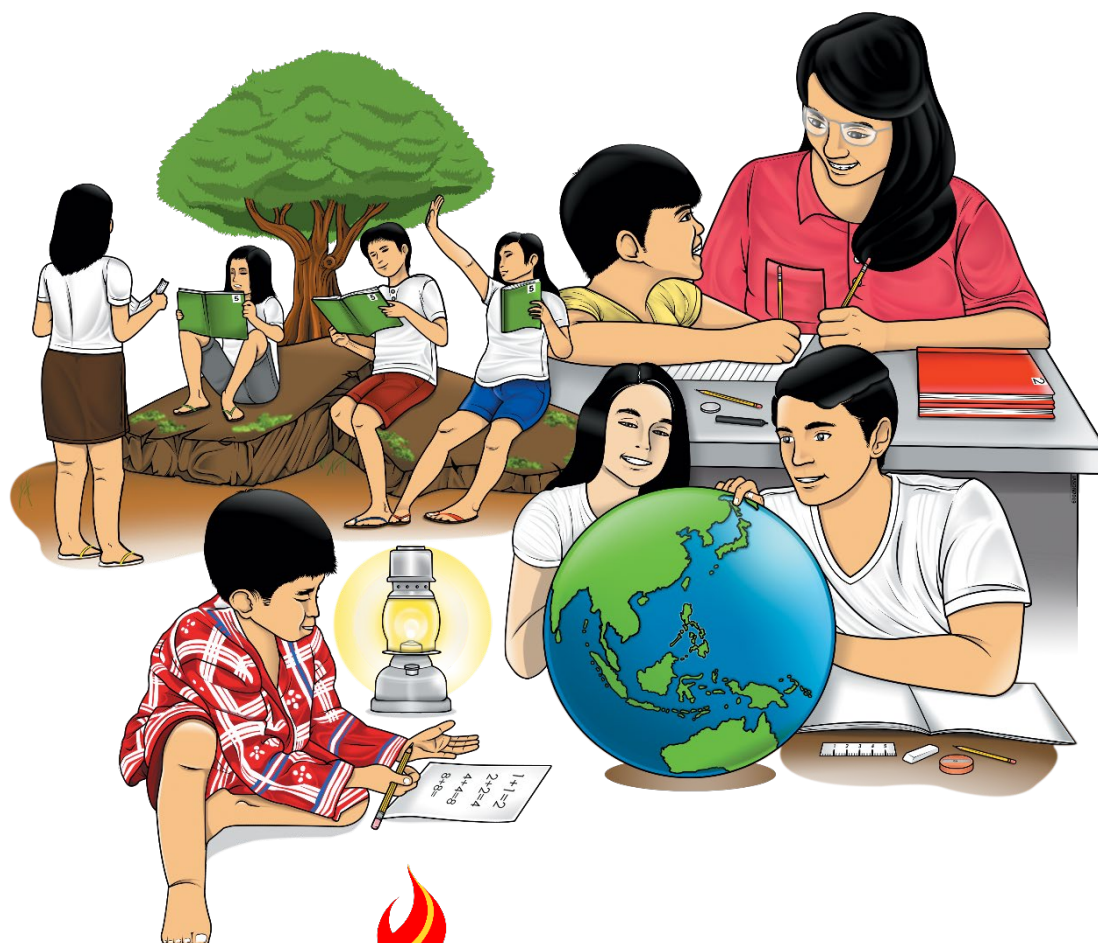


Earth and Life Science

Quarter 1 – Module 2: Origin and Structure of the Earth (The Subsystem)



Earth and Life Science
Alternative Delivery Mode
Quarter 1 – Module 2: Origin and Structure of the Earth – The Subsystem
First Edition, 2021

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Secretary: Leonor Magtolis Briones
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Development Team of the Module

Writers: Rochelle M. Mercado

Editors: Melanie I. Samudio, Jocelyn M. Manset

Reviewer: Jason Ricaforte, Angelica Beriña

Princess Paolah L. De Guzman, Marissa C. Betchaida, Louie L. Alvarez

Gregorio M. De Chavez, Jr, Jocelyn M. Manset, Mario B. Maramot,

Elaine T. Balaogan, Job S. Zape Jr. , Lea C. Villegas, Waylie Niña D. De Claro

Illustrator: Ednelinda Robles, Lovely Joy La Rosa, Charles Erick A. Jusay,
Sandro Carlo B. Tablizo

Layout Artist: Elizalde L. Piol, Anselma M. Ebero, Jocelyn M. Manset

Management Team: Francis Cesar B. Bringas

Job S. Zape Jr.

Eugenio S. Adrao

Elaine T. Balaogan

Merthel M. Evardome

Nadine C. Celindro

Nicolas M. Burgos

Mario B. Maramot

Fe M. Ong-ongowan

Rosalinda A. Mendoza

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Department of Education – Region IV-A CALABARZON

Office Address: Gate 2 Karangalan Village, Barangay San Isidro
Cainta, Rizal 1800

Telefax: 02-8682-5773/8684-4914/8647-7487

E-mail Address: region4a@deped.gov.ph

Senior High School

Earth and Life Science

Quarter 1 – Module 2:

Origin and Structure of the Earth (The Subsystem)

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



What I Need to Know

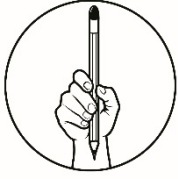
This module was designed and written with you in mind. It is here to help you master the nature of Biology. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is composed of:

- Lesson 1 – The Subsystems of the Earth

After going through this module, you are expected to:

1. determine the four subsystems of the Earth;
2. describe the characteristics of each subsystem;
3. trace the flow of matter and energy in the Earth's subsystems; and
4. express one's internalized role as steward of the four subsystems concerning the flow of matter and energy.



What I Know

Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following is NOT one of the four subsystems of the Earth?
 - A. biosphere
 - B. hydrosphere
 - C. water sphere
 - D. geosphere
2. All of the waters, including subsurface and atmospheric water comprise the Earth. Which geological subsystem best label the statement?
 - A. the geosphere
 - B. the hydrosphere
 - C. the biosphere
 - D. the atmosphere
3. Earth contains all living organisms including those on the land, in the water and air. Which subsystem best describes the statement?
 - A. biosphere
 - B. hydrosphere
 - C. atmosphere
 - D. geosphere
4. Which subsystem suits the statement, “Global ecological system interacting with each other”?
 - A. biosphere
 - B. geosphere
 - C. hydrosphere
 - D. atmosphere
5. What subsystem will network with biosphere for photosynthesis to take place?
 - A. atmosphere
 - B. geosphere
 - C. hydrosphere
 - D. biosphere
6. Oxygen, water vapor, nitrogen, and other gases help organism to survive. Which Earth sphere contain these materials?
 - A. biosphere
 - B. atmosphere
 - C. hydrosphere
 - D. geosphere
7. Which term is used to describe the thin layer of solid rock that makes up the outermost part of the Earth?
 - A. core
 - B. crust
 - C. mantle
 - D. biosphere

8. Among the subsystems, which is composed of a mixture of gases that surrounds the Earth?
 - A. nitrogen
 - B. atmosphere
 - C. biosphere
 - D. kingdoms
9. The atmosphere of the Earth is composed of ___ nitrogen and _____ oxygen and other gases.
 - A. 0% and 100%
 - B. 21% and 78%
 - C. 78% and 21%
 - D. 505 and 505
10. In what subsystem of the Earth are the rocks and mineral found?
 - A. atmosphere
 - B. biosphere
 - C. hydrosphere
 - D. geosphere
11. What part of the Earth's sphere makes up hydrosphere?
 - A. glaciers
 - B. groundwater
 - C. seawater and inland water
 - D. all of the above
12. Which gas dominates the Earth's atmosphere?
 - A. CO₂ - Carbon Dioxide
 - B. He - Helium
 - C. N² - Nitrogen
 - D. O₂ - Oxygen
13. Ozone plays an important part for organisms to stay alive. To what sphere does ozone belong?
 - A. atmosphere
 - B. biosphere
 - C. geosphere
 - D. hydrosphere
14. Which answer best describes the role of the ozone layer?
 - A. It traps heat from the sun to heat the planet.
 - B. It protects the plants and animals on earth from receiving too much ultraviolet radiation.
 - C. It cools the earth through the evaporation of water vapor
 - D. It keeps the oxygen in the atmosphere closest to Earth and the nitrogen separated in the atmosphere.
15. Human actions greatly affect the Earth itself. Which of the following is an example of a human impact of the biosphere?
 - A. littering
 - B. air pollution
 - C. water pollution
 - D. littering, air and water pollution

Lesson**1****Origin and Structure of the Earth – The Subsystem**

Earth is sometimes called the “water planet” or the “blue planet” because seas cover more than two-thirds of its surface. Earth is the only planet in the solar system with rain that falls from clouds, runs over the land, and collects in extensive oceans. It is also the only body we know that supports life. This self-learning module will help you understand the subsystem of the planet where you stand right now.

***What’s In***

Read the statement below and fill the table with the needed answers.

Imagine walking along a rocky coast as a storm blows in from the sea. The wind whips the ocean into whitecaps, and waves crash onto the shore. Before you have time to escape, blowing spray has soaked your clothes. A hard rain begins as you scrambled over the rocks to your car. During the adventure, you have observed the spheres of the Earth.

List down the terms that are used in the statement that reflects to what made up the Earth. Categorize them based on the following:

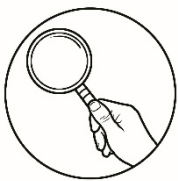
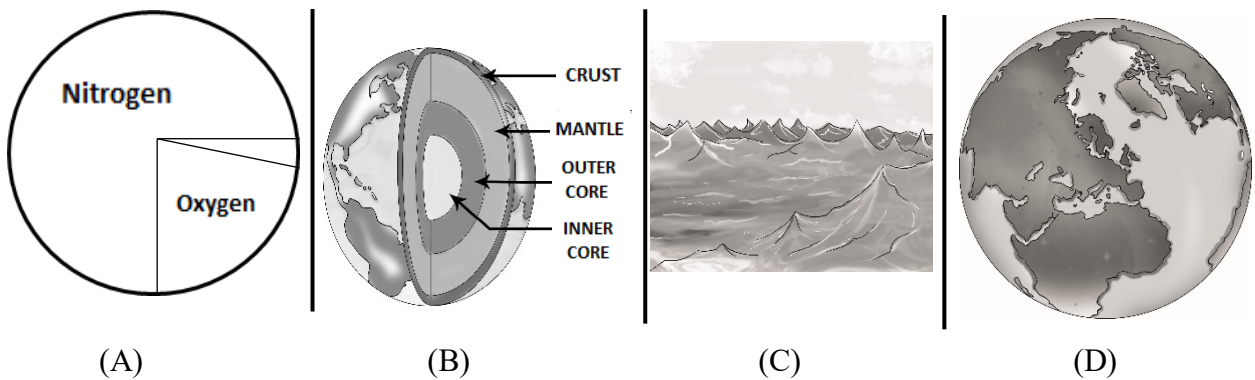
<i>Air</i>	<i>Water</i>	<i>Land</i>	<i>With Life</i>



What's New

Subsystems of the Earth

Analyze and label the given picture. From the picture, create a general concept on each picture and identify the physical characteristics of the subsystem of the Earth. Differentiate one with the other. Write your answers on a separate sheet of paper.

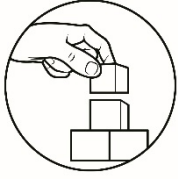


What is It

Subsystems of the Earth

The four subsystems of the Earth are:

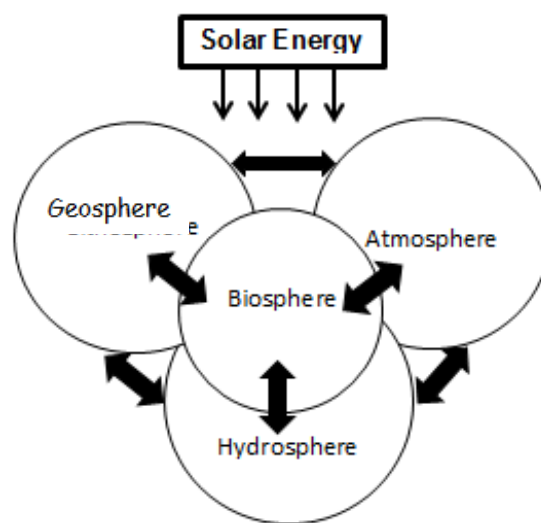
1. Atmosphere – the gaseous layer above the Earth's surface primarily composed of different gases such as nitrogen and oxygen.
2. Biosphere – the zone of the Earth where all forms of life exist. This serves as the ecosystem of all living and non- living organisms.
3. Geosphere – the solid part of the Earth that consists the entire planet from the center of the core to the outer crust. It includes core, mantle, and crust of the Earth.
4. Hydrosphere – the water part of the Earth that includes oceans and glaciers.



What's More

Activity 1.1 We are Connected!

According to John Muir, “When one tugs at a single thing in nature, he finds it attached to the rest of the world.” How is the given diagram related to the said quote? How does the four subsystem of the Earth connect with each other? Write your answer on a separate sheet of paper.



What I Have Learned

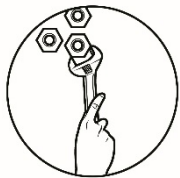
Subsystems of the Earth

The four subsystems of the Earth are:

1. **Atmosphere** – it is the gaseous layer above the Earth’s surface, primarily composed of 78% nitrogen and 21% oxygen. Other gases like argon, carbon dioxide, carbon monoxide, ozone, and other inert gases made the remaining 1%. The atmosphere supports life because animals and oxygen, and plants need both carbon dioxide and oxygen. In addition, the atmosphere supports life indirectly by regulating climate. Air acts as both a blanket and a filter, retaining heat at night and shielding from direct solar radiation during the day.
2. **Biosphere** – the zone of Earth where all forms of life exist: in the sea, on land, and in water. It is sometimes called as the large ecosystem. This is the zone that life inhabits. Biosphere is a very thin layer of the earth’s surface.
3. **Geosphere** – the solid Earth, consisting of the entire planet from the center of the core to the outer crust. It includes the core, mantle, and crust of the Earth.

4. **Hydrosphere** – the water part of the Earth which circulates among oceans, continents, glaciers, and atmosphere. Oceans cover 71% of the Earth and contain 97.5% of its water.

Earth is a complex system made up of many smaller systems through which matter and energy are continuously cycled. Energy and matter flow through Earth’s spheres: geosphere, hydrosphere, atmosphere, and biosphere. Energy flows through the atmosphere mostly by convection. How does matter and energy flow across the four subsystems of the Earth? The Earth consists of four subsystems, across whose boundaries matter and energy flows, the atmosphere (air), biosphere (living things), hydrosphere (water), and geosphere (land). The atmosphere provides the geosphere with heat and energy needed for rock breakdown and erosion. The biosphere receives gases, heat, and sunlight (energy) from the atmosphere. It receives water from the hydrosphere and a living medium from the geosphere.



What I Can Do

The human population has increased rapidly since the 1700’s. For most of human history, there were fewer than half-billion people on Earth. In mid- 2009, 6.7 billion people inhabited our planet. Because of these, extensive pollution is everywhere. As a student, what can you do to save not only a particular system, but the Earth itself? Tabulate your answer on a separate sheet of paper . Copy the template below.

<i>MY ENVIRONMENTAL “TO DO” LIST</i>	
1.	
2.	
3.	
4.	
5.	

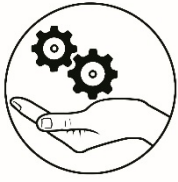


Assessment

Multiple Choice. Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.

1. Earth includes beach grasses, forms of life in the sea, on land, and even in the air. Which term best describes the statement?
 - A. atmosphere
 - B. biosphere
 - C. geosphere
 - D. hydrosphere
2. Which system of the Earth is considered as the largest component of the Earth?
 - A. atmosphere
 - B. biosphere
 - C. geosphere
 - D. hydrosphere
3. Life is supported by oxygen and carbon dioxide. Which subsystem will best describe the statement?
 - A. atmosphere
 - B. biosphere
 - C. geosphere
 - D. hydrosphere
4. Relationship between the complex communities of individual organism is seen in the different systems of the Earth. What do you call the unit in nature?
 - A. ecosystem
 - B. complexity
 - C. ground
 - D. system
5. All of earth's cycles and spheres are interconnected. Why is this so?
 - A. because they are interconnected
 - B. because Earth is where we live in
 - C. because Earth is the only living planet
 - D. because every organism has its own function in the Earth
6. What is an example of a connection between atmosphere and geosphere?
 - A. water
 - B. nitrogen
 - C. mountains
 - D. volcanic eruption release gas
7. Which among the choices is an example of a connection between atmosphere and hydrosphere?
 - A. lakes
 - B. rain
 - C. rivers
 - D. rocks

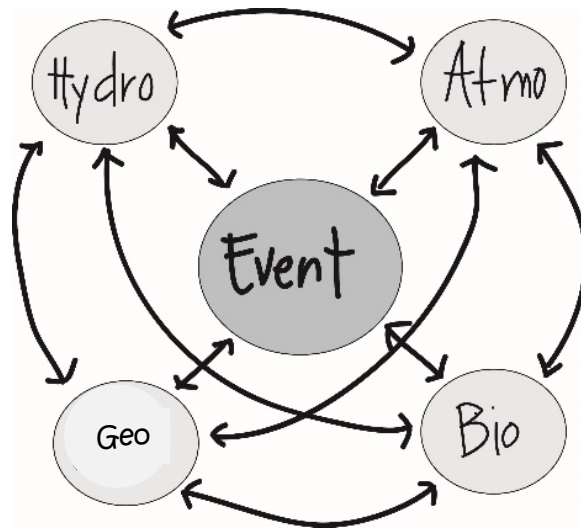
8. From the given choices, which is an example of a connection between biosphere connecting to atmosphere?
 - A. Animals eat plants.
 - B. Animals drink water.
 - C. Animals lie in caves.
 - D. Plants produce oxygen.
9. Among the choices, which clearly gives an example of connection between hydrosphere and geosphere?
 - A. boats transporting goods
 - B. fish swimming in water
 - C. water evaporating to make clouds
 - D. waves eroding rocks on beach
10. All living things, including land and sea made up the Earth. Which term best described the statement?
 - A. geosphere
 - B. ozone layer
 - C. atmosphere
 - D. biosphere
11. When nitrogen is returned to the soil when dead plants decompose is an interaction that occurs in what system?
 - A. biosphere and atmosphere
 - B. geosphere and atmosphere
 - C. biosphere and geosphere
 - D. atmosphere and geosphere
12. Carbon dioxide dissolving from the air into the ocean is an interaction that occurs in which system?
 - A. atmosphere and hydrosphere
 - B. atmosphere and atmosphere
 - C. atmosphere and geosphere
 - D. atmosphere and biosphere
13. The atmosphere of the Earth is composed of ___ oxygen and ____ nitrogen and other gases.
 - A. 0% and 100%
 - B. 21% and 78%
 - C. 78% and 21%
 - D. 50% and 50%
14. A thin layer of solid rock that makes up the outermost part of the Earth is visible to which part of geosphere?
 - A. core
 - B. crust
 - C. mantle
 - D. biosphere
15. Ozone plays an important function in every single organism on Earth. To what sphere does ozone layer belong?
 - A. atmosphere
 - B. biosphere
 - C. geosphere
 - D. hydrosphere



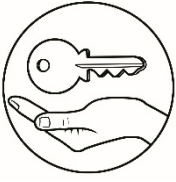
Additional Activities

“Connect Me Spheres”

Procedure: Analyze the interactions of the spheres after the onslaught of Taal Volcano. Answer the questions that follow. Use a separate sheet of paper for your answers.



1. What sphere caused the event?
2. What are the effects of the event on one or more spheres?
3. What is the global implication of the event?



Answer Key

<p style="text-align: center;">Assessment</p> <p>1. B 2. C 3. A 4. A 5. D 6. D 7. B 8. D 9. D 10. D 11. C 12. A 13. B 14. B 15. A</p>	<p style="text-align: center;">What's More</p> <p>The Earth consists of four subsystems, across whose boundaries matter and energy flows, the atmosphere (air), biosphere (living things), hydrosphere (water), and geosphere (land). The atmosphere provides the geosphere with heat and energy needed for rock breakdown and erosion. The biosphere receives gases, heat, and sunlight (energy) from the atmosphere. It receives water from the hydrosphere and a living medium from the geosphere.</p>	<p style="text-align: center;">What I Know</p> <p>1. C 2. B 3. D 4. A 5. A 6. B 7. B 8. B 9. C 10. D 11. D 12. C 13. A 14. C 15. A</p>
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For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph