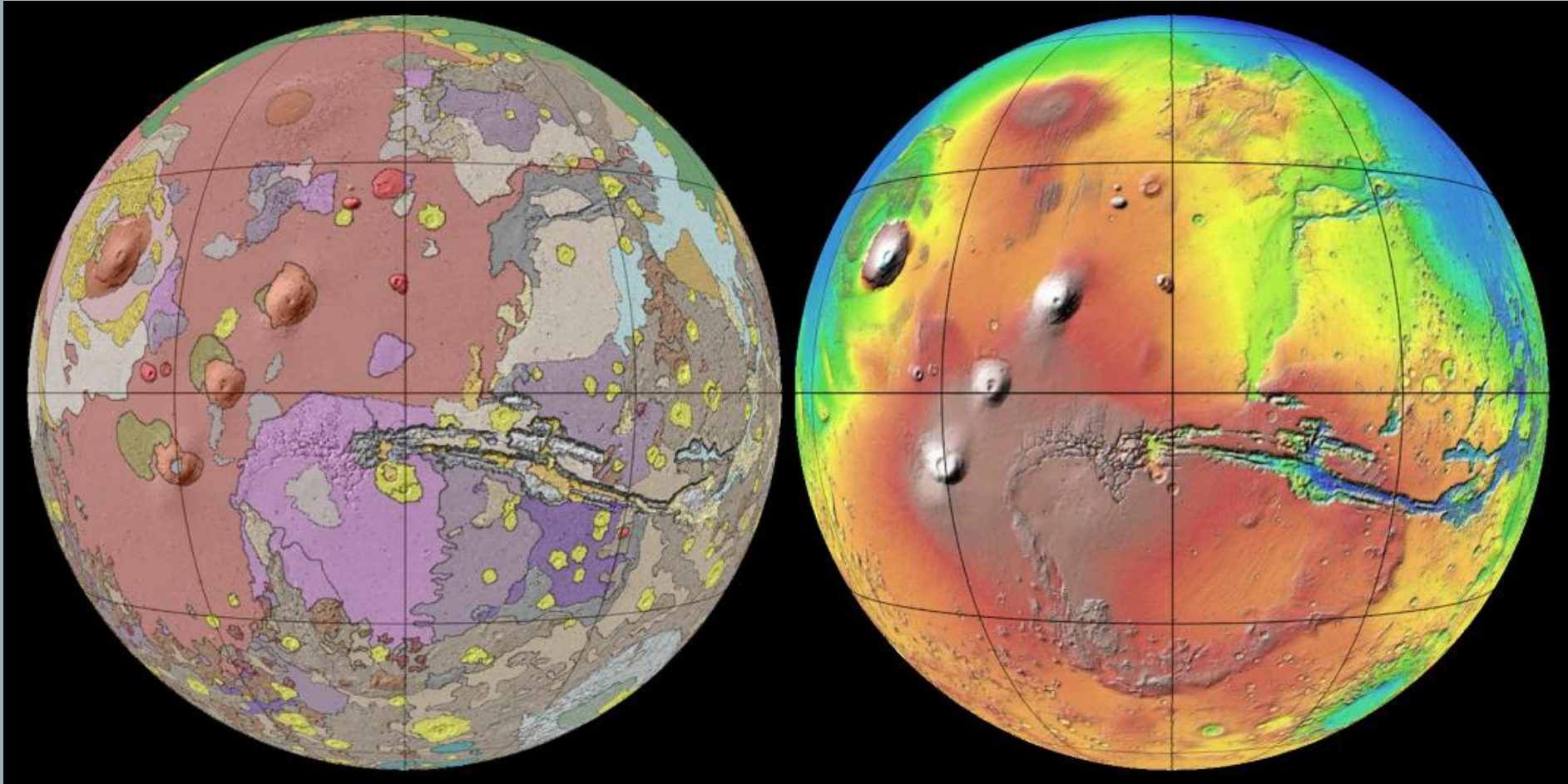


GEOLOGY ON MARS

Unit I - Chapter I-1



The Night Sky



In this unit, you will learn how Earth scientists use what they know about Earth to help them in the search for possible life.



Planetary geologists use their understanding of Earth to guide the search for evidence that other planets could have supported life.



Your work is similar to the work of real scientists that are studying Mars. The data that you will work with is real data that scientists use in their research.



WHAT DOES A PLANET NEED TO SUPPORT LIFE?



- You will help the Universal Space Agency search for evidence that other planets could support life.
- Talk to a partner about what you think a planet would need to support life.

- Be ready to share!



WHAT IS NEEDED TO SUPPORT LIFE?

LIQUID WATER



ENERGY SOURCE



VOCABULARY

Habitable: having the conditions necessary to support life

When a place has the conditions necessary to support life, we say that place is habitable.

WHERE TO VIEW AND ACCESS VOCABULARY

- You will be provided a copy of vocabulary for your folder.
- You can also access vocabulary online...
 - On Quizlet (Go to class website)
 - On Amplify in digital resources

Unit Question

How can we search for evidence that other planets were once habitable?

The Unit Question refers to evidence that planets were *once* habitable.

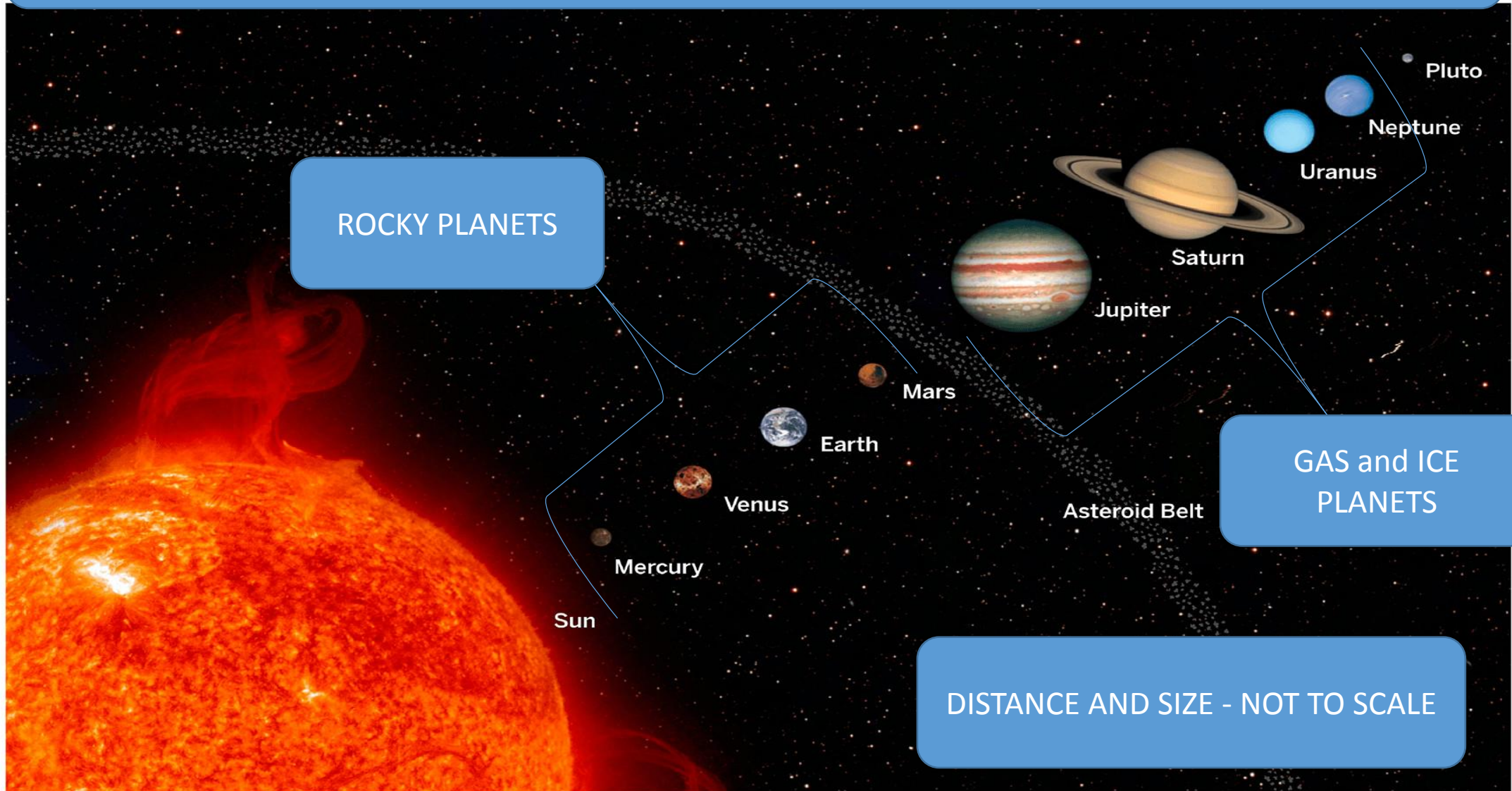
Scientists are interested in evidence that a planet that is not habitable now could have been habitable in the past.

VOCABULARY

Rocky Planet: any planet with a solid surface, such as Earth or Mars



Since Earth is a planet that supports life, scientists have focused on nearby planets to see if they also have the conditions needed for life, or if they might have supported life in the past.

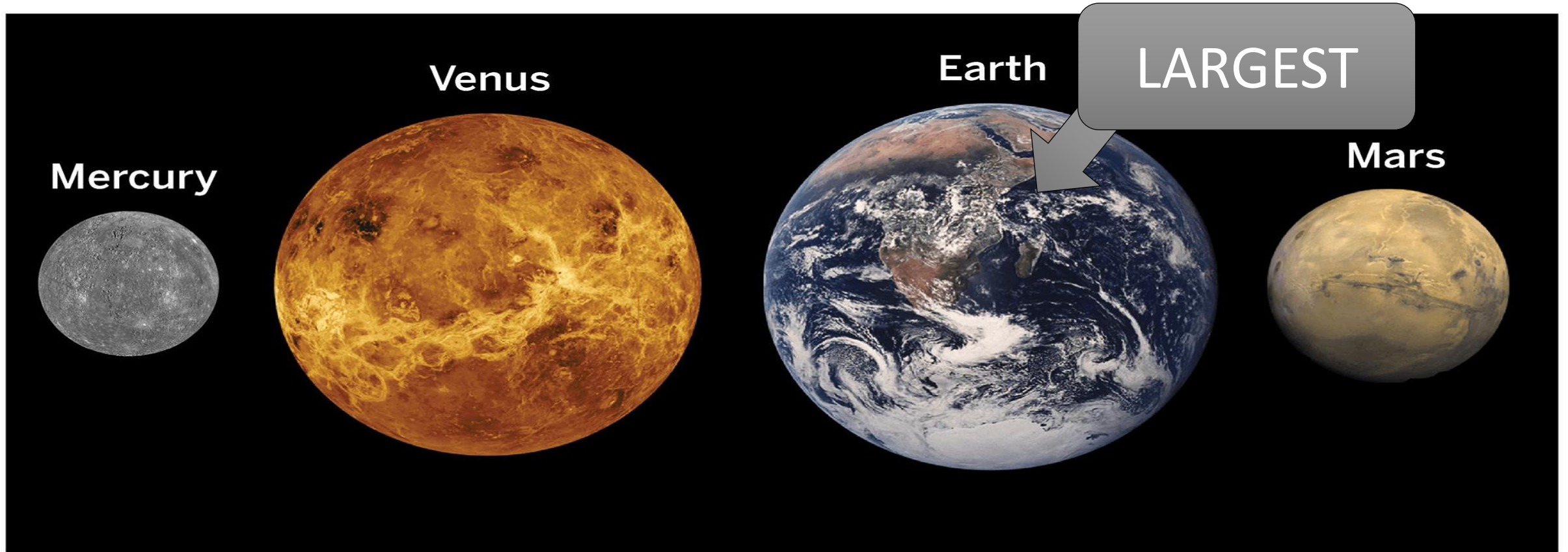


ROCKY PLANETS

GAS and ICE PLANETS

DISTANCE AND SIZE - NOT TO SCALE

COMPARING THE ROCKY PLANETS



Mercury

Venus

Earth

LARGEST

Mars

CLOSE TO THE SUN

MADE OF SOLID ROCK

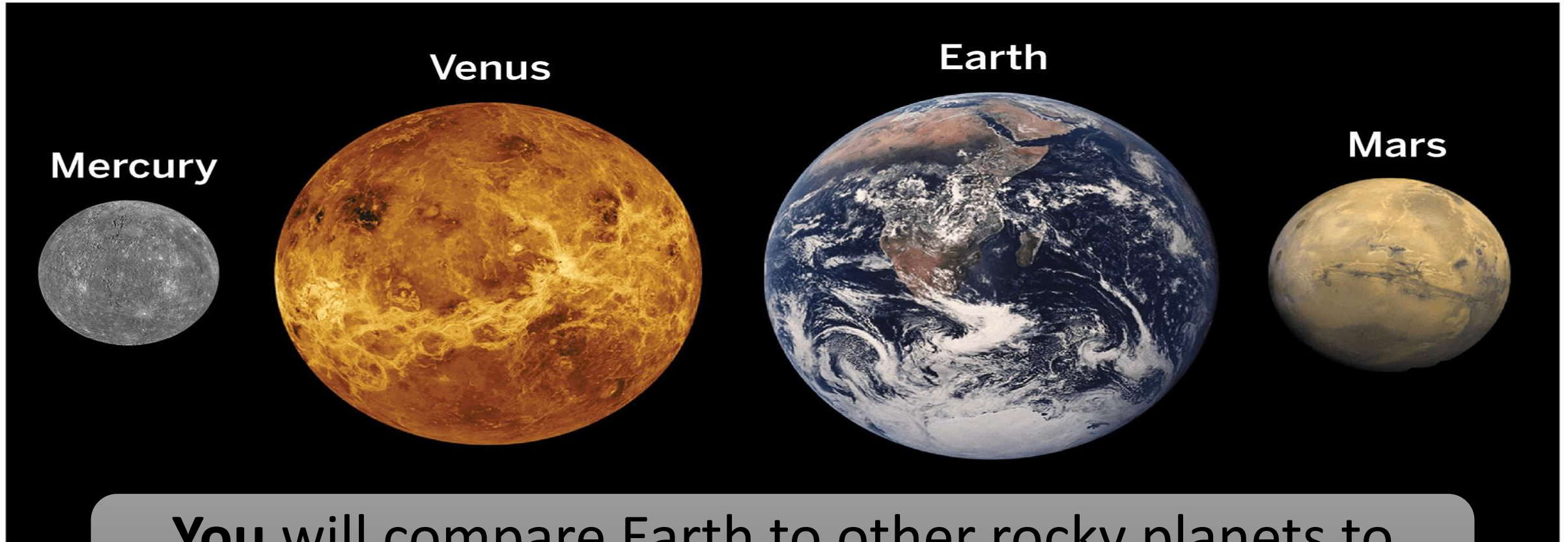
INVESTIGATION QUESTION

How does our understanding of Earth help us learn about other rocky planets?

Planetary Geologists use their knowledge of Earth to learn about other rocky planets because of the similarities they have.

You will learn about this process over the next few days.

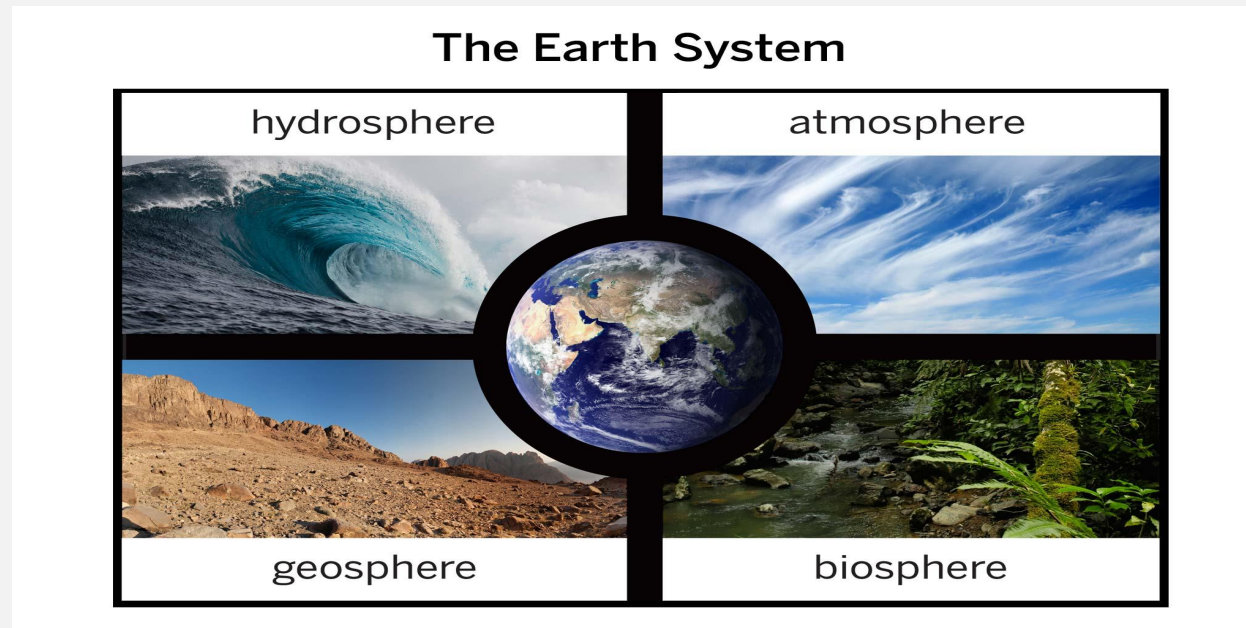
The Four Rocky Planets



You will compare Earth to other rocky planets to identify similarities and differences.

VOCABULARY

System: a set of interacting parts forming a complex whole



The Earth system is made of several parts called spheres.

hydrosphere



atmosphere



geosphere



biosphere

FOUR SPHERE'S

HYDROSPHERE

all the liquid water and ice
on a planet.

ATMOSPHERE

mixture of gases
surrounding a planet.



GEOSPHERE

solid part of a rocky
planet.

BIOSPHERE

all the living things on a
planet.

They try to determine whether other planets might also have a biosphere.

hydrosphere



atmosphere

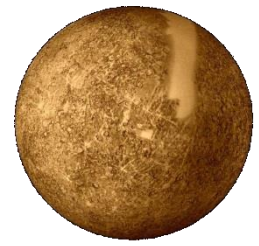


geosphere

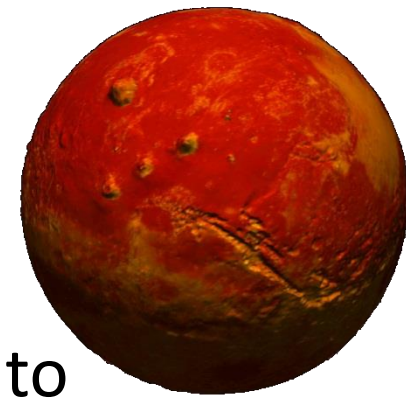


biosphere



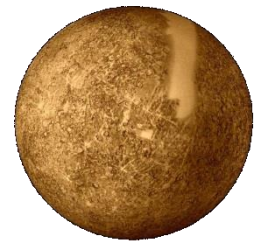


Comparing Rocky Planets activity.



- You need to determine which planet or planets are good places to search for evidence of current or past habitability.
- We already know that the rocky planets are more similar to Earth than other planets within our solar system and planets outside of our solar system.
- This activity will help you compare Earth to the other rocky planets so we can learn more about where to search for evidence of habitability.





Comparing Rocky Planets activity.

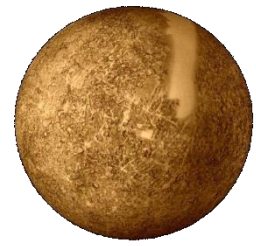


Each student in a group of four will examine one sphere for all four rocky planets.

Quickly decide who will be examining each sphere (geosphere, biosphere, atmosphere, and hydrosphere) in your group.

If sitting in a group of 5, two students will work on the same sphere.





Comparing Rocky Planets activity.



1. View Student Screens to see where to enter information.
2. When prompted - Move to your designated Investigation Tables and work with a partner to become experts on your sphere.
 - Tables 1-2: Atmosphere
 - Tables 3-4: Hydrosphere
 - Tables 5-6: Geosphere
 - Tables 7-8: Biosphere

With a partner, make comparisons between planets' spheres to find out which rocky planets are the most similar and the most different from Earth.

You will individually record your comparisons –
Take good notes.

Return to your table to share what you learned
about your sphere.



Atmosphere of Earth



RETURN TO YOUR TABLE

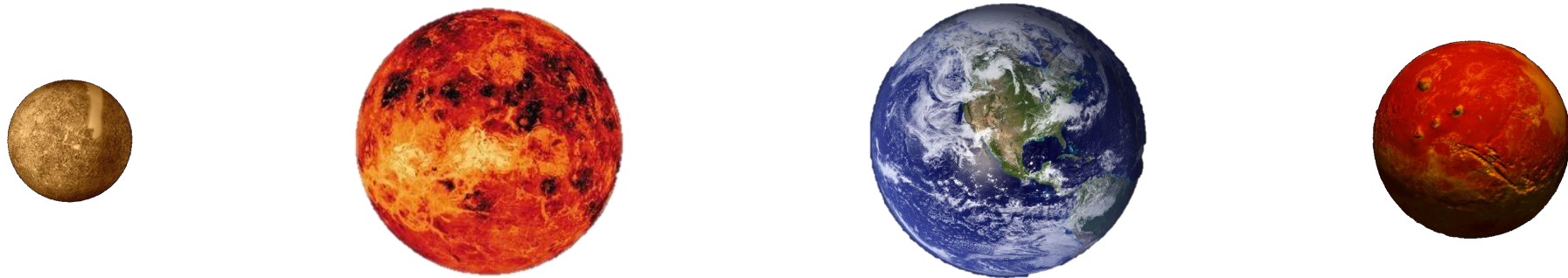
1. Begin sharing the information you learned.
2. Listen and take notes for each planet.

By sharing your notes and ideas with one another, you will begin to see how the four rocky planets compare overall.

Earth's atmosphere is made of a mixture of gases, mainly nitrogen and oxygen, but also small amounts of other gases, including carbon dioxide. Earth's atmosphere keeps its rocky surface warm, but not too hot.

Share your table's similarities and differences, or findings that came up during group discussion

- The atmospheres of Earth and Venus both have carbon dioxide;
- Earth is the only planet with a biosphere.



It may have seemed like the other rocky planets in our solar system were very different from Earth.

It is clear that some spheres on Mercury, Venus, and Mars are similar to the same sphere on Earth.

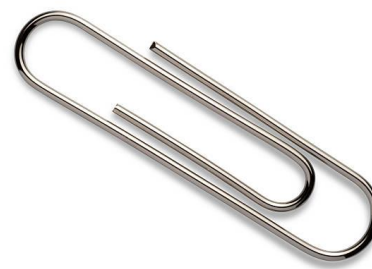
MARS

Earth and Mars have similar geospheres;

- There is evidence that volcanoes once erupted on Mars.
- Mars also has frozen water at its poles, which makes it the only other rocky planet to have water (other than Earth).

These similarities suggest that Mars could be the best rocky planet in our solar system to search for evidence of life.





Clip your cards back together.

MEET A PLANETARY GEOLOGIST

- You already have some idea of what planetary geologists do.
- You will hear from a real planetary geologist who is using what she knows about Earth to learn about Mars.
- This will help you better understand your role as student planetary geologists and how what you are doing in this unit is similar to what real scientists do.

DR. LAUREN EDGAR – PLANETARY GEOLOGIST

Dr. Lauren Edgar is a real scientist.

- In this video, you will meet Dr. Lauren Edgar.
- Just like her, you will get to analyze real data collected by NASA.



"Meet a Planetary Geologist"

WHAT TWO THINGS ARE NECESSARY
FOR HABITABILITY?

LIQUID WATER



ENERGY SOURCE



A PLANETS SYSTEM IS CONSTANTLY CHANGING

Scientists are looking for evidence of past habitability.

Scientists have looked and have not found bodies of liquid water, it's not likely that Mars is habitable right now.

Just because Mars doesn't have bodies of liquid water now, doesn't mean it didn't in the past.

A planet's system is constantly changing.

DR. LAUREN EDGAR – PLANETARY GEOLOGIST

- Investigation Question:
 - *How does our understanding of Earth help us learn about other rocky planets?*
- You will now watch the video again, paying careful attention to how Dr. Edgar uses what she knows about Earth to learn about Mars.



"Meet a Planetary Geologist"

PARTNER: PAIR-SHARE

- Turn to a partner to discuss how Dr. Edgar uses what she knows about Earth to learn about Mars.
- Earth supports many types of life, so we can study how life exists on Earth in order to understand how life could possibly exist on other planets.



"Meet a Planetary Geologist"

What questions do you have about the video, Mars, or your role as student planetary geologists.

TRACKING NEW IDEAS ON THE CLASSROOM WALL

This is where we will keep track of our questions, ideas, and vocabulary during this unit.

You can refer to this area to remember some of the new things we are learning.

DISCUSS THE UNIT QUESTION

You might already have some ideas about the Unit Question.

Share how comparing Earth with other rocky planets helped you learn about how scientists search for evidence that other planets were once habitable.

Remember your comparisons of the rocky planets and the similarities between Earth and Mars.

We were able to narrow our focus to Mars as a good place to search for evidence of past habitability.

Unit Question - This is the question you will try to answer throughout the unit.

How can we search for evidence that other planets were once habitable?

Scientists who study the rocky planets, including geologists, often compare the spheres of other rocky planets to those of Earth—the rocky planet that we know the best.



Key Concept

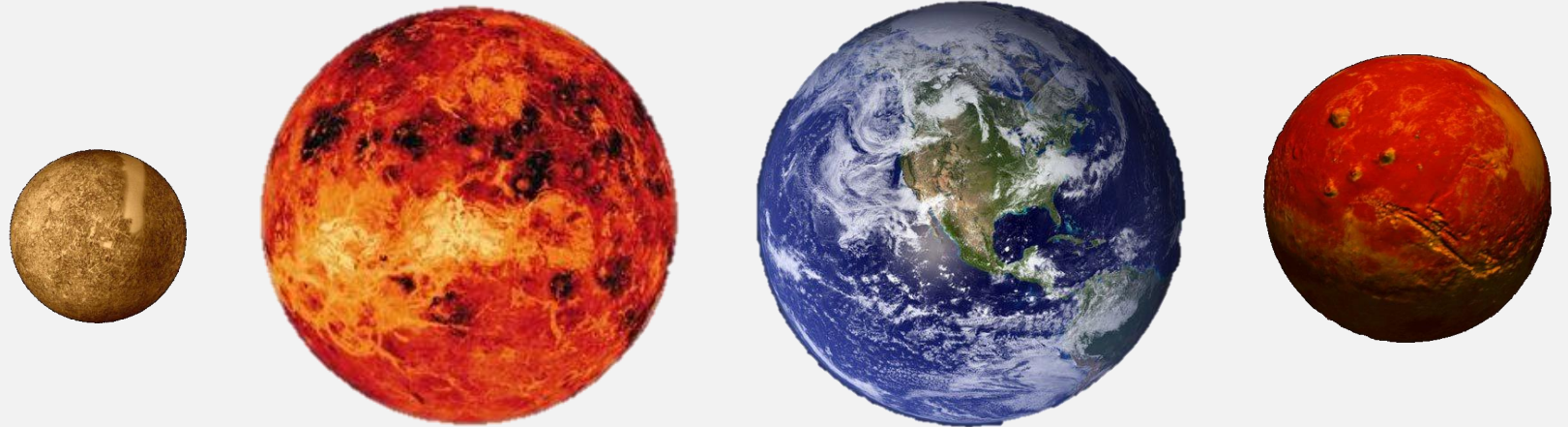


Earth, Mars, and other rocky planets can be thought of as systems. These systems are made up of interacting spheres that can include the geosphere, atmosphere, hydrosphere, and biosphere.

VOCABULARY

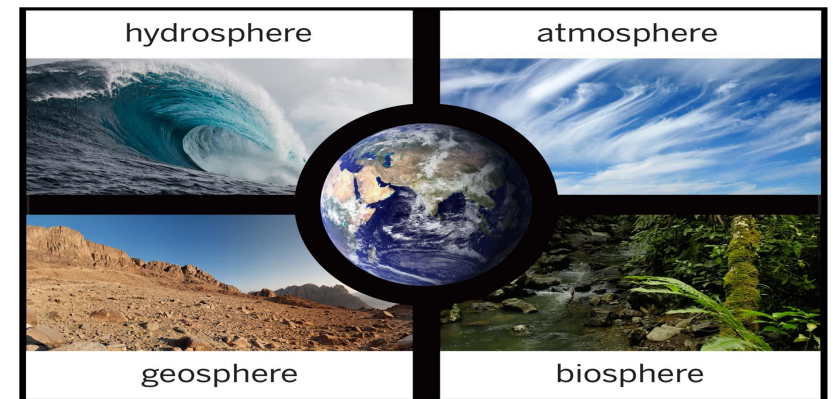
Vocabulary

- *habitable,*
- *rocky planet,* and
- *system*

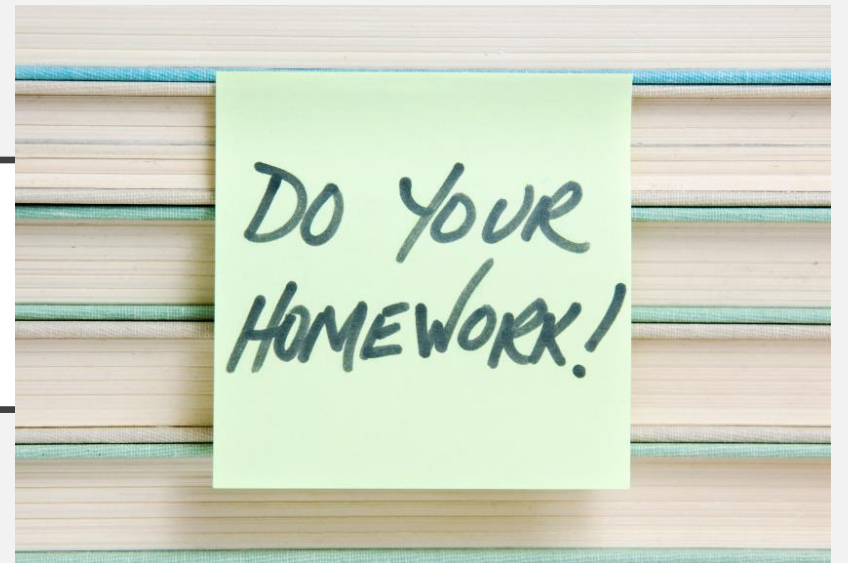


The vocabulary list on the wall serves as a reminder of these words, you will continue to use throughout the unit.

The Earth System



HOMEWORK



1.1.5: (Activity 5).

Record your ideas about what signs of habitability to look for on Mars.

You will also read an article about scale in the solar system.