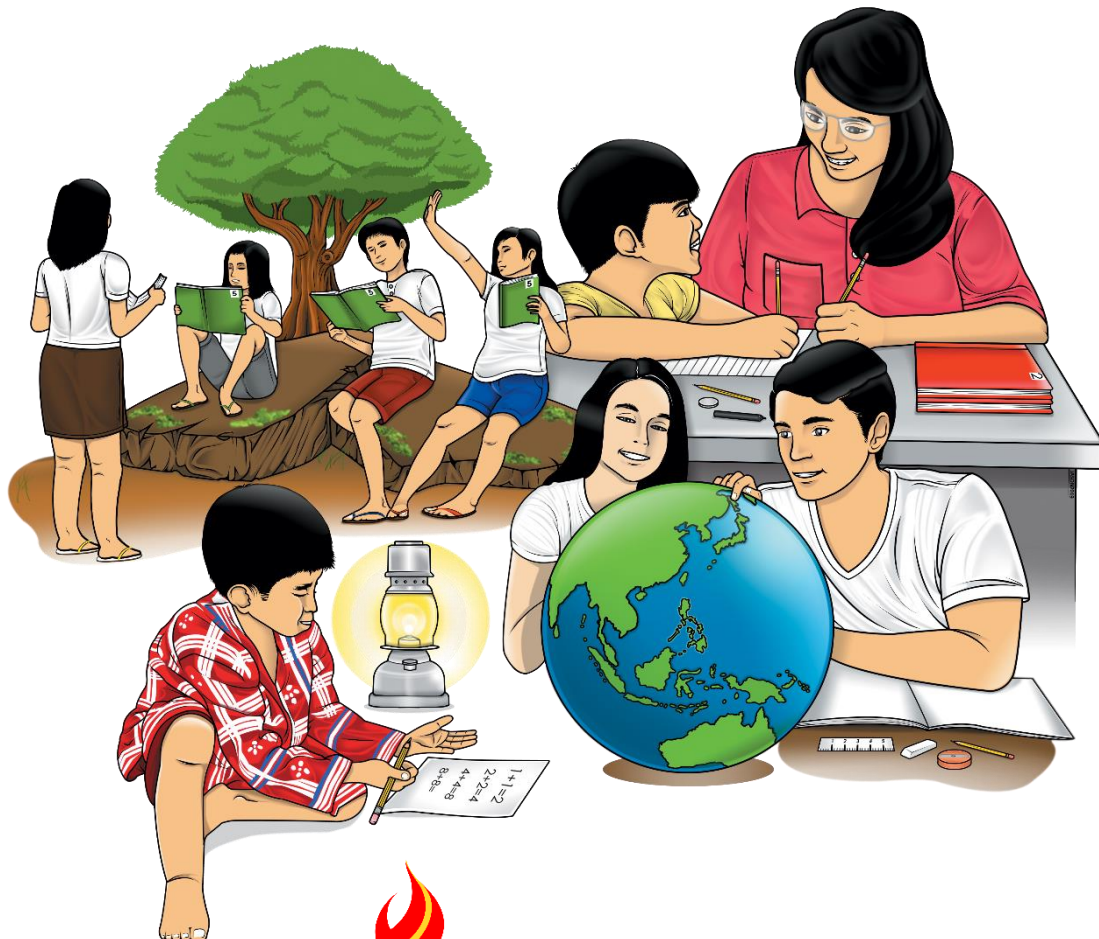


Senior High School

Earth Science for Stem

Quarter 1 – Module 1: Characteristics of Earth that are Necessary to Support Life



Earth Science
Alternative Delivery Mode
Quarter 1 – Module 1: Characteristics of Earth that are Necessary to Support Life
First Edition, 2021

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Earth Science for STEM

Quarter 1 – Module 1:

Characteristics of Earth that are Necessary to Support Life

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 will take you to a journey on how and why Earth is so special. This material was crafted to give you assistance to understand the concepts about the characteristics of the Earth that are necessary to support life. Lessons are bounded on the performance and content standard, learning competencies and level of the learners

After going through this module, you are expected to:

1. identify the different factors necessary to support life in a planet;
2. describe the characteristics of Earth necessary to support life; and
3. explain how each characteristic affect life on Earth



What I Know

Read and analyze the following questions. Write the letter of the best answer on your answer sheet.

1. Why is the ozone layer important to Earth?
 - a. It regulates the weather on Earth.
 - b. It produces enough amount of rain.
 - c. It protects Earth from meteors and asteroids impact.
 - d. It filters harmful UV radiation that reaches the Earth.
2. Plants, animals, and microbes survive and thrive on Earth million years ago because Earth provides essential factors needed for life to exist. Which of the following factors is essential to support life on the planet?
 - a. Liquid water
 - b. Nutrients
 - c. Temperature
 - d. All of the above
3. How does temperature affect the ability of Earth to support life?
 - a. temperature intensifies gravity
 - b. temperature produces nutrients
 - c. temperature protects Earth from radiation
 - d. temperature affects biological and chemical processes
4. Which of the following is not a function of Earth's atmosphere?
 - a. It provides energy.
 - b. It provides significant insulation.
 - c. It protects from harmful radiation.
 - d. It gives protection against small to medium size meteorites.
5. What is a greenhouse gas?
 - a. It is a gas that traps heat.
 - b. It is a gas that releases heat from Earth.
 - c. It is a gas that shields Earth from radiation.
 - d. It is a gas that provides protection from space.
6. Which of the following factors affects a planet's ability to hold atmosphere?
 - a. orbital size
 - b. presence of volcano
 - c. distance from the sun
 - d. presence of liquid water
7. What element composes the ozone layer?
 - a. carbon
 - b. helium
 - c. hydrogen
 - d. oxygen

8. What will happen to Earth if there are no greenhouse gases?
 - a. Earth's temperature will increase.
 - b. Earth's temperature will decrease.
 - c. Earth's temperature will become stable.
 - d. Earth's temperature will not be affected.

9. Ozone layer depletes when combined with CFC. What do you think will the ozone layer completely depleted?
 - a. changes in weather
 - b. solar wind will pass through
 - c. penetration of ultraviolet radiation
 - d. meteors will freely get through the Earth's atmosphere

10. Which of the following statement is **TRUE**?
 - a. Living organisms can harness energy from sun.
 - b. All living organisms cannot survive without sunlight.
 - c. Living organisms cannot harness energy from chemical substances.
 - d. All of the above statements are true.

11. What is the most important factor that determines Earth's temperature?
 - a. size of the orbit
 - b. distance from the sun
 - c. gas in the atmosphere
 - d. amount of water on the planet

12. If Earth is smaller than its size, how will you describe its atmosphere?
 - a. It will have a thinner atmosphere.
 - b. It will have a thicker atmosphere.
 - c. Size will not affect the Earth's atmosphere.
 - d. Both A and B are correct.

13. How do volcanoes support life on Earth?
 - a. It helps in nutrient cycling.
 - b. It produces gas that cools the Earth.
 - c. It provides heat through magma release.
 - d. It changes the topography of the Earth's crust.

14. What will most likely happen if Earth is the first planet from the sun?

I. No atmosphere **II.** No liquid water **III.** No energy present

 - a. I and II
 - b. I and III
 - c. II and III
 - d. I, II and III

15. An astronomer observed an Earth-sized like planet in a distant galaxy. Based on the data, the planet is at the same distance from its star, like Earth to its star - the sun. It is also covered with a thick atmosphere which is composed of carbon dioxide and shows no volcanic activity. What can you infer from these data?
 - a. The Earth-like planet is hot and nutrient cycling occurs.
 - b. The Earth-like planet is cold and nutrient cycling occurs.
 - c. The Earth-like planet is hot and no nutrient cycling occurs.
 - d. The Earth-like planet is cold and no nutrient cycling occurs.

Lesson

1

Characteristics of Earth that are Necessary to Support Life

Earth is the only planet known to cater life forms. This planet underwent massive change in the environment million years ago to enable living organisms to thrive and survive in it. From single simple microorganisms, Earth's environment allowed these organisms to evolve into a more complex and diverse organisms.



What's In

On your answer sheet, list down five important biological factors that you need in order to live. From your list, select the top three most important factors for you. Explain your answer.



Notes to the Teacher

As facilitator kindly asks the learner to share the insights, he/she has gained during his/her exchange or consultation of experiences or ideas with his/her peers.



What's New

Earth's environment is conducive to different life forms. But what are the different characteristics of Earth that enable life to flourish on it? Let us discover the terms you are going to encounter as we go on this lesson.

4 Pics 1 Word is a guessing game which presents four pictures. Guess the specific word that fits the theme of the photos presented. You can use the letters given below as clues for your answer. Write your answer on your answer sheet.

1.

T _ _ P E _ _ T _ _ E

2.

_ _ A _ _ E R

3.

A _ _ M O _ _ P _ _ E _ _ E

4.

_ _ N _ _ R _ _ Y

5.

N _ _ T _ _ I E _ _ _ S



What is It

CHARACTERISTICS OF EARTH NECESSARY TO SUPPORT LIFE

Earth has been existing 4.543 billion years. In its early formation, life was not possible because the environment did not permit it. However, as time went by, life flourished from microorganisms into a more complex organism. The presence of life on Earth was made possible due to the following factors:

1. **Temperature.** It influences how quickly atoms, molecules or organisms move. Low temperature slows down chemical reaction and produces ice that makes liquid water unavailable. High temperature can cause break down of important biological molecules.

In Earth's condition, temperature is just right to support life.

2. **Water.** It is one of the important ingredients in the different biological processes. Absence of this will interfere reactions necessary for life. However, solid form of this will also hinder living organisms to use it.

Water on Earth has different forms. It is solid (ice) in the two poles and liquid along the equator which allows living organisms to consume it.

3. **Atmosphere.** It provides significant insulation or shielding from the sun and impact of small to medium size meteorites. Greenhouse gases like carbon dioxide (CO₂) and methane (CH₄) trap heat and protects our planet from freezing. Moreover, ozone (O₃) layer shields the Earth's surface from harmful UV radiation. Atmosphere also provides chemicals needed for life, such as nitrogen and carbon dioxide.

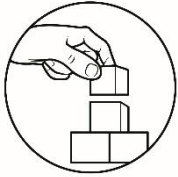
The size of the planet and its distance from the sun affects its ability to hold significant amount of atmosphere. Earth has a right size and distance from the sun that permits it to have a right amount of atmosphere. The presence of gravity also helps in sustaining its atmosphere.

4. **Energy.** Earth has available energy- rich sunlight to support life. Living organisms like plants and photosynthetic bacteria use light as the source of their energy. Some chemosynthetic organisms rely on chemical energy to support various biological processes.

Earth is at right position from the sun that enables it to harness enough amount of sunlight.

5. **Nutrients.** It is an essential factor used to build and maintain organism's body structure. Insufficient or absence of nutrients can impede synthesis of the different biological molecules.

In our planet, there are processes that recycle nutrients. Water, carbon and oxygen, phosphate and nitrogen cycles are some of the examples. Volcanism also helps in cycling the nutrients.



What's More

Write **T** if the statement is correct but if it is false, change the underlined word or group of words to make the whole statement true. Write your answer on your answer sheet.

- _____ 1. Low temperature slows down chemical reactions among living organisms.
- _____ 2. Atmosphere provides chemicals needed for life.
- _____ 3. Gravity does not affect the Earth's atmosphere.
- _____ 4. Water traps heat from the sun.
- _____ 5. Size and distance from the sun affect the planet's ability to hold atmosphere.
- _____ 6. Absence of water interferes reactions necessary for life.
- _____ 7. Earth cannot provide enough amount of sunlight as source of energy of most organisms.
- _____ 8. Insufficient or absence of nutrients can hinder different biological processes.
- _____ 9. Volcanism helps in nutrient recycling.
- _____ 10. Atmosphere protects Earth from small to medium size meteorite impacts.



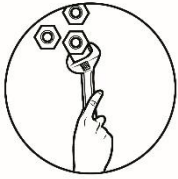
What I Have Learned

A. Complete the table by supplying the needed information on your answer sheet.

Biological Factors	Illustration/ Picture (Draw or cut picture that is related to the biological factor.)	Based on your experience, answer the following questions briefly.
1. Temperature		How does temperature affect the ability of a planet to support life?
2. Water		Why is liquid water important?
3. Atmosphere		What is the role of atmosphere in sustaining life on Earth?
4. Energy		How do living organisms harness energy?
5. Nutrients		How are nutrients recycled on Earth?

B. Complete the table below by supplying the planet's requirement for life to exist. Write this on your answer sheet.

Factor	Planet's Requirement for Life to Exist
1. Temperature	
2. Water	
3. Atmosphere	
4. Energy	
5. Nutrients	



What I Can Do

From the concepts you have learned in this module, how are you going to assess the Earth's condition to support life? Explain your answer on your answer sheet.

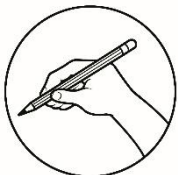
1. Temperature

2. Water

3. Atmosphere

4. Energy

5. Nutrients



Assessment

Multiple Choice. Read and analyze the following questions. Write the letter that best answers each question on your answer sheet.

1. What is the most important factor that determines Earth's temperature?
 - a. Size of the orbit
 - b. Distance from the sun
 - c. Gas in the atmosphere
 - d. Amount of water on the planet
2. Which of the following is not a function of Earth's atmosphere?
 - a. It provides energy.
 - b. It provides significant insulation.
 - c. It protects Earth from harmful radiation.
 - d. It gives protection against small to medium size meteorites

3. Which of the following best describes a greenhouse gas?
 - a. It is a gas that traps heat.
 - b. It is a gas that releases heat from Earth.
 - c. It is a gas that shields Earth from radiation.
 - d. It is a gas that provides protection from space.

4. An astronomer observed an Earth-sized like planet in a distant galaxy. Based on the data, the planet is at the same distance from its star, like Earth to its star-the sun. It is also covered with a thick atmosphere which is composed of carbon dioxide and shows no volcanic activity. What can you infer from these data?
 - a. The Earth-like planet is hot and nutrient cycling occurs.
 - b. The Earth-like planet is cold and nutrient cycling occurs.
 - c. The Earth-like planet is hot and no nutrient cycling occurs.
 - d. The Earth-like planet is cold and no nutrient cycling occurs.

5. How does ozone layer support life on Earth?
 - a. by providing significant insulation
 - b. by providing energy needed by organisms
 - c. by protecting it from the sun's harmful radiation
 - d. by giving protection against small to medium size meteorites

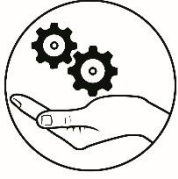
6. If greenhouse gases will increase in Earth's atmosphere, what will happen to its temperature?
 - a. Earth's temperature will increase.
 - b. Earth's temperature will decrease.
 - c. Earth's temperature will become stable.
 - d. Earth's temperature will not be affected.

7. Ozone layer is one of the compositions of Earth's atmosphere. What do you think will happen if the ozone layer completely depletes?
 - a. changes in weather
 - b. solar wind will pass through
 - c. penetration of ultraviolet radiation to Earth's surface
 - d. meteors will freely get through the Earth's atmosphere

8. Which of the following are not a function of Earth's ozone layer?
 - I. It produces enough amount of rain.
 - II. It filters harmful UV radiation that reaches Earth.
 - III. It regulates the weather on Earth.
 - IV. It protects Earth from meteors and asteroids impact.
 - a. I, II and III
 - b. I, II and IV
 - c. I, III and IV
 - d. II, III and IV

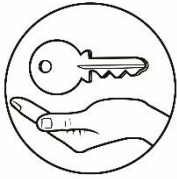
9. Which of the following factors is essential for life to exist?
 - a. Liquid water
 - b. Nutrients

- c. Temperature
 - d. All of the above
10. How does temperature affect the ability of Earth to support life?
- a. Temperature intensifies gravity
 - b. Temperature produces nutrients
 - c. Temperature protects Earth from radiation
 - d. Temperature affects biological and chemical processes
11. Which of the following statement is **TRUE**?
- a. Living organisms can harness energy from the sun.
 - b. All living organisms cannot survive without sunlight.
 - c. Living organisms cannot harness energy from chemical substances.
 - d. All of the above statements are true.
12. Atmosphere plays vital role in planet's ability to support life. Which of the following factors affects a planet's ability to hold atmosphere?
- a. orbital size
 - b. presence of volcano
 - c. distance from the sun
 - d. presence of liquid water
13. Given its current position, if Earth is bigger than its size, how will you describe its atmosphere?
- a. It will have a thinner atmosphere
 - b. It will have a thicker atmosphere
 - c. Size will not affect the Earth's atmosphere
 - d. Both A and B are correct
14. How do volcanoes support life on Earth?
- a. It helps in nutrient cycling.
 - b. It produces gas that cools the Earth.
 - c. It provides heat through magma release.
 - d. It changes the topography of the Earth's crust.
15. What will most likely to happen if Earth is the first planet from the sun?
- I. No atmosphere
 - II. No liquid water
 - III. No energy present
- a. I and II
 - b. I and III
 - c. II and III
 - d. I, II and III



Additional Activities

Design a terrarium or aquarium that explains why Earth can sustain life.



Answer Key

<p>What's More</p> <p>1. T 2. T 3. Does not affect- affects 4. Water-Greenhouse gases/heat from the sun-is important in different biological processes 5. T 6. T 7. cannot provide- can provide 8. T 9. T 10. T</p>	<p>What's New</p> <p>1. Temperature 2. Water 3. Atmosphere 4. Energy 5. Nutrients</p>	<p>What I know</p> <p>1. 1. D 2. 2. D 3. 3. D 4. 4. A 5. 5. A 6. 6. C 7. 7. D 8. 8. B 9. 9. C 10. 10. A 11. 11. C 12. 12. A 13. 13. A 14. 14. A 15. 15. C</p>
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Rubrics for Grading	Excellent 4pts	Very Good 3 pts	Good 2 pts	Poor 1pt.
<p>Biotic features of ecosystem Biotic = living at least 4/5 plans -plant life is thriving based on the environment: watered, light, in the container,</p>				
<p>Ecosystem has at least 4/5 -Rock -Soil -Sand -Charcoal -Coffee Filters -Clear Container</p>				
<p>Care of Terrarium is evident -plants are being watered and groomed if necessary.</p>				
<p>Terrarium Design -plan was well thought out and drawn with a supplies list.</p>				

Source:
<https://www.rcampus.com/rubricshowc.cfm?sp=yes&code=KX79A9>

Assessment

1. 1. C
2. 2. A
3. 3. A
4. 4. C
5. 5. C
6. 6. A
7. 7. C
8. 8. C
9. 9. D
10. 10. D
11. 11. A
12. 12. C
13. 13. B
14. 14. A
15. 15. A

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https://www.lpi.usra.edu/education/explore/our_place/hab_ref_table.pdf

<https://www.rcampus.com/rubricshowc.cfm?sp=yes&code=KX79A95&>

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