

Department of Education  
National Capital Region

**SCHOOLS DIVISION OFFICE  
MARIKINA CITY**

# **Earth & Life Science**

**First Quarter-Module 1**

## **Uniqueness of Earth**

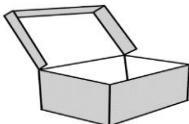


**Evangeline C. Agtarap**



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# **What I Need to Know**

This module was designed and written with you in mind. It is here to help you understand what makes our planet Earth unique from all the other planets. This module permits it to be used in many different learning situations.

The module has one lesson which is **Uniqueness of Earth**.

At the end of the module, you are expected to:

1. describe the characteristics that make Earth unique;
  2. explain how these characteristics enable Earth to support life; and
  3. recognize the uniqueness of Earth, being the only planet in the solar system with properties necessary to support life (S11/12ES-Ia-e- 3).



## What I Know

Read each question carefully and encircle the letter of the correct answer.



5. How do plate tectonics enable Earth to support life?
  - A. It protects Earth from solar flares.
  - B. It helps regulate Earth's temperature.
  - C. It prevents the burning of Earth's surface.
  - D. It protects Earth from meteoroids and asteroids.
6. How does the distance of the planet from the sun affect its ability to support life?
  - A. Planets that are too near to the sun have conditions conducive for life.
  - B. Planets that are too far from the sun have conditions conducive for life.
  - C. A planet should neither be too far, nor too near the sun to be able to support life.
  - D. There is no relationship between a planet's distance from the sun and its ability to support life.
7. Why is the presence of water on Earth so important to life?
  - I. It flows in a natural cycle.
  - II. It is very minimal on Earth's surface.
  - III. Many organisms depend on water for survival.
  - IV. Earth is the only known planet with water in it.

A. I and II	C. I, II, and III
B. III and IV	D. I, III, and IV
8. Why is Earth unique?
  - I. Earth is not located in the habitable zone.
  - II. There are different types of organisms on Earth.
  - III. Earth is the only known planet where life forms exist.
  - IV. The Earth's atmosphere is very conducive to life's existence.

A. I and II	C. I, II, and III
B. III and IV	D. II, III, and IV
9. How does Earth compare with the other planets in the solar system?
  - I. It is protected by its ozone layer.
  - II. It is not too close or too far from the sun.
  - III. It has a strong magnetic field that protects it from solar flares.
  - IV. It has Oxygen and Carbon Dioxide which are not essential to life.

A. I and II	C. I, II, and III
B. III and IV	D. II, III, and IV
10. How does the location of a planet in the solar system affect its characteristics?
  - I. The nearer the planet to the sun, the hotter it is.
  - II. The nearer the planet to the sun, the colder it is.





## Lesson

# Uniqueness of Earth



## What's In

### Activity 1. Planets Word Search Puzzle

In your previous science classes, you have learned that our planet Earth belongs to the solar system: a group of planets and other celestial objects that revolve around the sun. You learned how the planets are positioned according to how far they are from the sun. In the word search puzzle below are the names of the planets. Find them all and arrange your answers from the nearest to the farthest planet from the sun.

G	R	M	H	C	P	O	C	H	Y	R	B	M	N	E
B	H	A	U	F	H	Q	X	Z	A	P	F	I	U	D
Z	N	R	N	E	P	T	U	N	E	R	K	H	L	W
Y	O	S	M	D	A	Y	L	V	T	S	E	Z	I	Q
R	H	P	H	W	U	S	Q	C	U	F	Y	H	S	M
E	X	B	S	G	A	R	H	G	M	J	A	K	E	C
T	S	O	Q	T	J	V	A	S	W	K	Q	Y	M	N
I	V	H	U	B	L	Y	I	N	Y	S	Z	F	R	S
P	L	R	K	J	S	R	S	L	U	H	T	K	H	F
U	N	V	I	P	Z	U	X	Q	B	S	Z	B	T	K
J	R	D	O	N	V	C	B	W	I	W	Y	I	Q	J
U	O	W	P	E	S	R	N	U	K	E	A	R	T	H
X	V	K	N	G	L	E	J	F	W	I	P	S	Z	J
U	C	U	J	A	Y	M	T	I	C	G	R	C	X	U
O	S	N	W	B	P	B	S	X	N	W	L	J	I	P

The planets in the solar system (from the nearest to the farthest from the sun) are: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.





## What's New

### What makes life on Earth possible?

#### Activity 2. Comparing Venus, Earth, and Mars

Below is a list of some information about the three planets Mercury, Venus, and Earth. Examine the information provided in the table below and answer the questions that follow.

(Note: 0.8 M Earth means that the planet has a mass that is 80% the mass of Earth.)

*Table 1. Venus, Earth, and Mars' Fact Sheet*

Characteristic	Venus	Earth	Mars
Planet Mass (MEarth):	0.8 M Earth	1 M Earth	0.1 M Earth
Planet Radius (REarth):	0.95 R Earth	1 R Earth	0.5 R Earth
Distance from Sun (DEarth):	0.7 D Earth	1 D Earth	1.5 D Earth
Average Surface Temperature:	464 °C	15 °C	-65 °C
Atmosphere:	Thick	Medium	Thin

- How will you compare the three planets? Fill in the gaps.
  - (mass) The heaviest planet is \_\_\_\_\_ followed by \_\_\_\_\_ and the lightest is \_\_\_\_\_.
  - (radius) The biggest planet is \_\_\_\_\_ followed by \_\_\_\_\_ and the smallest is \_\_\_\_\_.
  - (distance from the sun) The planet closest to the sun is \_\_\_\_\_, followed by \_\_\_\_\_ and the planet farthest from the sun is \_\_\_\_\_.
  - (average surface temperature) The planet with a very hot temperature is \_\_\_\_\_ and the planet with very cold temperature is \_\_\_\_\_. The planet with temperature not too hot or too cold is \_\_\_\_\_.
  - (atmosphere) The planet with a thick atmosphere is \_\_\_\_\_ and the planet with a thin atmosphere is \_\_\_\_\_. The planet with an atmosphere not too thick or thin is \_\_\_\_\_.
- Based on the information listed on the table, what characteristics do you think allow life to flourish on Earth but not on Venus or Mars? Explain your answer.





# What Is It

## The Uniqueness of Earth

Earth, where we live, is the only planet we know where life exists. Scientists are always on the lookout for planets with characteristics that could possibly support life like Earth. Earth has unique characteristics. These are atmosphere, water, location in the solar system, plate tectonics, magnetism, and life forms.

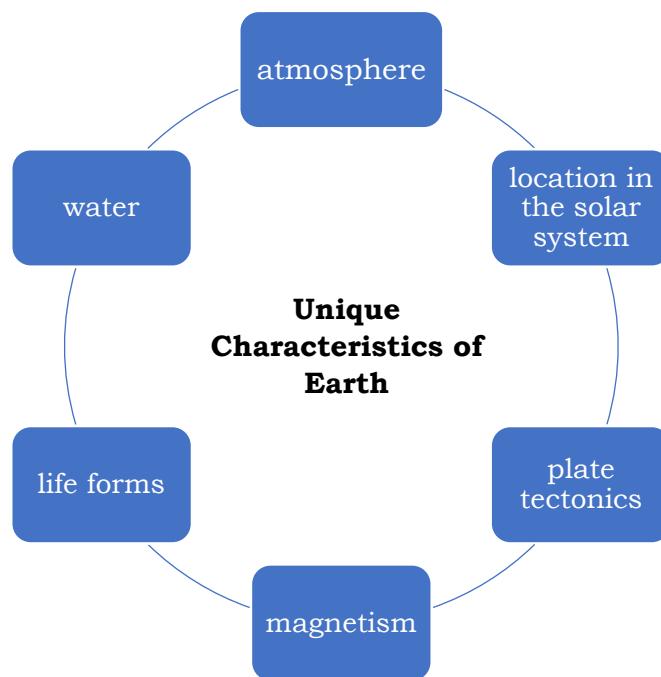
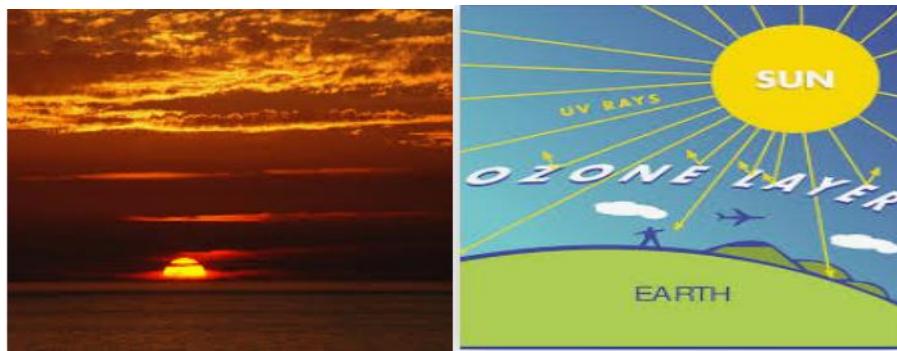


Figure 1. Unique Characteristics of Earth

Earth is unique because of its **atmosphere**. It is the only planet with enough oxygen and carbon dioxide needed by plants, animals, and other living things. Also, Earth's atmosphere has a protective layer called the ozone layer. This layer protects the planet from harmful ultraviolet radiation from the sun. In addition, Earth's atmosphere protects it from the impact of meteoroids and asteroids.



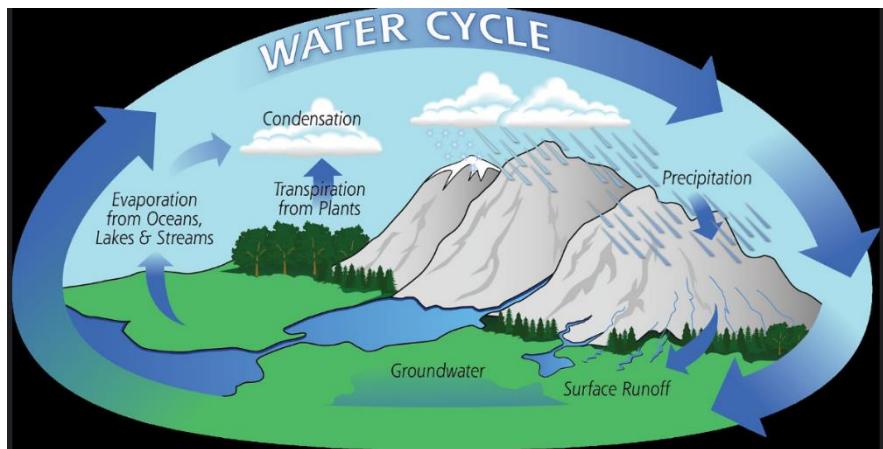


*Figure 2. Earth's Atmosphere*

**Sources:** (From left to right)

- (1) "Sunset". Wikipedia. Accessed August 7, 2020. [https://en.wikipedia.org/wiki/File:Sunset\\_2007-1.jpg](https://en.wikipedia.org/wiki/File:Sunset_2007-1.jpg)
- (2) "Diagram Earth-Sun". Pixabay. Accessed August 7, 2020. <https://pixabay.com/vectors/diagram-earth-sun-atmosphere-layer-29982/>

Another unique thing about Earth is the presence of **water**. Water is essential to life. We all need water for survival. Water is present in solid, liquid, and gaseous phases and flows in a natural cycle called the water cycle. This cycle allows water to be used again and again.



*Figure 3. Water Cycle*

**Source:** "Water Cycle". Flickr. Accessed August 7, 2020. <https://www.flickr.com/photos/atmospheric-infrared-sounder/8265046380>

The **location** of Earth is also unique. It is in the so-called **habitable zone**. The habitable zone is defined as the distance from a central star where liquid water can exist on the planet's surface. Because of Earth's location in the solar system, its physical characteristics make it conducive to life. Earth's temperature is not so high or so low for organisms to thrive. Also, at this temperature, liquid water can exist in abundance.



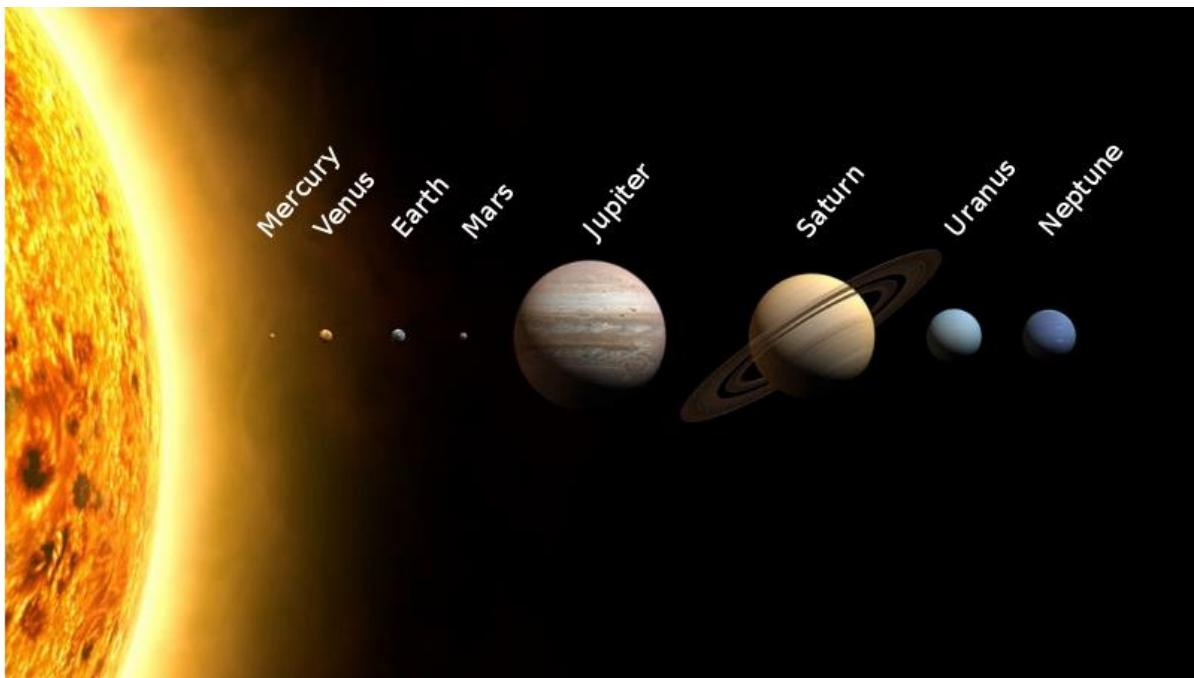


Figure 4. Solar System

**Source:** "Planets". Wikimedia Commons. Accessed August 7, 2020.  
<https://commons.wikimedia.org/wiki/File:Planets2013.svg>

Another unique characteristic of Earth is its **plate tectonics**. Recall that plate tectonics is what allows the formation of landforms like mountains and volcanoes. Scientists believe that the constant movement of plates is important in helping to maintain the planet's temperature.

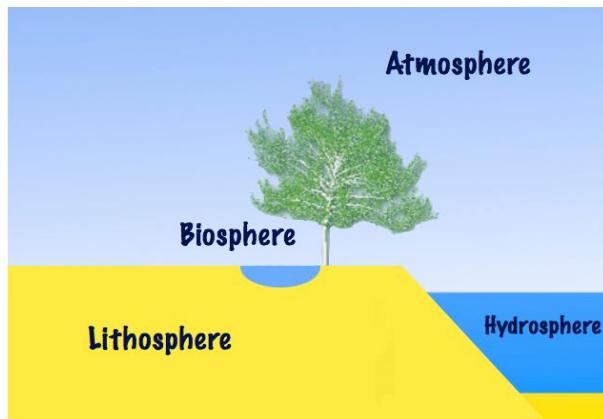


Figure 5. Lithosphere

**Source:** "Atmosphere-Biosphere-Hydrosphere-Lithosphere". Wikimedia Commons. Accessed August 7, 2020. <https://commons.wikimedia.org/wiki/File:Atmosphere-Biosphere-Hydrosphere-Lithosphere.png>

The Earth's **magnetic field** is also unique. Scientists believe that due to the Earth's strong magnetic field, it can protect the planet from solar winds. Without



the magnetic field, solar winds could possibly break the ozone layer and scorch Earth.

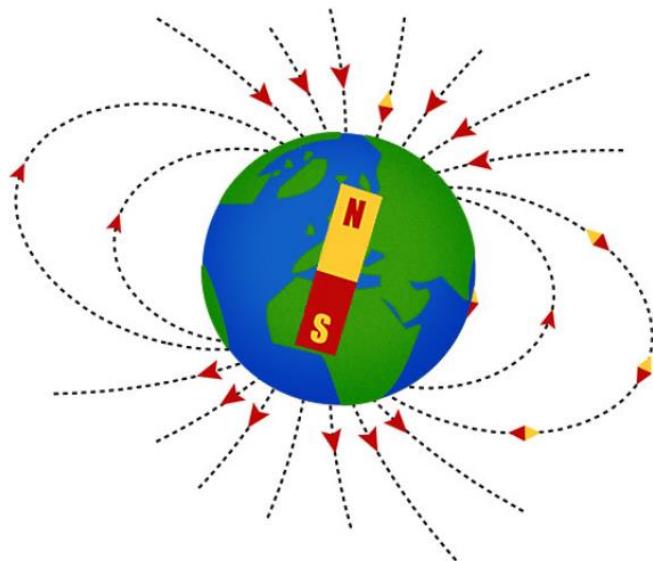


Figure 6. Earth's Magnetic Field

**Source:** "Earth's Magnetic Field". Flickr. Accessed August 7, 2020.  
<https://www.flickr.com/photos/102642344@N02/9859928405>

Of all the characteristics we have mentioned, probably the most unique feature of Earth is its **life forms**. Earth has a variety of life forms. Scientists categorize Earth's life forms into six types: bacteria, archaea, fungi, protists, plants, and animals. Truly, there is no other planet like Earth. We should be good stewards of our home planet.

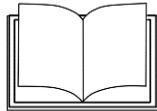


Figure 8: Earth's Life Forms

**Sources:** (From left to right)

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<https://www.flickr.com/photos/rayinmanila/25685444152>
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<https://www.flickr.com/photos/shankaronline/9103402533>





## What's More

### Activity 3. Defining the Habitable Zone

The habitable zone is defined as "the area around a star where liquid water can exist". For a star the size of the sun, the habitable zone has been identified as between 0.95 AU and 1.67 AU or Astronomical Unit. The AU or Astronomical Unit is the average distance between Earth and the sun, which is approximately 149,570,000 kilometers.

In this activity, you will construct a scale model of the solar system and mark the habitable zone. Study the table below.

Table 2: Planets' Distance to Sun

Planet Name	Distance to Sun in km	Distance to Sun in AU
Mercury	57,950,000	
Venus	108,110,000	
Earth	149,570,000	
Mars	227,840,000	
Jupiter	778,140,000	
Saturn	1,427,000,000	
Uranus	2,870,300,000	
Neptune	4,499,900,000	

1. Convert the distances from km to AU for each of the planets in our solar system. Your answers should be up to one decimal place.
2. Construct a scale model of our solar system. Represent the sun with a large circle at one end of the model. Place smaller circles at the correctly scaled distances away from the sun to represent each of the eight planets.
3. Mark the habitable zone on your solar system scale model.





## What I Have Learned

### Activity 4. Characteristics of Earth

Summarize what you have learned by completing the sentences below.



Figure 9: Earth

Earth is unique because of \_\_\_\_\_.  
The most unique characteristic of Earth is \_\_\_\_\_.



### What I Can Do

### Activity 5 Appreciating Our Planet

Considering your new knowledge, what are some ways you can show appreciation to and care for our habitable planet? You can choose to do either an essay or a poem to answer this question. Your output should be written on a clean sheet of paper. Be guided by the following rubric:

Criteria	3 points	2 points	1 point	0 point
Content	Has these elements: easy to understand, expresses appreciation to our planet and identifies ways to care for it	Lacks two elements	Lacks one element	No elements present
Originality and Creativity	The work shows originality and creativity all the	The work shows originality and creativity most	The work shows originality	The work does not show



	time.	of the time.	and creativity sometimes.	originality and creativity.
Neatness	Incredibly neat, with no tears or smudges	Neat, with a few smudges or tears	With several smudges or tears	With many smudges or tears



## Assessment

Read each question carefully and encircle the letter of the correct answer.

1. How will Earth's characteristics change if it moved farther from the sun?
  - A. It would be much colder.
  - B. It would be much hotter.
  - C. It would have water in abundance.
  - D. It would have properties conducive to life.
  
2. How will the habitable zone be affected if the sun grows bigger and hotter?
  - A. It will be nearer the sun then be farther from it.
  - B. It would be farther from the sun.
  - C. It would not be affected at all.
  - D. It would be nearer the sun.
  
3. Suppose Earth does **NOT** have an atmosphere like the one it has now. Which of the following scenario do we expect to happen?
  - I. Vegetation and organisms would survive.
  - II. The earth's temperature would be stable.
  - III. The Earth's surface would burn from sun's radiation.
  - IV. We will be experiencing the impact of meteoroids and asteroids.

A. I and II	C. I, II, and III
B. III and IV	D. I, II, III and IV





8. Why is Earth unique?

- I. Earth is not located in the habitable zone.
  - II. There are different types of organisms on Earth.
  - III. Earth is the only known planet where life forms exist.
  - IV. The Earth's atmosphere is very conducive to life's existence.
- |               |                    |
|---------------|--------------------|
| A. I and II   | C. I, II, and III  |
| B. III and IV | D. II, III, and IV |

9. Why is the presence of water on Earth so important to life?

- I. It flows in a natural cycle.
  - II. It is very minimal on Earth's surface.
  - III. Many organisms depend on water for survival.
  - IV. Earth is the only known planet with water in it.
- |               |                   |
|---------------|-------------------|
| A. I and II   | C. I, II, and III |
| B. III and IV | D. I, III, and IV |

10. How does the distance of the planet from the sun affect its ability to support life?

- A. Planets that are too near the sun have conditions conducive for life.
- B. Planets that are too far from the sun have conditions conducive for life.
- C. A planet should be not too far nor too near the sun to be able to support life.
- D. There is no relationship between a planet's distance from the sun and its ability to support life.

11. How do plate tectonics enable Earth to support life?

- A. It protects it from solar flares.
- B. It helps regulate its temperature.
- C. It prevents the burning of its surface.
- D. It protects it from meteoroids and asteroids.

12. Which of the following element or compound is the **least** important to life?

- |                   |           |
|-------------------|-----------|
| A. Carbon dioxide | C. Oxygen |
| B. Mercury        | D. Water  |

13. How does the magnetic field of Earth enable life to thrive in it?

- A. by allowing nutrients to be recycled
- B. by producing Carbon Dioxide and Oxygen
- C. by protecting it from solar winds of the sun
- D. by providing the right temperature for liquid water to exist

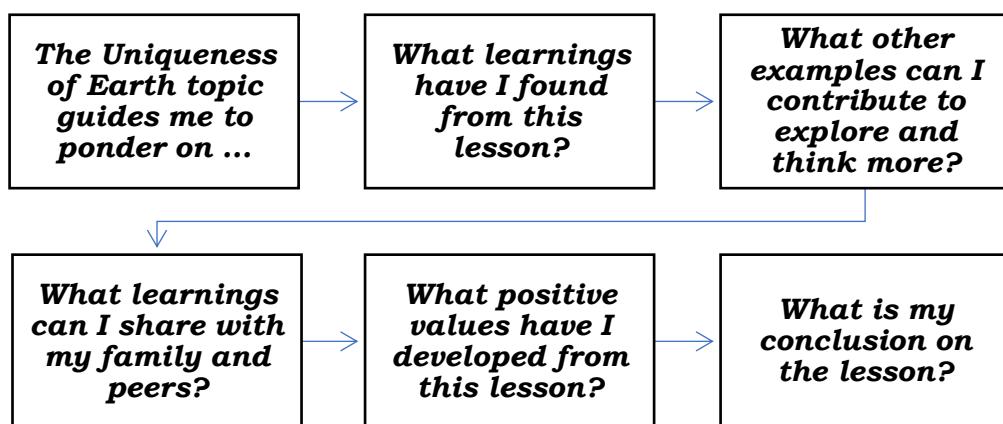


14. How does the presence of the ozone layer contribute to make Earth habitable?
- It makes the water cycle possible.
  - It allows for the recycling of nutrients.
  - It protects Earth from the Earth's internal heat.
  - It protects the planet from ultraviolet rays from the sun.
15. Which of the following is **NOT** a type of life forms on Earth?
- |              |             |
|--------------|-------------|
| A. Archaea   | C. Bacteria |
| B. Asteroids | D. Plants   |



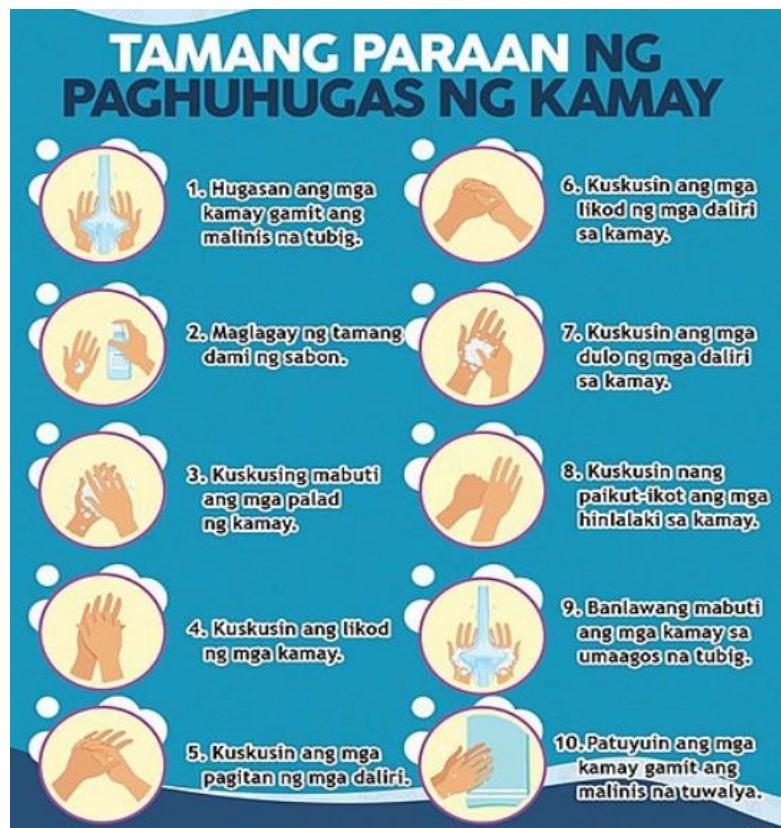
## Additional Activities

I. Write your reflection on the Uniqueness of Earth by answering the questions inside the box. Express your critical and creative thinking skills in your answers. Have fun and enjoy!



II. Suppose you are a historian and you are tasked to educate the future generation about Earth. Your task is to make an infographic about the characteristics that make Earth unique. You want them to appreciate and take care of the planet because it is the only habitable planet we know. The picture on the following page shows an example of an infographic:





**Source:** "Paghuhugas ng Kamay". Wikimedia Commons. Accessed August 7, 2020.  
[https://commons.wikimedia.org/wiki/File:Paghuhugas\\_ng\\_kamay.jpg](https://commons.wikimedia.org/wiki/File:Paghuhugas_ng_kamay.jpg)

It will be evaluated based on the following criteria:

Criterion	3 points	2 points	1 point	0 point
Content	Accurate information on three characteristics that make Earth unique	accurate information on two characteristics that make Earth unique	accurate information on one characteristic that make Earth unique	No information presented
Visual Appeal	Has all these elements: 1. The use of color, design, and space makes the infographic pleasing. 2. shows originality and 3. shows creativity.	has two of the required elements.	has one of the required elements.	Does not have any of the required elements.
Neatness	Incredibly neat, with no tears or smudges	Neat, with a few smudges or tears	With several smudges or tears	With many smudges or tears



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