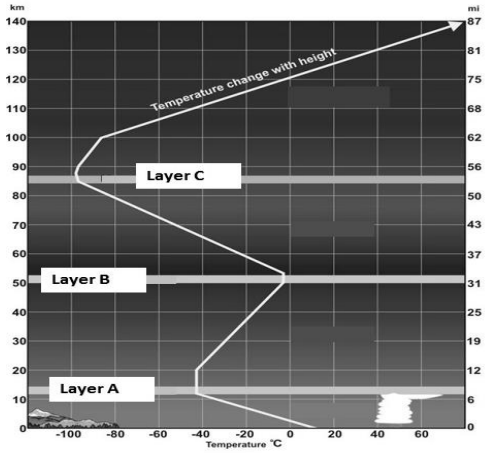
Atmospheric Layers Check for Understanding

1. Satellite communication is an important aspect of daily life that allows us to receive radio signals that transmit to our phones, computers, and TVs. Where is the satellite communication taking place in our atmosphere? *(SC.6.E.7.9)*

a. Mesosphere
b. Stratosphere
c. Thermosphere
d. Troposphere

2. The stratosphere contains the Earth's ozone layer. The ozone blocks some solar radiation. What would happen if the ozone layer was removed from the atmosphere? *(SC.6.E.7.9)*

a. The removal of the ozone layer would cause higher temperatures.
b. The removal of the ozone layer would cause an extinction of all life.
c. The removal of the ozone layer would cause a higher rate of skin cancer.
d. The removal of the ozone layer would cause the depletion of natural resources.



3. Referencing the diagram above, how does layer C of the atmosphere protect Earth's surface? *(SC.6.E.7.9)*

a. The mesosphere's thickness helps break down meteors.
b. The stratosphere's thickness helps break down meteors.
c. The mesosphere contains the ozone layer which helps absorb the suns radiation.
d. The stratosphere contains the ozone layer which helps absorb the suns radiation.

4. Referencing the diagram above, how does layer A support life on Earth? *(SC.6.E.7.9)*

a. The mesosphere's thickness helps break down meteors.
b. The thermosphere shields us from dangerous radiation from the sun.
c. The troposphere contains the gases we breathe and water cycle we depend on.
d. The stratosphere contains the ozone layer which helps absorb the suns radiation.

5. Why is a model of the layers of the atmosphere helpful to learning about the atmosphere? *(SC.6.N.3.4)*

a. The model allows us to safely observe the atmosphere.
b. The model allows us to see all of the layers and their characteristics at once.
c. The model allows us to learn more about the atmosphere than studying it directly.
d. The model allows us to increase the size of the atmosphere so that we can view it.

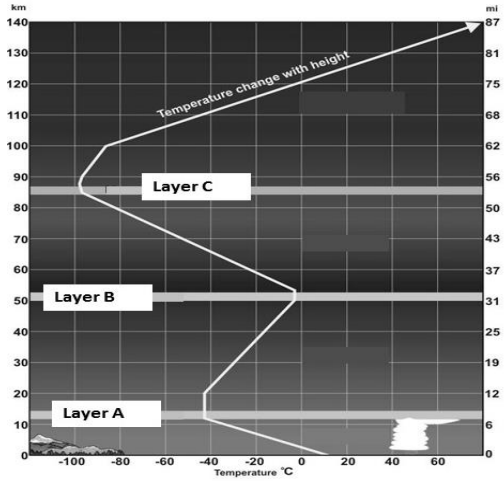
Atmospheric Layers Check for Understanding Answer Key

1. Satellite communication is an important aspect of daily life that allows us to receive radio signals that transmit to our phones, computers, and TVs. Where is the satellite communication taking place in our atmosphere? *(SC.6.E.7.9)*

a. Mesosphere
b. Stratosphere
c. Thermosphere
d. Troposphere

2. The stratosphere contains the Earth's ozone layer. The ozone blocks some solar radiation. What would happen if the ozone layer was removed from the atmosphere? *(SC.6.E.7.9)*

a. The removal of the ozone layer would cause higher temperatures.
b. The removal of the ozone layer would cause an extinction of all life.
c. The removal of the ozone layer would cause a higher rate of skin cancer.
d. The removal of the ozone layer would cause the depletion of natural resources.



3. Referencing the diagram above, how does layer C of the atmosphere protect Earth's surface? *(SC.6.E.7.9)*

a. The mesosphere's thickness helps break down meteors.
b. The stratosphere's thickness helps break down meteors.
c. The mesosphere contains the ozone layer which helps absorb the suns radiation.
d. The stratosphere contains the ozone layer which helps absorb the suns radiation.

4. Referencing the diagram above, how does layer A support life on Earth? *(SC.6.E.7.9)*

a. The mesosphere's thickness helps break down meteors.
b. The thermosphere shields us from dangerous radiation from the sun.
c. The troposphere contains the gases we breathe and water cycle we depend on.
d. The stratosphere contains the ozone layer which helps absorb the suns radiation.

5. Why is a model of the layers of the atmosphere helpful to learning about the atmosphere? *(SC.6.N.3.4)*

a. The model allows us to safely observe the atmosphere.
b. The model allows us to see all of the layers and their characteristics at once.
c. The model allows us to learn more about the atmosphere than studying it directly.
d. The model allows us to increase the size of the atmosphere so that we can view it.

Blackline Masters 5: Clip Art Pictures