

7

Lesson Exemplar for Science

Quarter 4

Lesson

5

Lesson Exemplar for Science Grade 7
Quarter 4: Lesson 5 (Week 5)
SY 2024-2025

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SCIENCE (EARTH AND SPACE SCIENCE) /QUARTER 4/ GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners learn that: 1. Sunlight is the Earth's external source of energy.
B. Performance Standards	By the end of the Quarter, learners use reliable scientific information to identify and explain how solar energy influences the atmosphere and weather systems of the Earth and use such information to appreciate and explain the dominant processes that influence the climate of the Philippines.
C. Learning Competencies and Objectives	Explain how energy from the Sun interacts with the atmosphere. Lesson Objectives: 1. Describe the different layers of the atmosphere. 2. Differentiate the layers of the atmosphere in terms of temperature and altitude. 3. Explain the interaction of solar energy with the layers of Earth's atmosphere. 4. Describe the types of clouds.
D. Content	Topic: Sun and the Earth's Atmosphere • Sub-Topic 1. Sunlight serves as Earth's external source of energy, interacting with the layers of the atmosphere. • Sub-Topic 2. Atmosphere interactions with sun and earth and elements of weather • Sub-Topic 3. Types of clouds
E. Integration	SDG#7 - Affordable and Clean Energy SDG#13 - Climate Action IKSP - Indigenous Knowledge Systems and Practices

II. LEARNING RESOURCES

- Pavico, Josefna et.al (2013). Exploring Life Through Science. Phoenix Publishing Inc.
- Pepito, Leah Joy Desamparado-Walan, (2020). Science – Grade 7 Learner’s Module First Edition. DepEd – Instructional Materials Council Secretariat (DepEd-IMCS. Pasig City
- Sunshine Trees Green Free Photo. (n.d.). <https://www.needpix.com/photo/download/52892/sunshine-trees-green-landscape-sunny-day-bright-white-clouds>
- Atmosphere structure-en.svg - Wikimedia Commons. (2014, October 26). https://commons.wikimedia.org/wiki/File:Atmosphere_structure-en.svg
- Cloud types fr.svg - Wikimedia Commons. (2012, January 3). https://commons.wikimedia.org/wiki/File:Cloud_types_fr.svg#/media/File:Cloud_types_en.svg

III. TEACHING AND LEARNING PROCEDURE

NOTES TO TEACHERS

A. Activating Prior Knowledge

1. Short Review (Day 1)

Ask the learners to look at the illustration and answer the guide questions.



<https://www.needpix.com/photo/download/52892/sunshine-trees-green-landscape-sunny-day-bright-white-clouds>

Guide

- What do you see in the illustration?
- How does the energy from the sun reach the Earth?

Questions:

The teacher may use a video clip or a different illustration with the sun.

Learners’ answers to the questions may vary depending on their level of understanding.

The teacher may share this fun fact with the learners before the next activity.

On average, it takes approximately 8 1/3 minutes or 500 seconds for solar energy to reach the top of Earth's atmosphere. Covering an approximate distance of 149 million kilometers through space, this energy reaches the top layer

		<i>of Earth's atmosphere. Solar energy propagates in waves from the Sun, traveling at the speed of light as electromagnetic radiation within the vacuum of space.</i>																					
B. Establishing Lesson Purpose	2. Lesson Purpose Self-Assessment Instruct the learners to read the statement and assess their skills and knowledge using the color of traffic lights. Ask them to shade the box with appropriate color that describes their skills and understanding of the concepts before the lesson. <table><tr><td></td><td>No, I cannot do it.</td></tr><tr><td></td><td>Yes, I can do it alone.</td></tr><tr><td></td><td>Yes, I can do it and apply my learnings.</td></tr></table> <table><thead><tr><th>Statements</th><th>Before the lesson</th><th>After the lesson</th></tr></thead><tbody><tr><td>1. I can describe the different layers of the atmosphere.</td><td></td><td></td></tr><tr><td>2. I can differentiate the layers of the atmosphere in terms of temperature and altitude.</td><td></td><td></td></tr><tr><td>3. I can explain the interaction of solar energy with the layers of Earth's atmosphere.</td><td></td><td></td></tr><tr><td>4. I can describe the different types of clouds</td><td></td><td></td></tr></tbody></table>		No, I cannot do it.		Yes, I can do it alone.		Yes, I can do it and apply my learnings.	Statements	Before the lesson	After the lesson	1. I can describe the different layers of the atmosphere.			2. I can differentiate the layers of the atmosphere in terms of temperature and altitude.			3. I can explain the interaction of solar energy with the layers of Earth's atmosphere.			4. I can describe the different types of clouds			The teacher may use emoticons or other symbols instead of colors. This activity will assess the level of understanding and confidence of learners about the lessons.
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	2. Unlocking Content Vocabulary Ask the learners to connect dots to match the correct word that describes the prefixes attached to the root word sphere. <table><tr><td>1. Exosphere</td><td>●</td><td>●</td><td>changes</td></tr><tr><td>2. Thermosphere</td><td>●</td><td>●</td><td>outside</td></tr><tr><td>3. Mesosphere</td><td>●</td><td>●</td><td>middle</td></tr><tr><td>4. Stratosphere</td><td>●</td><td>●</td><td>heat</td></tr><tr><td>5. Troposphere</td><td>●</td><td>●</td><td>layer</td></tr></table>	1. Exo sphere	●	●	changes	2. Thermo sphere	●	●	outside	3. Meso sphere	●	●	middle	4. Strato sphere	●	●	heat	5. Tropo sphere	●	●	layer	
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5. Developing and Deepening Understanding	SUB-TOPIC 1: SUNLIGHT SERVES AS EARTH’S EXTERNAL SOURCE OF ENERGY, INTERACTING WITH THE LAYERS OF THE ATMOSPHERE. a. Explicitation Ask the learners to read the reading material “The Atmosphere of Earth.” The Atmosphere of Earth The Earth’s Atmosphere surrounds our planet and is mostly composed of air. The atmosphere is essential to living things - it provides carbon dioxide for plants and oxygen for animals. The two main gases that make up the atmosphere are nitrogen (approximately 78%), and oxygen (approximately 21%). Argon and traces of other gases, such as carbon dioxide, make up the rest. The total water content in the atmosphere is about 0.25%, mostly made up of water vapor. The diagram shows a cross-section of the Earth. A horizontal line with arrows at both ends indicates the diameter of the solid Earth. A dashed line with an arrow points to the thin layer of the atmosphere surrounding the Earth. Text labels provide specific measurements and facts about the atmosphere. The diameter of the solid Earth is about 12,750 km. Earth's Atmosphere More than 98% of the gases in the Earth's atmosphere are in three layers to 100 km above the surface.	You may relate the content vocabulary to the reading material. <i>The reading material “The Atmosphere of Earth” is taken from the NLC Enhancement Camp Teacher’s Lesson Plan.</i> <i>Science Grade 7 Lesson Plan 9-The Atmosphere of Earth</i> After reading the material, ask the students to answer the guide questions. Answer Key: The atmosphere is the layer of gases surrounding the Earth.																				

	Guide Questions: 1. What is the atmosphere? 2. What is in the atmosphere? b. Worked Example (Day 2) Activity 1. Let the learners read about the “Layers of the Atmosphere” below and answer the following guide questions. Layers of the Atmosphere Scientists believe that the atmosphere has five distinctive layers, but the boundaries between layers are not sharp and can be hard to measure precisely. The layers and some of their features are: Troposphere: This layer extends up to about 13 kilometers (km) from the Earth's surface. This layer holds 75% of the atmosphere's mass. As you go higher, the temperature drops from an average of about 13°C near the Earth's surface to - 50°C at the top of the layer. The air pressure also drops from 1000 millibars (mb) near the Earth's surface to 100 mb at the top of the layer. Stratosphere: This layer lies directly above the troposphere. It extends from about 13km to 48km above the Earth's surface. The temperature of the bottom of the layer is -50°C but at the top, its temperature is -15°C. The air pressure at the bottom of the layer is about 100 mb but at the top of the layer, the air pressure is only 1 mb. Mesosphere: This layer lies directly above the stratosphere. It extends from about 48 km to 85 km above the Earth's surface. The temperature of the bottom of the layer is -30°C but at the top, it is only -90°C. The air pressure at the bottom of the layer is about 1 mb but at the top of the layer, the air pressure is only 0.01 mb. Thermosphere: This layer lies directly above the mesosphere. It extends from about 85 km to 700 km above the Earth's surface. The temperature of the bottom of the layer is -90°C but at the top of the thermosphere it can be 350°C or higher. The air pressure at the bottom of the layer is about 0.01 mb but at the top of the layer the air pressure is very weak at about 0.000001 mb.	The atmosphere contains various gases, including nitrogen, oxygen, carbon dioxide, and others, as well as water vapor, aerosols, and trace amounts of other substances. Source:: <i>The reading material “Layers of the Atmosphere above the Philippines” is adapted from the NLC Enhancement Camp Teacher's Lesson Plan.</i> <i>Science Grade 7 Lesson Plan 10- The Layers of the Atmosphere right above the Philippines</i>
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Exosphere: This layer is the uppermost layer, and it extends 10,000 km into space. In fact, it blends with what scientists consider to be outer space! The pull of Earth's gravity is so small in this layer that molecules of gas escape into outer space.

Guide Questions:

1. What physical quantities were mentioned that characterize each layer of the atmosphere?
2. How far above the surface is the Troposphere?
3. Which layer has the lowest temperature?
4. Which layer is the thinnest?
5. Which layer is the farthest from the surface?

c. Lesson Activity.

Activity 2.

Ask the learners to use the previous reading materials to complete the table in worksheet 5.2. The data for the troposphere is given as an example.

Allow the students to analyze the tabulated data from the Worked Example.

Use the following as guide questions:

- a. How do air pressures of the atmosphere change as altitude increases from the Earth's surface to 700 kilometers above?
- b. What is the relationship between the temperature and altitude in each layer of the atmosphere? Tabulate the answer.

Layer	Relationship between temperature and altitude
Troposphere	Inversely proportional
Stratosphere	
Mesosphere	
Thermosphere	
Exosphere	

The teacher may compose other guide questions as they see fit.

Answer Key

1. Altitude, thickness, temperature, and air pressure
2. Immediately above the earth's surface
3. Mesosphere
4. Troposphere
5. Exosphere

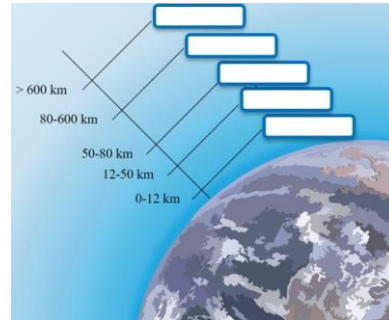
Answer Key:

- a. The air pressure drops continuously as altitude increases from the Earth's surface. The air pressure at the Earth's surface is about 1000 mb, at the top of the troposphere it is about 100 mb, at the top of the stratosphere it is about 1 mb, at the top of the mesosphere it is about 0.01 mb and at the top of the thermosphere it is about 0.0000001 mb.

SUB-TOPIC 2: ATMOSPHERE INTERACTIONS WITH THE SUN AND EARTH AND ELEMENTS OF WEATHER

1. Explicitation

Ask the learners to label the layers of the atmosphere using the terms from the content vocabulary.



Mesosphere
Exosphere
Thermosphere
Troposphere
Stratosphere

https://commons.wikimedia.org/wiki/File:Atmosphere_structure-en.svg

2. Worked Example

Ask the students to study the image below. Have them complete the table and answer the guide questions that follow.

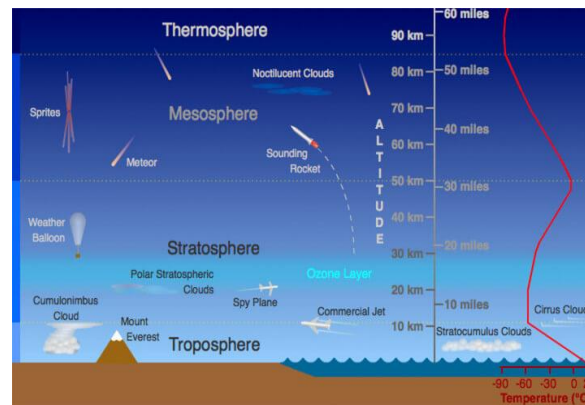


Image source: <https://sciencepickle.com/earth-systems/atmosphere/atmospheric-layers/>

The teacher may show an illustration or a video of how solar radiation interacts with the layers of the atmosphere.

If most of the learners labeled the layers of the atmosphere incorrectly, then the teacher must add reading materials to further understand the arrangement of the layers of atmosphere.

Additional Reading Materials
Earth's Atmosphere: A Multi-layered Cake.

<https://climate.nasa.gov/news/2919/earths-atmosphere-a-multi-layered-cake/#:~:text=Earth's%20atmosphere%20has%20five%20major,%2C%20mesosphere%2C%20thermosphere%20and%20exosphere>

	Determine the notable events, or features of each layer of the atmosphere <table><tr><th>Layer of the Atmosphere</th><th>Notable events or features</th></tr><tr><td>Troposphere</td><td></td></tr><tr><td>Stratosphere</td><td></td></tr><tr><td>Mesosphere</td><td></td></tr><tr><td>Thermosphere</td><td></td></tr></table> Guide questions: At which layer of the atmosphere do commercial jets fly? Why? Why does the temperature increase in the stratosphere? 3. Lesson Activity (Day 3) Ask the learners to read the material and answer the questions that follow. The Sun Interacts with our Atmosphere The Sun is the Earth's primary source of external energy. Energy from the Sun heats our planet to the point where life can flourish. Most of the energy from the Sun is transmitted to the Earth as short-wave radiation (light and ultraviolet radiation). Because the atmosphere is mostly transparent, much of the light reaches the Earth’s surface where it is firstly absorbed. The Earth then re-radiates the absorbed energy into the atmosphere in the form of infrared energy. Some atmospheric gases, including carbon dioxide, ozone, nitrous oxide and water vapor, are naturally occurring gases that absorb and emit infrared energy very effectively. These gases are called greenhouse gases. The naturally occurring greenhouse gases have a positive effect as they absorb some of Earth’s heat energy so that it does not all escape into space. This keeps the average temperature of the atmosphere to about 13°C. The atmospheric warming effect is called the greenhouse effect. Without the	Layer of the Atmosphere	Notable events or features	Troposphere		Stratosphere		Mesosphere		Thermosphere		Teachers may also use graphs instead of tabulated data. Include in the discussions the relevance of each layer of the atmosphere. Answer key: - Commercial jets fly at the top of the troposphere nearing the stratosphere to lessen the encounter with clouds that cause turbulence - The stratosphere contains the ozone layer which absorbs the incoming ultraviolet radiation leading to the increase in temperature <i>Note: The reading material “The Sun Interacts with our Atmosphere” is taken from the NLC Enhancement Camp Teacher’s Lesson Plan. Science Grade 7 Lesson Plan 11</i>
Layer of the Atmosphere	Notable events or features											
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Stratosphere												
Mesosphere												
Thermosphere												

	greenhouse effect, the Earth's surface temperature would be about -23°C, and life probably would not be able to exist. The weather we experience on Earth is a direct result of absorbing energy from the Sun. The Sun heats the Earth's surface in varying amounts, and this sets up convection currents in the troposphere, producing winds and influencing ocean currents. In the warmer months in both the northern and southern hemispheres, tremendous storms form (including typhoons, hurricanes, and cyclones) which is a way the Earth gets rid of excess energy. The weather effects convert heat into kinetic energy like the wind. Think-Pair and Share. Ask the learners to discuss their answers with their pair. Challenge them to share their answers with the class. - What is the main form of energy that is transmitted from the Sun to the Earth? - How does the interaction between the Sun and Earth's atmosphere influence the weather patterns observed throughout the day in Sunny Village? - What role does the greenhouse effect play in maintaining Earth's temperature? SUB-TOPIC 3: TYPES OF CLOUDS	Answer Key - The energy from the sun is called solar radiation which includes visible light, UV, infrared, radio, microwave, x-ray, and gamma ray - The interaction between the Sun and Earth's atmosphere influences weather patterns by causing temperature variations, atmospheric pressure changes, and cloud formation. As sunlight penetrates the atmosphere, it warms the Earth's surface, leading to the formation of thermals and air currents that drive weather systems. Additionally, the angle of sunlight throughout the day affects temperature gradients and wind patterns, contributing to the development of local weather phenomena such as winds, clouds, and precipitation. - The greenhouse effect plays a crucial role in maintaining Earth's temperature by trapping heat in the atmosphere. Greenhouse gases, such as carbon dioxide, methane, and water vapor, absorb and re-emit infrared radiation emitted by the Earth's surface, preventing it from escaping into space. This process creates a warming effect. The greenhouse gases trap heat and help regulate
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1. Explicitation (Day 4)

Let the learners answer the riddle.

Never resting, never still.
Moving silently from hill to hill.
It does not walk, run or trot.
All is cool where it is not.

What is it?

I float high above,
sometimes white,
sometimes gray, I bring

Earth's temperature within a habitable range. Without the greenhouse effect, Earth would be much colder, making it unsuitable for life as we know it.

Answer key: Sun, Clouds

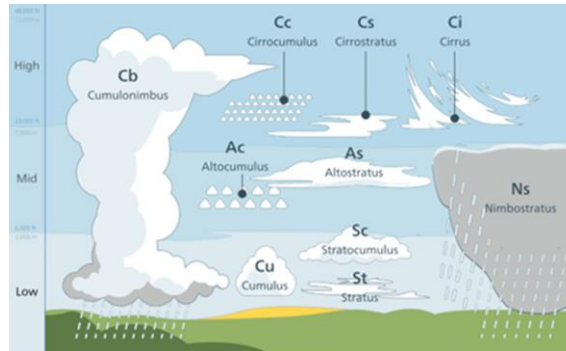
2. Worked Example

Have the students take a look outside and look at the clouds. If the weather is not suitable for observations, show pictures of the different types of clouds.

Let the students describe the clouds according to appearance. Determine which clouds are cumulus, stratus, and cirrus.

3. Lesson Activity

Ask the learners to analyze the illustration of clouds at different altitudes. and use the illustration to identify the types of clouds asked below.



https://commons.wikimedia.org/wiki/File:Cloud_types_fr.svg#/media/File:Cloud_types_en.svg

The teacher needs to explain the characteristics of each cloud to deepen the concept.

The teacher may discuss that clouds are formed within specific layers of the atmosphere, primarily the troposphere, which is the lowest layer where weather phenomena occur. Different types of clouds

	Guide Questions: 1. What are the thick, dark clouds that cover the sky at low to middle altitudes and bring continuous, steady precipitation? 2. What type of cloud is often associated with fair weather and has a fluffy, white appearance? 3. Which type of cloud is characterized by a uniform layer or sheet covering the sky, often resulting in overcast conditions? 4. What are the towering clouds with extensive vertical development, often associated with thunderstorms, heavy rain, and lightning? 5. Which type of cloud is thin and wispy, composed of ice crystals, and typically found at high altitudes? 6. What are the mid-altitude clouds that appear as gray or blue-gray sheets covering the sky and often precede storm systems? 7. What type of cloud is characterized by rounded masses or rolls and often appears in clusters or patches at mid-altitudes? 8. Which cloud type is low-altitude and forms in layers or patches with a mix of cumulus and stratus characteristics?	form at different altitudes within the troposphere, depending on factors such as temperature, humidity, and air currents. Answer Key: 1. Nimbostratus clouds 2. Cumulus clouds 3. Stratus clouds 4. Cumulonimbus clouds 5. Cirrus clouds 6. Altostratus clouds 7. Altocumulus clouds 8. Stratocumulus clouds
6. Making Generalizations	1. Learners' Takeaway Ask the learner to complete the sentence cloze by choosing the correct answer from the given word bank The 1) _____ is composed of gases that surround the Earth, providing oxygen for life and protecting the planet from harmful solar radiation. The 2)_____ is the lowest layer of the atmosphere, where weather phenomena occur, while the 3)_____ is above it and contains the ozone layer. Next, the 4)_____ extends higher into the atmosphere, where temperatures decrease with altitude. The 5)_____, located above the mesosphere, contains charged particles and is responsible for auroras. Finally, the outermost layer, the 6)_____, gradually transitions into outer space. As altitude increases in the atmosphere, temperatures generally 7)_____ in the troposphere, 8)_____ in the stratosphere due to the presence of the ozone layer, then 9)_____ again in the mesosphere, and finally 10)_____ in the thermosphere due to absorption of solar radiation.	Answer Key: 1. atmosphere 2. troposphere 3. stratosphere 4. mesosphere 5. thermosphere 6. exosphere 7. decrease 8. increase 9. decrease 10.increase Teachers may use online tools or applications to present the learners' takeaways.

atmosphere	decrease	exosphere	increase
mesosphere	thermosphere	troposphere	stratosphere

2. Reflection on Learning

Instruct the learners to read the statement and assess their skills and knowledge using the color of traffic lights. Ask them to shade the box with an appropriate color that describes their skills and understanding of the concepts after the lesson.

	No, I cannot do it.
	Yes, I can do it alone.
	Yes, I can do it and apply my learnings.

Statements	Before the lesson	After the lesson
1. I can describe the different layers of the atmosphere.		
2. I can differentiate the layers of the atmosphere in terms of temperature and altitude.		
3. I can explain the interaction of solar energy with the layers of Earth's atmosphere.		
4. I can describe the different types of clouds		

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		NOTES TO TEACHERS
A. Evaluating Learning	1. Formative Assessment Multiple-Choice Questions: Encircle the letter of the best answer. - What is the CORRECT order of earth's atmospheric layers from its surface? A. stratosphere, mesosphere, troposphere, thermosphere, exosphere B. stratosphere, troposphere, mesosphere, thermosphere, exosphere C. troposphere, mesosphere, stratosphere, thermosphere, exosphere D. troposphere, stratosphere, mesosphere, thermosphere, exosphere - Which layer of atmosphere is the coldest? A. mesosphere B. troposphere C. stratosphere D. thermosphere - What happens to the temperature in the troposphere as the altitude increases? A. Decreases B. Increases C. Cannot be determined D. Remains the same. - In which layer of the atmosphere does passenger aircraft fly? A. Lower Mesosphere B. Lower Stratosphere C. Middle Thermosphere D. Upper Mesosphere - Which best describes the function of the atmosphere? A. It is responsible for the tides. B. It prevents heat from escaping into space too quickly. C. It does not account for the heat gain or loss of the planet. D. It allows heat to escape quickly into space to cool the planet. - Which best describes the greenhouse effect? A. The ability of the stratosphere to receive sunlight. B. The ability of the atmosphere to retain water vapor. C. The ability of atmospheric gases to keep the planet warm. D. The ability of clouds to scatter electromagnetic radiation in the atmosphere.	Answer Key: - D - A - A - B - B - C - D - B - D - B - A - A

	materials used			
	learner engagement/ interaction			
	Others			
C. Teacher's Reflection	<i>Reflection guide or prompt can be on:</i> ▪ <u>principles behind the teaching</u> What principles and beliefs informed my lesson? Why did I teach the lesson the way I did? ▪ <u>students</u> What roles did my students play in my lesson? What did my students learn? How did they learn? ▪ <u>ways forward</u> What could I have done differently? What can I explore in the next lesson?			