

## Activity 2.2 Patterns of the Moon Teacher Notes

### Introduction

When you think of the sky at night, what do you imagine? Do you picture the moon? What does it look like?

The moon is Earth's nearest neighbor in space. The moon has tall mountains, flowing lava, and many craters. The moon is the brightest object in the night sky. Early humans used the moon for lighting. They also decided when to plant and harvest crops based on the moon's position in the sky.

In this activity students will learn how we see the moon even though it does not produce its own light. Students will also observe and document patterns of the moon.

### Equipment

- Launch Log
- *The Sun is My Favorite Star*, by Frank Asch
- iPad® tablets
- iPad Apps:
  - Moon Globe by Midnight Martian app
  - Canvas by Instructure
- Optional iPad Apps:
  - Educreations™
  - Popplet Lite
  - Stage™
- Paper binoculars, 1 per student
- Aluminum foil
- Inflatable ball
- Flashlight
- Tacky Glue
- Yellow and blue crayons, colored pencils, or markers

### Procedure

#### Part 1 – Setting the Stage (Optional)

1. Before students begin to research the moon, the teacher reads *The Sun is My Favorite Star*, by Frank Asch, to the class. The following questions can be used to guide a discussion:
  - a. What did you notice about the position of the Sun in the illustrations?  
(Show examples of the Sun in the first scene and how it seems to move across the sky throughout the book. Relate the changes to their recording of the Sun's position at different times of the day in Activity 2.1)
  - b. In the book the author says:

*The sun is my favorite star.  
 Sometimes it plays hide-and-peek with me.  
 Sometimes it goes away...  
 ...and brings me back a big bouquet.*

Does the Sun really go away? What is the author describing? (Guide the students to understand that clouds and/or rain can keep us from seeing the Sun, but it is still there.)

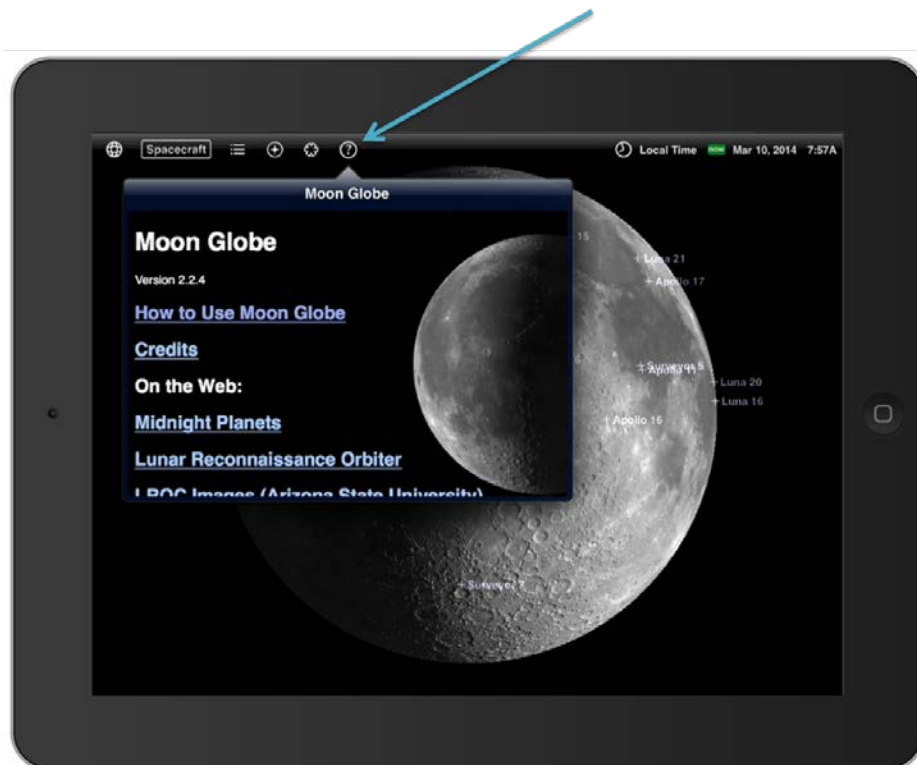
- c. The author also states, “Even in the night, it sends some light to keep me company.” What do you think this means? How can we see light from the Sun at night?
2. Use the inference of the moon reflecting the Sun’s light to set the stage for Part 2.

**Part 2 – Exploring the Moon**

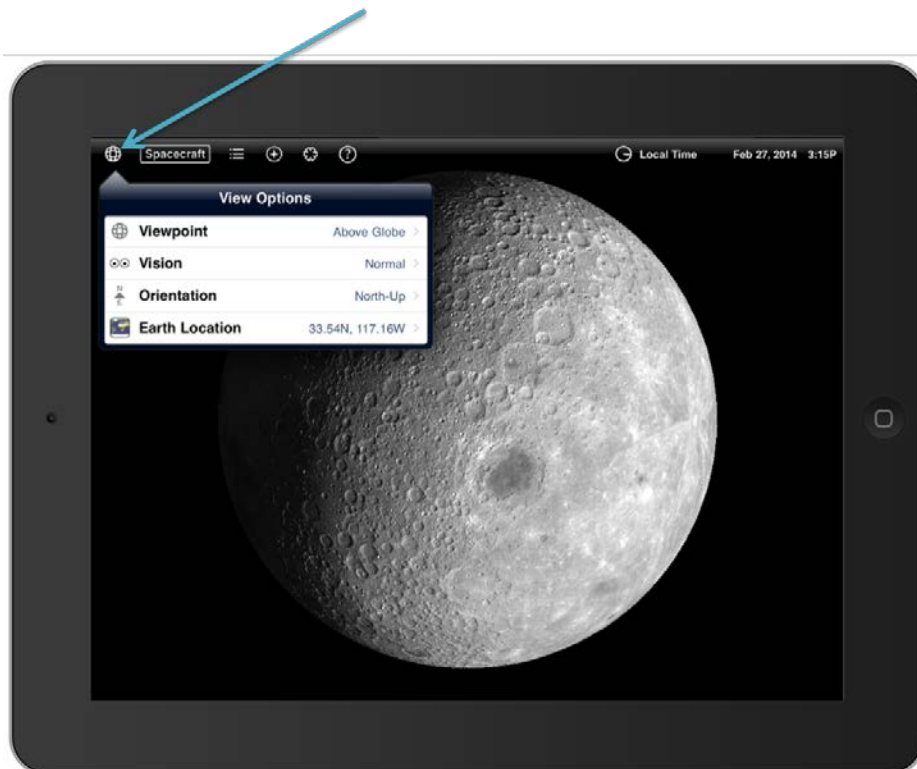
3. Before students begin to research the moon, the class will consider what they already know about the moon as well as what they would like to learn. Options for completing the K-W-L chart include paper/pencil or tablet applications, including the Educreations™, Popplet Lite, or Stage™ apps.
4. The teacher will guide the students to complete the following task:
  - As a class, create a K-W-L chart like the one shown below using the Educreations app, the Popplet Lite app, the Stage app, or a piece of chart paper.
  - Discuss and record the students’ knowledge of the moon in the “**K**” section of the K-W-L chart.
  - Talk with the students about what they want to learn about the moon and record ideas in the “**W**” section of the K-W-L chart.
  - At the conclusion of Activity 2.2, the students will have a chance to record what they learned in the “**L**” section of the K-W-L chart.

<b>K</b>	<b>W</b>	<b>L</b>
<b>What We Know</b>	<b>What We Want to Know</b>	<b>What We Learned</b>

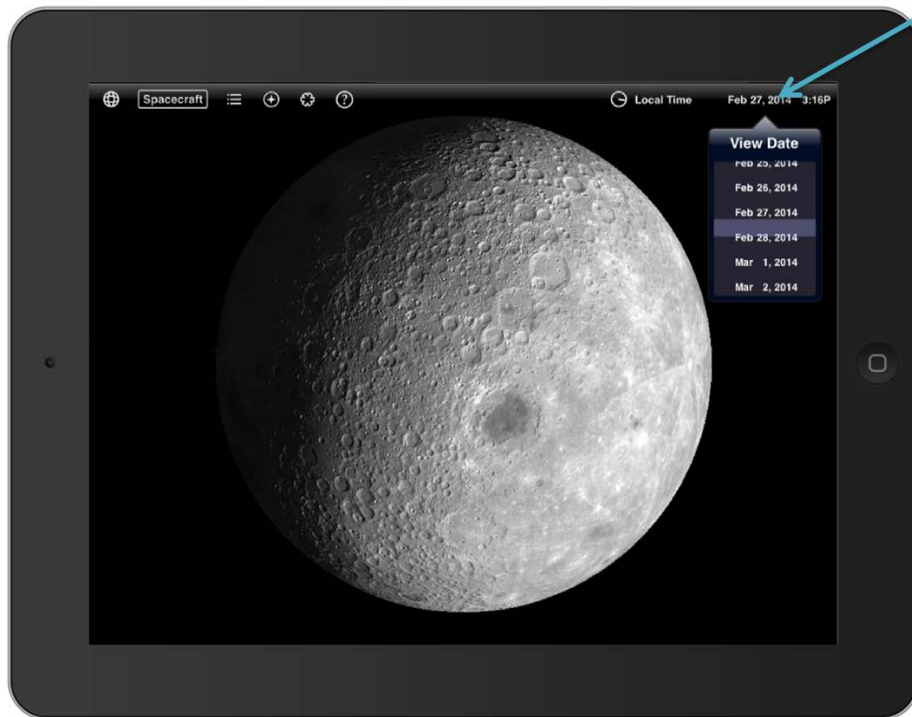
5. After the class creates the KWL chart, the students spend time exploring the surface of the moon with the Moon Globe app on their tablets. Prior to using the Moon Globe app with students, the teacher should read through the section titled *How to Use Moon Globe*. This can be accessed by tapping the question mark icon at the top of the app as shown below.



6. Two important settings to be aware of are View Options and View Date.
7. View Options may be selected by choosing the globe icon at the top left and choosing “Above Globe” as the setting. This will allow students to zoom in and out as well as rotate the moon.



8. View Date may be selected by tapping the date shown in the upper right corner and scrolling through the dates to view different phases of the moon.



9. Allow students to explore the moon for a period of 10 to 15 minutes while asking questions and prompting students to discuss their observations. As students zoom out and rotate the moon, they will be able to observe both the Sun and Earth in the background.

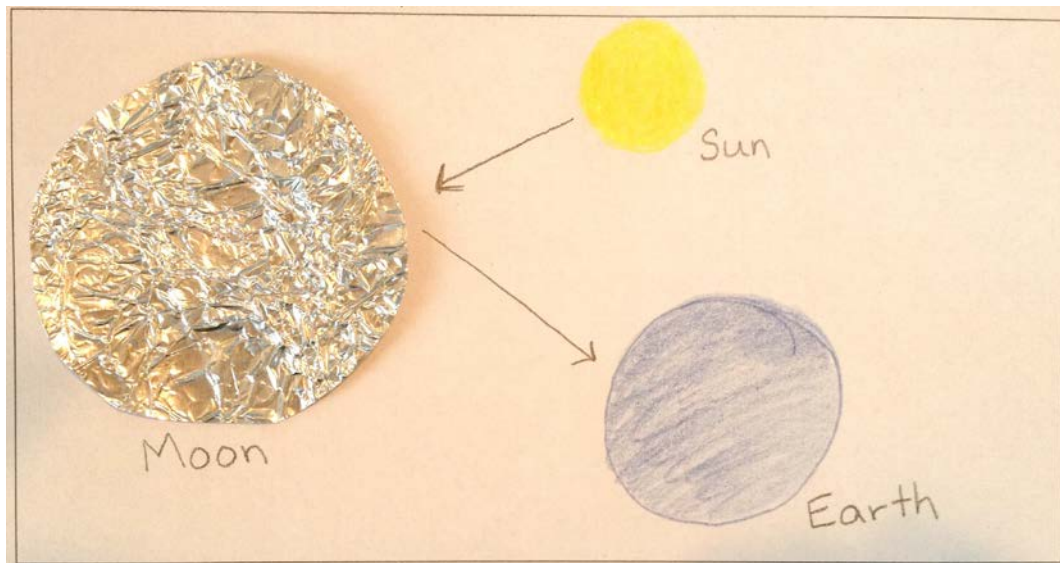
## Part 2 – Reflecting the Sun’s Light

10. Guide students to Activity 2.2 in the Canvas app and have them open and view the 4 minute video entitled “Moon.” Alternatively, the video may be shown to the entire class instead of on the tablets. The video will only play through a tablet, to play for the class the teacher will project the video from the tablet.
11. After the students have watched the video, discuss different features of the moon, such as surface features and the effect of the moon on the ocean tides.
12. Lead the students in a class demonstration similar to the one in the beginning of the video by following the instructions below. This demonstration requires a soft foam ball, aluminum foil, and a flashlight.
  - a. Cover a foam ball with aluminum foil. This will represent the moon.
  - b. Darken the classroom as much as possible.
  - c. Ask a student volunteer to hold the ball away from his or her body. The student represents the Earth. The student should hold the ball slightly above their head to allow the light to hit the ball.
  - d. Shine the flashlight at the ball. This represents the Sun. Have the student turn slowly in a circle and view the different phases of the moon. When the ball is between the flashlight and the student, the view is a new moon.

Here on Earth, the new moon would appear mostly dark. When the moon is on the opposite side of the student from the flashlight, it represents the full moon.

13. Use the following questions to guide a discussion around the moon.
  - a. Does the moon create its own light?  
*No, it reflects light from the Sun.*
  - b. How do you know?  
*The phases of the moon show how much Sun is being reflected. If the moon created its own light, it would look like a full moon all the time.*
14. Guide the students in creating a diagram like the one shown by following the steps below.
  - a. Distribute a sheet of aluminum foil to each student. The sheet should be at least 4 inches square.
  - b. Ask students to crumple and then smooth out their foil. Advise them not to tear the foil.
  - c. Have the students trace a circle using the bottom of a water bottle or other object and then cut out their moon.
  - d. Glue or tape the moon in place in the Launch Log.
  - e. Ask students to draw a yellow Sun and a blue Earth.
  - f. Have students draw two arrows to show how light from the Sun reflects off the moon and then back to the Earth.

Example:



### Part 3 – Observing the Moon

15. The teacher will need to determine the most appropriate viewing dates for students to complete Part 3 – Observing the Moon. Specific information may be found on the document entitled “LS.2.2 Phases of the Moon.”

16. The teacher provides each student with a pair of paper binoculars and requests that the students observe the moon in the evening or night sky and draw what they see.
17. After the students have observed the moon, the teacher will project the moon Globe app on the projector and lead a discussion on what the students were able to observe. Students may wish to describe whether they observed anything different from what is shown on the app. They may also wish to compare their observations with those of another student.
18. The teacher will guide the students to describe the features they were able to see, including light and dark regions of the moon. The teacher will determine how much of the following detail to provide to students during the discussion.
  - The light regions of the moon are called terrae or highlands because they are typically higher regions created by volcanic eruptions.
  - The dark regions of the moon are called maria, which is Latin for “seas,” because early astronomers thought they were filled with water.
  - Craters can also be viewed through binoculars and the naked eye and are formed when asteroids and comets collide with the surface of the moon.
19. After the discussion the class reviews the KWL chart from Part 1 and completes the last column. Students record information they learn through the course of the activity.
20. The students complete the following sentence in their Launch Logs:

Light from the **Sun** reflects off the **moon** and into our eyes.

## **Conclusion Question for Discussion**

1. How can we see the moon if it does not make its own light?