Lesson 32: Activity 2 – Interplanetary Weather

Time: 2 Class Periods

Teacher Overview: This activity invites students to think about what the needs are to colonize on Mars. Students study temperature data for the Moon, Earth, and planets and make a connection between a planet's distance from the Sun and its temperature before determining whether other places than Earth in the solar system can support life.

***Objective*:**

- Students will explore the necessary elements critical to support life on the Moon and Mars.
- Students will observe and analyze real-time temperatures and apply that data.

***Problem*:** NASA Explorers are determining what is necessary to create a colony to sustain life on the moon and Mars.

- *What must be considered the most important elements to sustain life*?

Part One – Colonization:

List what you think are the four most important needs of man when entertaining the possibility of the colonizing or living on the Moon or Mars.

1. _____
2. _____
3. _____
4. _____

Discuss the students' responses to the above list.

Ask:

- Is weather important to man's survival?
- What are the key factors in weather to make it possible for humans to survive?

Part Two - Exploring Temperatures:

Study the following mean, minimum, and maximum temperatures.

Mean Planetary Surface Temperature

Earth	59 °F
Moon	-9 °F
Mars	-76 °F

Minimum Surface Temperature

Earth	-128 °F
Moon	-233 °F
Mars	-170 °F

Maximum Surface Temperature

Earth	136 °F
Moon	212 °F
Mars	17 °F

Fill in the following table.

	Minimum Temperature	**Maximum Temperature**	**Difference**
Mars			
Moon			
Earth			

4. Using the **Latest State Temperature Observations** on the WDLC website, what is the **mean** temperature in your state this morning? (Use the temperature in the city closest to you and four other cities in your state to arrive at the mean.)

5. Contrast the **mean** temperature in your state right now with the overall **mean** temperature on the Moon. Which is higher? How much higher?

6. Contrast the **mean** temperature in your state with the overall **mean** temperature on Mars. Which is higher? How much higher?

7. Analyze the following table. Look at the various planets and the Moon, their distance from the sun, and mean surface temperatures.

Teacher Tip: Students may notice the high temperature of Venus compared to Mercury. Tell students the atmosphere of Venus is thick. Its gases absorb heat more efficiently than Mercury. The reason Jupiter's mean temperature seems high is because its atmosphere has gases that can absorb and hold onto heat, unlike other planets.

Planet	Distance from the Sun	Mean Surface Temperature (°F)	Diameter (in miles)
Mercury	36 million miles	332	3032
Venus	67 million miles	854	7521
Earth	93 million miles	59	7926
Mars	142 million miles	-81	4222
Jupiter	484 million miles	64	88846
Saturn	887 million miles	-218	74898
Uranus	1.78 billion miles	-333	31763
Neptune	2.8 billion miles	-328	34504
Pluto	3.7 billion miles	-356	1485
The moon	93 million miles	225 (day) - 252 (night)	2154

7. (*…continued*)

a. Do you have any questions about the information given?
b. Is Earth closer to Sun or Mars?
c. Is Earth closer to Venus or Mars?
d. How much farther from the Sun is Earth than Mercury?
e. How much father from the Sun is Jupiter than Earth?
f. List the planets in order of size from the largest to the smallest.
g. How much bigger is the diameter of Earth than that of Moon?
h. How much bigger is the diameter of Earth than that of Mars?
i. Can you draw any conclusions about the relationship between the distance from the Sun and the mean surface temperatures of the planets?

8. **Further Investigation** (*Optional*). Use the WDLC website to research similarities and differences between 'the moon and Earth' and 'Mars and Earth'. On large paper, create two VENN Diagrams: *Moon-Earth* and *Mars-Earth.* This will help support your conclusion in ***Part Three*** below.

Part Three:

Think about what you have learned from these temperature analyses. Now think about what you think are man's vital needs from Part One? Write a paragraph on whether you think life could be supported on Mars and/or the Moon. Give reasons to support your conclusion.